Chapter 4

BENEFIT-COST ANALYSIS

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Chapter 4

BENEFIT-COST ANALYSIS

4.1 APPROACH

FAR Part 161 requires an analysis to determine if there is "a reasonable chance that expected benefits [of the proposed noise or access restriction] will equal or exceed expected cost."* According to the regulation, an example of this kind of analysis may be "…comparative economic analyses of the costs and benefits of the proposed restriction and aircraft and non-aircraft alternative measures." This section presents the analysis of the costs and benefits that are reasonably expected to result from the implementation of the proposed full curfew and the two less restrictive curfews.

Benefit-cost analysis is an evaluation technique used to aid decision-making. It is a systematic method of comparing the costs and economic benefits of a project or policy. Where possible, the costs and benefits occurring from the project are monetized. Where costs and benefits will occur in different time periods, the stream of all costs and benefits is discounted to net present value for comparison. Of course, many publicly sponsored projects and policy decisions may produce benefits and costs that are not easily monetized. In these situations, the benefit-cost analysis should discuss as best as possible the nature and magnitude of the benefits and costs that are hard to quantify or not monetizable.

The purpose of benefit-cost analysis is to estimate the net effect of a project or policy on overall public welfare. Thus, certain localized impacts of a project or policy are excluded from the analysis because they represent transfers from one entity to another rather than a change in overall public welfare. An example relevant to the present study is the impact of the full curfew on local property taxes. If a full curfew is implemented, it is anticipated that some aircraft operators will move their base of operations from Bob Hope Airport to another airport, say, Van Nuys. In that event, the City of Burbank would lose the property taxes on the based aircraft, but Los Angeles would gain those taxes. This would merely be a transfer of the taxes from one entity to another rather than a net increase in public welfare, income, or economic growth.

The basic approach of this analysis is to establish the current noise situation, forecast the future noise situation based on airport demand forecasts, and to project the effects of the alternative curfews on airport activity and noise exposure. The restrictive activity forecasts provide the basis for the estimate of costs. The noise analyses provide the basis for the estimate of benefits. The costs are largely borne by air carriers, passengers, cargo airlines, and general aviation operators. The greatest share of monetary benefits would accrue to the FAA and the Airport Authority, through savings in acoustical treatment program expenditures. Residential property

*F.A.R. Part 161, Subpart D, 161.305.

owners would also realize monetary benefits through increases in property values. Non-monetized benefits in the form of noise reduction are realized by local residents.

4.1.1 2003 Draft Analysis and FAA Comments

The Airport Authority's consultants prepared a draft benefit-cost analysis in 2003, which they submitted to the FAA for review and comment.* The FAA responded in 2004 with several suggestions, three of which related to the benefit-cost analysis.**

- The calculation of benefits should be confined to the 65 CNEL contour.
- The method used to estimate noise-induced awakenings was unacceptable.
- Rather than trying to place a value on awakenings, per se, consideration should be given to developing a cost by affected resident.

4.1.2 Refinements to Address FAA's 2004 Comments

The refined approach to the benefit-cost analysis, described in this chapter, addressed the FAA's guidance in the following ways:

- The area within which the benefits of the curfew were monetized was limited to an area based on the 65 CNEL contour, adjusted to include whole blocks and to follow neighborhood boundaries.
- The state of scientific research into aircraft noise-induced awakenings was comprehensively reviewed and a leading authority in the field joined the consultant team. A refined methodology for estimating awakenings was developed and used.

One other change was made that was not addressed by the FAA. In the initial benefit-cost analysis, the benefits of deferring acoustical treatment of homes inside the Airport Authority's program eligibility area that would be outside of the updated noise contour based on implementation of a curfew were computed. Based on Federal policies at that time, those homes would have become lower priorities for FAA funding and would have received funding much later than otherwise. This deferral would have freed the Federal funds and Airport matching funds for other purposes during the deferral period. The difference in the net present value of the original program versus the deferred program were computed and taken as benefits of a curfew.

*Evaluation of a Curfew at Burbank-Glendale-Pasadena Airport, Draft, Landrum & Brown and SH&E, October 7, 2003.

**See Appendix H, Letter from Victoria L. Catlett, Federal Aviation Administration, APP-600, to Max A. Wolfe, Landrum & Brown, May 19, 2004.

The Airport Authority is now managing its program to provide treatment only within the most recent 65 CNEL contour, subject to adjustments that include whole blocks and that follow street and neighborhood boundaries. Thus, by reducing the size of the 65 CNEL contour, a mandatory curfew would also reduce the size of the treatment program boundary. This, in turn, would reduce the financial obligation of the Airport Authority to provide treatment in the future. This could be counted as a monetized benefit of the curfew. Thus, the updated benefit-cost analysis considers the savings attributable to the reduction in the size of the treatment program boundary as a benefit of the curfew.

In August of 2007, the Airport Authority's consultant produced a preliminary draft benefit-cost analysis that was reviewed by the Airport Authority. Summary results of the analysis were also discussed with the FAA. That analysis reflected the computation of savings to the acoustical treatment program based on a program area limited to the 65 CNEL contour itself. In that initial analysis, only the departure curfew showed net benefits and a benefit-cost ratio exceeding 1.0.

The consultant and Airport Authority staff reviewed and refined the analysis by adjusting the projected boundaries of the acoustical treatment program in each forecast 2015 scenario (unrestricted, full curfew, departure curfew, and noise-based curfew) to reflect its current policy and FAA funding eligibility guidelines. Specifically, the treatment area boundaries were adjusted to follow streets and natural neighborhood boundaries to achieve a more equitable set of boundaries from the viewpoint of local residents. The analysis described in this chapter reflects these revisions. Based on the revisions, all three curfews produce net benefits. The departure curfew has the highest benefit-cost ratio. The noise-based curfew has the next highest, followed closely by the full curfew.

4.1.3 Revisions to BCA in Draft Part 161 Application

During the official comment period on the Draft FAR Part 161 Application, many commenters expressed concerns about various aspects of the benefit-cost analysis. In consideration of several comments, and after a comprehensive review of the benefit-cost analysis, the following revisions have been made.

- Adjustments to Costs
  - Increased employee attrition costs for general aviation operators who move to other airports. Increased employee commuting costs by adding the value of additional commuting time. (See Table 4-5.)
  - Corrected an error in the computation of general aviation staging and repositioning operations between Bob Hope Airport and Van Nuys. Added costs for the value of GA passenger time, pilot time, use of personal cars by GA passengers. The corrections and additions resulted in a net decrease in costs associated picking up and dropping off GA passengers at other airports. (See Table 4-7.)

  - Increased employee attrition costs for Ameriflight and increased employee commuting costs by adding the value of additional commuting time. (See Section 4.6.2.1.)

  - Corrected costs for trucking by major cargo operators. Average hourly operating costs for trucks were overstated in the original BCA, but travel time to ground sort facilities was understated. The corrections resulted in an increase in ground transportation costs for major cargo carriers. (See Table 4-9.)

- Adjustments to Sensitivity Tests

  - The original BCA included a sensitivity test to consider the effect of a lower estimate of acoustical treatment costs for multi-family dwellings, but it did not include a narrative description of the analysis. The narrative has now been included (Section 4.9.6).

- Other Revisions

  - A new section has been added to discuss benefits and costs that are hard to quantify or monetize (Section 4.7).

  - Additional explanations have been added to clarify sources of various unit costs.

4.1.4 Relationship to Standard FAA BCA Guidance

This benefit-cost analysis has been prepared in accordance with guidelines and criteria contained in *FAA Airport Benefit-Cost Analysis Guidance* (FAA BCA Guidance), dated December 15, 1999. The organization of this chapter differs somewhat from a standard FAA project-related BCA. For example, the following steps have already been described elsewhere and for that reason are not reiterated here:

- Project Objectives – See Chapter 1, Introduction.

- Forecasts of future airport operations – See Technical Report 1, Aviation Demand Forecasts, for the full analysis.

Similarly, the standard convention of fully developing a Base Case is not followed here. The Base Case scenario in this study would be continued operation of the Airport as it is today (without an FAA-approved curfew), with the correlating forecasted changes in passenger enplanements and operations.

4.2 ALTERNATIVES

The proposed alternatives are described in Chapter 3. The alternatives analyzed in this section are the full curfew, departure curfew and noise-based curfew.

4.3 EVALUATION PERIOD

The evaluation period for this study is 2008 through 2015. For the purposes of the benefit-cost analysis, the alternatives were assumed to be implemented in 2008. Benefit-cost analyses for large infrastructure projects typically use 20-year evaluation periods, based on the presumed useful life of the project. As a policy action, the proposed curfew would have an indefinite "useful life." The essential requirement of benefit-cost analysis is that benefits and costs be evaluated over equivalent evaluation periods.* Given the dynamic nature of the primary components of the costs and benefits - airline activity, acoustical treatment costs, and real estate values – this was determined to be a prudent evaluation period.

4.4 SUMMARY OF UNRESTRICTED AND RESTRICTED FORECASTS

Airport activity is projected to increase throughout the forecast period, as documented in Technical Report 1, Aviation Demand Forecasts. This is forecasted to cause an increase in noise exposure through the forecast period, as described in Appendix B, Aircraft Noise Analysis. As summarized in Section 1.3 in Chapter 1, Introduction, (and in Section 1 of Technical Report 1) the two years of airport operations since the forecasts were produced support this forecast trend.

With implementation of a curfew, the forecast increase in operations will be reduced somewhat. Significantly, the nighttime operations would be substantially reduced, producing a large reduction in the size of the CNEL noise contours. Accordingly, the noise exposure forecasts for 2008 and 2015 show much smaller noise contours than would occur without the curfew. The area exposed to noise would be 34% smaller in 2008 and 36% smaller in 2015 with implementation of the full curfew. The amount of contour area reduction would be approximately 10 percentage points less with the departure curfew and the noise-based curfew.

4.5 BENEFITS

The fundamental benefit of the proposed curfew is the reduction of nighttime noise in neighborhoods in the Airport environs. The largest monetary component of this benefit accrues to the Federal government in projected savings in the Airport's residential acoustical treatment program. Local residents residing inside the 65 CNEL contour receive the next largest monetary benefit in the form of increased property values. They also receive non-monetized benefits related to the reduction in nighttime awakenings and disruptions due to aircraft noise.

*FAA Airport Benefit-Cost Analysis Guidance, Office of Aviation Policy and Plans, 1999, p. 7.

4.5.1 Savings in Residential Acoustical Treatment

This analysis assesses the savings in acoustical treatment costs through 2015 attributable to the three curfews. The analysis involved the following steps:

- Develop a projected acoustical treatment program boundary for the year 2015, assuming no additional operating restrictions at the Airport.
- Count the untreated dwellings within the projected treatment boundary but that are outside the current treatment program boundary.*
- Estimate the total cost of treating all dwellings in the projected program boundary.

These steps were repeated for the three curfews. The difference in the net present value of costs between the baseline, unrestricted case and each of the three curfews was then calculated to estimate the savings in the treatment program with each curfew.

In the absence of any curfew, the 2015 baseline contour would be the basis for the acoustical treatment eligibility area. In keeping with past Airport Authority policy and FAA guidance**, the specific program boundaries would be adjusted to follow streets and neighborhood boundaries in order to assure equity in the affected neighborhoods. Figure 4-1 shows the boundaries of the projected 2015 acoustical treatment area, based on the 2015 baseline (unrestricted) 65 CNEL noise contour.*** The figure also shows the current treatment area boundary, which is based on the 3rd quarter 2007 noise contour developed through the Airport's quarterly noise measurement reporting process.

If a curfew is adopted, the 2015 noise contours would be smaller than the baseline contours. Consequently, the acoustical treatment eligibility boundary would be reduced to match the smaller 65 CNEL contour, resulting in a need for the treatment of fewer homes.

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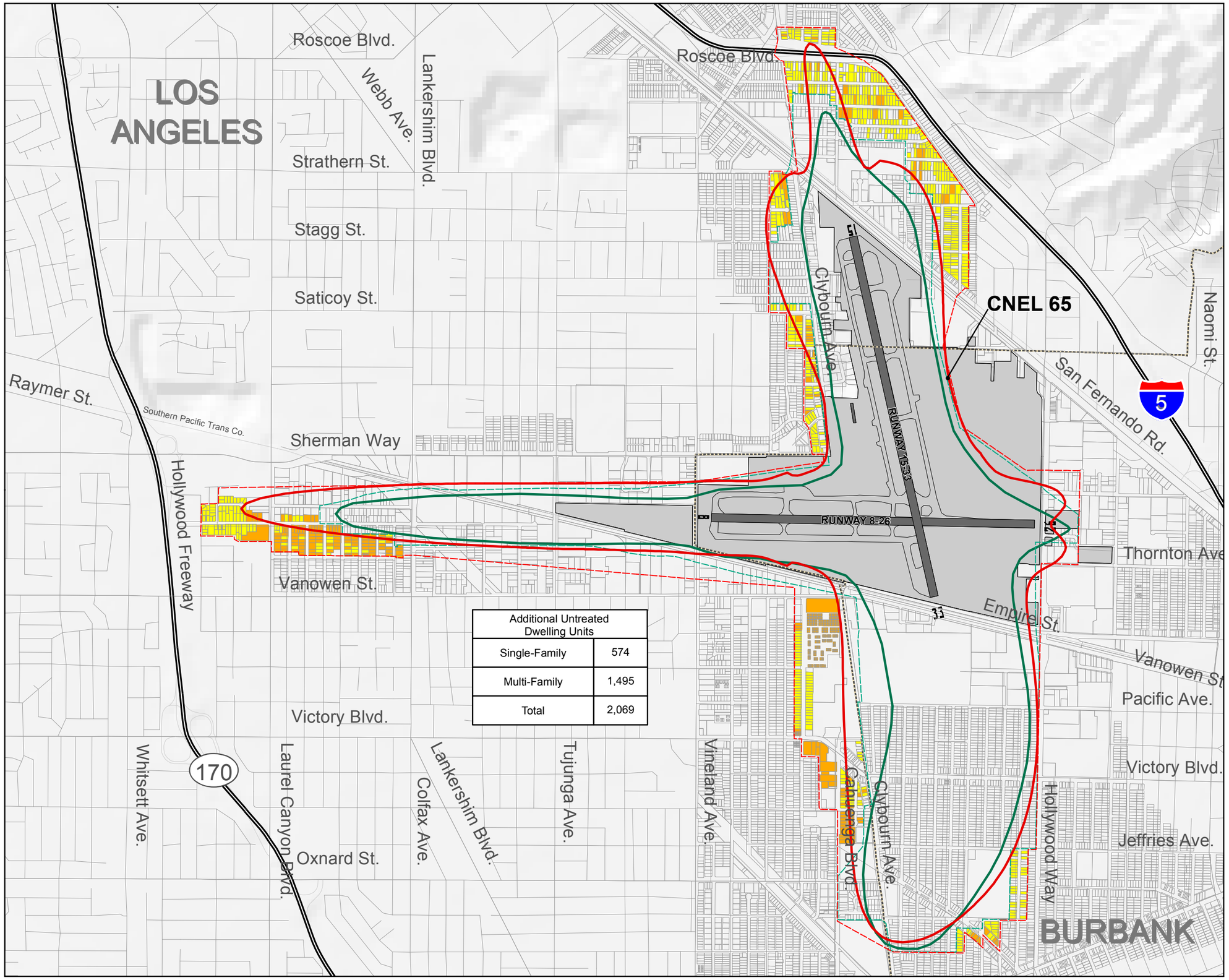
*All dwellings within the current treatment program boundary will be treated in the near future. Their status will be unaffected by the outcome of the Airport Authority's FAR Part 161 Application.

**FAA Order 5100.38C, Airport Improvement Program Handbook, Section, 810.b, June 28, 2005.

***The projected 2015 treatment boundary is smaller than the "ultimate" boundary defined in Noise Mitigation Measure 2 in the 1999 Part 150 Noise Compatibility Program (NCP). That measure, adopted by the Airport Authority and approved by the FAA in its Record of Approval dated November 27, 2000, based the ultimate residential acoustical treatment area boundary on a combination of the noise contours projected in the original 19889 NCP and an updated forecast developed in the 1999 NCP. That area is considerably larger than the projected 2015 treatment boundary shown in Figure 4-1, particularly north and south of the airport. (See Figure 7E, page 7-28, in the 1999 NCP.) While the treatment of all single-family housing in that larger area remains an informal goal, subject to available funding, Airport Authority continues to use the most recent 65 CNEL contour, adjusted to follow streets and blocks, as its priority area for treatment. It adjusts the boundaries of the priority area periodically as updated noise contour maps become available. See FAA Program Guidance Letter 05-4 (dated June 3, 2005).



Additional Untreated Dwelling Units	
Single-Family	574
Multi-Family	1,495
Total	2,069

LEGEND

- Current Treatment Program Boundary
- Third Quarter 2007 CNEL 65 Contour
- Projected 2015 Treatment Boundary
- 2015 Baseline CNEL 65 Contour
- Untreated Single-Family Residence*
- Untreated Multi-Family Residence*
- Airport Boundary
- Municipal Boundary
- Freeways
- Roads

* Outside current treatment program but inside projected 2015 program boundary.

Sources:
Noise Analysis by Jacobs Consultancy, 2007.
Acoustical treatment data from Burbank-Glendale-Pasadena Airport Authority records, through January 2008.

NORTH

0 500 1,000 2,000 Feet

Figure 4-1
ACOUSTICAL TREATMENT PROGRAM BOUNDARIES CURRENT AND 2015 PROJECTION WITHOUT CURFEW
FAR Part 161 Study for Bob Hope Airport
January 2009

JACOBS CONSULTANCY
Airport Management Consulting

Figure 4-2 shows the projected 65 CNEL contours for each of the three curfews in 2015 compared with the 2015 baseline contour. Projected eligibility boundaries are also shown, as are the locations of residences still needing to be treated. As discussed in Appendix B, Aircraft Noise Analysis, the area within the 65 CNEL contour is substantially reduced under each curfew alternative, as indicated in Table 4-1.

Table 4-1

CHANGE IN DWELLING UNITS IN ACOUSTICAL TREATMENT PROGRAM AREA
Bob Hope Airport FAR Part 161 Study

Alternative	Homes to be Treated	Difference from Baseline
Baseline - 2015	2,069	--
Full Curfew	73	<1,996>
Departure Curfew	346	<1,723>
Noise-Based Curfew	200	<1,869>

Note: This includes only homes that were untreated and not programmed for improvement as of February 2008.

Sources: Jacobs Consultancy and Psomas analysis, 2007 - 2008.

Reduction in Program With Full Curfew

Reduction in Units to be Treated - Full Curfew

Housing Type	Baseline	With Curfew	Difference
Single-Family	574	44	-530
Multi-Family	1,495	29	-1,466
Total	2,069	73	-1,996

Reduction in Program With Noise-Based Curfew

Reduction in Units to be Treated - Noise-Based Curfew

Housing Type	Baseline	With Curfew	Difference
Single-Family	574	139	-435
Multi-Family	1,495	61	-1,434
Total	2,069	200	-1,869

Reduction in Program With Departure Curfew

Reduction in Units to be Treated - Departure Curfew

Housing Type	Baseline	With Curfew	Difference
Single-Family	574	114	-460
Multi-Family	1,495	232	-1,263
Total	2,069	73	-1,663

LEGEND

- 2007 Treatment Program Boundary
- Projected 2015 Treatment Program Boundary
- 2015 Baseline CNEL 65 Contour
- Projected 2015 Treatment Program Boundary - Curfew
- 2015 Curfew CNEL 65 Contour
- Untreated Single-Family Removed from Program*
- Untreated Multi-Family Removed from Program*
- Untreated Single-Family Remaining in Program*
- Untreated Multi-Family Remaining in Program*
- Airport Boundary
- Municipal Boundary
- Freeways
- Roads

* Outside current treatment program but inside projected 2015 program boundary.

Note:
The portions of each alternative curfew contour that are not shown in this figure lie entirely within the 2007 treatment program boundary shown in Figure 4-1.

Sources:
Noise Analysis by Jacobs Consultancy, 2007.
Acoustical treatment data from Burbank-Glendale-Pasadena Airport Authority records, through January 2008.

NORTH

0 500 1,000 2,000 Feet

Figure 4-2
PROJECTED REDUCTION IN ACOUSTICAL TREATMENT PROGRAM WITH ALTERNATIVE CURFEWS
FAR Part 161 Study for Bob Hope Airport
January 2009

JACOBS CONSULTANCY
Airport Management Consulting

The savings in acoustical treatment costs were computed through the following steps:

- The number of untreated homes within the 65 CNEL contour for each 2015 forecast scenario was counted.
- The average cost of acoustically treating a dwelling unit, including administrative expenses, was estimated at $43,000, which is based on the awarded bid price for a recent program module that included a mix of single-family and multi-family dwellings, one of the first program modules to include multi-family buildings.*
- An average of 259 homes per year would be treated, enough to ensure that all homes in the future program area would be treated by the end of 2015.
- The stream of annual costs to treat eligible homes, based on the average cost per home and the average pace of the work, was calculated for each 2015 forecast scenario.
- The stream of costs for each scenario was then discounted to net present value (in 2006 dollars).
- The difference in cost between the unrestricted case and each curfew scenario was taken as the savings attributable to each alternative curfew.

The results of the analysis are summarized in Table 4-2.

Table 4-2

SAVINGS IN RESIDENTIAL ACOUSTICAL TREATMENT WITH ALTERNATIVE CURFEWS
Bob Hope Airport FAR Part 161 Study

Scenario	Dwelling Units Remaining to be Treated *(b)*	Cost of Treatment	Savings Compared to Baseline	Net Present Value of Savings *(a)*
2015 Baseline	2,069	$88,967,000	--	--
2015 Full Curfew	73	$ 3,139,000	$85,828,000	$59,320,000
2015 Departure Curfew	346	$14,900,000	$74,100,000	$49,281,000
2015 Noise-Based Curfew	200	$ 8,600,000	$80,400,000	$54,550,000

(a) Net present value (2006) was computed based on a treatment rate of 259 homes per year. Values are rounded to the nearest $1,000.

(b) Includes only homes that were untreated and not scheduled for treatment in any contracted program modules as of February 2008.

*Program module Module 10.1, awarded on January 8, 2008.

4.5.2 Increase in Residential Property Values

It has been demonstrated through a hedonic modeling analysis undertaken for this Part 161 Study that aircraft noise in the Airport vicinity affects the price of housing, effectively creating a discount directly correlated with the degree of aircraft noise exposure.* That study found that as cumulative noise levels increased inside the 65 CNEL contour (as measured by the CNEL metric), the price discount increases.

The potential increase in property value attributable to the reduction in noise through the alternative curfews was estimated for all housing units (single-family and multi-family) inside the 65 CNEL contour for 2008 conditions. (The process is described in Appendix D.)

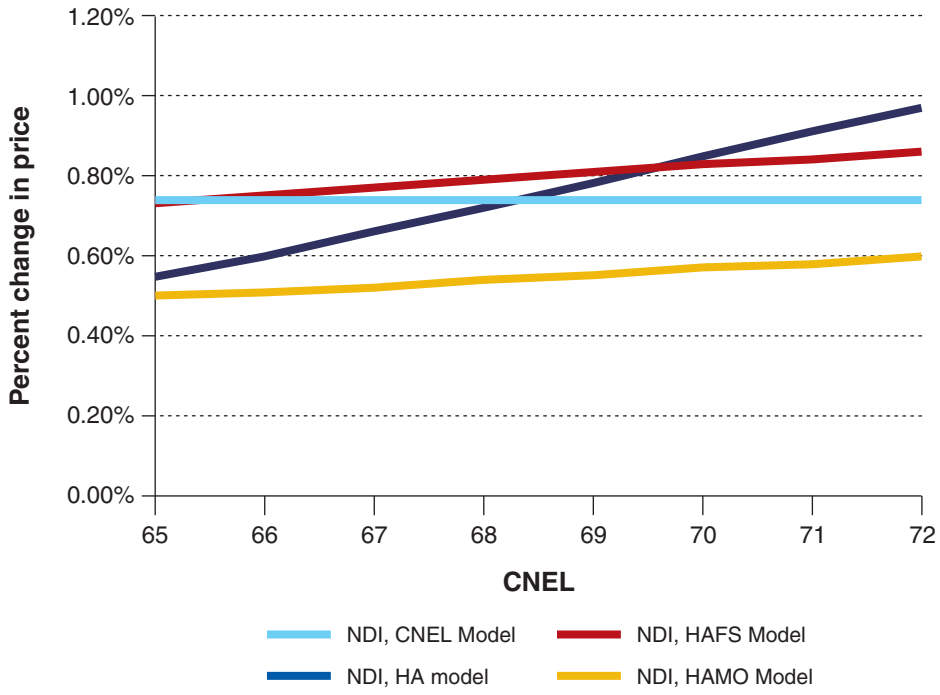
Coefficients to compute the increase in property values were developed from noise discount indices (NDIs) graphed below in Figure 4-3 for four alternative property value models. The average NDI for the four curves was used to compute the estimated property value recovery with the curfew alternatives. NDIs were computed from a hedonic housing price modeling study, developed from a data set of 3,462 housing sales in 1998 and 1999, correlated with numerous housing style and neighborhood variables, including 1998 aircraft noise levels.

*According to the Merriam Webster on-line dictionary, "hedonic" means, "of, relating to, or characterized by pleasure. "Hedonic" modeling is the term used by economists to describe statistical models designed to estimate from market data the implicit price that people are willing to pay for various environmental qualities at their home sites.

Figure 4-3

NOISE DISCOUNT INDICES FROM ALTERNATIVE PROPERTY VALUE IMPACT MODELS

Bob Hope Airport FAR Part 161 Study



Source: Jacobs Consultancy analysis, 2006-2007.

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The total potential increase in property values attributable to the alternative curfews is shown in Table 4-3. The benefit is assumed to be capitalized into property values soon after the curfew is implemented. For the purposes of the benefit-cost analysis, the total value of the increase shown in Table 4-3 was discounted to a net present value in 2006 dollars. The alternative NDIs produce different estimates of the potential property value increase associated with the curfews. The estimated increase presented in the first row of the table is the average of the estimates produced by all NDIs. The other estimates presented in the table are based on the high and low estimates that were computed.

Table 4-3

INCREASE IN RESIDENTIAL PROPERTY VALUE WITH ALTERNATIVE CURFEWS
Net Present Value, 2006 Dollars
Bob Hope Airport FAR Part 161 Study

	Full Curfew	Departure Curfew	Noise-Based Curfew
Estimated Property Value Increase (inside 65 CNEL contour) *(a)*	$7,881,000	$6,368,000	$5,740,000
Potential Property Value Increase – High Estimate *(b)*	8,888,000	7,207,000	6,513,000
Potential Property Value Increase – Low Estimate *(c)*	6,427,000	5,137,000	4,610,000

(a) Estimate based on average of property value increases predicted by NDIs for all four specifications of the hedonic housing price model.
(b) Estimate based on the NDI for the HA_{FS} model.
(c) Estimate based on the NDI for the HA_{MO} model.

