APPENDIX E

NOISE AND ITS EFFECT ON PEOPLE AND NOISE MODELING TECHNICAL REPORT

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E.1

Noise and Its Effect on People

NOISE AND ITS EFFECT ON PEOPLE

Aircraft noise exposure in this document is addressed using the Day-Night Average Sound Level (DNL) metric. To assist reviewers in interpreting complex noise metrics, this appendix presents an introduction to the relevant fundamentals of acoustics and noise terminology and the effect of noise on human activity.

NOISE AND ITS METRICS

Noise, often defined as unwanted sound, is one of the most common environmental issues associated with aircraft operations. Of course, aircraft are not the only sources of noise in an urban or suburban surrounding, where interstate and local roadway traffic, rail, industrial, and neighborhood sources may also intrude on the everyday quality of life. Nevertheless, aircraft are readily identifiable to those affected by their noise and are typically singled out for criticism. Consequently, aircraft noise problems often dominate analyses of environmental impacts.

A "metric" is defined as something "of, involving, or used in measurement." As used in environmental noise analyses, a metric refers to the unit or quantity that quantitatively measures the effect of noise on the environment. Noise studies have typically involved a confusing proliferation of noise metrics used by individual researchers who have attempted to under-stand and represent the effects of noise. As a result, literature describing environmental noise or environmental noise abatement has included many different metrics.

Recently, however, various federal agencies involved in environmental noise mitigation have agreed on common metrics for environmental impact analysis documents. Furthermore, the FAA has specified which metrics, such as DNL, should be used for federal aviation noise assessments.

This section discusses the following acoustic terms and metrics:

- Decibel, dB
- A-Weighted Decibel, dBA
- Maximum Sound Level, Lmax
- Sound Exposure Level, SEL
- Equivalent Sound Level, Leq
- Day-Night Average Sound Level, DNL
- Time-Above a Specified Level, TA

The Decibel, dB

All sounds come from a sound source—a musical instrument, a speaking voice, and an airplane passing overhead. It takes energy to produce sound. The sound energy produced by any sound source is transmitted through the air in sound waves—tiny, quick oscillations of pressure just above and just below atmospheric pressure. These oscillations, or sound pressures, impinge on the ear, creating the sound we hear.

Our ears are sensitive to a wide range of sound pressures. The loudest sound that we hear without pain has about one trillion times more energy than the quietest sounds we hear. As this range, on a linear scale, is unwieldy, we compress the total range of sound pressures to a more meaningful range by introducing the concept of sound pressure level (SPL) and its logarithmic unit of decibel (dB).

SPL is a measure of the sound pressure of a given noise source relative to a standard reference value (typically the quietest sound that a young person with good hearing can detect). Decibels are logarithmic quantities—logarithms of the ratio of the two pressures, the numerator being the pressure of the sound source of interest, and the denominator being the reference pressure (the quietest sound we can hear).

The logarithmic conversion of sound pressure to SPL means that the quietest sound we can hear (the reference pressure) has a SPL of about zero decibels, while the loudest sounds we hear without pain have SPLs less than or equal to about 120 dB. Most sounds in our day-to-day environment have SPLs from 30 to 100 dB.

Because decibels are logarithmic quantities, they require logarithmic math and not simple (linear) addition and subtraction. For example, if two sound sources each produce 100 dB and are operated together, they produce only 103 dB—not 200 dB as might be expected. Four equal sources operating simultaneously result in a total SPL of 106 dB. In fact, for every doubling of the number of equal sources, the SPL (of all of the sources combined) increases another three decibels. A ten-fold increase in the number of sources makes the SPL increase by 10 dB. A hundredfold increase makes the level increase by 20 dB, and it takes a thousand equal sources to increase the level by 30 dB.

If one source is much louder than another, the two sources together will produce the same SPL (and sound to our ears) as if the louder source were operating alone. For example, a 100 dB source plus an 80 dB source produce 100 dB when operating together. The louder source "masks" the quieter one. But if the quieter source gets louder, it will have an increasing effect on the total SPL. When the two sources are equal, as described above, they produce a level 3 decibels above the sound level of either one by itself.

From these basic concepts, note that one hundred 80 dB sources will produce a combined level of 100 dB; if a single 100 dB source is added, the group will produce a total SPL of 103 dB. Clearly, the loudest source has the greatest effect on the total.

There are two useful rules of thumb to remember when comparing SPLs: (1) most of us perceive a 6 to 10 dB increase in the SPL to be an approximate doubling of loudness, and (2) changes in SPL of less than about 3 dB are not readily detectable outside of a laboratory environment.

A-Weighted Decibel, dBA

Another important characteristic of sound is its frequency, or "pitch." This is the rate of repetition of the sound pressure oscillations as they reach our ear. Frequency can be expressed in units of cycles per second (cps) or Hertz (Hz). Although cps and Hz are equivalent, Hz is the preferred scientific unit and terminology.

A very good ear can hear sounds with frequencies from 16 Hz to 20,000 Hz. However, most people hear from approximately 20 Hz to approximately 10,000-15,000 Hz. People respond to sound most readily when the predominant frequency is in the range of normal conversation, around 1,000 to 4,000 Hz. Acousticians have developed and applied "filters" or "weightings" to SPLs to match our ears' sensitivity to the pitch of sounds and to help us judge the relative loudness of sounds made up of different frequencies. Two such filters, "A" and "C," are most applicable to environmental noises.