See Table D-5 in Appendix D, Methodology for Estimating Effects of Noise on Residential Property Values.

4.5.3 Summary of Monetized Benefits

Table 4-4 presents the results of the analysis of monetized benefits. The net present value of the benefits of the full curfew is estimated at $67,201,000, the departure curfew at $55,649,000, and the noise-based curfew at $60,290,000.

Table 4-4 also shows high and low estimates of the benefits of each curfew alternative. The ranges reflect the alternate estimates of the potential increase in property values. These alternate estimates are considered in the discussion of sensitivity tests, Section 4.9.

Table 4-4

SUMMARY OF MONETIZED BENEFITS OF ALTERNATIVE CURFEWS
Bob Hope Airport FAR Part 161 Study

	Savings in Acoustical Treatment	Increase in Residential Property Values	TOTAL
Full Curfew	$59,320,000	$ 7,881,000	$67,201,000
High Estimate	--	*$8,888,000*	*$68,208,000*
Low Estimate	--	*$ 6,427,000*	*$65,747,000*
Departure Curfew	$49,281,000	$ 6,368,000	$55,649,000
High Estimate	--	*$ 7,207,000*	*$56,488,000*
Low Estimate	--	*$ 5,137,000*	*$54,418,000*
Noise-Based Curfew	$54,550,000	$ 5,740,000	$60,290,000
High Estimate	--	*$ 6,513,000*	*$61,063,000*
Low Estimate	--	*$ 4,610,000*	*$59,160,000*

Note: Values are in net present value, 2006 dollars.

4.6 MONETIZED COSTS

The costs of the proposed curfew are directly related to the reduction of operations during the nighttime hours. The largest monetary cost is borne by general aviation and air taxi, followed by all-cargo carriers, airline passengers and air carriers.

The computations presented in this section represents professional judgment, informed by consultations with the affected air carriers, locally based general aviation operators, and major itinerant general aviation operators known to use the airport. The values used in the analysis are representative of a broad range of potential choices by aircraft operators and passengers. Parameters that are subject to sudden change or that are especially difficult to estimate have been subjected to sensitivity testing, described in Section 4.9.

4.6.1 Costs to General Aviation and Air Taxi

General aviation and air taxi operators would be affected by the curfews. This is discussed in detail in Appendix AA, of Technical Report 1, Aviation Demand Forecasts. The effects would include the following:

- Relocation of operations to another airport.
- Setting up a satellite operation at another airport.
- Repositioning aircraft and dropping off passengers at another airport during curfew hours.

4.6.1.1 Relocation to Other Airports

As reported in Appendix AA of Technical Report 1, Aviation Demand Forecasts, up to six based corporate operators would move from Bob Hope Airport to other airports in the area if the full curfew is implemented. Based on consultations with the operators, four, accounting for 8 aircraft, would move to Van Nuys and two, with 3 aircraft, would move to Camarillo.

With the departure curfew, three operators with 6 aircraft would move to Van Nuys and one operator with two aircraft would to move to Camarillo. With the noise-based curfew, four operators with 8 aircraft would move to Van Nuys and one operator with 2 aircraft to Camarillo.

The primary costs associated with these moves would be planning, legal, and moving expenses. Employees of the operators moving to Camarillo are anticipated to incur annual commuting expenses. These would diminish to zero over five years with employee turnover or as employees decide to move. At the same time, the operators will incur future hiring costs for those who resign, and the employees who move in the future will incur future moving costs. Table 4-5 summarizes the costs of relocating to other airports.*

*After release of the Official Draft Part 161 Application, it was discovered that some of the employee commuting and moving costs were inadvertently understated. Correction of this error resulted in an increase in the initial and recurring annual costs in Table 4-5.

Table 4-5

COSTS FOR GENERAL AVIATION OPERATORS MOVING TO OTHER AIRPORTS
Bob Hope Airport FAR Part 161 Study

Year	Curfew Alternative	Initial Costs	Recurring Annual Costs*
2008	Full Curfew	$220,000	$78,828
	Departure Curfew	$152,000	$52,552
	Noise-Based Curfew	$177,000	$52,552
2015	Full Curfew	--	--
	Departure Curfew	--	--
	Noise-Based Curfew	--	--

*Annual costs diminish to zero after five years.

4.6.1.2 Satellite Operation at Another Airport

AvJet has an aircraft management and air taxi operation based at Bob Hope Airport. The flexibility to operate at night is part of its business strategy. With the adoption of any of the curfew alternatives, AvJet would set up a satellite operation at another airport, most likely Van Nuys, since its key clientele is in the film and television industries.

AvJet would be most greatly impacted by the full curfew, followed by the noise-based curfew, and the departure curfew. Based on interviews with AvJet management and the consultant's analysis, it was determined that AvJet would move 8 aircraft with a full curfew, 7 aircraft with a noise-based curfew, and 6 aircraft with a departure curfew. Their major costs would be for additional staff and higher hangar rents at Van Nuys. These costs are summarized in Table 4-6.

The initial costs include planning and legal fees, costs for recruiting and hiring new personnel and for purchasing furniture and equipment. The recurring annual costs include salaries for the additional personnel and hangar rents.

Table 4-6

COST OF ESTABLISHING AND OPERATING SATELLITE OPERATION AT VAN NUYS
Bob Hope Airport FAR Part 161 Study

Year	Curfew Alternative	Initial Costs	Recurring Annual Costs *(a)*
2008	Full Curfew	$59,900	$889,423
	Departure Curfew	$58,800	$781,912
	Noise-Based Curfew	$59,350	$840,862
2015	Full Curfew	--	$989,632
	Departure Curfew	--	$850,449
	Noise-Based Curfew	--	$909,893

(a) Hangar rental costs are projected to increase as AvJet adds aircraft at its satellite facility. Other recurring costs will remain constant.

4.6.1.3 Picking Up and Dropping Off Passengers at Other Airports

When operators based at the Airport need to takeoff at night, they would need to reposition their aircraft to another airport in the area. In most cases, the airport of choice would be Van Nuys. Based on interviews with NetJets management, they and other fractional operators will also need to arrange for late night pick-up of passengers at Van Nuys who would have been staging from Bob Hope Airport without a curfew.

Under the full curfew and, for many operators, the noise-based curfew, Bob Hope-based operators and itinerant operators would also need to make late night arrivals at other area airports. Again, Van Nuys is expected to be the most common airport of choice. Unless the Bob Hope-based operators have a departure scheduled the next day, they would reposition their aircraft to Bob Hope Airport the next day for servicing and for storage in the hangar.*

The costs associated with these operations include landing and parking fees at Van Nuys, ground transportation for passengers, overnight accommodations for pilots, and the repositioning flights.

*It is standard practice among corporate and managed aircraft operators to return aircraft to their bases for servicing and hangar storage. The costs of a repositioning flight are less than the costs, inconvenience, and potential impact on customer responsiveness cause by having the aircraft out of position.

The number of operations picking up and dropping off passengers at Van Nuys was estimated as follows:

- The number of nighttime operations by fractional operators in the 2008 baseline case that would be affected by the curfew was estimated. NetJets management estimated that approximately 534 operations at Bob Hope Airport would be affected by the curfew. Recognizing that they represent 59% of the fractional market, the NetJets number was extrapolated to 905 as an estimate of all affected fractional operations.

- Again, based on the interview with NetJets management, some of the fractional operators dropping off passengers at night at Van Nuys would need to reposition to other airports in the metro area to pick up passengers. It is estimated that one-third of the flights dropping off passengers at Van Nuys because of the curfew would reposition to Bob Hope Airport to pick up passengers there. (The cost of repositioning to other airports was not computed as this cost would be incurred by the operators regardless of whether a curfew was implemented at Bob Hope Airport.)

- The number of Bob Hope Airport-based operators that would drop off and pick up passengers at Van Nuys was estimated by computing the number of nighttime operations in the baseline case attributable to operators who would remain at the Airport with the curfew. This was computed as follows:

  – The number of nighttime jet operations in the baseline forecasts for 2008 and 2015 was obtained from Tables 49 and 52 in Technical Report 1, Aviation Demand Forecasts.

  – The number of fractional operations affected by the curfew (905) was subtracted from the total.

  – The proportion of forecast operations attributable to other transient operations (41.8% of the total) was subtracted from the total.

  – The remainder, 861 in the 2008 forecast and 1,410 in the 2015 forecast, represented baseline operations by Bob Hope Airport-based operators.

  – Based on the operator interviews and the restricted forecasts presented in Appendix AA of Technical Report 1, approximately 75% of these remaining operations would be accounted for by based operators that would move with implementation of a curfew.

  – The remaining operations, 215 in 2008 and 352 in 2015 would be accounted for by based operators remaining at Bob Hope Airport with a curfew.

– The operations were apportioned to three classes of aircraft – small, medium, and large – based on the proportions in the based business jet fleet expected to remain after implementation of the curfew – 25% small, 26% medium, and 49% large.

Costs associated with these operations would include:

- Landing and parking fees at Van Nuys (obtained from published information and interview with fixed base operator at Van Nuys) for three classes of aircraft – small, medium, and large.

- Limo service for passengers, equivalent to trip between Bob Hope and Van Nuys airports, with prices obtained from interviews with limo operators in the Burbank area.

- Value of passenger time, estimated as the one-way driving time between Bob Hope and Van Nuys airports at low-traffic times of the day (about 20 minutes). Passenger time is valued at $37.20, in accordance with FAA guidance.*

- Hotel accommodations for one-half of the flight crews dropping off passengers after curfew hours. (The other crew members would go home and return in the morning for the repositioning flight.)

- Value of time for pilots staying overnight at local hotels. This was estimated at $31.50 (the recommended value of personal time for general aviation passengers)** for 8 hours.

- Positioning flight between the airports. Operating costs were estimated for three classes of aircraft, small, medium, and large, using data from the Aircraft Cost Evaluator, published by Conklin & de Decker Associates.*** Flights would take approximately 20 minutes, allowing for taxi, departure, climb, insertion into the arrival pattern for BUR or VNY, approach, landing, and taxi to parking position or hangar.

- Pilot time for repositioning flights, estimated at 2 hours for each member of a 2-person crew. The value was estimated at $31.50.

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*See GRA, Inc. *Economic Values for FAA Investment and Regulatory Decisions, A Guide*, Contract No. DTFA 01-02-C00200, Draft, December 31, 2004, Table 1-1, p. 1-2

**See GRA, Inc. 2004, cited above. Corporate pilots are typically salaried employees available on an on-call basis. Thus, any extra time they may spend on an assignment is best valued as personal time.

***Aircraft Cost Evaluator is an aircraft operating cost database that provides variable and fixed operating costs for over 475 jets, turboprops, helicopters and piston aircraft. It is published by Conklin & de Decker Associates, Inc., Arlington, TX 76012. Published since 1984, it is updated twice a year. Additional details are available at the publisher's website www.conklindd.com.

The number of affected operations and the cost of the operations are summarized in Table 4-7.*

Table 4-7

COST OF PICKING UP AND DROPPING OFF PASSENGERS AT OTHER AIRPORTS
Bob Hope Airport FAR Part 161 Study

Year	Curfew Alternative	Affected Operations *(a)* Total	Affected Operations *(a)* Repositioning to/from BUR	Cost
2008	Full Curfew	1,120	330	$ 742,401
	Departure Curfew	560	108	$ 266,831
	Noise-Based Curfew	694	246	$ 538,528
2015	Full Curfew	1,621	505	$1,129,362
	Departure Curfew	810	176	$ 418,691
	Noise-Based Curfew	1,018	384	$ 835,636

(a) The "Total" column represents all operations either dropping off or picking up passengers at other airports with each curfew. Without a curfew, these operations would have occurred at Bob Hope Airport. Repositioning operations are those that either return to Bob Hope Airport after dropping off passengers elsewhere or that depart from Bob Hope Airport to pick up passengers at another LA area airport.

*In reviewing the analysis of shifted general aviation flights after the close of the comment period on the Official Draft Part 161 Application, it was discovered that the number of flights involved in dropping off and picking up passengers at other airports had been incorrectly computed, overstating the number by a factor of five. At the same time, it was found that several costs associated with this activity had not been accounted for, including the value of additional general aviation passenger time needed for ground transportation, the cost of additional ground transportation, and the value of additional crew time associated with aircraft repositioning. The original analysis also understated aircraft operating time, which was increased by a factor of two to more accurately account for ground taxi time. Correction of these errors resulted in a net decrease in the costs shown in Table 4-7 of picking up and dropping off passengers at other airports.

4.6.2 Costs to All-Cargo Carriers

Three all-cargo carriers are of primary importance at Bob Hope Airport: Ameriflight; FedEx, and UPS. The proposed curfews will affect Ameriflight much differently than the two large package carriers. Thus, Ameriflight is discussed separately.*

4.6.2.1 Ameriflight

The assessment of the effects of the alternatives on Ameriflight is based on interviews with Ameriflight management undertaken in the summer of 2006 and on the consultant's analysis of Ameriflight's operations. Ameriflight is a large cargo charter operator that conducts two kinds of operations at Bob Hope Airport—a daytime cargo feeder service for both FedEx and UPS and a round-the-clock courier service for California financial institutions. Much of the courier activity occurs at night. With either the full curfew or the departure curfew, Ameriflight would have to move its bank courier operation. (The noise-based curfew would have no effect on Ameriflight's operation, so they would remain at Bob Hope Airport if that was implemented.) Ameriflight said they would move to Ontario since it already has a sizeable base of operations there. Ameriflight's president indicated that he would maintain the firm's headquarters at Bob Hope Airport. Because Ameriflight will continue serving UPS and FedEx at Bob Hope Airport, in addition to providing other daytime cargo services, their aircraft will continue to use the Airport. Thus, it would be reasonable for Ameriflight to keep its maintenance base at the Airport.

Ameriflight's move to Ontario is estimated to involve a one-time cost of approximately $310,500. This estimate was developed from the following assumptions:

- The planning, legal and physical costs of moving the operation are estimated at $100,000.**
- The jobs of approximately 50 Ameriflight employees would be relocated with the overnight courier service to Ontario. They will have three choices: to accept the transfer and commute to Ontario from their current homes; to accept the transfer and move to the Ontario area; to resign rather than being transferred. Because the affected employees were not interviewed as to their personal preferences, they were evenly allocated to each of the three alternative choices.
  - About one-third (16) would choose not to make the move and would resign from the company. Each is estimated to receive $2,000 in severance or unused vacation pay, equivalent to 80 hours at $25 per

*This analysis was undertaken by Jacobs Consultancy and Conklin deDecker Aviation Information Services.

**These costs include the legal work related to negotiating the discontinuance of leases new lease agreements. Moving costs must cover office equipment and at least some tools and machinery and aircraft parts.

hour, for a total of $32,000. Ameriflight would spend an additional $1,000 per employee to advertise for, hire and train replacements - $16,000 total. Training for certain employee classifications, such as pilots and aircraft mechanics could be higher.

- About one-third (17) of the affected employees would choose to move closer to Ontario. The employees' moving costs are estimated at $2,500 each, which is based on a move for a modest household. Based on the proportion of renters versus homeowners in Los Angeles County reported in the 2000 Census, 50% of the employees who move are assumed to be homeowners. Real estate fees associated with the sales of their homes are estimated at $15,000, based on a sale price of $200,000 to $300,000, a modest, working class home by Los Angeles Basin standards.

- Recurring annual costs associated with Ameriflight's move include employee commuting costs, additional ground transportation costs associated with the drive from downtown Los Angeles to Ontario, and the higher operating costs at Ontario compared to Bob Hope Airport.

- One-third of the affected Ameriflight employees (17) would choose to continue working at Ameriflight and living at their current residences. They would incur additional costs related to the longer commute. These employees, on average, would have to travel an additional 50 miles to get to work or 100 additional miles round-trip, based on the road distance from Bob Hope Airport to Ontario. The additional commuting time would be about 2 hours. Based on the IRS standard mileage rate on January 1, 2006 ($.445) and $10.60 per four for additional commuting time, the additional travel cost would be $223,346 in the first year.*

- Over time, the commuting employees would either leave the company or move closer to Ontario for other personal reasons, resulting in an annual 20% reduction in these commuting costs until they reach zero in 2013. Long-distance commuters who decide to move in the future will incur moving costs. Ameriflight will incur hiring costs to replace those who decide to resign.

*The costs of increased employee commuting time were inadvertently excluded from the analysis in the Official Draft Part 161 Application. Correction of this error resulted in an increase in the cost associated with employee commuting.
In accordance with the practice used by the Southern California Association of Goverments (SCAG) in surface transportation planning, commuting time is valued at 50% of the average wage rate for the Los Angeles-Long Beach-Riverside County area. Based on the April 2007 National Compensation Survey for the area, the average wage for private sector workers was $21.19. See U.S. Bureau of Labor Statistics, Los Angeles-Long Beach-Riverside, CA, National Compensation Survey, April 2007, January 2008.

Ameriflight's customers, the couriers for the financial institutions, would also incur additional costs by having to drive to Ontario instead of Bob Hope Airport. From downtown Los Angeles, the difference in the roundtrip distance to Ontario compared to Bob Hope Airport is approximately 50 miles. Driving time from downtown Los Angeles to Bob Hope Airport ranges from 20 to 40 minutes, depending on traffic. The trip from downtown Los Angeles to Ontario Airport takes from 45 to 90 minutes – 25 to 50 minutes longer. As an average, the increased roundtrip travel time is estimated at 60 minutes. Two costs are associated with this additional travel – the cost of the driver's time and the operating costs of the vehicle. These are recurring costs that would be incurred annually. The following assumptions were used to estimate the additional costs to the customers:

- Based on Ameriflight's data as of the date of the interview, 67 shuttle trips are assumed to be made daily, 240 days per year. Drivers are paid $20 per hour. At one additional hour per trip, this yields an estimate of $321,600.

- Vehicle operating costs, based on the IRS mileage rate in 2006, are $.445 per mile. At an additional distance of 50 miles per trip, this yields an estimate of $357,780.

- Operating costs at Ontario are higher than at Bob Hope Airport. The landing fee for aircraft with maximum gross landing weights between 12,500 pounds and 25,000 pounds, which would apply to about 50% of Ameriflight's fleet, is $30 at Ontario and $20 at Bob Hope. The remaining Ameriflight aircraft have landing weights below 12,500 pounds, where the same $20 landing fee applies at both airports. Ontario also has a parking fee of $10 per day. There is no parking fee at Bob Hope Airport.

- Based on Ameriflight's activity at the time of the analysis, which is projected to remain constant through the forecast period, the additional landing fee would apply to an average of 4 flights per day over 365 days per year, yielding an estimated annual cost of approximately $15,000.

- The parking fee would apply to an average of 8 aircraft per day, annually yielding a cost of approximately $29,000.

4.6.2.2 FedEx and UPS

FedEx and UPS each have one early morning arrival, four days per week, which would be prohibited with either the full curfew or the noise-based curfew. (They also each have one flight during non-curfew hours which would be unaffected by the proposed curfew.) The frequency of each of these flights is forecast to increase to 5 per week by 2015, in the absence of a curfew. Both airlines will be forced to deliver this cargo to an alternate airport. LAX is the most likely candidate since it is the next closest commercial airport to the San Fernando Valley area served by the carriers from Bob Hope Airport. They will either shift the flights to LAX or add the cargo from those flights to existing flights scheduled to LAX, which could require

switching to larger aircraft. For purposes of developing an estimate of the costs to each carrier, it is assumed that both carriers would shift their flights to LAX. The departure curfew would have no effect on either carrier. (See Appendix CC of Technical Report 1, Aviation Demand Forecasts, for a discussion of the forecast effect of the alternative curfews on the cargo operators.)

Costs that FedEx and UPS are anticipated to bear in response to a curfew include:

- Lost revenues
- Increased costs of operating at LAX compared to BUR
- Additional trucking costs

These are discussed in the following sections.

4.6.2.2.1 Lost Cargo Revenue

The carriers would lose revenue from time-sensitive customers that require just-in-time (JIT) delivery of their shipments. The additional trucking time required to process flights arriving at LAX and to truck the cargo to a ground terminal would result in the loss of these JIT customers to the carriers.

Other customers would be unaffected by the change in the location of these flights from Bob Hope Airport to LAX. The carriers are expected to deal with the cargo that would have flown into or out of Bob Hope Airport on the affected flights by either putting it on a different flight to or from Bob Hope Airport or by keeping it on the flight that is shifted to LAX.

The projected costs of the curfew to the cargo carriers were based on the following:

- Average shipping rates:
  - Each carrier has thousands of possible rates, based on the thousands of destinations to which they provide service. The following average rates to and from the eastern half of the United States were used as a basis for calculating the impact of the curfew on revenues:
    - A flat-rate of $25.00 for small courier-sized packages/documents weighing less than 3 lbs. An average of 1.5 pounds per package was used.
- An average rate of $5.00 per pound for bulk freight is assumed.
- Based on industry averages in office and white collar work centers, it is estimated that 0.5% of the cargo on the affected flights includes time-sensitive JIT goods, which would be lost to the carriers.

- Based on general industry averages, 67% of this lost cargo would be bulk freight and 33% would be small packages.* (Given the potential variability in this estimate, a sensitivity test was conducted based on a 55% to 45% split of bulk freight versus small packages. This is documented in Section 4.8, Sensitivity Tests.)

- A summary of the total lost cargo revenue for FedEx and UPS, for each curfew alternative, is presented in Table 4-8.

Table 4-8

LOST CARGO REVENUE ANNUALLY BY YEAR AND CURFEW ALTERNATIVE
Bob Hope Airport FAR Part 161 Study

Year	Curfew Alternative	Lost Revenue
2008	Full Curfew	$1,862,890
	Departure Curfew	--
	Noise-Based Curfew	$1,862,890
2015	Full Curfew	$2,328,612
	Departure Curfew	--
	Noise-Based Curfew	$2,328,612

Note: Lost revenues are expressed in actual 2006 dollars.

4.6.2.2.2 Additional Trucking Costs for FedEx and UPS

The additional costs of trucking cargo from LAX to the ground sorting facilities of each carrier are based on the following:

- Based on a review of air cargo service at the Airport, it was determined that 10 percent of the cargo on affected flights could be shifted onto other Bob Hope Airport flights. As noted above, 0.5% of the original cargo load would not be carried since it is too time-sensitive to be handled on the shifted flights.

- The balance of the cargo (89.5% of the pre-curfew load carried to and from Bob Hope Airport on the affected flights) would fly into and out of LAX and would be trucked the extra distance to the ground sorting facilities of each carrier. This amounts to an average of 22.64 tons per flight.

*Given the potential variability in this estimate, a sensitivity test was conducted based on a 55% to 45% split of bulk freight versus small packages. This is documented in Section 4.9.

- The average 18-wheeler has a capacity of 22.05 tons. One truck for each flight would be sufficient most of the time. Two trucks would be needed on heavier days. Based on average variations in cargo volumes, this is projected to occur 25% of the time.

- In addition to the driving time to the sort facilities, congestion at LAX is expected to add approximately 15 minutes to each trip.

- In 2004, the average hourly cost for operating an 18-wheeler in California urban areas was estimated at $114.* In the same year, Southern California Association of Governments (SCAG) estimated the value of saved time for trucks at $66.20 per hour.** SCAG noted that the Federal Highway Administration said that estimates could range $30 to $145. For purposes of this analysis, the $114 rate was used. It was inflated by 8%, the rate of increase in the consumer price index for the Los Angeles-Riverside-Orange County area from 2004 to 2006 to yield a value of $123.

- The average additional distance from LAX to the FedEx ground sorting facilities serving Bob Hope Airport is approximately 14 miles, or about 28 minutes travel time. The two UPS ground sort centers serving the area are an average of 3.2 miles further from LAX than Bob Hope Airport, but the additional driving time is negligible.

- Table 4-9 shows the forecast additional total combined trucking costs for FedEx and UPS by curfew alternative for 2008 and 2015.***

*Poole, R.W., et al. Building for the Future: Easing California's Transportation Crisis with Tolls and Public-Private Partnerships, Policy Study 324. Reason Foundation, Table 3, p. 22.

**SCAG, 2004 Regional Transportation Plan, Appendix C, Performance Measures, Exhibit C.25, p. C-23.

***The analysis in the Official Draft Part 161 Application used an estimate that was four times too high for truck operating costs as a consequence of a misreading of a source document. Also, the travel time estimates in the Official Draft Application were underestimated as noted by several commenters and are increased an average of 3 minutes for each operator for a new average of 28 minutes. Correction of both errors resulted in an increase in the total additional trucking costs, shown in Table 4-9.

Table 4-9

ADDITIONAL TRUCKING COSTS BY CURFEW ALTERNATIVE FOR 2008 AND 2015
Bob Hope Airport FAR Part 161 Study

Year	Curfew Alternative	Total Additional Trucking Costs
2008	Full Curfew	$59,376
	Departure Curfew	--
	Noise-Based Curfew	$59,376
2015	Full Curfew	$74,220
	Departure Curfew	--
	Noise-Based Curfew	$74,220

Note: Costs are actual 2006 dollars.

4.6.2.2.3 Extra Landing Fees for Jet Cargo Operators

Landing fees at LAX are higher than at Bob Hope Airport. The cost per 1,000 pounds of gross landing weight (MGLW) is $.80 at BUR, while it is $2.38 for cargo carriers that are signatories to the airline operating agreement at LAX.* While Bob Hope Airport has no parking fee for signatory carriers, LAX has a fee of $.40 per day per 1,000 pound MGLW. (This is pro-rated for periods of less than 12 hours. Parking for periods of less than 3 hours is free.)

Table 4-10 provides a breakdown of the additional landing and parking fees under each curfew alternative.

*Air Carrier/Airport Operating Permit or Landing Fee Agreement. http://www.lawa.org/AirOps/pdf/Sect_8_Operating-Permits_and_Fees.pdf.

Table 4-10

ADDITIONAL LANDING AND PARKING FEES TO THE CARGO AIRLINES BY CURFEW ALTERNATIVE FOR 2008 AND 2015
Bob Hope Airport FAR Part 161 Study

Year	Curfew Alternative	Total
2008	Full Curfew	$220,402
	Departure Curfew	--
	Noise-Based Curfew	$220,402
2015	Full Curfew	$259,753
	Departure Curfew	--
	Noise-Based Curfew	$259,753

Note: Costs are actual 2006 dollars.

4.6.3 Costs to Airline Passengers

Cancelled and diverted flights will impose costs on passengers. These may include overnight hotel stays, extra meals, additional ground transportation costs, and the loss of time. The categories of potential costs and the assumptions used in estimating the magnitude of these costs are described in Table 4-11.