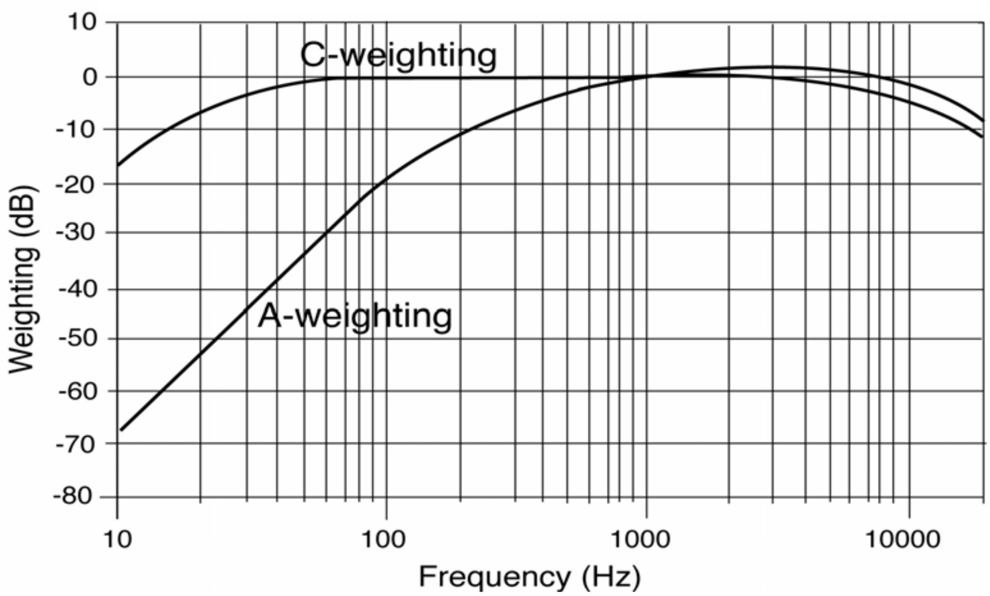
A-weighting significantly de-emphasizes noise at low and high frequencies (below approximately 500 Hz and above approximately 10,000 Hz) where we do not hear as well. The filter has little or no effect at intervening frequencies where our hearing is most efficient. **Figure E-1** shows a graph of the A-weighting as a function of frequency and its aforementioned characteristics. Because this filter generally matches our ears' sensitivity, sounds having higher A-weighted sound levels are usually judged to be louder than those with lower A-weighted sound levels, a relationship which does not always hold true for unweighted levels. Therefore, A-weighted sound levels are normally used to evaluate environmental noise. SPLs measured through this filter are referred to as A-weighted decibels (dBA).

As shown in Figure E-1, C-weighting is nearly flat throughout the audible frequency range, hardly de-emphasizing the low frequency noise. C-weighted levels are not used as frequently as A-weighted levels, but they may be preferable in evaluating sounds whose low-frequency components are responsible for secondary effects such as the shaking of a building, window rattle, perceptible vibrations, or other factors that can cause annoyance and complaints. Uses include the evaluation of blasting noise, artillery fire, sonic boom, and, in some cases, aircraft noise inside buildings. SPLs measured through this filter are referred to as C-weighted decibels (dBC).

Other weighting networks have been developed to correspond to the sensitivity and perception of other types of sounds, such as the "B" and "D" filters. However, A-weighting has been adopted as the basic measure of community environmental noise by the U.S. Environmental Protection Agency (EPA) and nearly every other agency concerned with aircraft noise throughout the United States.

Figure E-1

Frequency Response Characteristics of A and C Weighting



Source: ANSI S1.4-1983 "Specification of Sound Level Meters"

Figure E-2 presents typical A-weighted sound levels of several common environmental sources. Sound levels measured (or computed) using A-weighting are most properly called "A-weighted sound levels" while sound levels measured without any frequency weighting are most properly called "sound levels." However, since this document deals only with A-weighted sound levels, the adjective "A-weighted" will be hereafter omitted, with A-weighted sound levels referred to simply as sound levels. As long as the use of A-weighting is understood, there is no difference implied by the terms "sound level" and "A-weighted sound level" or by the dB or dBA units.

An additional dimension to environmental noise is that sound levels vary with time and typically have a limited duration, as shown in **Figure E-3.** For example, the sound level increases as an aircraft approaches, then falls and blends into the background as the aircraft recedes into the distance (although even the background varies as birds chirp, the wind blows, or a vehicle passes by). Sounds can be classified by their duration as continuous like a waterfall, impulsive like a firecracker or sonic boom or intermittent like an aircraft overflight or vehicle passby.

Maximum Sound Level, L_{max}

The variation in sound level over time often makes it convenient to describe a particular noise "event" by its maximum sound level, abbreviated as L_{max}. For the aircraft over-flight event in Figure 3, the L_{max} is approximately 67 dBA.

Figure E-4 shows L_{max} values for a variety of common aircraft from the FAA's Integrated Noise Model database. These L_{max} values for each aircraft type are for aircraft performing a maximum stage (trip) length departure on a day with standard atmospheric conditions at a reference distance of 3.5 nautical miles from their brake release point. Of the dozen aircraft types listed on the figure, the Concorde has the highest L_{max} and the Saab 340 (SF340) has the lowest L_{max}.

The maximum level describes only one dimension of an event; it provides no information on the cumulative noise exposure generated by a sound source. In fact, two events with identical maxima may produce very different total exposures. One may be of short duration, while the other may continue for an extended period. The metric, discussed later in this appendix, corrects for this deficiency.

Sound Exposure Level, SEL

A frequently used metric of noise exposure for a single aircraft flyover (and the metric that Part 150 specifies) is the Sound Exposure Level, or SEL. SEL may be considered an accumulation of the sound energy over the duration of an event. The shaded area in **Figure E-5** illustrates that portion of the sound energy (or "dose") included in an SEL computation. The dose is then normalized (standardized) to a duration of one second. This "revised" dose is the SEL, shown as the shaded rectangular area in Figure E-5. Mathematically, the SEL represents the sound level of the constant sound that would, in one second, generate the same acoustic energy as the actual time-varying noise event. For events that last more than one second, SEL does not directly represent the sound level heard at any given time, but rather provides a measure of the net impact of the entire acoustic event.

Figure E-2

Sound Levels of Typical Noise Sources (dBA)

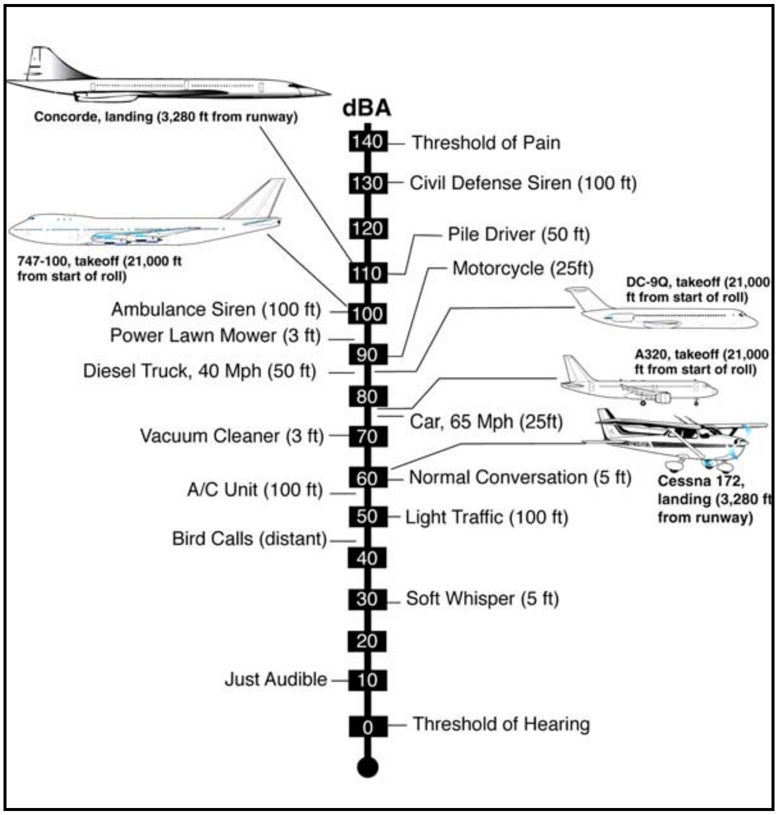
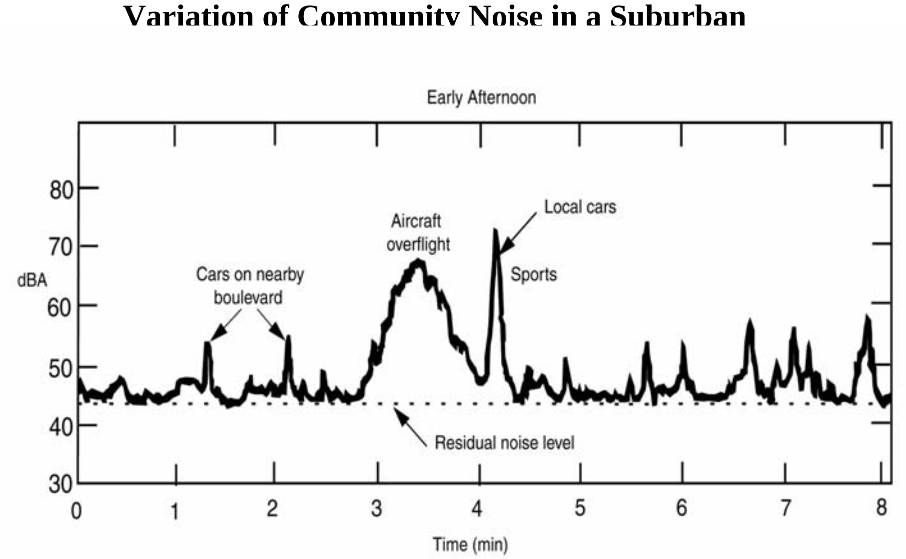


Figure E-3

Variation of Community Noise in a Suburban



Source: "Community Noise," NTID 300.3 EPA, December 1971.