The total cost to passengers developed from these parameters is presented in Table 4-12 for 2008 and 2015. Note that the cost to passengers is the same under the full curfew as the noise-based curfew. This is because the effect of those curfews on air carriers is the same.

Table 4-11

PARAMETERS USED IN ESTIMATING COSTS OF ALTERNATIVE CURFEWS TO PASSENGERS

Bob Hope Airport FAR Part 161 Study

Passenger Category	Type of Cost	Affected Proportion of Passengers*	Typical Unit Cost Estimates
Passengers on Cancelled Flights	Hotel and meal	35% of arriving passengers; 30% of departing passengers; 1.6 persons per room	$180 per room
	Ground transportation – hotel passengers	25% require taxicab to and from airport; 75% use free hotel shuttle	$30 each cab ride
	Ground transportation – other passengers	65% of arriving and 70% of departing passengers have second trip to airport (next day); 75% use personal car; 25% use taxicab	$10 for personal car (22 mi @ $.445/mi) $30 for taxicab
	Lost time	Assume passengers rebooked 12 hours after cancelled flight.	Hotel passengers lose 5 hrs (12 hrs less 7 hrs sleep); others lose 2 hrs; @ $28.60/hr
Passengers on Diverted Flights	Ground transportation – taxi	55% return to BUR to pickup their cars	$40 from LAX; $75 from ONT
	Ground transportation – family/friend pickup	30%, 1.6 passengers per car	58 mile roundtrip to/from LAX; 106 mile roundtrip to/from ONT @ $0.445 per mile
	Ground transportation – taxi	15% have no net increase in ground transportation expense because destination is equidistant between BUR and diversion airport	Zero cost
	Lost time	100%	Travel time from LAX to BUR -- 0.6 hrs; from ONT to BUR -- 0.87 hrs; @ $28.60/hr
Passengers on Permanently Shifted Flights (Charters)	Ground transportation – taxi	10%	Additional trip distance to LAX instead of BUR -- $20 additional cab fare
	Lost time	100%	Additional time at airport for ticketing, security, walking to gate -- 0.5 hrs @ $28.60/hr

*Affected proportion of passengers estimated by Jacobs Consultancy based on prior staff experience and consulting experience with commercial airlines.

Note: Value of passenger time is estimated at $28.60 per FAA guidance (*Economic Values for FAA Investment and Regulatory Decisions: A Guide* (Draft Final Report), prepared by GRA, Inc. for FAA Office of Aviation Policy and Plans, FAA, Washington, DC, December 31, 2004). Mileage cost for personal cars is $.445, the Internal Revenue Service value for 2006.

Source: Jacobs Consultancy 2007.

Table 4-12

SUMMARY OF ANNUAL COSTS TO PASSENGERS BY CURFEW ALTERNATIVE FOR 2008 AND 2015

Bob Hope Airport FAR Part 161 Study

Year	Curfew Alternative	Out-of-Pocket Costs	Value of Lost Time	Total
2008	Full Curfew	$604,795	$1,056,480	$1,661,275
	Departure Curfew	$178,804	$ 323,024	$ 501,828
	Noise-Based Curfew	$604,795	$1,056,480	$1,661,275
2015	Full Curfew	$999,709	$1,836,790	$2,836,499
	Departure Curfew	$295,801	$ 752,523	$1,048,324
	Noise-Based Curfew	$999,709	$1,836,790	$2,836,499

4.6.4 Costs to the Airlines

Costs to the airlines are classified as follows:

- Lost ticket revenues – Passengers on flights cancelled due to the curfew will be entitled to refunds if they cannot be rebooked on other flights.
- Diversions to other airports – Flights diverted to other airports because of the curfew will be subject to the costs of higher landing and parking fees and repositioning empty aircraft to Bob Hope Airport in the morning for the next day's departures.
- Repositioning of aircraft on cancelled flights – Aircraft assigned to evening flights to Bob Hope Airport that are delayed and cancelled often will need to be repositioned for the next day's schedule.
- Opportunity costs – Some flights are anticipated to be eliminated with implementation of a curfew. In other cases, airlines are expected to adjust their schedules to comply with the curfew, and to substitute smaller aircraft on the route because of the decrease in connecting opportunities at their hubs. It is assumed that the aircraft removed from service at Bob Hope Airport will be used to serve other markets that are slightly less profitable, resulting in an opportunity cost to the carriers.
- Crew hotel room cancellation penalties – When flights scheduled to terminate for the day at Bob Hope Airport are cancelled, the hotel rooms reserved for crews will have to be cancelled, resulting in the payment of penalties by the airlines.

As discussed in Appendix BB of Technical Report 1, Aviation Demand Forecasts, the effects of the full curfew and the noise-based curfew on the air carriers will be the

same. All existing air carrier jet aircraft would exceed the maximum noise level set by the noise-based curfew. No jet aircraft types are projected to be entering service by 2015 that would meet the nighttime noise limit. Further, very few air carrier turboprop aircraft comply with the noise-based curfew. For a variety of reasons, discussed in Appendix BB of Technical Report 1, carriers serving Bob Hope Airport are not anticipated to use turboprops in the market through the forecast period.

4.6.4.1 Lost Ticket Revenues

Airlines will lose ticket revenues from passengers on cancelled flights who cannot be rebooked to another flight, and thus require a refund. Airlines will be able to avoid the loss of revenues if passengers on cancelled flights to and from Bob Hope Airport:

- Are put on other flights to or from Burbank at a different time of day or re-scheduled to another flight on a different day (usually the following day);
- Are put on another flight to or from another LA-area airport; or
- Decide not to travel at the planned time and opt to keep their tickets as future travel credits.

The following steps were taken to calculate the lost ticket revenue for each airline:

- For each airline and route, determine the number of lost operations, the estimated percentage of passengers who cannot re-book to another Burbank flight and the total lost passengers on the route. (This is taken from Appendix BB of Technical Report 1, Aviation Demand Forecasts.)
- Obtain the average fare per passenger for the airline on the route.*
- Estimate the percentage of passengers who will not take a flight to or from another LA-area airport and who will not keep a future travel credit with the airline, therefore requiring a refund. These estimates were developed for each airline based on their schedules at Bob Hope Airport and other Los Angeles area airports, and professional judgments about the flexibility of passengers to adjust their travel schedules, with leisure travelers presumed to have more flexibility than business travelers. The estimated loss in passengers varies from 30% (for JetBlue, Southwest, and Virgin America), to 40% (for Alaska, Delta, and US Airways), to 50% for (American and United).
- Of those passengers requiring a refund, estimate the percentage on each route that would have been making a connection. Passengers making a

*Fare data for third calendar quarter of 2006 were obtained from Back Aviation, March 2007. For new flights projected in 2008 and 2015, fares were estimated based on the average fare of other carriers serving the route from Bob Hope Airport or, if no carrier was currently serving the route from the Airport, the average fare to and from other Los Angeles area airports.

connection are estimated to pay a fare that is an average 33% higher than a local origin-destination passenger on the route. These estimates were developed in consideration of the nature of each airline's route structure. Flights to major hubs on network carriers, such as American to Dallas-Fort Worth, United to San Francisco, and Delta to Salt Lake City, would have a greater share of connecting passengers than flights to smaller hubs by point-to-point carriers, such as Southwest to Oakland, Sacramento, and San Jose.

- Calculate the lost revenue for each flight by airline and sum the results to estimate the total lost revenue.

A summary of the total lost airline ticket revenue is presented in Table 4-13.

Table 4-13

LOST PASSENGER REVENUE BY YEAR AND CURFEW ALTERNATIVE
Bob Hope Airport FAR Part 161 Study

Year	Curfew Alternative	Lost Airline Ticket Revenue
2008	Full Curfew	$590,146
	Departure Curfew	$113,804
	Noise-Based Curfew	$590,146
2015	Full Curfew	$983,237
	Departure Curfew	$178,852
	Noise-Based Curfew	$983,237

4.6.4.2 Diversion and Aircraft Repositioning Costs to the Airlines

On occasion, flights delayed until after the 11:00 p.m. grace period will be diverted to other Los Angeles area airports. These aircraft will have to be repositioned to Bob Hope Airport the following morning. Given the cost and disruption created by the diversion of flights, diversions would be rare.

Other evening flights that are seriously delayed would be cancelled before they takeoff for Burbank. It is estimated that an average of 25% of these cancellations will require the aircraft to be repositioned for the next day's flight schedule. Appendix BB of Technical Report 1, Aviation Demand Forecasts, describes the basis underlying the projection of diverted and cancelled flights.

In addition to diversions and flight cancellations, all nighttime ad-hoc charter flights would be relocated from Bob Hope Airport to Los Angeles International (LAX).

A summary of the estimated number of diverted flights, cancelled flights requiring aircraft repositioning, and shifted charter flights for 2008 and 2015 for each curfew scenario is presented in Table 4-14.

Table 4-14

DIVERTED AND SHIFTED PASSENGER FLIGHTS BY CURFEW ALTERNATIVE FOR 2008 AND 2015

Bob Hope Airport FAR Part 161 Study

Year	Curfew Alternative	Number of Diverted Flights	Number of Cancellations Requiring Aircraft Repositioning	Number of Charter Flights Shifted to LAX
2008	Full Curfew	6	36	17
	Departure Curfew	0	9	17
	Noise-Based Curfew	6	36	17
2015	Full Curfew	9	46	173
	Departure Curfew	0	10	173
	Noise-Based Curfew	9	46	173

The following steps were taken to calculate the costs associated with diverting and repositioning air carrier passenger aircraft:

- Obtained the forecast number of diverted flights, by airline, for 2008 and 2015, from Appendix BB of Technical Report 1, Aviation Demand Forecasts.
- Obtained the 2006 landing and parking fees for Bob Hope Airport and the two airports to which flights are expected to be diverted—LAX and Ontario International.*
- Obtained block hour operating costs for the diverted aircraft types.**

*In 2006, the landing fee for signatory carriers at Bob Hope Airport was $.80 per 1,000 pounds, maximum gross landing weight (MGLW). There was no aircraft parking fee. The landing fee for signatory passenger carriers at LAX was $2.69 per 1,000 pounds MGLW, and the parking fee was $.40 per day per 1,000 pounds MGLW. The landing fee for signatory carriers at ONT was $2.29 per 1,000 pounds MGLW, and the parking fee was $.40 per day per 1,000 pounds MGLW.

**A block hour is the cost to operate an aircraft for one hour. Block hour costs, by airline and aircraft type, were used for the 12-month period ending September 2006, as published in *Aviation Daily*, February 20 through March 21, 2007.

- Then the following calculations were made:
  - Compute the additional landing and parking fees paid at LAX and Ontario, where fees are higher than at Bob Hope Airport.
  - Compute repositioning costs for aircraft diverted to LAX and Ontario for the next morning's flights. The computation assumed that 1.5 hours of aircraft operating and crew time would be required for the repositioning.
  - Compute repositioning costs for aircraft on cancelled flights. It was assumed that these flights would be about 500 miles long and that the total aircraft operating time for repositioning would be 2.5 hours.

The costs for the ad hoc charter airlines in shifting their flights from Bob Hope Airport to LAX would primarily involve the payment of higher landing fees and parking fees. The total costs were estimated by computing the difference in fees paid at LAX compared to fees paid at Bob Hope Airport.

The total estimated costs of diversions, aircraft repositioning, and the relocation of charter flights to LAX are presented in Table 4-15.

Table 4-15

ANNUAL AIRLINE DIVERSION AND REPOSITIONING COSTS BY CURFEW ALTERNATIVE FOR 2008 AND 2015

Bob Hope Airport FAR Part 161 Study

Year	Curfew Alternative	Diversion Costs	Repositioning Costs for Cancelled Flights	Cost for Flights Permanently Shifted to LAX	Total
2008	Full Curfew	$27,081	$220,954	$ 5,248	$253,283
	Departure Curfew	--	$ 54,163	$ 5,248	$ 59,411
	Noise-Based Curfew	$27,081	$220,954	$ 5,248	$253,283
2015	Full Curfew	$41,840	$287,888	$57,707	$387,435
	Departure Curfew	--	$ 60,573	$57,707	$118,280
	Noise-Based Curfew	$41,840	$287,888	$57,707	$387,435

4.6.4.3 Opportunity Costs to the Airlines

With implementation of any of the alternatives under consideration, one flight is expected to be eliminated from the projected 2008 schedule and two flights from the projected 2015 schedule. In addition, it is anticipated that one early morning United Airlines flight to San Francisco will be rescheduled to depart after 7:00 a.m. The later departure will cause it to miss enough connecting opportunities at San

Francisco that the airline is expected to replace the B737 on the flight with a smaller Regional Jet.

If, in the absence of a curfew, the airlines are using their aircraft to fully maximize profits, then the reassignment of aircraft to other routes and markets in response to the curfew will result in some degree of profit loss. As a foregone opportunity for profit, this potential loss is considered an opportunity cost of the curfew.

The following steps were used to calculate the opportunity costs associated with the eliminated flights and the substitution of a smaller aircraft on the United Airlines flight to San Francisco:

- Estimate the percentage of passengers who would have been on the eliminated flights and who would not otherwise use an alternative Burbank flight. (This was taken from Appendix BB of Technical Report 1.)
- The average fare per passenger for the airline on the route.*
- It was assumed that connecting passengers would pay a fare that is an average of 33% higher than a local origin-destination passenger.
- Estimate the percentage of passengers not using an alternative Burbank flight who would be lost entirely to the affected airline. That is, they would either use another airline at another airport or would not fly at all. Of the lost Burbank passengers, estimate the percentage of passengers that will not take a flight to/from another LA-area airport.
- Compute lost revenue for each affected airline.

The net opportunity cost was then calculated by assuming that the foregone profit would be equal to 2% of the revenue that would be lost due to the eliminated flights or aircraft substitution.

Table 4-16 summarizes the opportunity costs to the airlines due to either eliminating flights or utilizing a small aircraft on flights to and from Burbank.

*Fares for the third quarter of 2006 were obtained from Back Aviation, March 2007.

Table 4-16

ANNUAL OPPORTUNITY COSTS TO AIRLINES BY CURFEW ALTERNATIVE FOR 2008 AND 2015

Bob Hope Airport FAR Part 161 Study

Year	Curfew Alternative	Number of Flights Eliminated	Number of Flights with Substitution of Smaller Aircraft	Net Opportunity Cost
2008	Full Curfew	1	1	$ 64,264
	Departure Curfew	1	1	$ 64,264
	Noise-Based Curfew	1	1	$ 64,264
2015	Full Curfew	2	1	$152,284
	Departure Curfew	2	1	$152,284
	Noise-Based Curfew	2	1	$152,284

4.6.4.4 Hotel Cancellation Costs for Airlines

Most hotels usually change a cancellation penalty when a reservation is cancelled after 6:00 p.m. on the day of the reservation. When a flight with an aircraft and crew scheduled to remain overnight is cancelled, the decision will undoubtedly be made after 6:00 p.m. Therefore, airlines canceling those flights will likely have to pay a hotel cancellation penalty. It is possible that the contracts negotiating by the airlines with the hotels will protect them from having to bear the full costs of these cancellations. The following assumptions were made about the added hotel costs for airlines:

- Crews on regional jets require 3 hotel rooms and crews on B-737 or equivalent sized equipment need 5 rooms.
- The penalty for late cancellation of a reservation is $35 per room.
- Flights diverted to other Los Angeles area airports will not be affected as the crews are assumed to use the rooms originally booked for them.

This cost will affect airlines only under the full curfew and the noise-based curfew. Table 4-17 provides a breakdown of the additional hotel costs to the airlines.

Table 4-17

COST OF LATE HOTEL CANCELLATIONS BY CURFEW ALTERNATIVE FOR 2008 AND 2015

Bob Hope Airport FAR Part 161 Study

Year	Curfew Alternative	Total Additional Hotel Costs
2008	Full Curfew	$14,630
	Departure Curfew	$ 0
	Noise-Based Curfew	$14,630
2015	Full Curfew	$21,280
	Departure Curfew	$ 0
	Noise-Based Curfew	$21,280

4.7 BENEFITS AND COSTS THAT ARE HARD TO QUANTIFY OR MONETIZE

Thus far, the analysis has considered only monetizable benefits and costs. The FAA's benefit-cost analysis guidance document advises the consideration of benefits, costs, and impacts that are "hard to quantify."* This includes benefits and costs that are difficult to measure or difficult to describe in monetary terms. (For example, estimates can be made of the number of reduced awakenings. It is quite difficult, however, to assign a dollar value to them.)

The consideration of hard-to-quantify benefits and costs is important, as stated in the FAA's guidance document.

> In selecting between alternatives that have approximately equal NPVs [net present value of benefits], particular weight should be assigned to the alternative with the preponderance of qualitatively described benefits. Moreover, the airport sponsor may believe that a lesser ranked project from an NPV perspective has very important hard-to-quantify benefits that would make it preferable to the other alternatives.**

4.7.1 Hard-to-Quantity Benefits

As already stated (p. 4-4), the fundamental benefit of a nighttime curfew is the reduction of nighttime noise in the Airport environs. The value of this benefit is intrinsically difficult to compute. Indirect indicators of the monetized benefits of a curfew, the reduction of sound insulation costs and the increase in residential property values, have been used to estimate at least part of the benefit of nighttime

**FAA Airport Benefit-Cost Analysis Guidance*. Office of Aviation Policy and Plans, Federal Aviation Administration, December 15, 1999, pp. 58 and 90.

***Ibid*, p. 90.

noise reduction. It is useful, however, to consider the more direct (and more difficult to quantify) benefits to local residents.

4.7.1.1 Reduced Sleep Disturbance

One of the chief benefits of a nighttime curfew is the reduced incidence of noise-induced awakenings and sleep disturbance. This benefit is analyzed in detail in Appendix C and discussed in Chapter 5, Section 5.3.4.3. Research indicates that only a relatively small proportion of people are highly sensitive to noise at the levels that are experienced indoors in the Bob Hope area.* Although the proportion may be small, the number of affected individuals is large. It is estimated that the number of awakenings over an average year would be reduced by 146,000 to 265,000 with implementation of a full curfew. (See Chapter 5, Table 5-3.)

A contingent valuation survey, described in Appendix E, found that 19% of respondents in the Airport area reported being awakened by aircraft noise more than once per month.** Based on projected 2008 noise levels, this would correspond to 917 people within the 65 CNEL contour who are subject to awakenings more than once per month.

The effects of sleep disruption can be debilitating, causing irritability, difficulty in concentrating, and decreased work performance. Chronic sleep disruption is also known to be detrimental to health.

While the state of scientific understanding does not enable precise quantification of noise-induced awakenings, and while the monetary value of an uninterrupted night's sleep cannot be reliably computed, the reduction of awakenings must be considered a significant benefit of a nighttime curfew.

4.7.1.2 Improved Quality of Life for Residents

In addition to the reduction in awakenings and sleep disturbance, the reduction of nighttime noise provides a variety of other benefits, not all of which are likely to have been captured by the estimated increase in residential property values within the 65 CNEL contour. The benefits include the reduction of nighttime disruptions in conversation, television viewing, and quiet relaxation. They also include the increased flexibility afforded residents in enjoying their property. They can enjoy outdoor relaxation and entertainment with less disturbance, and they can leave windows open on pleasant nights while they sleep.

While the value of at least part of this collection of benefits is captured by the increase in property values within the 65 CNEL contour, these benefits are also enjoyed by sensitive people residing outside the 65 CNEL contour. Although FAA policy and the Airport Authority's compatible land use guidance note that

*See Appendix C for more detail on noise-induced awakenings research.

**Appendix E, Table E-1.

residential land use is compatible with aircraft noise less than 65 CNEL, it must be recognized that at least some people are disturbed by noise at those lower noise levels. While the degree of community impact is not severe enough to deem residential use "incompatible" with noise below 65 CNEL, the relief of adverse nighttime noise effects on sensitive people must be recognized as an intangible or hard to quantify benefit of a full curfew and the less restrictive curfews.

4.7.1.3 Reduced Controversy and Contention

As discussed in Chapter 2, Section 2.1, nighttime noise and the question of a curfew have been at the center of the frequently contentious, often litigious relationship between the City of Burbank and the Authority for 30 years. Those conflicts have cost the City and the Authority tens of millions of dollars in legal fees and other expenses, have occupied the time and attention of City and Authority leadership and have added to the cost, in time, money and resources, of operating the Airport and governing the City. Implementation of a full curfew would remove one of the critical points of contention relating to the Airport. This would provide the opportunity to improve relations between the City and the Authority, permitting more efficient resolution of the many issues on which the City and Authority must coordinate. While it is impossible to place a dollar figure on this effect, it is an important benefit of the full curfew.

Given the City of Burbank's position that only a full curfew will meet its objectives, this benefit would not be attributable to the two less restrictive curfews under study.*

4.7.1.4 Benefits to Nonresidents and Businesses

In addition to the nighttime noise reduction benefits enjoyed by local residents are the benefits enjoyed by owners, employees, and customers of local businesses. While these businesses are generally compatible with the Airport CNEL noise levels in the environs, it must be recognized that at least some of the people at those business uses will be disturbed by nighttime aircraft noise. Hotels are one example of a business where customers would benefit appreciably from the reduction of nighttime aircraft noise. In fact, the reduction in nighttime awakenings of hotel occupants may be proportionately much greater than the reduction for permanent residents. One of the interesting findings of the awakenings research is that many people become habituated to recurring nighttime noise. (This factor has been accounted for in the awakenings estimates discussed in Section 4.7.1.1, above.) In contrast to permanent residents, hotel occupants will not stay in the area long enough to become habituated to airport noise.

Other businesses where people would benefit from nighttime noise reduction include 24-hour restaurants and local sound, video, and film studios.

*See letter from Mayor Dave Golonski to Part 161 Study Comment Docket, June 13, 2008, Detailed Comments, p. 9.

4.7.2 Hard-to-Quantity Costs

Estimating the costs of the proposed curfew is conceptually much simpler than estimating the benefits. The costs of adjusting to the curfew are directly borne by aircraft operators. After assessing the responses of the operators to the curfew, estimation of their operating costs and losses in revenue is rather straightforward, although collection of the required data and the related computations can be complicated.

One category of costs that has proven difficult to estimate is the cost to air cargo customers.

4.7.2.1 Costs to Cargo Customers

Costs to FedEx and UPS customers relying on the early morning arrivals were not estimated but deserve consideration. (The costs to Ameriflight's customers were considered in the additional ground transportation costs they would incur in driving from downtown to Ontario rather than Burbank.)

With either the full curfew or the noise-based curfew, UPS and FedEx each would have to eliminate one early morning arrival at the Airport. This would require the flights to be shifted to an alternate airport, most likely LAX. Alternatively, the carriers could choose to add the cargo from the displaced BUR flights to flights already serving LAX. In either case, the effect would be to put the arriving cargo somewhat further away from San Fernando Valley customers. Essentially, this would increase the "stem-time" (time required for trucks to move cargo from LAX to the San Fernando Valley ground sorting facilities of each carrier), which is one of the most critical operational metrics of integrated carriers like FedEx and UPS. This could delay delivery of packages to customers of the highest priority early morning delivery service. It would have negligible effect on customers for standard next day, 2nd day, or bulk cargo service. Without access to proprietary information from each carrier, it is not possible to reliably compute the amount of delay in providing early morning service. It is quite possible that the delay would make it impractical to provide the highest priority early morning deliveries.

Both UPS and FedEx currently offer early morning delivery service in the Burbank area, with deliveries by 8:30 a.m. If this became impractical, the best service that could be offered would be their next day morning service, with deliveries by 10:30 a.m. Thus, as a worst case estimate, the highest priority delivery services would be delayed by about 2 hours. In Section 4.6.2.2.1, it was estimated that 0.5% of the cargo on the affected flights would be highly time-sensitive goods. While this provides an understanding of the volume of affected shipments, the consequences of the delay in receiving deliveries are unknown.

4.7.2.2 Quality-of-Life Costs

In Section 4.7.1, benefits in improved quality of life for Bob Hope Airport area residents were discussed. The opposite may occur for residents near airports that receive operations shifted from Bob Hope Airport after implementation of a curfew. Only Van Nuys Airport and Ontario International Airport will receive a large enough number of flights to potentially cause a noticeable increase in noise in the surrounding area. (See Chapter 10 for an analysis of the air traffic shifted to other airports due to a curfew at Bob Hope Airport.) Noise analyses were undertaken for both airports. The Van Nuys analysis found that CNEL levels would increase by 0.5 to 0.9 dBA within the 65 CNEL contour based on 2015 forecasts. Levels would increase by 0.1 to 0.3 dBA in the Ontario area.* These compare with decreases of 1.6 to 6.0 dBA within the 65 CNEL in the Bob Hope Airport area. Clearly, the increases in noise at those two airports are far less than the decreases at Bob Hope Airport.

The increase at Ontario is so small that it is difficult to envision any adverse quality of life effects. The increase at Van Nuys is greater and may possibly result in adverse effects for particularly sensitive people.

4.8 COMPARISON OF BENEFITS AND COSTS

Tables 4-18 through 4-20 present the results of the benefit-cost analysis for each curfew alternative. All three produce net benefits. The departure curfew results in the greatest net benefits and highest benefit-cost ratio -- $37.98 million and 3.15. The full curfew has the next highest level of net benefits, at $19.31 million, with a benefit-cost ratio of 1.40. The noise-based curfew produces slightly lower net benefits, at $19.16 million, but a slightly higher benefit-cost ratio, 1.47, than the full curfew.

*The results of the Van Nuys noise analysis is described in Chapter 10, Section 10.3.2.2.1. The Ontario analysis is in Section 10.3.2.6.1 of the same chapter.