Figure E-4

Common Aircraft Departure Noise Levels

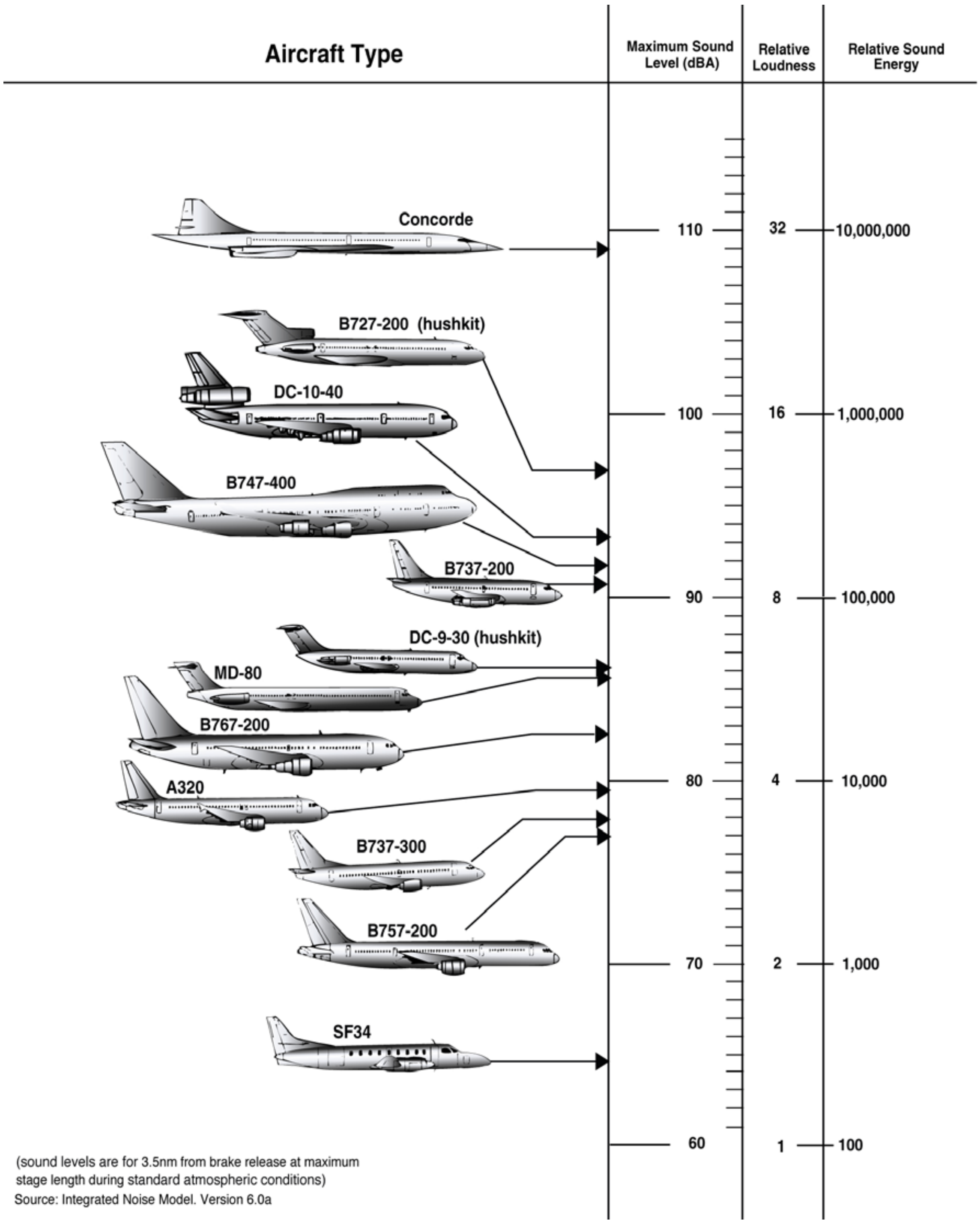
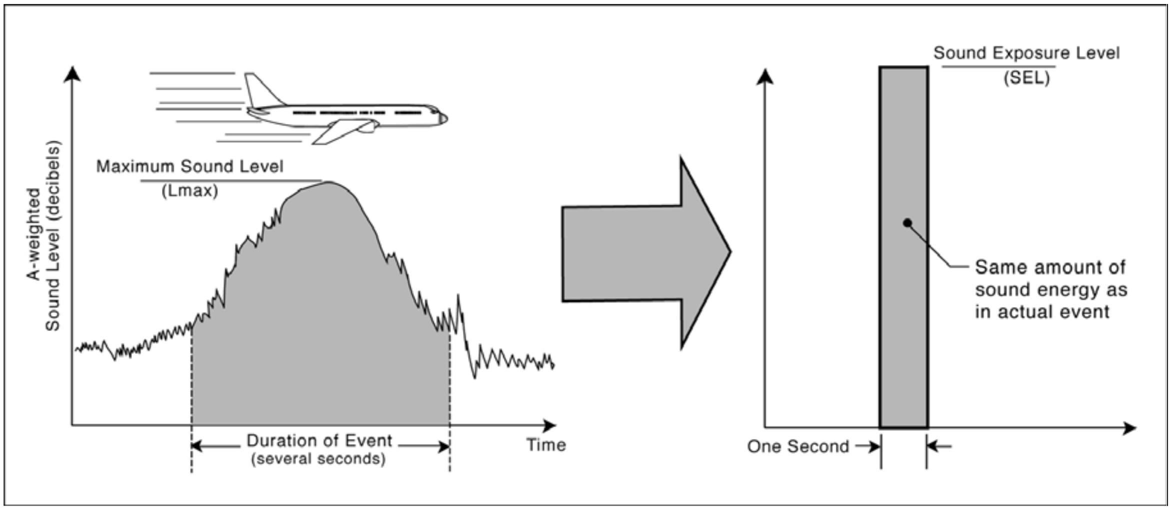


Figure E-5

Relationship between Single Event Noise Metrics



Note that, because the SEL is normalized to one second, it will always be larger in magnitude than the maximum A-weighted level for an event that lasts longer than one second. In fact, for most aircraft overflights, the SEL is on the order of 7 to 12 dBA higher than the L_{max}. The fact that it is a cumulative measure means that not only do louder flyovers have higher SELs than quieter ones (of the same duration), but longer flyovers also have greater SELs than shorter ones (of the same L_{max}).

It is the SEL's inclusion of both the intensity and duration of a sound source that makes SEL the metric of choice for comparing the single-event levels of varying duration and maximum sound level. This metric provides a comprehensive basis for modeling a noise event in determining overall noise exposure.

Equivalent Sound Level, L_{eq}

Maximum A-weighted level, SEL, and LFSL are used to measure the noise associated with individual events. The following metrics apply to longer-term cumulative noise exposure that often includes many events.

The first cumulative noise metric, the Equivalent Sound Level (abbreviated L_{eq}), is a measure of the exposure resulting from the accumulation of A-weighted sound levels over a particular period of interest (e.g., an hour, an 8-hour school day, nighttime, or a full 24-hour day). However, because the length of the period can be different depending on the time frame of interest, the applicable period should always be identified or clearly understood when discussing the metric. Such durations are often identified through a subscript, for example $L_{eq(8)}$ or $L_{eq(24)}$.

As for its application to aircraft noise issues, L_{eq} is often presented for consecutive 1-hour periods to illustrate how the hourly noise dose rises and falls throughout a 24-hour period, as well as how certain hours are significantly affected by a few loud aircraft. Since the period of interest for this study is in a full 24-hour day, $L_{eq(24)}$ is the proper nomenclature.

Conceptually, L_{eq} may be thought of as a constant sound level over the period of interest that contains as much sound energy as the actual time-varying sound level with its normal "peaks" and "valleys," as illustrated in Figure E-3. In the context of noise from typical aircraft flight events and as noted earlier for SEL, L_{eq} does not represent the sound level heard at any particular time, but rather represents the total sound exposure for the period of interest. Also, it should be noted that the "average" sound level suggested by L_{eq} is not an arithmetic value, but a logarithmic, or "energy-averaged," sound level. Thus, loud events tend to dominate the noise environment described by the L_{eq} metric.

Day-Night Average Sound Level

DNL is the same as L_{eq} (an energy-average noise level over a 24-hour period) except that 10 dB is added to those noise events occurring at night (between 10 p.m. and 7 a.m.). This weighting reflects the added intrusiveness of nighttime noise events attributable to the fact that community background noise levels typically decrease by about 10 dB during those nighttime hours, as well as the potential impact of noise on sleep. DNL does not represent the sound level heard at any particular time, but rather represents the total (and partially weighted) sound exposure.

Typical DNL values for a variety of noise environments are shown in **Figure E-6** to indicate the range of noise exposure levels usually encountered.

Due to the DNL metric's excellent correlation with the degree of community annoyance from aircraft noise (the subject of Section A.2), DNL has been formally adopted by most federal agencies for measuring and evaluating aircraft noise for land use planning and noise impact assessment. Federal interagency committees such as the Federal Interagency on Urban Noise (FICUN) and the Federal Interagency on Noise (FICON) which include the EPA, FAA, Department of Defense, Department of Housing and Urban Development (HUD), and Veterans Administration, found DNL to be the best metric for land use planning. They also found no new cumulative sound descriptors or metrics of sufficient scientific standing to substitute for DNL. Other cumulative metrics could be used only to supplement, not replace DNL. Furthermore, FAA Orders 1050.1E and 5050.4A for environmental studies require that DNL be used in describing cumulative noise exposure and in identifying aircraft noise/land use compatibility issues. [1 2 3 4 5]

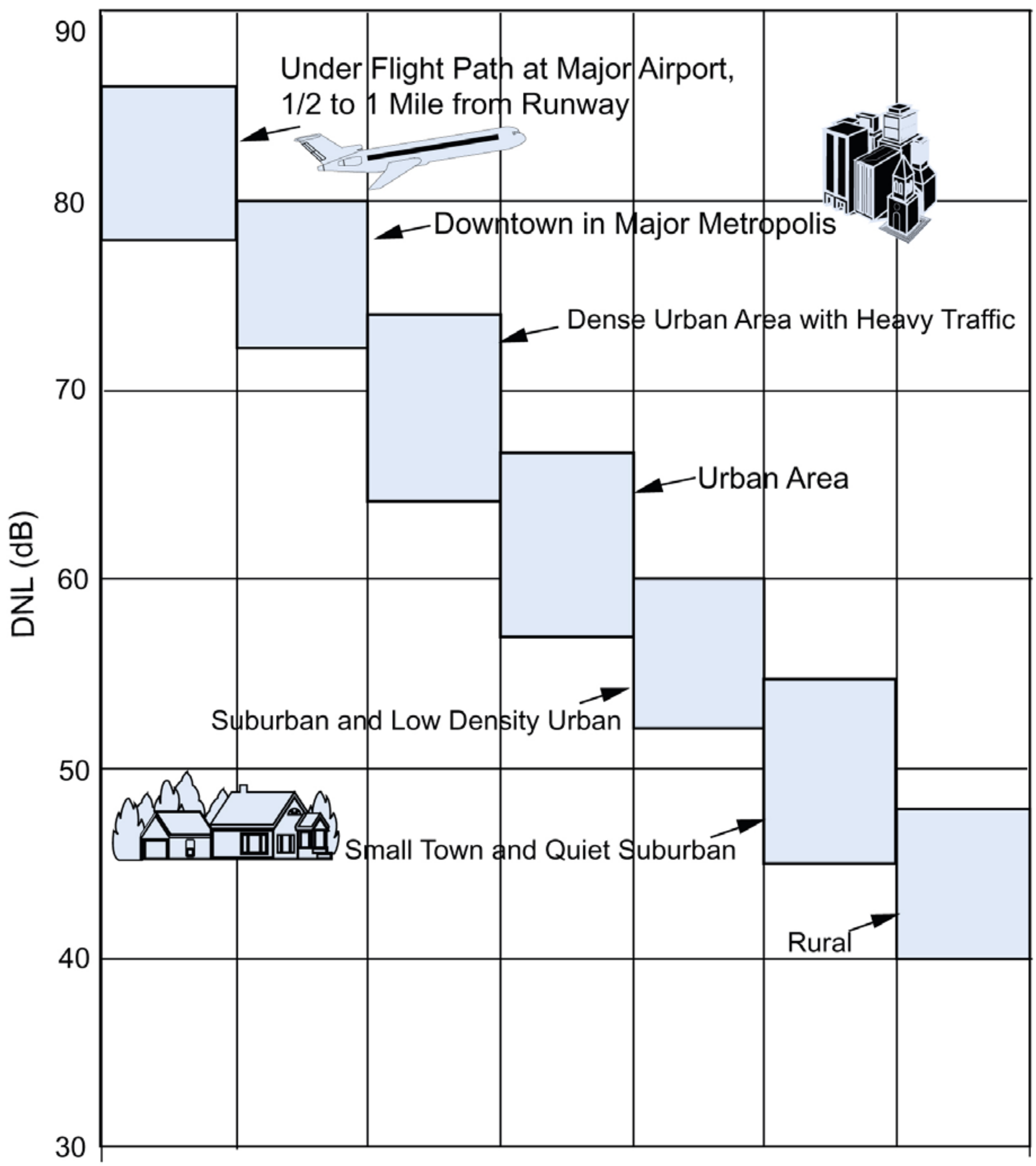
Measurements of DNL are practical only for obtaining values for a relatively limited number of points. Instead, many noise studies, including this document, are based on estimates of DNL using a FAA-approved computer-based noise model.

Time-Above a Specified Level

The Time-Above a Specified Level (TA) metric describes the total number of minutes that instantaneous sound levels (usually from aircraft) are above a given threshold. For example, if 65 dB is the specified threshold, the metric would be referred to as "TA65." Like DNL, the TA metric is typically associated with a 24-hour annual average day or only for the DNL nighttime period of 10 p.m. to 7 a.m.

When the TA calculation is expressed as a percentage of the day it is referred to as "%TA." Although the threshold chosen for the TA calculation is arbitrary, it is usually the ambient level for the location of interest or 65 dB for comparison to a level of 65 dB or DNL.