Table 4-18

BENEFIT-COST ANALYSIS SUMMARY -- FULL CURFEW
Bob Hope Airport FAR Part 161 Study

Year	Benefits (in constant 2006 dollars)			Costs (in constant 2006 dollars)					Net Present Values (2006 dollars)	
	Residential Property Value Increase	Reduced Acoustical Treatment Obligation	**Total Benefits**	Airline Costs	Passenger Costs	All-Cargo Carrier Costs	General Aviation Costs	**Total Costs**	Net Present Value of Benefits	Net Present Value of Costs
2008	$ 9,022,949	$ 7,981,875	$ 17,004,824	$ 922,322	$ 1,661,275	$ 3,400,443	$ 1,990,552	$ 7,974,593	$ 14,852,672	$ 6,965,318
2009	$ -	$ 11,120,875	$ 11,120,875	$ 1,011,167	$ 1,829,164	$ 3,152,946	$ 1,760,067	$ 7,753,345	$ 9,077,947	$ 6,329,039
2010	$ -	$ 11,120,875	$ 11,120,875	$ 1,100,012	$ 1,997,053	$ 3,182,551	$ 1,836,584	$ 8,116,201	$ 8,484,062	$ 6,191,811
2011	$ -	$ 11,120,875	$ 11,120,875	$ 1,188,856	$ 2,164,942	$ 3,212,156	$ 1,876,099	$ 8,442,054	$ 7,929,030	$ 6,019,068
2012	$ -	$ 11,120,875	$ 11,120,875	$ 1,277,701	$ 2,332,831	$ 3,241,761	$ 1,915,613	$ 8,767,907	$ 7,410,309	$ 5,842,427
2013	$ -	$ 11,120,875	$ 11,120,875	$ 1,366,546	$ 2,500,720	$ 3,237,965	$ 1,975,031	$ 9,080,262	$ 6,925,522	$ 5,654,731
2014	$ -	$ 11,120,875	$ 11,120,875	$ 1,455,390	$ 2,668,609	$ 3,312,239	$ 2,030,311	$ 9,466,550	$ 6,472,451	$ 5,509,618
2015	$ -	$11,120,875	$ 11,120,875	$ 1,544,235	$ 2,836,499	$ 3,386,513	$ 2,118,994	$ 9,886,241	$ 6,049,019	$ 5,377,460
								TOTAL	**$ 67,201,011**	**$ 47,889,470**

Net Present Value of Benefits:	**$19,311,541**
Benefit-Cost Ratio:	**1.40**

ASSUMPTIONS

Discount Rate:	7%
Curfew Start Date:	2008

Source: Jacobs Consultancy, 2008.

Table 4-19

BENEFIT-COST ANALYSIS SUMMARY -- DEPARTURE CURFEW
Bob Hope Airport FAR Part 161 Study

Year	Benefits (in constant 2006 dollars)			Costs (in constant 2006 dollars)					Net Present Value (2006 dollars)	
	Residential Property Value Increase	Reduced Acoustical Treatment Obligation	**Total Benefits**	Airline Costs	Passenger Costs	All-Cargo Carrier Costs	General Aviation Costs	**Total Costs**	Net Present Value of Benefits	Net Present Value of Costs
2008	$ 7,290,690	$ -	$ 7,290,690	$ 237,479	$ 501,828	$ 1,257,774	$ 1,312,095	$ 3,309,176	$ 6,367,971	$ 2,890,362
2009	$ -	$ 7,363,750	$ 7,363,750	$ 267,756	$ 579,899	$ 936,005	$ 1,119,279	$ 2,902,938	$ 6,011,013	$ 2,369,662
2010	$ -	$ 11,120,875	$ 11,120,875	$ 298,032	$ 657,970	$ 891,336	$ 1,130,463	$ 2,977,800	$ 8,484,062	$ 2,271,750
2011	$ -	$ 11,120,875	$ 11,120,875	$ 328,309	$ 736,040	$ 846,666	$ 1,175,915	$ 3,086,930	$ 7,929,030	$ 2,200,939
2012	$ -	$ 11,120,875	$ 11,120,875	$ 358,586	$ 814,111	$ 801,997	$ 1,187,099	$ 3,161,793	$ 7,410,309	$ 2,106,836
2013	$ -	$ 11,120,875	$ 11,120,875	$ 388,862	$ 892,182	$ 723,928	$ 1,191,483	$ 3,196,455	$ 6,925,522	$ 1,990,591
2014	$ -	$ 11,120,875	$ 11,120,875	$ 419,139	$ 970,253	$ 723,928	$ 1,213,177	$ 3,326,497	$ 6,472,451	$ 1,936,051
2015	$ -	$ 11,120,875	$ 11,120,875	$ 449,415	$1,048,324	$ 723,928	$ 1,269,140	$ 3,490,807	$ 6,049,019	$ 1,898,768
								TOTAL	**$ 55,649,377**	**$17,664,960**
								Net Present Value of Benefits:	**$37,984,417**	
								Benefit-Cost Ratio:	**3.15**	

ASSUMPTIONS
Discount Rate: 7%
Curfew Start Date: 2008

Source: Jacobs Consultancy, 2008.

Table 4-20

BENEFIT-COST ANALYSIS SUMMARY -- NOISE-BASED CURFEW
Bob Hope Airport FAR Part 161 Study

Year	Benefits (in constant 2006 dollars)			Costs (in constant 2006 dollars)					Net Present Value (2006 dollars)	
	Residential Property Value Increase	Reduced Acoustical Treatment Obligation	**Total Benefits**	Airline Costs	Passenger Costs	All-Cargo Carrier Costs	General Aviation Costs	**Total Costs**	Net Present Value of Benefits	Net Present Value of Costs
2008	$ 6,571,374	$ 2,520,875	$ 9,092,249	$ 922,322	$ 1,661,275	$ 2,142,668	$1,668,292	$ 6,394,557	$ 7,941,522	$ 5,585,254
2009	$ -	$ 11,120,875	$ 11,120,875	$ 1,011,167	$ 1,829,164	$ 2,216,941	$1,470,675	$ 6,527,948	$ 9,077,947	$ 5,328,750
2010	$ -	$ 11,120,875	$ 11,120,875	$ 1,100,012	$ 1,997,053	$ 2,291,215	$1,502,609	$ 6,890,889	$ 8,484,062	$ 5,257,026
2011	$ -	$ 11,120,875	$ 11,120,875	$ 1,188,856	$ 2,164,942	$ 2,365,490	$1,569,057	$ 7,288,346	$ 7,929,030	$ 5,196,490
2012	$ -	$ 11,120,875	$ 11,120,875	$ 1,277,701	$ 2,332,831	$ 2,439,764	$1,600,991	$ 7,651,287	$ 7,410,309	$ 5,098,376
2013	$ -	$ 11,120,875	$ 11,120,875	$ 1,366,546	$ 2,500,720	$ 2,514,037	$1,626,125	$ 8,007,427	$ 6,925,522	$ 4,986,623
2014	$ -	$ 11,120,875	$ 11,120,875	$ 1,455,390	$ 2,668,609	$ 2,588,311	$1,703,085	$ 8,415,395	$ 6,472,451	$ 4,897,837
2015	$ -	$ 11,120,875	$ 11,120,875	$ 1,544,235	$ 2,836,499	$ 2,662,585	$1,745,529	$ 8,788,847	$ 6,049,019	$ 4,780,550
								TOTAL	**$ 60,289,862**	**$ 41,130,906**

Net Present Value of Benefits:	**$19,158,955**
Benefit-Cost Ratio:	**1.47**

ASSUMPTIONS

Discount Rate:	7%
Curfew Start Date:	2008

Source: Jacobs Consultancy, 2008.

4.9 SENSITIVITY TESTS

Sensitivity testing was done to consider the effect on the analysis of adjustments to variables that are subject to change or that are particularly difficult to quantify.

The following categories of costs and benefits were subject to the sensitivity tests:

- Benefits and Costs—Estimates of the willingness of sensitive sleepers in the Bob Hope Airport area to pay for a curfew and estimates of the cost of increased nighttime flights and noise to residents of the Van Nuys Airport area, derived from contingent valuation surveys of residents in both areas.
- Benefits—Alternate estimates of the increase in residential property values.
- Benefits—Lower estimate of average acoustical treatment costs.
- Costs—Alternate estimates of the value of passenger time.
- Costs—Alternate projections of the number of ad hoc charter flights in 2015.
- Costs—Alternate projections of the proportion of small packages versus freight carried on all-cargo flights.

4.9.1 Benefit and Cost Estimates from Contingent Valuation Surveys

Contingent valuation surveys were undertaken in the Bob Hope Airport vicinity in an attempt to ascertain the willingness of local residents to pay for a curfew. Because Van Nuys is the airport projected to receive the most noticeable change in flights and noise exposure of the various airports receiving flights shifted from Bob Hope Airport with implementation of a curfew, a contingent valuation survey was also done there. A similar study was done in the Van Nuys Airport area to determine the perception of the cost imposed by the additional noise and aircraft activity.

4.9.1.1 Value of Curfew to People Sensitive to Awakening

The contingent valuation survey administered to a sample of people residing in the Airport area was designed to reveal concerns about nighttime aircraft noise and to consider the value respondents would place on reducing nighttime aircraft noise through any of the curfew alternatives. Because of the uncertainty associated with the findings of the survey, the results are appropriate for consideration in the sensitivity of the benefit-cost analysis. The methodology and a detailed analysis of the data are discussed in Appendix E, Documentation and Analysis of Contingent Valuation Surveys in Bob Hope and Van Nuys Airport Areas.

The analysis of the survey results revealed the following key findings, which are summarized in Table 4-21, below:

- There was a marked difference in willingness-to-pay between those who reported being awakened by aircraft noise and those who did not. (Those who were awakened are willing to pay more.)

- There was also a marked difference in willingness-to-pay between owners and renters. (Owners were willing to pay more.)

Table 4-21

ESTIMATED WILLINGNESS OF LOCAL RESIDENTS TO PAY FOR NIGHTTIME CURFEW BY HOUSING TENURE AND SENSITIVITY TO AWAKENING

Monthly Payment in Current Dollars
Bob Hope Airport FAR Part 161 Study

	Noise Sensitivity		
Housing Tenure	Awakened *(a)*	Rarely Awakened	*Difference*
Owners	$86.84	$57.36	*$29.48*
Renters	$39.42	$29.87	*$ 9.55*

(a) Approximately 19% of the sample reported being awakened more than once per month by aircraft noise at night.

Source: Jacobs Consultancy analysis, 2007.

Using the above payment amounts, an estimate of the total willingness-to-pay of households inside the baseline 65 CNEL contour over the eight-year period from 2008 through 2015 was developed. The results, converted to net present value (2006 dollars) are presented in Table 4-22. Based on the findings of the contingent value survey, local residents are estimated to be willing to pay $5,810,000 through their housing payments for a curfew. This is of the same magnitude as the lower estimates of potential property value increase produced using the results of the hedonic modeling study. (See Table 4-3 in Section 4.5.2, above.)

Table 4-22

TOTAL WILLINGNESS OF LOCAL RESIDENTS TO PAY FOR NIGHTTIME CURFEW
Net Present Value, 2006 Dollars
Bob Hope Airport FAR Part 161 Study

	Any Curfew Alternative
Value of Curfew to All Residents (inside baseline 65 CNEL contour)	$5,810,000

Source: Jacobs Consultancy analysis, 2007.

This result is general confirmation of the validity of the property value increase estimated using the results of the hedonic modeling study, but it cannot be taken as a measure of an additional benefit of the curfew alternatives.

Table 4-21, however, provides evidence of an important detail that could not have been discovered through the hedonic modeling study – that people who report being regularly awakened by aircraft noise are willing to pay more for nighttime noise reduction than those who are rarely awakened.

The hedonic model, which provided a basis for estimating the potential property value increase attributable to the alternative curfews shown in Table 4-3, is explicitly based on housing market data. The price of housing is set by the market, where the interaction of demand and supply establish prices. Aircraft noise is responsible for many disturbances which can annoy people at their residences. While disruption of sleep is one of those disturbances, the research into noise-induced awakenings in residential settings has found that only a small proportion of people are highly sensitive to nighttime awakenings from aircraft noise. According to several studies, indoor sound exposure levels (SELs) from aircraft overflights as loud as 90 dBA awaken only about 5 to 6% of the people exposed to the noise.* Furthermore, in the Bob Hope Airport area, the contingent value survey found that only 19% of respondents reported being awakened more than once per month by aircraft noise.

Given the small proportion of people who are highly sensitive to nighttime awakenings from aircraft noise, it is unlikely that they have sufficient force in the market to affect the price of housing in the airport area. This means that the estimated property value recovery developed from the hedonic modeling study does not fully account for the value of the curfew alternatives to sensitive sleepers.

The additional amount that sensitive sleepers are willing to pay for a curfew, as reported in Table 4-21, above, can be characterized as a premium that households

*See Figure C-1 in Appendix C, Analysis of Aircraft Noise-Induced Awakenings.

with sensitive sleepers would be willing to pay for a curfew. This premium can be taken as an estimate of the value of the reduction in awakenings that would result from the alternative curfews.

Table 4-23 presents the estimated value of the reduction in awakenings. It was calculated by taking the willingness-to-pay premium from Table 4-21 and applying it to the number of households inside the baseline 65 CNEL contour. The annual willingness-to-pay was then converted to net present value to develop the estimate shown in Table 4-23 – a total of $450,000.

Table 4-23

WILLINGNESS OF SENSITIVE SLEEPERS TO PAY FOR ANY CURFEW BY HOUSEHOLD TYPE

Bob Hope Airport FAR Part 161 Study

Households with Sensitive Sleepers	Monthly WTP Premium	Households inside 65 CNEL Contour	
		2008 Baseline	2015 Baseline
Owner Households	$29.48	129	213
Renter Households	$ 9.55	145	240
Annual Willingness to Pay		$62,203	$103,040
Net Present Value (2006 $)		$450,000	

Notes: Estimates of annual willingness to pay for each year between 2008 and 2015 were estimated through interpolation.

The findings presented in Table 4-23 are incomplete since they do not account for differences in value to local residents of the three different curfews. The contingent valuation survey found that supporters of a full curfew were willing to pay more for a curfew than those who supported a less restrictive alternative. As shown in Table 4-24, those favoring a full curfew would be willing to pay $60.48 per month. This is 24% more than the willingness-to-pay of those favoring the less restrictive alternatives (just under $49) and 28% more than the willingness-to-pay of all survey respondents ($47.08). See Table E-4 in Appendix E for more detail.

Table 4-24

MONTHLY WILLINGNESS TO PAY FOR CURFEW BY CURFEW PREFERENCE
Bob Hope Airport FAR Part 161 Study

Preference					Average for All Respondents
Full Curfew	Departure Curfew	Noise-Based Curfew	All Curfews	Unsure or Opposed	
$60.48	$48.91	$48.73	$41.67	$14.66	$47.08

Source: Jacobs Consultancy analysis, 2007. See Appendix E, Documentation and Analysis of Contingent Valuation Surveys in the Bob Hope and Van Nuys Airport Areas, Table E-4.

These findings were used to estimate the final value of the curfew alternatives to sensitive sleepers. As a rough estimate, the value of the full curfew to local residents who are sensitive to being awakened, presented in Table 4-25, is increased by 25% above the value presented in Table 4-23. These results represent a potential net additional benefit of the alternative curfews.

Table 4-25

ESTIMATED WILLINGNESS OF SENSITIVE SLEEPERS TO PAY FOR ALTERNATIVE CURFEWS
Bob Hope Airport FAR Part 161 Study

Net Present Value (2006 $)		
Full Curfew	Departure Curfew	Noise-Based Curfew
$562,000	$450,000	$450,000

Source: Jacobs Consultancy analysis, 2007.

4.9.1.2 Costs of Increased Noise at Van Nuys

Each of the curfews considered in this study would cause nighttime operations to shift from Bob Hope Airport to other airports in the Los Angeles area. These anticipated shifts are discussed in detail in Chapter 10, Condition 6 – Burden on the National Aviation System.

According to the analysis presented in Chapter 10, Van Nuys is projected to have an average of 94 nighttime operations in 2008 and 100 in 2015 (without a curfew at Bob Hope Airport). An increase of 8 to 13 nighttime operations would be experienced in 2008 and 10 to 16 in 2015, with the various curfew alternatives. Over an entire average day, the number of operations shifted from Bob Hope Airport to Van Nuys would range from 11 to 33, depending on the curfew alternative and the forecast year. These represent increases of 1% to 3% in the baseline forecast of operations at Van Nuys.

A contingent value survey of Van Nuys area residents was undertaken in the attempt to establish a basis for monetizing any adverse effect to which the residents would be exposed if a curfew is adopted at Bob Hope Airport. Although the number of respondents was too low to enable a rigorous statistical analysis of the results, the small amount of data were generally consistent with the findings of the contingent value survey undertaken in the Bob Hope Airport area. (See Appendix E for a discussion of the survey and data analysis.)

The survey found that the residents who reported being awakened by nighttime aircraft noise were willing to pay more than less sensitive residents to avoid an increase in 10 nighttime jet operations at the airport. (As in the Bob Hope Airport area survey, willingness to pay was established through a series of questions about the willingness to pay for housing, given various nighttime aircraft operations parameters.)

The average monthly willingness-to-pay to avoid additional nighttime flights, among residents who reported being awakened at night, was $46.88, whereas those who were not awakened were willing to pay an average of $11.11. These results were generally in line with those of the contingent value survey conducted in the Bob Hope Airport area. (At Bob Hope Airport, the willingness-to-pay for a curfew was twice as much.) The results of the two surveys cannot be expected to have yielded the same results, however, because of the different things each was measuring (i.e., the value of a curfew at Bob Hope Airport and the value of avoiding the limited shift of nighttime operations from Bob Hope Airport to Van Nuys).

The following steps were used to estimate the willingness of Van Nuys area residents to pay to avoid an increase in nighttime jet operations.

1. The number of dwelling units estimated to be within the 65 CNEL contour at Van Nuys in 2008 and 2015 with a curfew in force at Bob Hope Airport was estimated. This was done by comparing the FAA's 2007 Terminal Area Forecast for itinerant operations at Van Nuys for 2008 and 2015, with the number of itinerant operations at Van Nuys over the past five years. (This is discussed in greater detail below.)

2. The number of households likely to have a member awakened by noise more than once per month was calculated. Based on the results of the Van

Nuys area survey, 24% of respondents reported being awakened by aircraft noise more than once per month.

3. Compute the willingness of those sensitive to awakenings to pay to avoid an increase in nighttime operations based on a monthly payment of $46.88.

4. Compute the willingness of non-sensitive people to pay to avoid an increase in nighttime operations based on a monthly payment of $11.11.

Table 4-26 shows the number of itinerant operations at Van Nuys in 2002 through 2006 and the forecast for 2008 and 2015. It also shows the projected number of dwelling units inside the 65 CNEL contour in 2002 through 2006. Itinerant operations, rather than total operations or local operations, are more likely to be correlated with the number of impacted dwellings because the loudest aircraft tend to be better represented in the itinerant category. Local operations tend to be dominated by light, single-engine aircraft that produce little noise, compared with jets and multi-engine aircraft.*

The table also shows the projected number of operations that would be shifted to Van Nuys with the curfew alternatives being considered at Bob Hope Airport. Most of these would be nighttime operations, and most would be operations by turbine aircraft.

With the addition of the operations shifted from Bob Hope Airport, the 2008 forecast of itinerant operations is similar to the actual 2006 level. The 2015 projection is similar to the actual 2005 level. Thus, for purposes of estimating the willingness of Van Nuys area households to pay to avoid an increase in nighttime operations, the 2006 dwelling impact count was used to represent projected 2008 conditions and the 2005 impact count 2015 conditions.

Table 4-27 presents the results of the computation of the willingness of Van Nuys area residents to pay to avoid an increase in nighttime operations. In 2008, the total estimated willingness to pay is estimated at $11,596. In 2015, it is estimated to increase to $78,380, based on the projected increase in operations and noise levels. The total over the entire period, expressed in net present value, would be $232,000.

*Of course, the relationship between operations and the size of noise contours is generally quite imprecise. Other influences on airport noise include runway use percentages, the specific aircraft fleet mix, and flight tracks. At Van Nuys, however, the relationship between itinerant operations and CNEL contours is likely to be roughly constant over a relatively short time period. This is because dramatic changes in fleet mix from year to year are unlikely, the runway use percentages change very little from year to year, and flight track variations have virtually no impact at the 65 CNEL level and above.

Table 4-26

HISTORICAL AND FORECAST ITINERANT OPERATIONS COMPARED WITH HISTORICAL NOISE IMPACTS

Van Nuys Airport

Year	Curfew Alternative	Operations Shifting to VNY	Itinerant Operations At VNY	Itinerant Operations with Curfew at BUR	Dwellings Inside 65 CNEL Contour
Historical					
2002	--	--	343,344	--	836
2003	--	--	322,053	--	643
2004	--	--	313,217	--	550
2005	--	--	300,876	--	365
2006	--	--	285,445	--	54
Forecast					
2008	Without Curfew at BUR	--	269,627	--	--
	With Full Curfew	*6,789*	--	*276,416*	--
	With Departure Curfew	*5,723*	--	*275,350*	--
	With Noise-Based Curfew	*3,957*	--	*273,584*	--
2015	Without Curfew at BUR	--	289,322	--	--
	With Full Curfew	*12,111*	--	*301,433*	--
	With Departure Curfew	*9,454*	--	*298,776*	--
	With Noise-Based Curfew	*6,132*	--	*295,454*	--

Sources: Historic and forecast itinerant operations from FAA 2007 Terminal Area Forecast, http://aspm.faa.gov/main/taf.asp.

Dwellings inside 65 CNEL from 4th quarter noise contours and incompatible land use reports, Los Angeles World Airports.

Estimate of operations shifting to VNY with alternative curfews, Jacobs Consultancy, 2007.

Table 4-27

ESTIMATED WILLINGNESS OF VAN NUYS AREA HOUSEHOLDS TO PAY TO AVOID INCREASE IN NIGHTTIME OPERATIONS
Van Nuys Airport

Year	Estimated Number of Dwellings In 65 CNEL Contour *(a)*	Estimated Willingness to Pay
2008	54	$11,596
2015	365	$78,380
Total, 2008 through 2015, NPV(2006 $)		$232,000

(a) The number of dwelling units inside the 65 CNEL contour is estimated to be the same in 2008 as it was in the fourth quarter of 2006. The number in 2015 is estimated to be the same as in the fourth quarter of 2005.

4.9.1.3 Effect of Findings of Contingent Valuation Survey on Benefit-Cost Analysis

Table 4-28 presents the combined effects of the estimated willingness-to-pay for a curfew, in the Bob Hope Airport area, and the estimated willingness-to-pay to avoid an increased in nighttime operations in the Van Nuys area. Because the willingness-to-pay estimates are small, and they nearly cancel out each other, they have little effect on the benefit-cost ratios.

Table 4-28

SENSITIVITY TEST – USING FINDINGS OF CONTINGENT VALUATION SURVEYS
Bob Hope Airport FAR Part 161 Study

Alternative	Baseline B-C Ratio	B-C Ratio with Sensitivity Test
Full Curfew	1.40	1.41
Departure Curfew	3.15	3.13
Noise-Based Curfew	1.47	1.47

Note: Ratios above 1.0 mean that benefits exceed costs.

4.9.2 Alternate Estimates of the Amount of Property Value Increase

Table 4-3 in Section 4.5.2 presented alternate estimates of the potential increase in residential property values that could occur with implementation of the curfew alternatives. For this sensitivity test, the high and low estimates for each alternative were substituted into the benefit-cost analysis model. The results are shown in Table 4-29. The alternate estimates either increase or decrease the benefit-cost ratios for each alternative by only .02 to .07, and do not change the conclusions of the analyses – that all curfews are likely to produce net economic benefits.

Table 4-29

SENSITIVITY TEST – ALTERNATE ESTIMATES OF PROPERTY VALUE INCREASE
Bob Hope Airport FAR Part 161 Study

Alternative	Baseline B-C Ratio	B-C Ratios with Sensitivity Tests	
		High Estimate	Low Estimate
Full Curfew	1.40	1.37	1.42
Departure Curfew	3.15	3.08	3.20
Noise-Based Curfew	1.47	1.44	1.48

Note: Ratios above 1.0 mean that benefits exceed costs.

4.9.3 Alternate Estimates of the Value of Passenger Time

The FAA has developed guidance for economic values to use in benefit-cost analyses. According to that guidance document, passenger time is to be valued at $28.60 per hour. The guidance also offers a range of values for use in sensitivity analysis, with a low value of $23.80 and a high value of $35.60.*

Table 4-30 shows the results of sensitivity analyses using these alternate values of passenger time. The benefit-cost ratios change by only .02 to .12, and the conclusions of the analyses remain unchanged.

*_Economic Values for FAA Investment and Regulatory Decisions: A Guide_ (Draft Final Report), prepared by GRA, Inc. for FAA Office of Aviation Policy and Plans, FAA, Washington, DC, December 31, 2004, p. 1-3.

Table 4-30

SENSITIVITY TEST – ALTERNATE ESTIMATES OF VALUE OF PASSENGER TIME
Bob Hope Airport FAR Part 161 Study

Alternative	Baseline B-C Ratio	B-C Ratios with Sensitivity Tests	
		Low Estimate	High Estimate
Full Curfew	1.40	1.44	1.35
Departure Curfew	3.15	3.24	3.03
Noise-Based Curfew	1.47	1.49	1.40

Note: Ratios above 1.0 mean that benefits exceed costs.

4.9.4 Alternate Forecast of Ad Hoc Charter Flights in 2015

In developing the flight schedules that were used as the basis for preparing the forecast of air carrier operations for the three curfew alternatives, it was projected that ad hoc charter operations would increase from 33 in 2008 to 346 in 2015. In Appendix BB of Technical Report 1, Aviation Activity Forecasts, it is explained that the charter forecast was essentially an artifact of the process of assigning operations to a specific flight schedules. Residual operations that remained after the development of the schedule were treated as charter operations.

The number of charter operations projected for 2008 -- 33, or less than one-tenth per day -- is too small to have any consequences on the benefit-cost analysis. The number of operations projected for 2015 – 346 – is high enough, however, to justify a test of its effect on the benefit-cost analysis.

The detailed flight schedules in Appendix BB of Technical Report 1were developed from the baseline forecasts of operations by time of day. Thus, in structuring a sensitivity test of the 2015 charter operations forecast, it is essential to preserve the same total number of operations, but to reassign them from charter to regularly scheduled service. For this test, the following assumptions were made:

- The number of charter operations in 2015 will be 66, twice the number projected for 2008 and 280 fewer than in the baseline forecast.
- The 280 operations removed from the 2015 charter forecast will be provided by a scheduled air carrier through a seasonal flight offered over a period of 4 to 6 months (depending on the number of days in the week the flight is offered).

Since the 280 reassigned operations represent nighttime air carrier operations for the baseline, unrestricted case, it was necessary to estimate how many would be subject to the various impacts of each curfew alternative (such as cancellation and diversion). This was done in the following way:

- Take the number of nighttime air carrier operations in the unrestricted forecast for 2015 from Table 50 on page 89 of Technical Report 1, Aviation Activity Forecasts (16.1 operations per night, equal to 5,877 for the year).

- Take the number of air carrier operations under each curfew alternative that will be subject to cancellation, diversion, or elimination in 2015 and compute a percentage of total unrestricted operations affected by each alternative:

  – With the full curfew and the noise-based curfew—2,549 operations (43% of the unrestricted nighttime operations)

  – With the departure curfew—2,270 operations (39%)

- Assume that under the full curfew and the noise-based curfew, 43% of the 280 scheduled operations (121) would be subject to the effects of the curfew. With the departure curfew, assume that 39% (108) would be subject to curfew effects.