Figure E-6
Typical Range of Outdoor Community Day-Night Average Sound Levels



Source: U.S. Department of Defense. Departments of the Air Force, the Army, and the Navy, 1978. *Planning in the Noise Environment.* AFM 19-10. TM 5-803-2, and NAVFAC P-970. Washington, D.C.: U.S. DoD.

THE EFFECTS OF AIRCRAFT NOISE ON PEOPLE

To many people, aircraft noise can be an annoyance and a nuisance. It can interfere with conversation and listening to television, disrupt classroom activities in schools, and disrupt sleep. Relating these effects to specific noise metrics aids in the understanding of how and why people react to their environment. This section addresses three ways we are potentially affected by aircraft noise: annoyance, interference of speech, and disturbance of sleep.

Community Annoyance

The primary potential effect of aircraft noise on exposed communities is one of annoyance. The U.S. EPA defines noise annoyance as any negative subjective reaction on the part of an individual or group.[1]

Scientific studies [1 2 3 6 7] and a large number of social/attitudinal surveys[8 9] have been conducted to appraise U.S. and international community annoyance due to all types of environmental noise, especially aircraft events. These studies and surveys have found the DNL to be the best measure of that annoyance.

This relation between community annoyance and time-average sound level has been confirmed, even for infrequent aircraft noise events.[10] For helicopter overflights occurring at a rate of 1 to 52 per day, the stated reactions of community individuals correlated with the daily time-average sound levels of the helicopter overflights.

The relationship between annoyance and DNL that has been determined by the scientific community and endorsed by many federal agencies, including the FAA, is shown in **Figure 7**. Two lines in Figure 7 represent two large sets of social/attitudinal surveys: one for a curve fit of 161 data points compiled by an individual researcher, Ted Schultz, in 1978[8] and one for a curve fit of 400 data points (which include Schultz's 161 points) compiled in 1992 by the U.S. Air Force.[9] The agreement of these two curves simply means that when one combines the more recent studies with the early landmark surveys in 1978, the results of the early surveys (i.e., the quantified effect of noise on annoyance) are confirmed.

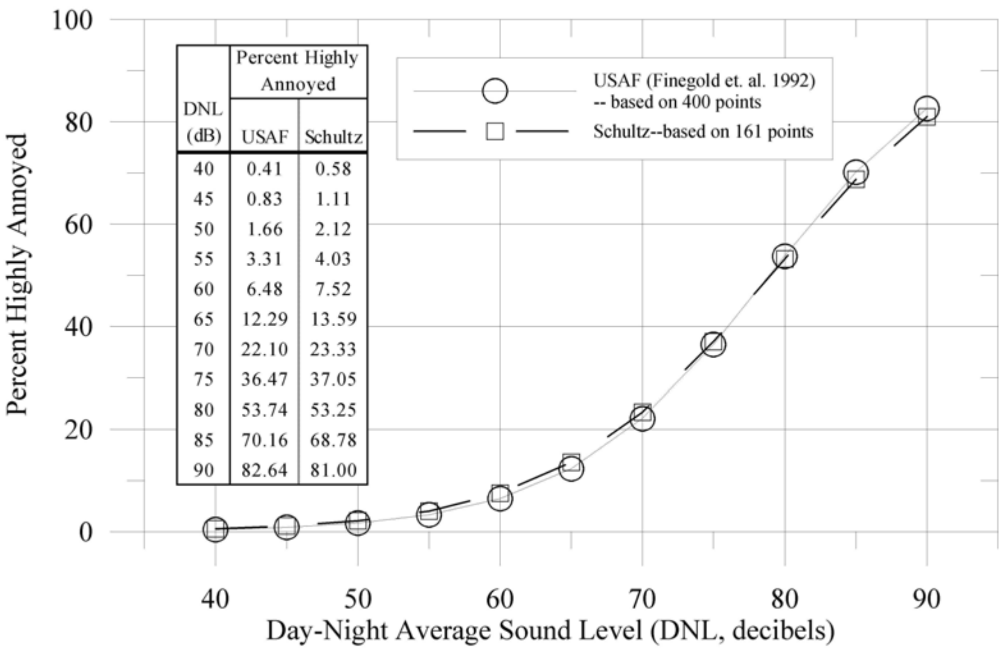
Figure E-7 shows the percentage of people "highly annoyed" by a given DNL. For example, the two curves in the figure yield a value of about 13% for the percentage of the people that would be highly annoyed by a DNL exposure of 65 dB. The figure also shows that at very low values of DNL, such as 45 dB or less, 1% or less of the exposed population would be highly annoyed. Furthermore, at very high values of DNL, such as 90 dB, more than 80% of the exposed population would be highly annoyed.

Recently, the use of DNL has been criticized as not accurately representing community annoyance and land-use compatibility with aircraft noise. One frequent criticism is based on the inherent feeling that people react more to single noise events and not as much to "meaningless" time-average sound levels. In fact, a time-average noise metric, such as DNL, takes into account both the noise levels of all individual events which occur during a 24-hour period and the number of times those events occur. As described briefly above, the logarithmic nature of the decibel unit causes the noise levels of the loudest events to control the 24-hour average.

As a simple example of this characteristic, consider a case in which only one aircraft overflight occurs in daytime hours during a 24-hour period, creating a sound level of 100 dB for 30 seconds. During the remaining 23 hours 59 minutes and 30 seconds of the day, the ambient sound level is 50 dB.