The costs to the airlines and passengers were computed in the following three steps:

1. Compute average costs per affected charter operation and scheduled operation for airlines and passengers under each alternative curfew, using the data developed and presented in Sections 4.6.3 and 4.6.4 for the benefit-cost analysis. The following averages were computed:

   Charter (all curfew alternatives) –
   Airline cost per affected operation—$167
   Passenger cost per affected operation—$1,467

   Scheduled Carrier –
   Airline cost per affected operation (full and noise-based curfews)—$583
   Passenger cost per affected operation (full and noise-based curfews)—$914

   Airline cost per affected operation (departure curfew)—$173
   Passenger cost per affected operation (departure curfew)—$238

2. Compute total costs to airlines and passengers for the alternate 2015 projection of charter operations (66) and the incremental change in affected air carrier operations (121 with the full and noise-based curfews and 108 with the departure curfew).

3. Subtract the costs of the alternative curfews to the charter carriers and charter passengers in the baseline 2015 benefit-cost analysis from the total costs to carriers and passengers for the alternate projection of charter/scheduled operations from Step 2, above. The result is the net change in costs to all air carriers and airline passengers to use for this sensitivity test.

Table 4-31 summarizes the effect of these adjustments. For the full curfew and the noise-based curfew, the cost to airlines increases slightly with the alternate charter forecast, but the cost to passengers declines by a far greater amount. For the departure curfew, both the costs to the airlines and to the passengers decrease with the alternate charter forecast.

Table 4-31

EFFECT OF SENSITIVITY TEST OF ALTERNATE CHARTER OPERATIONS FORECAST FOR 2015

Bob Hope Airport FAR Part 161 Study

	Costs of Full Curfew and Noise-Based Curfew		Costs of Departure Curfew	
	Cost to Airlines	Cost to Passengers	Cost to Airlines	Cost to Passengers
Baseline BCA	$9,866,229	$17,991,095	$2,747,578	$6,200,606
With Alternate Charter Forecast	$9,962,774	$16,792,067	$2,635,444	$4,660,741
Net Change with Alternate Forecast	$96,545	($1,199,028)	($112,134)	($1,539,865)

Costs in actual 2006 dollars.

Table 4-32 shows the results of the sensitivity test. Because the net effect of this test is to reduce the overall costs imposed upon airlines and passengers, the benefit-cost ratios for all three alternatives increase, although just slightly.

Table 4-32

SENSITIVITY TEST – ALTERNATE FORECAST OF CHARTER OPERATIONS IN 2015
Bob Hope Airport FAR Part 161 Study

Alternative	Baseline B-C Ratio	B-C Ratio with Sensitivity Test
Full Curfew	1.40	1.42
Departure Curfew	3.15	3.14
Noise-Based Curfew	1.47	1.49

Note: Ratios above 1.0 mean that benefits exceed costs.

4.9.5 Alternate Projections of Cargo Split

In the initial analysis of the costs of the curfew to the express package carriers, the proportion of cargo involving small express packages was estimated at 33%, while bulk cargo was estimated at 67%. For this test, the proportion of small packages was changed to 45%. This has the effect of increasing the costs of the curfew since small packages generate more revenues for the carrier by weight and volume.

Table 4-33 shows the results of the sensitivity test. The benefit-cost ratio for the full curfew declines by 0.10 and for the noise-based curfew by .06. The ratio for the departure curfew is unchanged because the large all-cargo carriers will not be affected by the departure curfew.

Table 4-33

SENSITIVITY TEST – HIGHER PROPORTION OF SMALL PACKAGES VERSUS BULK FREIGHT
Bob Hope Airport FAR Part 161 Study

Alternative	Baseline B-C Ratio	B-C Ratio with Sensitivity Test
Full Curfew	1.40	1.30
Departure Curfew	3.15	3.15
Noise-Based Curfew	1.47	1.41

Note: The large all-cargo carriers will not be affected by the departure curfew. Thus, the benefit-cost ratio is unchanged for that scenario. Ratios above 1.0 mean that benefits exceed costs.

4.9.6 Lower Cost Estimate for Multi-Family Acoustical Treatment

One of the benefits of the proposed curfew would be the reduction in the residential acoustical treatment obligation of the Airport Authority, which would save expenditures. The total estimated savings was based on an average cost of $43,000 per unit for both single-family homes and multi-family dwellings. This estimate was derived from a recent contract award for the first program module to include a sizeable proportion of multi-family units.

Because the Airport Authority's experience with acoustical treatment of multi-family dwellings is so limited, and because multi-family units are such a large proportion of the dwellings remaining to be treated, alternative cost estimates were used for a sensitivity test. A multi-family treatment cost estimate of $32,000 was used. This is based on the average cost recently incurred for treatment of multi-family dwellings in Inglewood. At the same time, the single-family treatment cost estimate was changed to $46,000, which is representative of current treatment costs for program modules at Bob Hope Airport including only single-family homes.

The results of the test are shown in Table 4-34. The change in the cost estimate for multi-family acoustical treatment has a relatively large effect on the benefit-cost ratio, reducing it by about two-tenths for the full curfew and noise-based curfew and by four-tenths for the departure curfew. The ratios remain above 1.0, however, for all three cases.

Table 4-34

SENSITIVITY TEST – LOWER COST OF ACOUSTICAL TREATMENT FOR MULTI-FAMILY UNITS
Bob Hope Airport FAR Part 161 Study

Alternative	Baseline B-C Ratio	B-C Ratio with Sensitivity Test
Full Curfew	1.40	1.19
Departure Curfew	3.15	2.68
Noise-Based Curfew	1.47	1.22

In baseline analysis, acoustical treatment costs were estimated at $43,000 for both single and multi-family dwellings. In the sensitivity test, single-family costs were estimated at $46,000 and multi-family at $32,000.

Note: Ratios above 1.0 mean that benefits exceed costs.

4.9.7 Combined Effects of Sensitivity Tests

While each sensitivity test, taken individually, has little effect on the outcome of the benefit-cost analysis, it is important to understand the interactions among various combinations of the sensitivity tests. Table 4-35 shows the results of two-way combinations of the sensitivity tests for each curfew alternative. Again, the results show only relatively small changes in the benefit-cost ratios. For the full curfew, the ratio ranges from 1.11 to 1.46. Of the 26 combinations of tests shown in the table, all have benefit-cost ratios above 1.0. The benefit-cost ratios for the departure curfew range from 2.58 to 3.33, while the ratios for the noise-based curfew range from 1.17 to 1.54.

Table 4-36 shows benefit-cost ratios for the three-way combination of sensitivity tests. All of the 24 combinations of variables produce ratios above 1.00, ranging from a low of 1.07 to a high of 1.49. Only 12 of the three-way sensitivity tests apply to the departure curfew. The ratios range from a low of 2.60 to a high of 3.38. The results of the noise-based curfew are similar to the full curfew, with the benefit-cost ratios ranging from 1.12 to 1.56.

Table 4-37 shows four and five-way sensitivity tests for the full curfew. It shows a range of benefit-cost ratios from 1.04 to 1.37.

Table 4-38 shows the four-way sensitivity tests for the departure curfew. The ratios remain well above 2.0 in all four combinations.

Table 4-35

BENEFIT-COST RATIOS FOR TWO-WAY SENSITIVITY TESTS

Bob Hope Airport FAR Part 161 Study

Sensitivity Test	1. Low Estimate of Property Value Increase	2. High Estimate of Property Value Recovery	3. Low Value of Passenger Time	4. High Value of Passenger Time	5. Alternate Forecast of Night Charter Operations	6. Alternate Estimate of Package/Bulk Cargo Split	7. Lower Estimate of MF Acoustical Treatment Costs
Full Curfew							
1. Low Estimate of Property Value Increase	1.37	--	1.41	1.32	1.39	1.27	1.16
2. High Estimate of Property Value Increase		1.42	1.46	1.37	1.45	1.32	1.21
3. Low Value of Passenger Time			1.44	--	1.46	1.34	1.23
4. High Value of Passenger Time				1.35	1.37	1.25	1.15
5. Alternate Forecast of Night Charter Operations					1.42	1.32	1.21
6. Alternate Estimate of Package/Bulk Cargo Split						1.30	1.11
7. Lower Estimate of MF Acoustical Treatment Costs							1.19
Departure Curfew							
1. Low Estimate of Property Value Increase	3.08	--	3.17	2.96	3.07	N.A.	2.61
2. High Estimate of Property Value Increase		3.20	3.29	3.08	3.19	N.A.	2.73
3. Low Value of Passenger Time			3.24	--	3.33	N.A.	2.75
4. High Value of Passenger Time				3.03	3.11	N.A.	2.58
5. Alternate Forecast of Night Charter Operations					3.14	N.A.	2.67
6. Alternate Estimate of Package/Bulk Cargo Split						N.A.	N.A.
7. Lower Estimate of MF Acoustical Treatment Costs							2.68
253 EPNdB Curfew							
1. Low Estimate of Property Value Increase	1.44	--	1.49	1.37	1.46	1.38	1.19
2. High Estimate of Property Value Increase		1.48	1.53	1.42	1.51	1.43	1.24
3. Low Value of Passenger Time			1.51	--	1.54	1.45	1.26
4. High Value of Passenger Time				1.40	1.42	1.35	1.17
5. Alternate Forecast of Night Charter Operations					1.49	1.43	1.24
6. Alternate Estimate of Package/Bulk Cargo Split						1.41	1.17
7. Lower Estimate of MF Acoustical Treatment Costs							1.22

NOTE: The outlined cells in the matrix show the results of each individual sensitivity test. The others show the results of two-way combinations of tests.

Source: Jacobs Consultancy analysis, 2008

Table 4-36

BENEFIT-CASTRATIOS FOR THREE-WAY SENSITIVITY TESTS

Bob Hope Airport FAR Part 161 Study

Sensitivity Test	3. Low Value of Passenger Time			4. High Value of Passenger Time			5. Alternate Forecast of Night Charter Operations		6. Alternate Estimate of Package/Bulk Cargo Split
	5. Alternate Forecast of Night Charter Operations	6. Alternate Estimate of Package/Bulk Cargo Split	7. Lower Estimate of Acoustical Treatment Costs	5. Alternate Forecast of Night Charter Operations	6. Alternate Estimate of Package/Bulk Cargo Split	7. Lower Estimate of MF Acoustical Treatment Costs	6. Alternate Estimate of Package/Bulk Cargo Split	7. Lower Estimate of MF Acoustical Treatment Costs	
Full Curfew									
1. Low Estimate of Property Value Increase	1.43	1.31	1.19	1.34	1.23	1.16	1.29	1.18	1.08
2. High Estimate of Property Value Increase	1.49	1.36	1.25	1.39	1.27	1.17	1.34	1.23	1.12
3. Low Value of Passenger Time							1.35	1.24	1.13
4. High Value of Passenger Time							1.27	1.16	1.07
Departure Curfew									
1. Low Estimate of Property Value Increase	3.26	N.A.	2.68	3.04	N.A.	2.61	N.A.	2.60	N.A.
2. High Estimate of Property Value Increase	3.38	N.A.	2.80	3.16	N.A.	2.62	N.A.	2.72	N.A.
3. Low Value of Passenger Time							N.A.	2.83	N.A.
4. High Value of Passenger Time							N.A.	2.64	N.A.
Noise-Based Curfew									
1. Low Estimate of Property Value Increase	1.51	1.43	1.23	1.40	1.32	1.19	1.40	1.21	1.15
2. High Estimate of Property Value Increase	1.56	1.47	1.28	1.44	1.36	1.18	1.45	1.26	1.19
3. Low Value of Passenger Time							1.48	1.28	1.21
4. High Value of Passenger Time							1.37	1.19	1.12

Source: Jacobs Consultancy analysis, 2008

Table 4-37

BENEFIT-COST RATIOS FOR FOUR AND FIVE-WAY SENSITIVITY TESTS OF FULL CURFEW

Bob Hope Airport FAR Part 161 Study

Sensitivity Test	3. Low Value of Passenger Time	4. High Value of Passenger Time	5. Alternate Forecast of Night Charter Operations	6. Alternate Estimate of Package/Bulk Cargo Split	7. Lower Estimate of MF Acoustical Treatment Costs	Benefit-Cost Ratio
1. Low Estimate of Property Value Increase	X		X	X		1.32
	X		X		X	1.21
	X			X	X	1.11
		X	X	X		1.24
		X	X		X	1.13
		X		X	X	1.04
			X	X	X	1.09
	X		X	X	X	1.12
		X	X	X	X	1.05
2. High Estimate of Property Value Increase	X		X	X		1.37
	X		X		X	1.27
	X			X	X	1.15
		X	X	X		1.29
		X	X		X	1.18
		X		X	X	1.08
			X	X	X	1.14
	X		X	X	X	1.17
		X	X	X	X	1.10
3. Low Value of Passenger Time			X	X	X	1.15
4. High Value of Passenger Time			X	X	X	1.08

Source: Jacobs Consultancy analysis, 2008

Table 4-38

BENEFIT-COST RATIOS FOR FOUR-WAY SENSITIVITY TESTS OF DEPARTURE CURFEW
Bob Hope Airport FAR Part 161 Study

Sensitivity Test	3. Low Value of Passenger Time	4. High Value of Passenger Time	5. Alternate Forecast of Night Charter Operations	6. Alternate Estimate of Package/Bulk Cargo Split	7. Lower MF Acoustical Treatment Costs	Benefit-Cost Ratio
1. Low Estimate of Property Value Increase	X		X	n.a.	X	2.202.76
		X	X	n.a.	X	2.062.57
2. High Estimate of Property Value Increase	X		X	n.a	X	2.332.88
		X	X	n.a.	X	2.182.69

n.a. – not applicable. Large cargo carriers will not be affected by departure curfew.

Source: Jacobs Consultancy analysis, 2008.

Table 4-39 shows the four and five-way sensitivity tests for the noise-based curfew. The ratios range from a low of 1.10 to a high of 1.50. The results are similar to those for the full curfew.

4.10 BENEFIT-COST ANALYSIS SUMMARY

Table 4-40 summarizes the results of the benefit-cost analysis and sensitivity tests. The results show that the benefit-cost ratio for the full curfew ranges from a low of 1.04 to 1.49. The departure curfew has a benefit-ratio well above 2.0 in all cases. The benefit-cost ratio for the noise-based curfew is similar to the full curfew, ranging from 1.10 to 1.56.

Based on this analysis, all three curfew alternatives have a reasonable chance of the benefits exceeding the costs.

Table 4-39

BENEFIT-COST RATIOS FOR FOUR AND FIVE-WAY SENSITIVITY TESTS OF NOISE-BASED CURFEW

Bob Hope Airport FAR Part 161 Study

Sensitivity Test	3. Low Value of Passenger Time	4. High Value of Passenger Time	5. Alternate Forecast of Night Charter Operations	6. Alternate Estimate of Package/Bulk Cargo Split	7. Lower Estimate of MF Acoustical Treatment Costs	Benefit-Cost Ratio
1. Low Estimate of Property Value Increase	X		X	X		1.45
	X		X		X	1.26
	X			X	X	1.18
		X	X	X		1.34
		X	X		X	1.16
		X		X	X	1.10
			X	X	X	1.17
	X		X	X	X	1.20
		X	X	X	X	1.11
2. High Estimate of Property Value Increase	X		X	X		1.50
	X		X		X	1.30
	X			X	X	1.23
		X	X	X		1.39
		X	X		X	1.20
		X		X	X	1.14
			X	X	X	1.21
	X		X	X	X	1.25
		X	X	X	X	1.16
3. Low Value of Passenger Time			X	X	X	1.23
4. High Value of Passenger Time			X	X	X	1.14

Source: Jacobs Consultancy analysis, 2008

Table 4-40

RANGE OF BENEFIT-COST RATIOS WITH SENSITIVITY TESTS
Bob Hope Airport

	Full Curfew	Departure Curfew	Noise-Based Curfew
Baseline BCA	1.40	3.15	1.47
Low Estimate	1.04	2.57	1.10
High Estimate	1.49	3.38	1.56

Note: Ratios above 1.0 mean that benefits exceed costs.

Chapter 5

CONDITION 1—PROPOSED RESTRICTION IS REASONABLE, NONARBITRARY, NONDISCRIMINATORY

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Chapter 5

CONDITION 1—PROPOSED RESTRICTION IS REASONABLE, NONARBITRARY, NONDISCRIMINATORY

5.1 GENERAL FINDINGS OF CONDITION 1

Under Condition 1 of FAR Part 161, the Airport Authority must demonstrate that the proposed restriction is reasonable, nonarbitrary, and nondiscriminatory. Evidence must be provided that:

- A current or projected noise problem exists.
- The proposed action could relieve the problem.
- Other available remedies are infeasible or would be less cost-effective.
- The noise or access standards are the same for all aviation user classes (or the differences are justified).

5.1.1 Current and Projected Noise Problem

A nighttime aircraft noise problem has existed at Bob Hope Airport for several decades. In 1978, the newly constituted Burbank-Glendale-Pasadena Airport Authority initiated a program of noise abatement actions that periodically has been refined and strengthened. These actions included the adoption of Airport noise rules in 1988, and the implementation of a voluntary curfew on nighttime air carrier flights. In 1997, the Airport Authority initiated a residential acoustical treatment program with Federal support. From a total of 4,700 incompatible dwellings located within the 65 CNEL noise contour in 1985*, the combined efforts of the Authority and aircraft operators using the Airport have decreased the number of incompatible dwellings in 2005 to less than 440.**

Notwithstanding the efforts of the Airport Authority to promote its noise abatement rules and to accelerate its acoustical treatment program, the area exposed to noise above 65 CNEL is now projected to expand due to a forecast increase in aviation activity at Bob Hope Airport. This forecast increase is consistent with forecast growth at airports throughout the Los Angeles Region. Total aircraft operations at the Airport are projected to increase from 136,000 in 2005 to 146,000 in 2015. This growth is attributable to all categories of turbojet and turboprop aircraft - business jets (4.4% annual growth rate), mainline air carrier jets (1.8%), smaller regional jets

*Peat Marwick Airport Consulting Services, *Final Report, Volume 1, Noise Exposure Maps, FAR Part 150 Noise Compatibility Program*, Burbank-Glendale-Pasadena Airport, March 1987, p. 73.

**This is based on the 2005 noise analysis undertaken for this Part 161 Study. See Table B-26, page B-76, in Appendix B, Aircraft Noise Exposure.

(3.4%), and large and medium turboprops (3.7%). An expected total decline of 12% in operations by light propeller aircraft will not offset the noise increase due to the forecast increases in turbojet operations. Consequently, by 2015, the noise problem is expected to grow at Bob Hope Airport, with the number of incompatible dwellings located in the expanded 65 CNEL noise contour projected to increase to 1,260 units. By California law and FAA planning criteria, those additional dwellings would be evidence of a continuing noise problem.

5.1.2 Ability of the Proposed Curfew to Relieve the Noise Problem

The Airport Authority has implemented a two-track noise program: noise abatement (principally its voluntary curfew) to reduce aircraft noise exposure over residential neighborhoods, and noise mitigation (principally the residential acoustical treatment program) to reduce the impact of noise on people and dwellings. While these two programs, together, have substantially reduced the number of noncompatible dwellings around the Airport, a nighttime noise problem persists and is projected to increase at Bob Hope Airport through 2015.

In its Part 150 Noise Compatibility Program (NCP) Update, approved by the FAA in 2000, the Airport Authority concluded that noise reduction measures that are within the sole purview of an Airport Sponsor to implement are not sufficient to effectively strengthen its current program for immediate and near-term mitigation. Accordingly, the Authority included in the NCP Update a measure to pursue an FAR Part 161 Study, which would be conducted to establish a variety of mandatory noise reduction measures that which can be implemented only with FAA approval.

One of the initial elements of the Part 161 Study was to determine which aspect of the Airport's noise problem should be given the highest priority in the Study. After extensive analysis and public outreach, the Authority concluded that nighttime noise is the most serious noise problem at Bob Hope Airport and that eliminating or significantly reducing nighttime aircraft noise is its first priority.

The curfew would fully meet the Airport Authority's goal of eliminating nighttime aircraft noise – a mandatory curfew on all aircraft flight operations (with minor exceptions) between the hours of 10:00 p.m. and 6:59 a.m. Based on findings of the Authority's consultants that it should meet FAA conditions for approval, the Authority selected the full curfew as the proposed measure for which FAA approval is sought.

The effect of the full curfew on the nighttime noise problem would be immediate and nearly total. Based on state-of-the-art analytical techniques, it is estimated that average nightly sleep awakenings caused by aircraft noise would be reduced from over 700 to less than 50 in 2008 and less than 90 in 2015.

Moreover, a full curfew would be highly effective in reducing the Airport's noise problem in terms of its 24-hour impact, as measured by the CNEL metric. With a

full curfew, along with continued implementation of the Airport's acoustical treatment program, the number of incompatible dwellings would be reduced from 1,260 in 2015 to 300.

5.1.3 Feasibility of Other Available Remedies

A range of reasonable alternatives to the proposed restriction were considered in the Part 161 Study, including other operating restrictions, modified flight procedures, and accelerated acoustical treatment of incompatible dwellings. None of the measures were judged to be feasible or cost-effective alternatives to the full curfew, as they would not produce a comparable reduction of nighttime noise impact in terms of noise levels over neighborhoods or sleep awakenings, or work with comparable speed at comparable cost.

5.1.4 Standards for All Aviation User Classes

The proposed full curfew would apply equally to all aviation user classes – air carrier, cargo, corporate, personal. (Exempted categories, such as public safety and late arrivals are justified on the basis of protecting essential public services and flight safety.) Therefore, it was concluded that the proposed restriction would be applied uniformly and would not be unjustly discriminatory.

5.2 REGULATORY REQUIREMENTS

FAR Part 161 Section 161.305(e)(2)(i) (Condition 1) requires a demonstration that the proposed restriction is reasonable, nonarbitrary, and nondiscriminatory. Information required to make this demonstration, quoted from the regulation, includes the following:

A. Essential information needed to demonstrate this condition includes the following:

   1. Evidence that a current or projected noise or access problem exists, and that the proposed action(s) could relieve the problem…

      i. A detailed description of the problem precipitating the proposed restriction…

      ii. An analysis of the estimated noise impact of aircraft operations with and without the proposed restriction for the year the restriction is expected to be implemented, for a forecast timeframe after implementation, and for any other years critical to understanding the noise impact of the proposed restriction.

   2. Evidence that other available remedies are infeasible or would be less cost-effective, including descriptions of any alternative aircraft restrictions that have been considered and rejected, and the reasons for the rejection;

and of any land use or other nonaircraft controls or restrictions that have been considered and rejected…

3. Evidence that the noise or access standards are the same for all aviation user classes or that the differences are justified…

5.3 EVIDENCE OF NOISE PROBLEM

Based on Federal and State of California standards and guidance, a noise problem exists at Bob Hope Airport. Evidence of the noise problem includes:

- A substantial amount of noise-sensitive land use is currently and is projected to remain inside the 65 CNEL contour. Figure B-12 in Appendix B, Aircraft Noise Exposure, shows the noise contours for 2005, 2008, and 2015 for baseline conditions (without any additional noise and operating restrictions). The total noise-sensitive area occupied by noise-sensitive land uses is as follows:

  – 2005 Baseline – 223 acres

  – 2008 Baseline Forecast – 255 acres

  – 2015 Baseline Forecast – 383 acres

- An estimated 3,939 people resided within the 65 CNEL contour in 2005. Based on forecast operations, 4,825 people would be inside the 65 CNEL contour in 2008 and 8,217 in 2015. (See Appendix B, Table B-26 on page B-76 for more information.)

- A requirement for a variance from the State of California for the Airport to continue operations because the Airport has been identified by the County as having a "noise problem." Renewal of the variance is dependent on the Airport Authority showing that it is making continuing progress toward eliminating the noise problem. This is discussed in more detail in Chapter Two, Section 2.6.

- Significant public concern exists about airport noise, especially in regard to nighttime noise. The history of these concerns is described at the beginning of Chapter 2. These concerns have been registered in a variety of forums through the years. These include the public information meetings and public hearing on the Part 150 Study Update in 1998-1999, the listening sessions and public meetings held in 2000 and 2001 at the beginning of the Part 161 study process (documented in Appendix F), and through elections in 2000 and 2001. In November 2000, voters in Burbank approved Measure B, which amended the Burbank Code to prohibit the City from granting permits and approvals for a relocated or expanded terminal without voter approval. In October 2001, Burbank voters approved

Measure A, which prohibited the City from consenting to the acquisition or rezoning of any land for Airport use or from consenting to the financing or construction of a any new Airport facility until the Airport complied with 12 restrictive conditions. (While Measure A was later struck down by the courts, Measure B remains in force.)

- Years of costly litigation by the City of Burbank against the Airport operator, most of which was either directly or indirectly related to the aircraft noise problem, demonstrates the longstanding and serious concerns in the local area. This is summarized in Chapter 2, Section 2.1

- A contingent value survey undertaken in spring 2007 found that airport noise was a substantial problem for many residents. Of the 601 respondents, 40% reported that aircraft noise was a problem for someone in their household. Twelve percent of the respondents said that airport noise or airport-related concerns were the biggest issues confronting their community. Twenty-six percent of the respondents reported having been awakened by aircraft noise, and 19% reported being awakened more than once per month.

The Airport Authority has determined that nighttime noise is the part of the noise problem that most urgently needs to be addressed. Evidence of the contribution of nighttime noise to the noise problem is indicated by the magnitude of reduction in the size of the noise contour with the elimination or substantial reduction of nighttime aircraft activity. With a full curfew, the total area within the 65 CNEL contour would immediately be reduced by 35% and the noise-sensitive area within the contour by 55%.

5.3.1 Current Noise Restrictions

The Airport Authority established noise restrictions in 1988 to address serious public concerns dating back to the 1970s. In fact, the establishment of the noise rules was directly related to the creation of the Airport Authority and its acquisition of the Airport from Lockheed Air Terminal in 1978. Appendix A, Current Noise Rules at Bob Hope Airport, contains the complete text of the noise rules.

Rules 7, 9, 10 and 11 are all at least indirectly relevant to the curfew alternatives under consideration in this Part 161 application.

5.3.2 Measures Taken To Achieve Land Use Compatibility

The Airport Authority has been actively promoting measures to achieve airport land use compatibility since it was formed in 1978. Chapter 2, Setting and Constraints for Noise Abatement, Sections 2.7.2 and 2.7.3, describes the various studies and actions undertaken by the Authority to achieve land use compatibility. These include the

1984 Noise Abatement Plan, the 1989 Part 150 Study, and the 1999 Part 150 Study Update.

In Section 5.4, below, Table 5-4 describes all noise abatement and mitigation measures in the updated Part 150 Noise Compatibility Program (NCP). Table 5-4 also includes a description of all noise abatement and mitigation alternatives considered and rejected in the 1999 Part 150 Study Update.

5.3.2.1 Acoustical Treatment Programs

The most significant projects arising from the Part 150 NCP are the acoustical treatment programs for schools and residences. The school program has resulted in the successful treatment of five schools and preschools. The residential acoustical treatment program (RATP), through which the owners of all housing units within the 65 CNEL contour are offered treatment, has been underway since 1998. As of March 31, 2007, 1,448 dwellings had been treated or were in the process of being treated. As part of this program, the Authority has also acquired avigation easements from the participating property owners.

5.3.2.2 Compatible Land Use Regulations

The Airport Authority has no power to regulate land use. It has had to rely on persuasion to encourage the two municipalities with land use planning and regulatory authority in the Airport vicinity – the cities of Burbank and Los Angeles – to consider land use compatibility planning and regulatory measures. It has attempted to influence the local land use planning and regulatory process through the Part 150 Study process. The current NCP includes several land use measures intended to improve airport compatibility. (See Table 5-4, below.)

The City of Los Angeles has modified its General Plan, through amendments to the two community plans that are applicable in the Airport vicinity, to acknowledge the challenge posed by aircraft noise and to encourage compatible redevelopment in selected areas. The City of Burbank has implemented, in modified form, a recommendation of the 1999 NCP Update through its adoption of a requirement that all new noise-sensitive structures built within the 60 CNEL contour (based on the noise contours in the 1992 Noise Element of its General Plan) be acoustically analyzed and sound-insulated to ensure an interior CNEL (from exterior noise sources) of 45 dBA. (See Burbank Ordinance 3662, effective March 15, 2005.)

It must be recognized that the community surrounding the Airport was almost fully developed many years ago. Most of the housing in the area dates from the 1930s through the 1950s. Thus, compatible land use planning and regulation can play only a small role in improving the noise impact situation in the Airport environs.

5.3.3 Compliance with Grant Assurances

The Authority has complied with the Airport Improvement Program grant assurances, including Grant Assurances 6 and 7 (referenced in Part 161, Section 161.305(e)(2)(i) as (A) and (B)). These grant assurances require that:

> (*A*) Airport development projects be reasonably consistent with plans of public agencies that are authorized to plan for the development of the area around the airport; and
>
> (*B*) The sponsor give fair consideration to the interests of communities in or near where the project may be located; take appropriate action, including the adoption of zoning laws, to the extent reasonable, to restrict the use of land near the airport to activities and purposes compatible with normal airport operations; and not cause or permit any change in land use, within its jurisdiction, that will reduce the compatibility (with respect to the airport) of any noise compatibility program measures upon which federal funds have been expended.

5.3.3.1 Grant Assurance 6 (A)—Consistency with Plans of Public Agencies Authorized to Plan for Development of Airport Vicinity

The three alternative curfews are fully consistent with the plans of public agencies, namely the cities of Burbank and Los Angeles.

The City of Burbank's General Plan, Noise Element, includes the following two goals that are pertinent to this assurance and the proposed restriction:

- To encourage the reduction of noise from all sources;
- To achieve compatibility between airport-generated noise and adjacent land uses.

Burbank has also taken regulatory action to promote the compatibility of new noise-sensitive development with the Airport. As noted in the preceding section, in 2005 the City adopted an ordinance requiring that new residential construction inside the 60 CNEL contour be built to ensure an indoor sound level (from exterior sources) of 45 CNEL.

As for the City of Los Angeles, two community plans address airport-related policies with respect to Bob Hope Airport. The North Hollywood-Valley Village Community Plan (North Hollywood Plan) states that, "[Bob Hope Airport] flight patterns should be restricted from residential areas to the maximum extent

possible." * In addition the North Hollywood Plan also supports continued efforts to reduce noise emanating from airport operations at the Airport.

The Sun Valley-La Tuna Canyon Community Plan (Sun Valley Plan) goes further and identifies the following needs: (1) to provide adequate buffering of residential neighborhoods near the Airport, (2) to minimize impact and growth of the Airport on the surrounding Sun Valley and North Hollywood communities. In addition, the Sun Valley Plan advocates future industrial land uses adjacent to the Airport which would be compatible with the Airport. Finally, the Sun Valley Plan articulates a goal to work with the Authority and FAA to mitigate airport-related noise, traffic, pollution and other negative environmental impacts.**

5.3.3.2 Grant Assurance 7 (B)—Fair Consideration to the Interests of Nearby Communities

The Authority has given fair consideration to the interests in the community and has facilitated the adoption of zoning laws to promote noise compatibility. The preceding section noted that the City of Burbank has adopted an ordinance requiring sound insulation in residences within the 60 CNEL contour. The same section also noted the General Plan policies of both Burbank and Los Angeles relating to Bob Hope Airport.

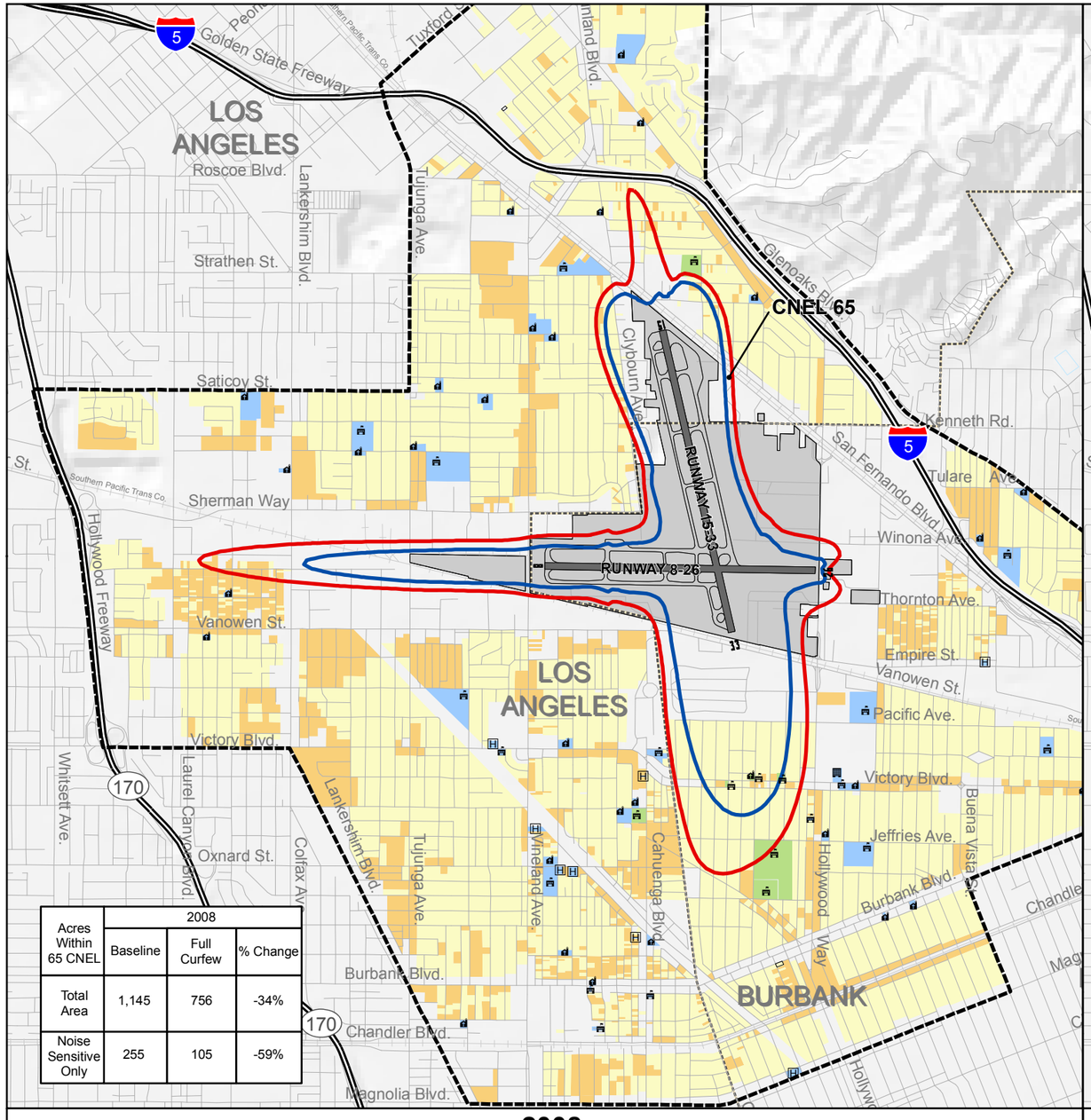
5.3.4 Noise Impact With and Without Proposed Restriction

Appendix B, Aircraft Noise Exposure, documents the noise analysis undertaken for the Part 161 Study. It includes maps of the study area, a description of all technical data used to develop the noise analyses, and forecast operations with and without the proposed restriction. A supplemental report, Technical Report 1, Aviation Demand Forecast, fully documents the forecasts of aviation activity with and without the proposed restriction.

Figures 5-1, 5-2, and 5-3 show the projected CNEL noise contours with each of the curfew alternatives in comparison with the baseline noise contours for 2008 and 2015. The 2008 noise contours are intended to represent conditions upon implementation of each alternative curfew. The 2015 contours depict conditions after the restriction has been in place for several years. No additional years of analysis are necessary to understand the effects of the proposed restriction.

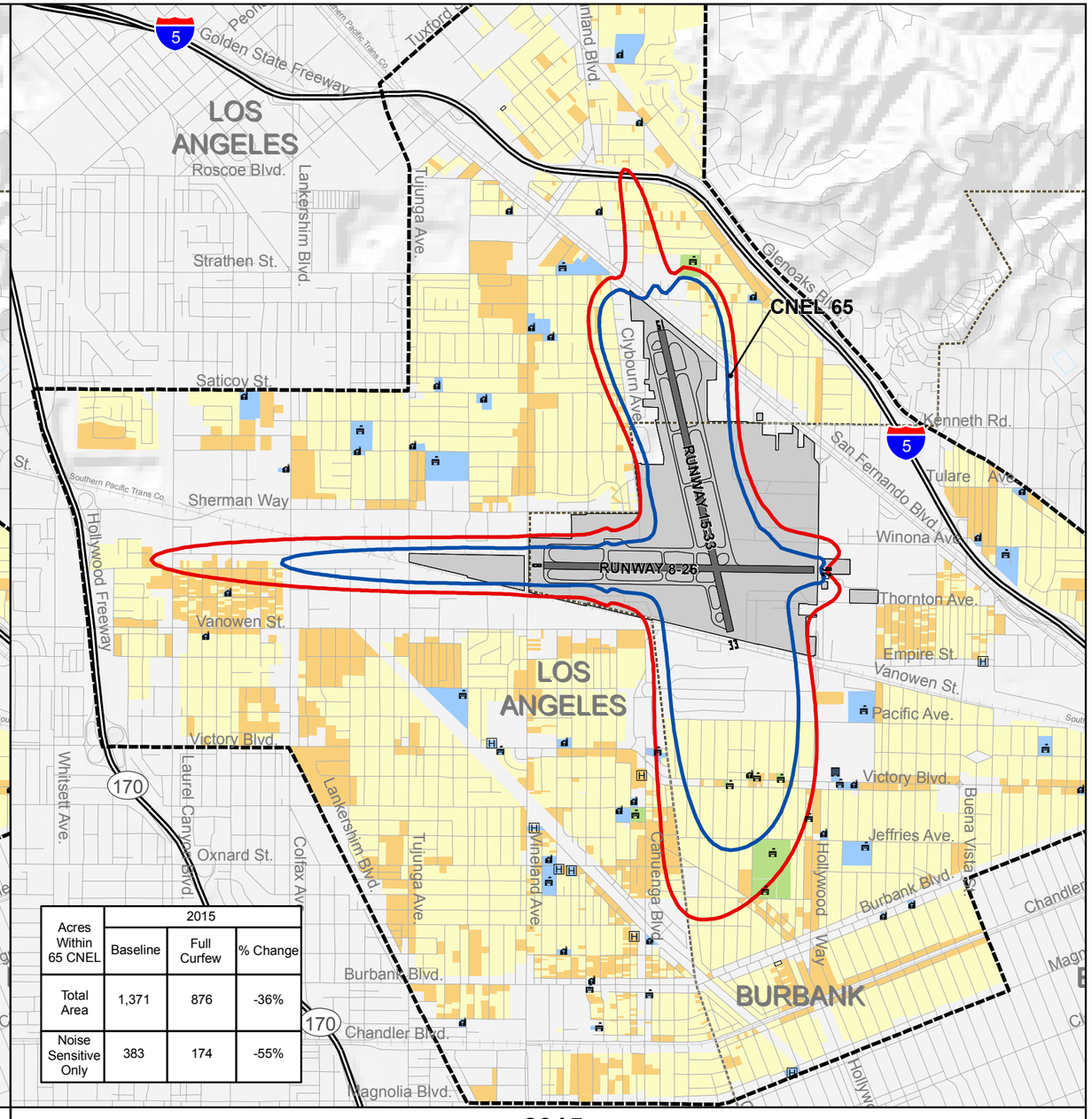
*North Hollywood-Valley Village Plan Community Plan, page III-7.

**Sun Valley-La Tuna Canyon Community Plan, A Part of the General Plans, City of Los Angeles, August 13, 1999. www.lacity.org/pln.



Acres Within 65 CNEL	2008		
	Baseline	Full Curfew	% Change
Total Area	1,145	756	-34%
Noise Sensitive Only	255	105	-59%

2008



Acres Within 65 CNEL	2015		
	Baseline	Full Curfew	% Change
Total Area	1,371	876	-36%
Noise Sensitive Only	383	174	-55%

2015

LEGEND

- Baseline CNEL Contour*
- CNEL Contour With Curfew
- Detailed Land Use Study Area
- Airport Boundary
- Municipal Boundary
- Freeways
- Roads

- Single-Family Residential
- Multi-Family Residential
- Noise-Sensitive Institutions
- Sound-Insulated School

- Schools, Preschools
- Places of Worship
- Hospital
- Library

*Conditions assuming no additional aircraft operating restrictions.

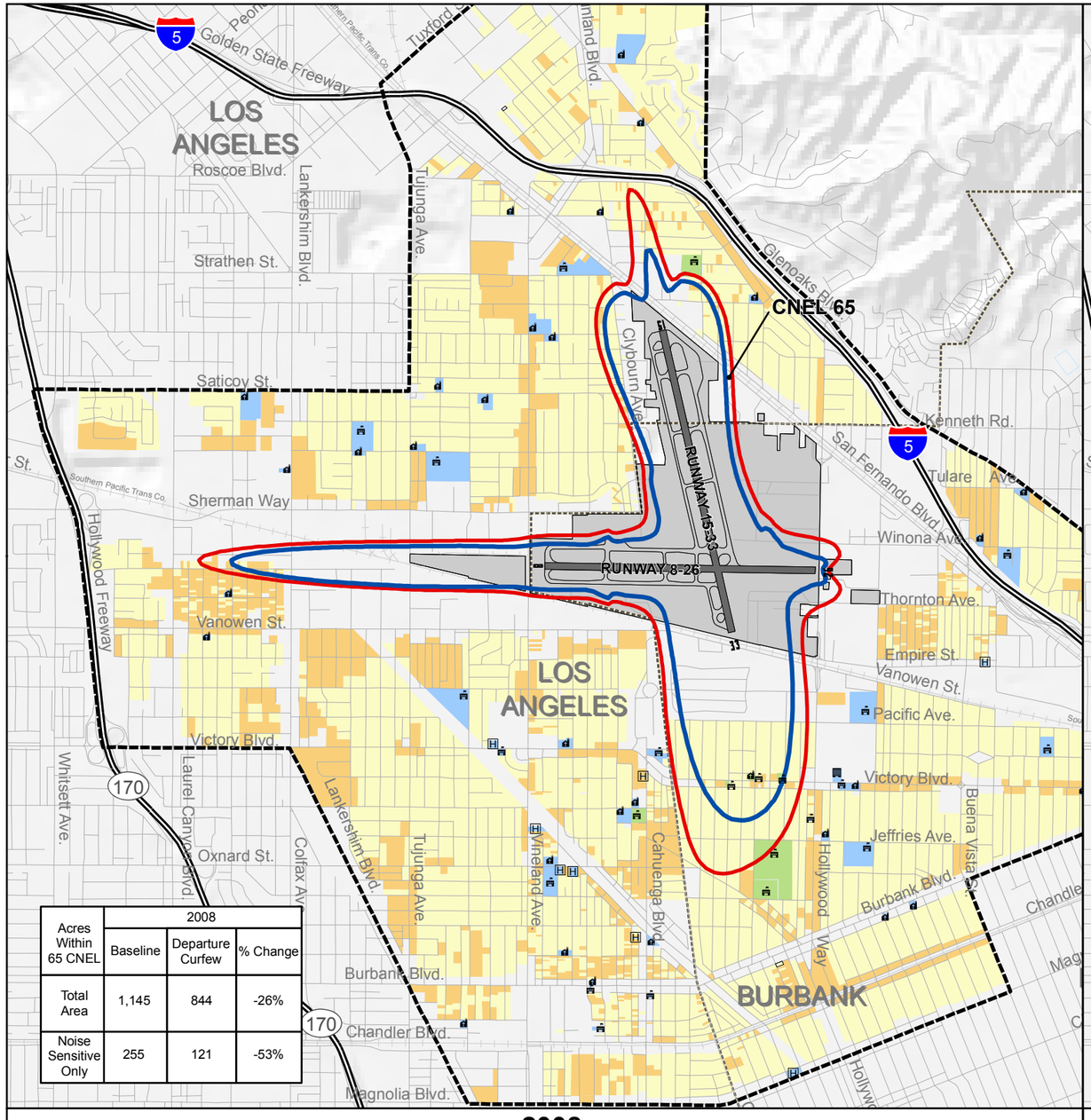
Sources: BGPAA Geographic Information System;
Noise Analysis by Jacobs Consultancy, 2007.

NORTH

0 750 1,500 3,000 Feet

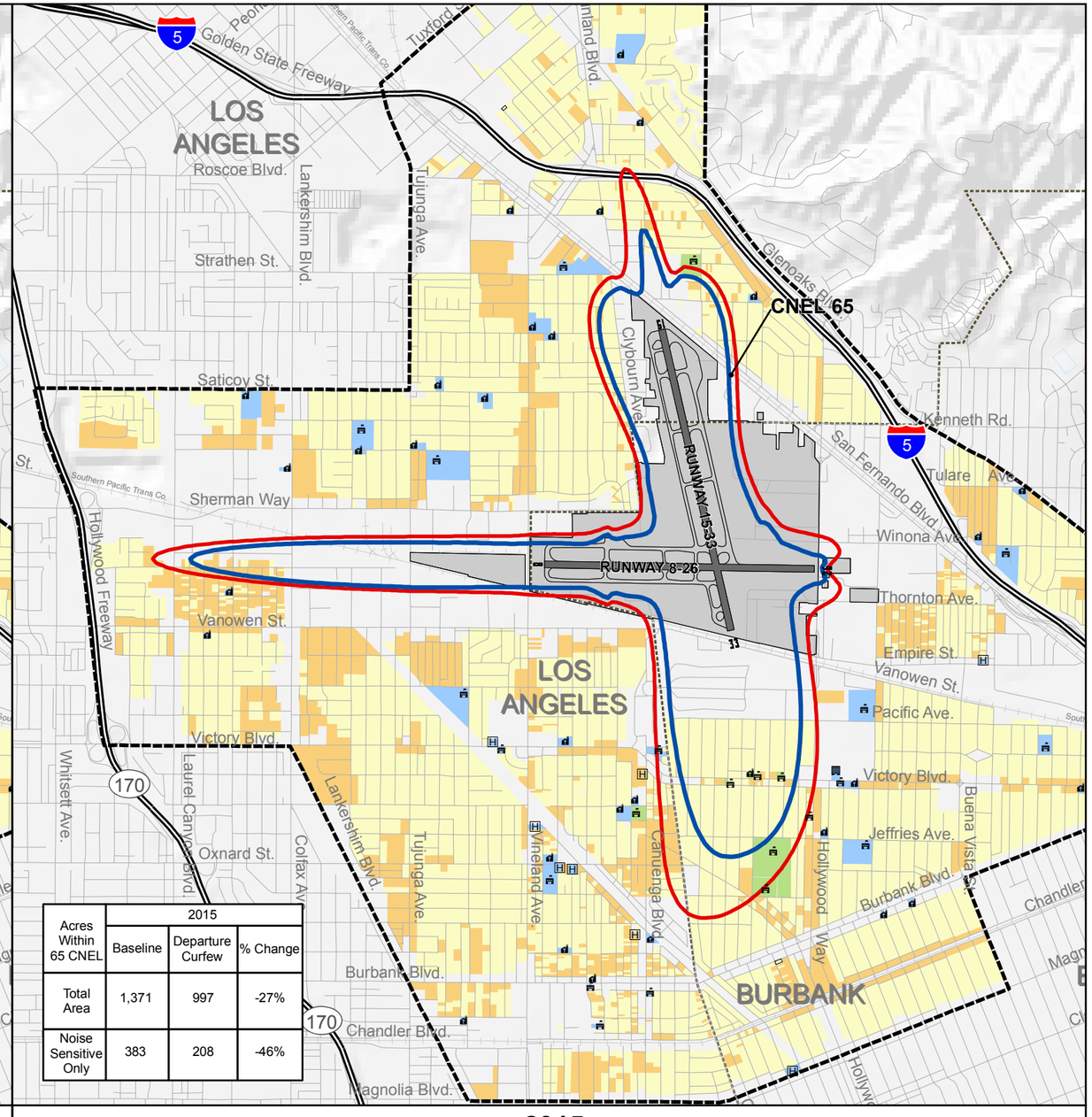
Figure 5-1
FORECAST NOISE EXPOSURE WITH FULL CURFEW
FAR Part 161 Study for Bob Hope Airport
January 2009

JACOBS CONSULTANCY
Airport Management Consulting



Acres Within 65 CNEL	2008		
	Baseline	Departure Curfew	% Change
Total Area	1,145	844	-26%
Noise Sensitive Only	255	121	-53%

2008



Acres Within 65 CNEL	2015		
	Baseline	Departure Curfew	% Change
Total Area	1,371	997	-27%
Noise Sensitive Only	383	208	-46%

2015

LEGEND

- Baseline CNEL Contour*
- CNEL Contour With Curfew
- Detailed Land Use Study Area
- Airport Boundary
- Municipal Boundary
- Freeways
- Roads

- Single-Family Residential
- Multi-Family Residential
- Noise-Sensitive Institutions
- Sound-Insulated School

- Schools, Preschools
- Places of Worship
- Hospital
- Library

*Conditions assuming no additional aircraft operating restrictions.

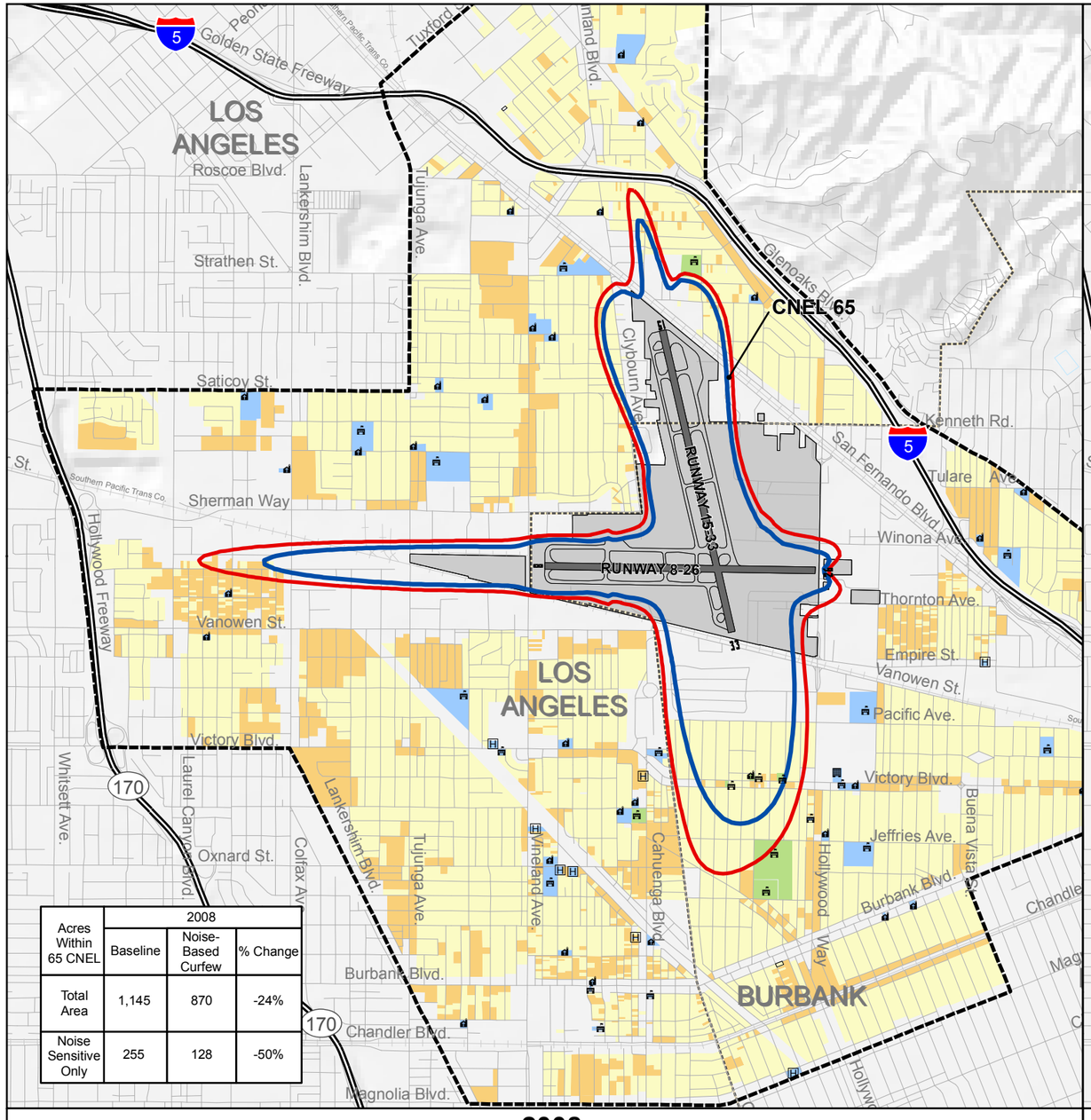
Sources: BGPAA Geographic Information System;
Noise Analysis by Jacobs Consultancy, 2007.