Figure E-7

Relationship between Annoyance and Day-Night Average Sound Level



DNL (dB)	Percent Highly Annoyed USAF	Schultz
40	0.41	0.58
45	0.83	1.11
50	1.66	2.12
55	3.31	4.03
60	6.48	7.52
65	12.29	13.59
70	22.10	23.33
75	36.47	37.05
80	53.74	53.25
85	70.16	68.78
90	82.64	81.00

Source: Federal Interagency Committee on Noise (FICON), "*Federal Agency Review of Selected Airport Noise Analysis Issues*", August 1992, p. 3-6, Figure 3.1

The DNL for this 24-hour period is 65.5 dB. As a second example, assume that 10 such 30-second overflights occur in daytime hours during the next 24-hour period, with the same ambient sound level of 50 dB during the remaining 23 hours and 55 minutes of the day. The DNL for this 24-hour period is 75.4 dB. Clearly, the averaging of noise over a 24-hour period does not ignore the louder single events and tends to emphasize both the sound levels and number of those events. This is the basic concept of a time-average sound metric, and, specifically, DNL.

It is often suggested that a lower DNL, such as 60 or 55 dB, be adopted as the threshold of community noise annoyance for airport environmental analysis documents. While there is no technical reason why a lower level cannot be measured or calculated for comparison purposes, a DNL of 65 dB:

(1) Provides a valid basis for comparing and assessing community noise effects.

(2) Represents a noise exposure level that is normally dominated by aircraft noise and not other community or nearby highway noise sources.

(3) Reflects the FAA's threshold for grant-in-aid funding of airport noise mitigation projects.

(4) HUD also established a DNL standard of 65 dB for eligibility for federally guaranteed home loans.

Speech Interference

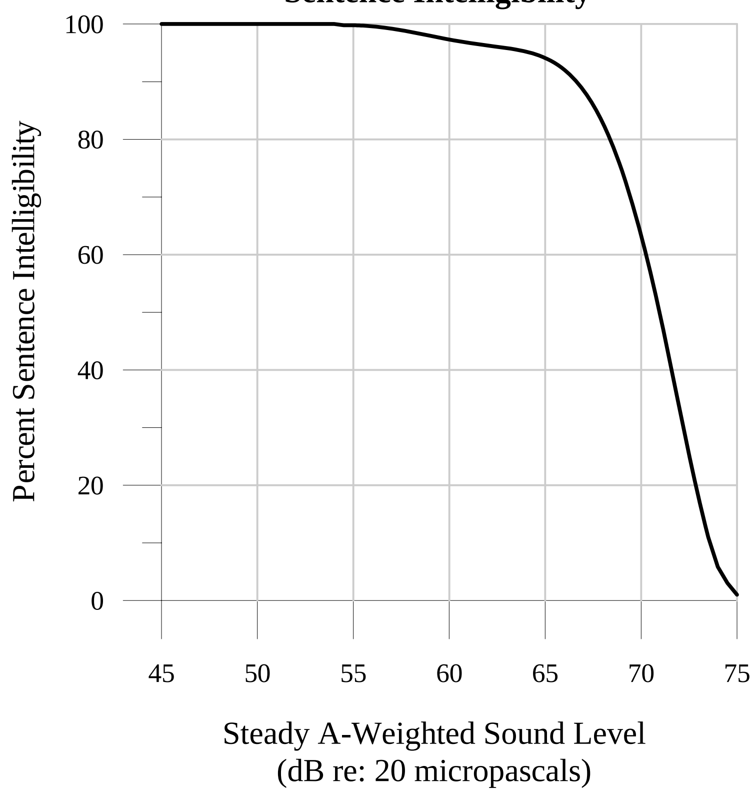
A primary effect of aircraft noise is its tendency to drown out or "mask" speech, making it difficult to carry on a normal conversation.

Speech interference associated with aircraft noise is a primary cause of annoyance to individuals on the ground. The disruption of routine activities, such as radio or television listening, telephone use, or family conversation, causes frustration and aggravation. Research has shown that "whenever intrusive noise exceeds approximately 60 dB indoors, there will be interference with speech communication."[1]

Indoor speech interference can be expressed as a percentage of sentence intelligibility among two people speaking in relaxed conversation approximately one meter apart in a typical living room or bedroom.[1] The percentage of sentence intelligibility is a non-linear function of the (steady) indoor background sound level, as shown in **Figure E-8**. This curve was digitized and curve-fitted for the purposes of this document. Such a curve-fit yields 100 percent sentence intelligibility for background levels below 57 dB and yields less than 10 percent intelligibility for background levels above 73 dB. Note that the function is especially sensitive to changes in sound level between 65 dB and 75 dB. As an example of the sensitivity, a 1 dB increase in background sound level from 70 dB to 71 dB yields a 14 percent decrease in sentence intelligibility.

Figure E-8

Sentence Intelligibility



Source: EPA, 1974

In the same document from which Figure E-8 was taken, the EPA established an indoor criterion of 45 dB DNL as requisite to protect against speech interference indoors.

Sleep Disturbance

Sleep disturbance is another source of annoyance associated with aircraft noise. This is especially true because of the intermittent nature and content of aircraft noise, which is more disturbing than continuous noise of equal energy and neutral meaning.

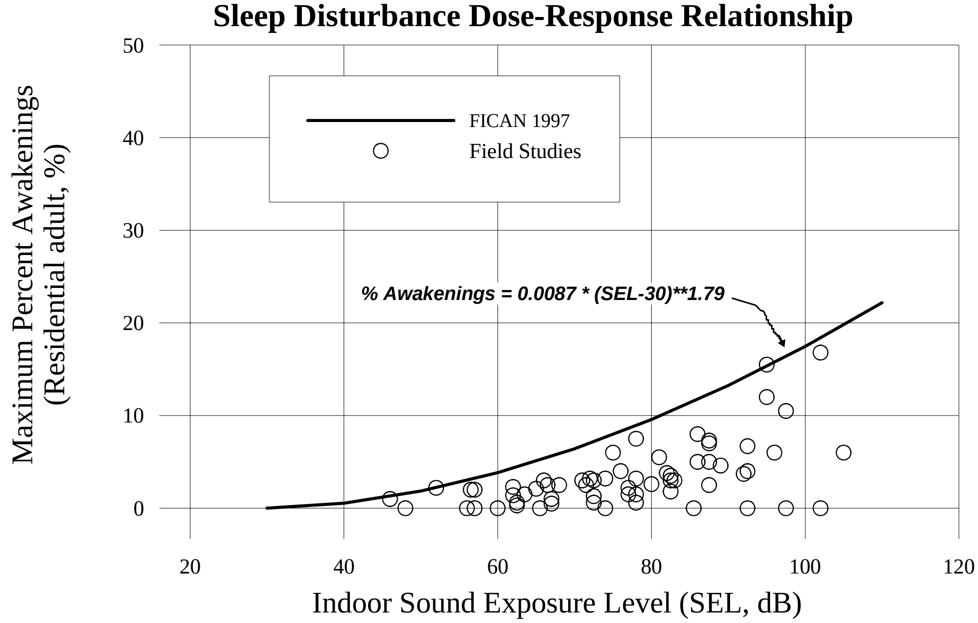
Sleep disturbance can be measured in one of two ways. "Arousal" represents awakening from sleep, while a change in "sleep stage" represents a shift from one of four sleep stages to another stage of lighter sleep without awakening. In general, arousal requires a higher noise level than does a change in sleep stage.