NORTH

0 750 1,500 3,000 Feet

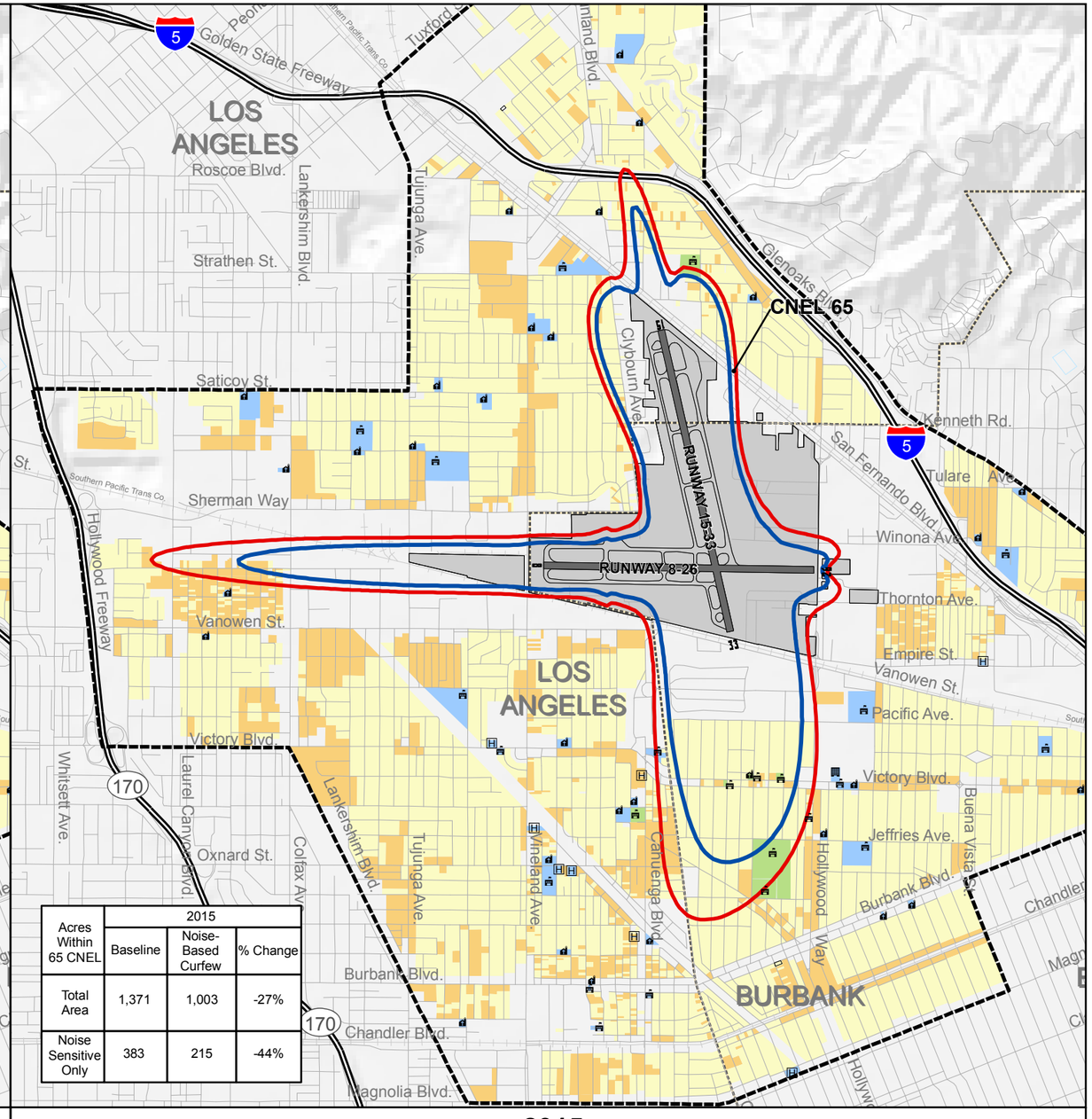
Figure 5-2
FORECAST NOISE EXPOSURE WITH DEPARTURE CURFEW
FAR Part 161 Study for Bob Hope Airport
January 2009

JACOBS CONSULTANCY
Airport Management Consulting



Acres Within 65 CNEL	2008		
	Baseline	Noise-Based Curfew	% Change
Total Area	1,145	870	-24%
Noise Sensitive Only	255	128	-50%

2008



Acres Within 65 CNEL	2015		
	Baseline	Noise-Based Curfew	% Change
Total Area	1,371	1,003	-27%
Noise Sensitive Only	383	215	-44%

2015

LEGEND

- Baseline CNEL Contour*
- CNEL Contour With Curfew
- Detailed Land Use Study Area
- Airport Boundary
- Municipal Boundary
- Freeways
- Roads

- Single-Family Residential
- Multi-Family Residential
- Noise-Sensitive Institutions
- Sound-Insulated School

- Schools, Preschools
- Places of Worship
- Hospital
- Library

*Conditions assuming no additional aircraft operating restrictions.

Sources: BGPAA Geographic Information System;
Noise Analysis by Jacobs Consultancy, 2007.

NORTH

0 750 1,500 3,000 Feet

Figure 5-3
FORECAST NOISE EXPOSURE WITH NOISE-BASED CURFEW
FAR Part 161 Study for Bob Hope Airport
January 2009

JACOBS CONSULTANCY
Airport Management Consulting

The full curfew produces the greatest reduction in noise, as shown in Figure 5-1. The noise-sensitive area within the 65 CNEL contour would be reduced by 59% in 2008 and 55% in 2015 with the full curfew. The departure curfew, shown in Figure 5-2, would result in a 53% reduction in noise-sensitive land area within the 65 CNEL contour in 2008 and a 46% reduction in 2015. A comparison of Figures 5-1 and 5-2 shows that the noise contours south of the airport would be nearly identical with the full curfew and the departure curfews. This is because Runway 15 is the most commonly used runway for takeoffs, and both curfews would have the same effect in prohibiting nighttime takeoffs. The noise reduction to the west and north is somewhat less with the departure curfew than with the full curfew. Runway 8 (from the west) and Runway 15 (from the north) are the most commonly used arrival runways. The lesser amount of noise reduction off these runway ends with the departure curfew reflects the continued use of these runways for nighttime arrivals.

The noise-based curfew, shown in Figure 5-3, produces about the same overall noise reduction as the departure curfew, with a 50% reduction in noise-sensitive area within the 65 CNEL contour in 2008 and a 44% reduction in 2015.

5.3.4.1 Impact on Population and Sensitive Land Uses

Table 5-1 notes the population and number of noise-sensitive land uses within the 65 CNEL contours with and without the alternative curfews.

Table 5-1

ESTIMATE OF IMPACTED POPULATION AND NOISE-SENSITIVE LAND USES WITH AND WITHOUT ALTERNATIVE CURFEWS

Bob Hope Airport FAR Part 161 Study

	Impacts within 65 CNEL Contour					
				Noise-Sensitive Institutions		
		Dwelling Units		Schools, Preschools		Places of
	Population	Treated*	Untreated	Treated*	Untreated	Worship
2005 Baseline	3,939			2	1	1
2008						
Baseline	4,825	833	611	3	1	1
Full Curfew	1,815	404	170	2	1	1
Departure Curfew	2,255	449	230	2	1	1
Noise-Based Curfew	2,224	475	219	2	1	1
2015						
Baseline	8,217	1,129	1,263	5	2	1
Full Curfew	2,873	622	303	2	1	1
Departure Curfew	4,204	727	534	2	1	1
Noise-Based Curfew	3,794	747	421	3	1	1

*Acoustically treated as of March 31, 2007.

Source: Appendix B, Table B-26.

The full curfew would produce the greatest reduction in noise-sensitive uses within the 65 CNEL contour. Based on the 2008 projections, the population residing inside the 65 CNEL contour would be 1,815 with the full curfew compared to 4,825 for baseline conditions. The numbers impacted with the departure curfew and the noise-based curfew would be 2,255 and 2,224, respectively.

The same relationships would apply based on the 2015 forecast, although the number of people impacted would be greater for each scenario because of the projected increase in airport operations from 2008 to 2015.

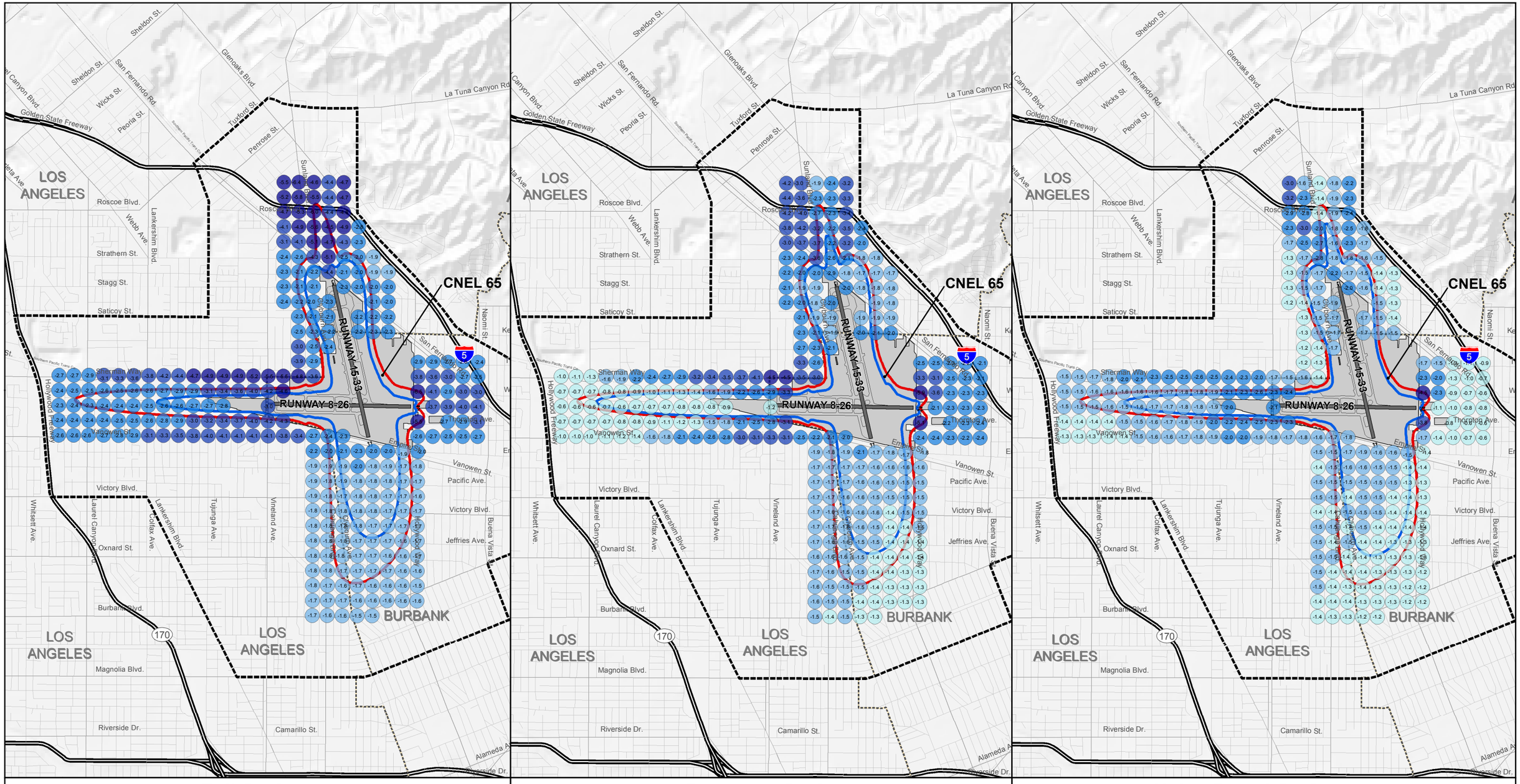
5.3.4.2 Magnitude of Noise Reduction with Departure Curfew

A grid analysis was undertaken to quantify the magnitude of noise reduction within the 65 CNEL contour off each runway end with the proposed departure curfew. The results of the analysis are shown in Figures 5-4 and 5-5.

Figure 5-4 shows the decrease in CNEL levels at each grid point for the three curfew alternatives. This represents the reduction in 24-hour noise levels. As summarized in Table 5-2, the level of noise reduction for the full curfew ranges from 1.6 to 6.5 decibels. The level of reduction for the departure curfew ranges from 0.6 to 5.9 decibels and, for the noise-based curfew, ranges from 0.8 to 4.5 decibels.

A clearer picture of the effect of the alternative curfews can be achieved by focusing only on the change in nighttime noise. Figure 5-5 shows the change in nighttime noise levels (LeqN) at each grid point with the alternative curfews. This shows a decrease ranging from 9.0 to 16.4 decibels with the full curfew. The decrease ranges from 0.9 to 13.8 decibels for the departure curfew and 1.7 to 11.5 decibels for the noise-based curfew. Note that, for all three curfews, the reduction in LeqN south of the airport is much greater than the reduction in CNEL levels in the same area. This is because Runway 15 is the primary departure runway, and the curfews would prohibit nearly all departures at night, in the case of the noise-based curfew, greatly limit them. Thus, the nighttime Leq shows a substantial decrease. (Because Runway 15 will continue to be heavily used during daytime hours, the 24-hour CNEL metric shows less of a change in noise south of the Airport.)

Figure 5-5 also shows that for the full curfew, the noise reductions off the west, north, and east sides of the Airport are all relatively the same. In contrast, for the departure and noise-based curfews, the reductions off the west, north, and east ends are proportionately less than off the south end. In the case of the departure curfew, this reflects the nighttime use of the primary arrival runways, Runway 8 and 15. For the noise-based curfew, it reflects the continued activity by lighter aircraft at night, which also tend to use Runway 8 for arrivals but that also often use Runway 33 for nighttime departures.



Full Curfew | **Departure Curfew** | **Noise-Based Curfew**

LEGEND

Decrease in CNEL

- Less Than 1.5 dBA
- 1.5 to 1.9 dBA
- 2.0 to 2.9 dBA
- 3.0 to 4.4 dBA
- 4.5 dBA and More

- Baseline CNEL Contour*
- CNEL With Curfew
- Detailed Land Use Study Area
- Airport Boundary
- Municipal Boundary
- Freeways
- Roads

* Conditions assuming no additional aircraft operating restrictions.

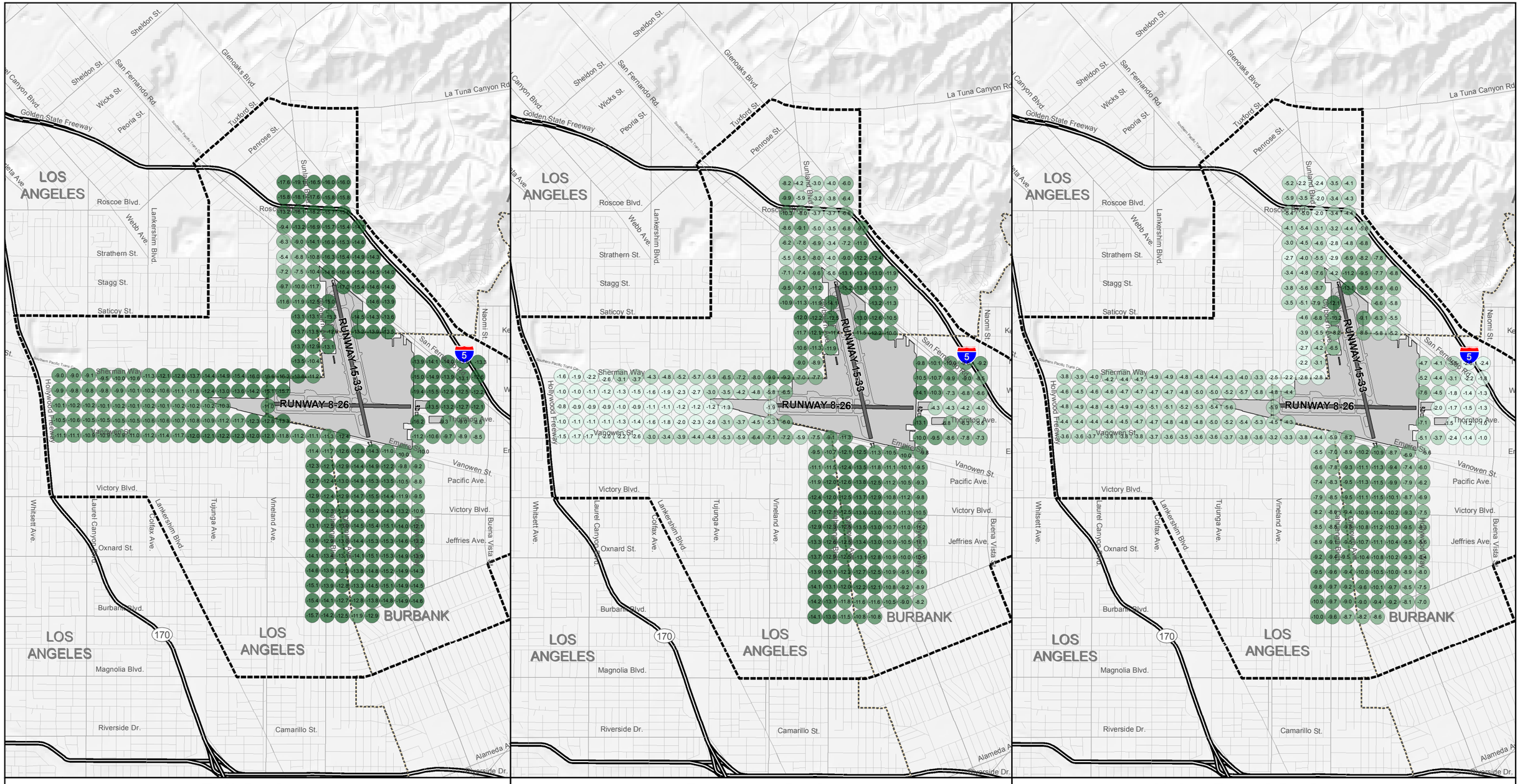
NORTH

0 1,050 2,100 4,200 Feet

Source:
Noise analysis by Jacobs Consultancy, 2007.

Figure 5-4
DECREASE IN CNEL WITH ALTERNATIVE CURFEWS IN 2015
FAR Part 161 Study for Bob Hope Airport
January 2009

JACOBS CONSULTANCY
Airport Management Consulting



LEGEND

- Detailed Land Use Study Area
- Airport Boundary
- Municipal Boundary
- Freeways
- Roads

Legend

NORTH

0 1,000 2,000 4,000 Feet

Source:
Noise analysis by Jacobs Consultancy, 2007.

Note:
Nighttime noise levels are described by the 9-hour Leq (LeqN) for the period after 10:00 p.m. and before 7:00 a.m.

Figure 5-5
DECREASE IN NIGHTTIME NOISE WITH ALTERNATIVE CURFEWS IN 2015
FAR Part 161 Study for Bob Hope Airport
January 2009

JACOBS CONSULTANCY
Airport Management Consulting

Table 5-2

MAGNITUDE OF NOISE REDUCTION WITHIN 65 CNEL WITH ALTERNATIVE CURFEWS
Bob Hope Airport FAR Part 161 Study

	Direction from Airport			
	North	East	South	West
Nature of Airport Activity	Rwy 15 Approaches; Rwy 33 Takeoffs	Rwy 26 Approaches; Rwy 8 Takeoffs	Rwy 33 Approaches; Rwy 15 Takeoffs	Rwy 8 Approaches; Rwy 26 Takeoffs
Full Curfew				
CNEL Reduction	-2.0 to -6.0 dBA	-2.7 to -6.5 dBA	-1.6 to -2.4 dBA	-2.3 to -4.2 dBA
LeqN Reduction	-10.4 to -16.4 dBA	-9.0 to -15.5 dBA	-10.5 to -15.5 dBA	-10.1 to -14.2 dBA
Departure Curfew				
CNEL Reduction	-1.7 to -3.7 dBA	-2.1 to -5.9 dBA	-1.4 to -2.1 dBA	-0.6 to -2.9 dBA
LeqN Reduction	-3.4 to -13.4 dBA	-4.3 to -10.3 dBA	-10.5 to -13.8 dBA	-0.9 to -4.8 dBA
Noise-Based Curfew				
CNEL Reduction	-1.5 to -2.8 dBA	-.0.8 to -4.5 dBA	-1.3 to -1.9 dBA	-1.5 to -2.6 dBA
LeqN Reduction	-2.8 to -11.2 dBA	-1.7 to -4.5 dBA	-7.4 to -11.5 dBA	-4.8 to -5.8 dBA

Note: CNEL is the 24-hour time-of-day weighted cumulative noise level. LeqN is the cumulative noise exposure for only the nighttime period -- the nine hours from 10:00 p.m. to 7:00 a.m.

Source: Jacobs Consultancy analysis, 2007.

5.3.4.3 Effect on Awakenings

Since the alternative curfews would reduce nighttime noise, an assessment of their effect on the pattern of aircraft noise-induced nighttime awakenings was undertaken. Effects on awakenings were measured using two alternative methodologies. Both are based the results of research studies undertaken in a variety of settings in the United States and Europe. They represent the current state of scientific knowledge on the relationship of aircraft noise to awakenings in residential settings. As discussed in Appendix C, Analysis of Aircraft Noise-Induced Awakenings, much remains to be discovered about the impact of aircraft noise on the quality of sleep. Research is continuing in this area, but at this time there is no scientific consensus as to the best method to predict noise-induced awakenings or to assess the significance of those awakenings.

Importantly, these studies do not reflect specific knowledge about noise-induced awakenings in the Bob Hope Airport vicinity. Since authoritative studies have not been undertaken in the Bob Hope Airport area, which could address variations in the sensitivity of local residents and the mitigating effects of the Airport Authority's acoustical treatment program, the only methods available for this analysis are estimation techniques.

The two methodologies used to estimate awakenings rely on SEL dose-response curves, correlating aircraft SELs with the percentage of a population likely to be awakened by the noise. The first (the Finegold-Elias Curve) was developed through a meta-analysis of the data from several studies of aircraft noise-induced "behavioral awakenings." The second (the Basner Curve) was developed from a thorough polysomnographic study of aircraft noise-induced awakenings in the vicinity of a German airport. The two dose-response curves are shown in Figure C-1 in Appendix C, Analysis of Aircraft Noise-Induced Awa Awakenings.

Behavioral awakenings require the subject to confirm awakening through a positive action, such as pushing a button on a counting device. Because a subject must be thoroughly roused from sleep to take the required action, "behavioral awakenings" tend to understate the actual impact of noise on sleep quality. Polysomnography, which involves the use of various electronic measuring devices to record changes in sleep stage, is a more accurate way of recording noise-induced effects on sleep. It is known, for example, that the lightest sleep stage (Stage 1) is of negligible restorative value to the sleeper and is equivalent to being "awakened." This level of sleep (or "wakefulness") can be recorded only with polysomnography. Although polysomnography is a superior method of investigating sleep disturbance, it has been undertaken less often than behavioral awakening studies because of far higher costs involved with the method.

The results of these analyses are shown in Table 5-3. Based on this analysis, all three curfew alternatives would result in a dramatic reduction in awakenings, ranging from 32% to 93% depending on the year, the curfew alternative, and the estimation method. As with the other indicators of noise impact, the greatest reduction would occur with the full curfew. The departure curfew and the noise-based curfew would both result in similar numbers of awakenings, although the results vary somewhat depending on the year and the estimation method.

Table 5-3

CHANGE IN ANNUAL AWAKENINGS INSIDE 65 CNEL CONTOUR WITH ALTERNATIVE CURFEWS

Bob Hope Airport FAR Part 161 Study

	Alternative Estimation Method	
	Behavioral Awakenings (Finegold-Elias)	Polysomnographic Awakening (Basner)
Definitions:	Confirmed by action of the subject, such as pushing the button of a counting device.	Confirmed by changes in sleep stage as recorded by electronic instrumentation (such as EEG)
Number of Annual Awakenings –2008		
Baseline -- Without Curfew	262,450	285,659
With Full Curfew	17,614	20,888
Difference	*-244,835 (-93%)*	*-264,771 (-93%)*
With Departure Curfew	93,739	115,571
Difference	*-168,711 (-64%)*	*-170,088 (-60%)*
With Noise-Based Curfew	93,484	93,170
Difference	*-168,966 (-64%)*	*-192,489 (-67%)*
Number of Annual Awakenings –2015		
Baseline -- Without Curfew	260,715	182,143
With Full Curfew	32,492	36,291
Difference	*-228,224 (-88%)*	*-145,851 (-80%)*
With Departure Curfew	128,156	106,176
Difference	*-132,559 (-51%)*	*-75,967 (-42%)*
With Noise-Based Curfew	130,207	123,610
Difference	*-130,508 (-50%)*	*-58,533 (-32%)*

Note: These figures represent the estimated number of annual awakenings of residents inside the unrestricted 65 CNEL contour in each forecast year.

Source: Jacobs Consultancy analysis, 2007. See Appendix C for a detailed explanation of the awakenings estimation methodology.

5.4 OTHER REMEDIES ARE INFEASIBLE OR LESS COST-EFFECTIVE

Over the past thirty years, the Airport Authority has undertaken three noise compatibility studies, several environmental assessments and impact studies, and considered numerous potential noise abatement and mitigation alternatives. As discussed in Chapter 2, the Airport Authority has also established noise regulations intended to restrict the loudest aircraft using the Airport.

The Airport Authority has determined that it has exhausted the range of non-restrictive noise abatement measures that can move it with adequate speed toward its current goal to eliminate nighttime flight noise. Thus, it has deemed it necessary to proceed with the consideration of the restriction proposed in this Part 161 Application.

Table 5-4 summarizes the range of noise abatement and mitigation alternatives that were considered either in the 1999 Part 150 Noise Compatibility Study Update or in this Part 161 Study. The 1999 Part 150 Study was a comprehensive update of the original 1988 Noise Compatibility Program (NCP). It reconsidered all measures in the Original NCP and evaluated many other alternatives, some of which had been assessed in prior environmental studies at the Airport. The table describes the measure, whether it was rejected for implementation by the Airport Authority or submitted to the FAA for approval, whether it was approved by the FAA (through a Noise Compatibility Program Record of Approval), and whether it has been implemented by the Airport Authority. Detailed discussion of these measures is provided in the cited source documents. In addition, Appendix G, Initial Evaluation of Alternatives, includes an analysis of alternatives to the three curfews that was undertaken in 2002, early in the Part 161 Study process.

None of the alternative measures presented in Table 5-4 are feasible or cost-effective alternatives to a nighttime curfew. None would provide a level of nighttime noise reduction comparable to the alternative curfews. In particular, the Authority's primary applicable abatement measure, the voluntary curfew, does not apply to the categories of airport users responsible for the majority of nighttime noise – cargo carriers, air taxi, and general aviation. As discussed in Section 5.2.2.1, above, even the residential acoustical treatment program, which has been quite successful in producing substantial outdoor-to-indoor noise level reductions and satisfaction among participating residents, cannot be completed as quickly as the alternative curfew can be implemented. Moreover, the benefit-cost analysis indicates that the full curfew is more cost-effective than acoustical treatment in addressing the nighttime noise problem.

Table 5-4

ALTERNATIVES CONSIDERED
Bob Hope Airport FAR Part 161 Study

Measure	Description	FAA Action	Status	Meet Goal?	Comments
Measures from 1999 NCP (Approved by Airport Authority)					
NAE 1	Continue requiring all transport category and turbojet aircraft to comply with Federal aircraft noise regulations.	Approved	Implemented.	Partial	Continued from 1988 NCP.
NAE 2	Continue requiring compliance with the Airport's Engine Test Run Up Policy.	Approved	Implemented.	Partial	Continued from 1988 NCP. Policy includes prohibition of nighttime run-ups unless delay of run-up would cause flight to depart at night within 24 hours.
NAE 3	Continue promoting use of AC 91-53A Noise Abatement Departure Procedures by air carrier jets.	Approved	Implemented.	Partial	Continued from 1988 NCP. Voluntary on the part of aircraft operator.
NAE 4	Continue promoting use of NBAA noise abatement procedures, or equivalent manufacturer procedures, by general aviation aircraft.	Approved	Implemented.	Partial	Continued from 1988 NCP. Voluntary on the part of aircraft operator.
NAE 5	Continue working with FAA Airport Traffic Control Tower to maintain the typical traffic pattern altitude of 1,800 feet MSL.	Approved	Implemented.	No	Continued from 1988 NCP. Approved as voluntary measure.
NAE 6	Continue the placement of new buildings on the airport north of Runway 8-26 to shield nearby neighborhood from noise on runway.	Approved	Policy applied as opportunities arise.	No	Continuation of informal Airport Authority policy. Would provide noise screening from power-up noise on takeoff to homes very near runway ends.
NAE 7	Designate Runway 26 as nighttime preferential departure runway.	Approved	Not implemented because Taxiway D extension has not been undertaken yet.	Partial	Approved as voluntary measure. Would require extension of Taxiway D to end of Runway 26 to enable aircraft on west side of Airport to get to runway end without multiple runway crossings.
NAE 8	Establish noise abatement departure turn for jet takeoffs on Runway 26.	No action	To be resubmitted for FAA review after Taxiway D extension is programmed.	Partial	The location of the turn would have to be defined using electronic NAVAIDS, specifically GPS. The criteria for development of GPS departure procedures is currently under review by FAA.
NAE 9	Build extension of Taxiway D to promote nighttime general aviation departures on Runway 26.	Approved	Not yet implemented.	Partial	Requires removal of auto parking lot.
NAE 10	Build engine maintenance run-up enclosure.	Approved	No action yet to implement.	Partial	Anticipated to be used by GA aircraft. Requires finding a building site on constrained airfield.
NAE 11	Phase-out operations by all Stage 2 jets.	Disapproved	FAA required Part 161 Application to consider this further.	Partial	Airport no longer considering this option. Given steady decline in Stage 2 operations, and current restriction on nighttime operations by loudest Stage 2 aircraft, this would have limited effectiveness in reducing nighttime noise.

Measure	Description	FAA Action	Status	Meet Goal?	Comments
NAE 12	Establish mandatory curfew on departures by all Stage 2 aircraft between 10:00 p.m. and 7:00 a.m., departures by all aircraft over 75,000 pounds between 10:30 p.m. and 6:30 a.m., and arrivals by all aircraft over 75,000 pounds between 11:00 p.m. and 6:00 a.m.	Disapproved	FAA required Part 161 Application to consider this further.	Partial	Airport no longer considering this option. Limited effectiveness due to declining number of Stage 2 operations; limited effectiveness in reducing nighttime noise; weight-based noise reduction measures not supported by FAA.
NME 1	Continue existing acoustical treatment program for single-family homes.	Approved	Ongoing	Partial	Continued from 1988 NCP. This alternative, while it would mitigate nighttime noise, it does not reduce or eliminate it.
NME 2	Expand residential acoustical treatment program to include homes within 65 CNEL contour based on 2003 NEM.	Approved	Federal policy limits AIP noise set-aside expenditures to 65 CNEL and higher, based on up-to-date noise contours. The Authority has been using the most recent quarterly noise contour maps as the basis for eligibility for the RATP.	Partial	Modified 1988 NCP measure. This alternative, while it would mitigate nighttime noise, it does not reduce or eliminate it.
NME 3	Establish acoustical treatment program for schools and preschools not previously treated within the 65 CNEL contour based on 2003 NEM.	Approved	Airport has treated the two preschools as recommended. Two other schools have not been treated because they are outside the current 65 CNEL contour.	No	Modified 1988 NCP measure. This alternative, while it would mitigate nighttime noise, it does not reduce or eliminate it.
NME 4	Offer purchase assurance as an option for homeowners in the acoustical treatment eligibility area.	Approved, in part	Not implemented by Airport.	No	Appears to be little interest in this option in neighborhoods.
LUE 1	Use Baseline 2010 noise contours as basis for noise compatibility planning (Burbank and Los Angeles)	Approved	City of Burbank -- not implemented, per se. Is using older set of noise contours from 1992 Noise Element of General Plan for compatibility planning. City of Los Angeles -- not implemented.	No	Would have limited effect in promoting compatibility since nearly entire area is fully developed.
LUE 2	Establish noise compatibility guidelines for the review of development projects within the 65 CNEL contour (Burbank, Los Angeles).	Approved	City of Burbank – not implemented. City of Los Angeles -- not implemented.	No	Would have limited effect in promoting compatibility since nearly entire area is fully developed.

Measure	Description	FAA Action	Status	Meet Goal?	Comments
LUE 3	Amend Sun Valley-La Tuna Canyon Community Plan to establish infill development standards for noise compatibility (Los Angeles).	Approved	Not implemented. Although, the Community Plan does encourage compatible land use near the airport.	No	Would have limited effect in promoting compatibility since nearly entire area is fully developed. The current Community Plan states, "[f]uture industrial development which would be more compatible with the existing airport oriented land uses and less sensitive to airport activity, should be considered adjacent to the [Airport]."
LUE 4	Amend North Hollywood-Valley Village Community Plan to establish land use policies promoting airport noise compatibility (Los Angeles).	Approved	Not implemented. Although, the Community Plan does encourage efforts to reduce noise impacts from the airport.	No	Would have limited effect in promoting compatibility since nearly entire area is fully developed. The current Community Plan states, "[t]his plan supports the continued effort to reduce noise emanating from airport operations at the [Airport]." It further states that Airport, "flight patterns should be restricted from residential areas to the maximum extent possible."
LUE 5	Establish airport noise overlay zoning to implement infill development policies of local General Plans (Burbank, Los Angeles).	Approved	City of Burbank -- has implemented noise overlay zoning. City of Los Angeles -- not implemented.	Partial	Would have limited effect in promoting compatibility since nearly entire area is fully developed.
LUE 6	Amend building codes to establish sound insulation construction standards to implement requirements of State law and infill development policies (Burbank, Los Angeles).	Approved	City of Burbank -- has a zoning-based performance standard requiring the attenuation of noise from exterior sources in new structures. However, the building codes have not been amended. City of Los Angeles -- not implemented.	Partial	Would have limited effect in promoting compatibility since nearly entire area is fully developed.
PME 1	Continue noise abatement information program.	Approved	Ongoing	No	Underway.
PME 2	Monitor implementation of updated Noise Compatibility Program.	Approved	Ongoing	No	Underway.
PME 3	Update NEMs and NCP.	Approved	Would be undertaken as needed in future.	No	
PME 4	Expand noise monitoring system.	Approved	Not implemented	No	Studied and found not to be feasible at one recommended location and not to be necessary at another.
PME 5	Enhance Airport Authority's geographic information system.	Approved	Ongoing	No	
PME 6	Maintain log of nighttime runway use and operations by aircraft type.	Approved	Implemented	No	

Measure	Description	FAA Action	Status	Meet Goal?	Comments
Measure from 2004 NCP Amendment (Approved by Airport Authority)					
LUE 7	Provision for retention of property located in the northeast quadrant of the Airport within the 2003 65 CNEL noise exposure contour.	Approved	Implemented	Partial	Airport Authority's objective was to retain ownership to ensure that the property would not be developed for noise-sensitive uses.
Alternatives Considered and Rejected in 1999 NCP					
LAND USE PLANNING AND REGULATORY ALTERNATIVES					
	Compatible Use Zoning	n/a	Rejected	No	Virtually all of the noise-impacted land is developed, so there is little opportunity for compatible use zoning.
	Zoning Changes- Residential Density - Large Lots, Planned Unit Development	n/a	Rejected	No	Noise-impacted area is nearly fully developed. No practical effect in the area.
	Subdivision Regulations	n/a	Rejected	No	Noise-impacted area is fully developed, very little subdivision activity is likely to occur in the future.
	Transfer of Development Rights	n/a	Rejected	No	Best suited to undeveloped areas, but BUR area is almost completely developed.
	Fair Disclosure By Sellers	n/a	Rejected	No	California law establishes fair disclosure requirements. Additional local requirements recommended as part of Measure LUE-5, Noise Overlay Zoning.
EXPENDITURE ALTERNATIVES					
	Property Acquisition	n/a	Rejected	No	Local communities are committed to preserving housing stock and local neighborhoods. In addition, acquisition of residential-zoned land is prohibited by Section 6546.1 of the California Government Code.
	Noise and Avigation Easement Purchase	n/a	Rejected	No	Potentially high cost, easements do not actually mitigate noise, Airport is securing easements anyway as condition of acoustical treatment program participation.
	Development Rights Purchase	n/a	Rejected	No	This is best suited to undeveloped areas, not in fully developed urban areas such as the Airport study area.
	Sales Assistance	n/a	Rejected	No	Requires substantial administrative support in return for limited benefits.
AIRPORT FACILITIES DEVELOPMENT ALTERNATIVES					
	Runway Lengthening	n/a	Rejected	No	Prohibited by Section 6546.1 of the California Government Code.
	New Runways	n/a	Rejected	No	Prohibited by Section 6546.1 of the California Government Code.
	Displaced/Relocated Thresholds	n/a	Rejected	Partial	Runways are not long enough to enable further displacements or threshold relocations to promote noise abatement. This alternative would degrade the capabilities of the airport and potentially reduce safety margins.
	Terminal Relocation	n/a	Rejected	No	This would have negligible effects on aircraft noise.

Measure	Description	FAA Action	Status	Meet Goal?	Comments
	Ground Activity Relocation	n/a	Rejected	No	Given the small size of the airfield, there is insufficient flexibility to relocate facilities and associated activities. Further, the major concerns of the public relate to flight noise, not ground noise.
RUNWAY USE AND FLIGHT ROUTING ALTERNATIVES					
	Nighttime Preferential Use of Runways 26 and 33	n/a	Rejected	No	While this reduces the total population inside 65 CNEL, it increases noise over a number of people west and north of Airport.
	Increased Use of Runway 8	n/a	Rejected	No	Not feasible given FAA prohibition on Runway 8 takeoffs by aircraft over 12,500 pounds, mountains to the east.
	Rotational Runway Use	n/a	Rejected	No	Not feasible given constraints posed by terrain, LAX traffic flows. Further, the uneven pattern of noise-sensitive development in the Airport area would make this ineffective for noise abatement.
	Runway 33 Left Departure Turn	n/a	Rejected	No	Noise compatible corridor too narrow and too near Airport to be overflown consistently. Increases noise over some people northwest of Airport.
	Visual Approaches	n/a	Rejected	No	No suitable approach corridors that would substantially reduce noise over sensitive areas.
	Offset Instrument Approaches	n/a	Rejected	No	No suitable approach corridors that would substantially reduce noise over sensitive areas.
ALTERNATIVE AIRCRAFT OPERATING PROCEDURES					
	Reduced Thrust Takeoffs	n/a	Rejected	Partial	Already used by most operators, but requires pilot discretion for safety.
	Maximum Climb Departures	n/a	Rejected	No	Increased fuel usage and engine wear on aircraft, and there is a potential increase in noise in some residential areas.
	Minimum Approach Altitude	n/a	Rejected	No	Possibility of only small reductions outside the 65 CNEL.
	Approach Flap Adjustments	n/a	Rejected	No	Possibility of small reductions, but not feasible to mandate; pilot must reserve flexibility to use flaps for safe operation of aircraft.
	Two-Stage Descents	n/a	Rejected	No	Unlikely to result in net noise reductions due to application of thrust to reduce rapid rates of descent.
	Raised Glide Slope Angle	n/a	Rejected	No	Negligible noise reduction if glide slope is kept within safe operating limits.
	Limited Reverse Thrust	n/a	Rejected	Partial	Short runways at BUR prevent the implementation of this alternative without degrading safety margins.
	Full Compliance with G-IIB and G-III Quiet Flying Procedures	n/a	Incorporated into NAE-4	Partial	Effective for noise abatement, but cannot be enforced. Was incorporated into Measure NAE-4, described above.

Measure	Description	FAA Action	Status	Meet Goal?	Comments
ALTERNATIVE AIRPORT OPERATING RESTRICTIONS					
	Nighttime Prohibition on Takeoffs by Aircraft Producing Noise Above 87.3 dBA	n/a	Rejected in favor of NAE-12	Partial	Considered less effective in reducing nighttime noise than other curfew alternatives.
	Nighttime Curfew on All Operations	n/a	Rejected in favor of NAE-12	Yes	Initially considered too severe a restriction on airport use. Deferred for future consideration under Part 161.
	Cap on Scheduled Operations (at 1998 or projected 2003 levels)	n/a	Rejected	Partial	Judged to be less effective in targeting major public concerns than the curfew alternatives. Would also require Part 161 Study.
	Nighttime Curfew on Stage 2 Aircraft Under 75,000 lbs.	n/a	Rejected in favor of NAE-12	Partial	Considered less effective in reducing nighttime noise than other curfew alternatives.
	Nighttime Departure Curfew on Stage 2 Aircraft Under 75,000 lbs.	n/a	Rejected in favor of NAE-12	Partial	Considered less effective in reducing nighttime noise than other curfew alternatives.
	Noise-based Landing Fee Surcharge	n/a	Rejected	Partial	Judged to be too complex to implement, given the need for extensive consultation with aircraft operators in addition to a Part 161 Study. Further, the effectiveness in reducing noise is speculative.
	Noise Budget	n/a	Rejected	Partial	Judged to be ineffective in quelling public concerns about noise, since Airport noise levels have been consistently lessening through the years without a concomitant reduction in controversy. Also would require Part 161 Study.
	Additional Touch and Go Restrictions	n/a	Rejected	No	Already prohibited at Burbank between 10:00 p.m. and 7:00 a.m. (Rule 8). Given rarity of touch-and-go operations at other times, this was not considered significant enough problem to warrant further restrictions.
Alternatives Considered and Rejected in Phase II of Part 161 Study					
	Accelerated Residential Acoustical Treatment Program	n/a	Rejected	Partial	Determined to be impractical since the Airport Authority's acoustical treatment program is dependent on FAA funding assistance, the level of which cannot be assured over time.
Alternatives Considered and Rejected in Phase III of Part 161 Study					
	RNAV Departures	n/a	Rejected	No	Procedures are effective only when traffic can be directed over relatively wide corridors of compatible land use. Would be of some help in reducing noise north and west of Airport, but improvement would be slight.
	Continuous Descent Approach Procedures	n/a	Rejected	No	Reduces approach noise only at considerable distance from runway at levels below 50 CNEL. Ineffective in reducing noise levels near airport. Ineffective in addressing departure noise.

Measure	Description	FAA Action	Status	Meet Goal?	Comments
	Completion of Residential Acoustical Treatment Program	n/a	Rejected	No	Although the Airport Authority intends to complete the program for dwellings inside the 65 CNEL, this program would not be as cost-effective as, nor would it produce benefits commensurate with, a full curfew. Thus, it is not a satisfactory alternative to a curfew.

Notes:
The 1999 NCP was a comprehensive update of the original Noise Compatibility Program, approved in 1988. It reconsidered the measures of the Original NCP and included the evaluation of numerous other noise abatement and mitigation alternatives. The measures in the 1999 NCP are numbered according to the "elements" of the NCP in which they were included: NAE -- Noise Abatement Element; NME -- Noise Mitigation Element; LUE - Land Use Planning Element; PME -- Program Management Element.

Sources:
Coffman Associates. *Burbank-Glendale-Pasadena Airport, F.A.R. Part 150 Noise Compatibility Study Update, Noise Compatibility Program,* Prepared for Burbank-Glendale-Pasadena Airport Authority, November 1999.
FAA Record of Approval, Burbank-Glendale-Pasadena Airport, Approved 11/27/2000.
http://www.faa.gov/airports_airtraffic/airports/environmental/airport_noise/part_150/states/media/roa_california_112700.pdf

FAA Record of Approval, Burbank-Glendale-Pasadena Airport, Amendment Approved 8/4/2004.
http://www.faa.gov/airports_airtraffic/airports/environmental/airport_noise/part_150/states/media/roa_california_080404.pdf

5.4.1 NCP Measures Yet to be Implemented

Three potential noise abatement measures in the current Noise Compatibility Plan that have not yet been implemented merit discussion. They are measures NAE-7, NAE-8, and NAE-9, summarized in Table 5-4. They involve the extension of Taxiway D, the parallel taxiway on the north side of Runway 8-26, to the east end of the runway (NAE-9). This could enable the nighttime preferential use of Runway 26 for departures (NAE-7). With the increased use of Runway 26 for departures, a right turn to follow a narrow compatible corridor could then become useful (NAE-8).

Any nighttime use of Runway 26 for departures would be somewhat limited because Runway 8, as the only runway with a precision approach, is the preferred arrival runway. Thus, Runway 26 departures could be allowed only when traffic on a Runway 8 approach is distant enough to allow safe aircraft separation.

This combination of noise abatement measures, coupled with increased nighttime departures on Runway 33, was evaluated in the 1999 Part 150 Study.* It was rated as moderately effective in reducing noise impacts. Within the 65 CNEL contour, it would have reduced noise exposure for approximately 1,420 people, while increasing noise for 266 people. The total population inside the 65 CNEL contour (based on the 5-year noise forecast at that time) would have declined from 6,047 to 5,196. While this combination of measures could help reduce noise impacts, its benefits would be modest, falling far short of remedying the nighttime noise problem.

*Coffman Associates, Burbank-Glendale-Pasadena Airport Authority, F.A.R. Part 150 Noise Compatibility Study, Noise Compatibility Program, November 1999, 5-38 to 5-42.

5.4.2 Other Operational Measures

Some reviewers of the Official Draft FAR Part 161 Application suggested the consideration of other noise abatement measures. These include noise abatement departures defined using RNAV procedures and Continuous Descent Approach (CDA) procedures.

5.4.2.1 RNAV Departures

RNAV (Area Navigation) procedures rely on onboard instruments and, typically, ground-based or satellite-based equipment to provide enhanced navigational capability to the pilot. RNAV procedures defined with global-positioning satellite (GPS) signals can be quite precise, provided detailed aircraft position information, enabling pilots to fly tightly defined flight paths. RNAV departure procedures can be effective for noise abatement in defining flight paths over corridors of compatible land use.

In the Bob Hope Airport area, two narrow noise-compatible corridors that could be used by departing aircraft are present. One extends along San Fernando Road northwest of Runway 33, the other is along the railroad tracks west of Runway 26. The use of both of these corridors was considered in the 1999 Part 150 Study in the alternative described above, involving the nighttime preferential use of Runways 26 and 33. In fact, for those departure turns to produce the degree of noise abatement modeled in the 1999 Part 150 Study, they would have to be defined using RNAV procedures because the compatible corridors are so narrow. As indicated above, the combination of preferential runway use and departure turns would produce only modest noise abatement benefits.

RNAV procedures are inappropriate for departures on Runway 15, the primary departure runway. No compatible corridors exist south of the Airport; the area is fully occupied by housing, with scattered noise-sensitive institutions. RNAV procedures could do no more than concentrate the noise over certain parts of the neighborhood.

5.4.2.2 Continuous Descent Approach Procedures

CDA procedures involve the descent of aircraft on approach at a constant rate, minimizing the need for thrust adjustments, thus reducing fuel burn and noise. In contrast, conventional approach procedures involve combinations of descending and level flight segments. CDA procedures have been tested in several settings and have been found to be effective in reducing noise several miles from the end of the approach runway (at noise levels below 50 DNL).*

*See for example the results of testing done at Louisville International Airport. Clarke, J.P., et al., 2006. Development, Design, and Flight Test Evaluation of a Continuous Descent Approach Procedure for Nighttime Operation at Louisville International Airport. Report No. Partner-COE-2005-02. Partnership for Air Transportation Noise and Emissions Reduction. January 9, 2006. http://web.mit.edu/aeroastro/partner/projects/project4.html.

CDA would be ineffective in reducing noise within the 65 CNEL contour at Bob Hope Airport. The contour extends approximately 8,000 feet off the end of Runway 8, the most appropriate candidate runway for CDA since it has the only ILS at the Airport. Aircraft using a conventional ILS approach would intercept the glideslope at the outer marker, 6 nautical miles from the runway end, and would become established on the 3-degree glideslope soon after. A CDA approach would be no different than a conventional approach at this distance from the runway. Thus, a CDA approach would produce no discernible difference in noise exposure inside the 65 CNEL contour at the Airport.

5.4.3 Completion of Residential Acoustical Treatment Program

Some reviewers of the Official Draft FAR Part 161 Application suggested that completion of the Airport Authority's residential acoustical treatment program will fully resolve the local noise problem, making a curfew unnecessary.

The Airport's acoustical treatment program has been successful in achieving substantial improvements in the outdoor-to-indoor noise level reduction (NLR) for participating dwellings. As of 2007, the average improvement in NLR was 8.9 dBA – significantly better than the typical target of 5 dBA.* While this degree of improvement has resulted in widespread satisfaction with the program among participating residents, the program is not capable of, and was never intended to, completely eliminate the nighttime noise problem. Further, the acoustical treatment program cannot deliver the nighttime noise reduction benefits as quickly as a curfew, nor would acoustical treatment be as cost-effective as the curfew.**

5.5 RESTRICTION IS THE SAME FOR ALL USER CLASSES

While the FAA's 2004 guidance letter (see Appendix H) suggests that a full curfew may be unjustly discriminatory because it would restrict aircraft which may "not contribute measurably to the noise contour or sleep awakenings," the full curfew and the two less restrictive curfews, and the exceptions to them, would apply uniformly to all airport users and should therefore not be viewed as unjustly discriminatory.

Longstanding blanket nighttime restrictions on aircraft operations (such as a curfew on air carrier operations and a complete ban on all nighttime departures) are in effect at John Wayne-Orange County Airport, Long Beach Airport, and San Diego International. These restrictions, which apply to all aircraft regardless of their size or type, have not been judged to be unjustly discriminatory. Airports elsewhere in the country, as noted in Table 5-5, also have nighttime noise restrictions. All were imposed before the passage of ANCA in 1990. None have been found to be unjustly discriminatory.

*See Appendix C, Table C-2, page C-18.

**See Chapter 4, Benefit-Cost Analysis.

Table 5-5

NIGHTTIME NOISE RESTRICTIONS AT U.S. AIRPORTS
Bob Hope Airport FAR Part 161 Study

Airport	Nighttime Restriction
Aspen/Pitkin County Airport	Closed to operations from 2300 to 0700.
John Wayne-Orange County Airport	Closed to commercial takeoffs, 2200 to 0700; closed to commercial landings 2300 to 0700.
Lake Tahoe	Maximum nighttime noise limit (Lmax) of 77.1 dBA from 2000 to 0800.
Long Beach	Curfew on air carrier and commuter operations from 2200 to 0700. Maximum nighttime noise limits, based on levels measured at monitoring sites.
San Diego International	Takeoffs prohibited from 2330 to 0630.
Teterboro	Maximum nighttime noise limits (2200 to 0700).
Washington National	Maximum nighttime noise limits (2200 to 0700).

Source: See Table 8-1 in Chapter 8.

While the proposed curfew clearly applies equally to all user classes, it is useful to consider the impact of the curfew on each user class in light of their contribution to nighttime noise at the Airport. Table 5-6 compares the nighttime operations of each user class – air carrier, large cargo carrier, the small cargo carrier, and general aviation – with the costs imposed on each class under the full curfew. Note that for the general aviation class, all costs would be experienced by operators of jet and turboprop aircraft.

For the passenger, large cargo, and general aviation jet operators, the number of operations is a rough indicator of their relative contribution to nighttime noise, although some caveats deserve mention. In general, most business jets serving the Airport tend to be somewhat quieter than most of the air carrier jets serving the airport. The large cargo jets serving the Airport (the A-300, A-310, and B-757) tend to be somewhat louder than many of the air carrier jets serving the Airport (primarily B-737-700, B-737-300, and A-320), although all nighttime cargo operations are arrivals, which tend to be quieter than departures. Ameriflight's fleet, which is dominated by multi-engine turboprop and piston aircraft, is considerably quieter than the jet aircraft operated by other user classes.

The cost index in Table 5-6 is a rough indicator of the degree of impact imposed on each user class by the full curfew. The index indicates that the costs experienced by passenger carriers, Ameriflight, and general aviation jet operators are roughly in line with their noise contributions. Costs to the large cargo carriers are considerably higher than their level of operations and presumed contribution to the nighttime noise level. Given that the large cargo aircraft are among the loudest operated at the Airport, however, this level of impact on the operators does not rise to the level of undue and unjust discrimination.

Table 5-6

COMPARISON OF NIGHTTIME OPERATIONS AND CURFEW COSTS BY USER CLASS
Bob Hope Airport FAR Part 161 Study

User Class	Reduction in Nighttime Operations with Full Curfew 2008	2015	Cost of Full Curfew (NPV)	Cost Index *(a)*
Passenger Carrier	2,916	5,260	$23,167,594	$ 2,834
Large Cargo Carriers	475	548	$15,451,658	$15,119
Small Cargo Carrier (Ameriflight)	7,957	8,103	$ 7,060,222	$ 440
General Aviation	5,059	5,449	$ 2,365,755	$ 1,418
Jet and turboprop (b)	*3562*	*5157*		
Piston	*1497*	*292*		

(a) Cost index computed by dividing cost by the sum of operations in 2008 and 2015 for each user class. For general aviation, only jet and turboprop operations were used in computing the cost index because most piston operators will be able to adapt to curfew with minimal cost implications.

(b) Business jets account for 73% of "jet and turboprop" operations in 2008 and 79% in 2015.

Sources: Operations data from Tables 47 through 52, Technical Report 1, Aviation Demand Forecasts. Cost data from Chapter 6, Table 6-1.