In terms of average daily noise levels, some guidance is available to judge sleep disturbance. The EPA identified an indoor DNL of 45 dB as necessary to protect against sleep interference.[1]

In June 1997, the Federal Interagency Committee on Aviation Noise (FICAN) reviewed the sleep disturbance issue and presented a sleep disturbance dose-response prediction curve.[11] FICAN based their curve on data from field studies[12 13 14 15] and recommends the curve as the tool for analysis of potential sleep disturbance for residential areas. **Figure E-9** shows this curve which, for an indoor SEL of 60 dB, predicts that a maximum of approximately 5 percent of the residential population exposed are expected to be behaviorally awakened. FICAN cautions that this curve should only be applied to long-term adult residents.

Figure E-9

Sleep Disturbance Dose-Response Relationship



Source: FICAN, 1997

Notes

[1] U.S. Environmental Protection Agency, "Information on Levels of Environmental Noise Requisite to Protect the Public Health and Welfare with an Adequate Margin of Safety," Report 550/9-74-004, March 1974.

[2] "Guidelines for Considering Noise in Land Use Planning and Control," Federal Interagency Committee on Urban Noise, June 1980.

[3] Federal Interagency Committee on Noise, "Federal Agency Review of Selected Airport Noise Analysis Issues," August 1992.

[4] 14 CFR Part 150, Amendment 150-3 December 8, 1995

[5] FAA Order 1050.1E, Environmental Impacts: Policies and Procedures, Department of Transportation, Federal Aviation Administration, June 8, 2004.

[6] "Sound Level Descriptors for Determination of Compatible Land Use," American National Standards Institute Standard ANSI S3.23-1980."

[7] "Quantities and Procedures for Description and Measurement of Environmental Sound, Part I," American National Standards Institute Standard ANSI S21.9-1988

[8] Schultz, T.J., "Synthesis of Social Surveys on Noise Annoyance," J. Acoust. Soc. Am., 64, 377-405, August 1978.

[9] Fidell, S., Barger, D.S., Schultz, T.J., "Updating a Dosage-Effect Relationship for the Prevalence of Annoyance Due to General Transportation Noise." J. Acoust. Soc. Am., 89, 221-233, January 1991

[10] "Community Reactions to Helicopter Noise: Results from an Experimental Study," J. Acoust. Soc. Am., 479-492, August 1987.

[11] Federal Interagency Committee on Aviation Noise (FICAN), "Effects of Aviation Noise on Awakenings from Sleep," June 1997.

[12] Pearson, K.S., Barber, D.S., Tabachnick, B.G., "Analyses of the Predictability of Noise-Induced Sleep Disturbance," USAF Report HSD-TR-89-029, October 1989.

[13] Ollerhead, J.B., Jones, C.J., Cadous, R.E., Woodley, A., Atkinson, B.J., Horne, J.A., Pankhurst, F., Reyner, L, Hume, K.I., Van, F., Watson, A., Diamond, I.D., Egger, P., Holmes, D., McKean, J., "Report of a Field Study of Aircraft Noise and Sleep Disturbance." London Department of Safety, Environment, and Engineering, 1992.

[14] Fidell, S., Pearsons, K., Howe, R., Tabachnick, B., Silvati, L., Barber, D.S. "Noise-Induced Sleep Disturbance in Residential Settings," AL/OE-TR-1994-0131, Wright Patterson AFB, OH, Armstrong Laboratory, Occupational and Environmental Health Division, 1994.

[15] Fidell, S., Howe, R., Tabachnick, B., Pearsons, K., Sneddon, M., "Noise-Induced Sleep Disturbance in Residences Near Two Civil Airports," Langley Research Center, 1995.

E.2

Noise Modeling Technical Report

February 2006

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NOISE MODELING TECHNICAL REPORT

This report provides detailed information related to the noise results disclosed in **Chapter 3, Affected Environment** and **Chapter 4, Environmental Consequences;** the methodology used in preparing the noise analysis; statistical information used in the development of the predicted noise levels; and information related to the impact of noise on people located within the Study Area. The organization of this document focuses on key assumptions and constraints affecting the overall noise analysis, the noise modeling process, and the noise metric results.

1. KEY ASSUMPTIONS AND CONSTRAINTS

A critical aspect of the NY/NJ/PHL airspace redesign noise modeling process was the integration of the delay, travel time, and airspace route data to account for noise exposure throughout the system, as well as any changes in noise exposure based on proposed alternatives. For this analysis, the following were key modeling assumptions and constraints prior to developing the model input data:

- Modeled conditions for all scenarios must reflect the concept of an "average annual day" (AAD). As defined in FAR Part 150, data collected for noise modeling input that reflect airport activity and operational data must indicate, on an annual average-daily basis, "the number of aircraft, by type of aircraft, which utilize each flight track, in both standard daytime (0700-2200 hours local) and nighttime (2200-0700 hours local) periods of both landings and takeoffs."[1/] The AAD provides the best representation of the typical long-term (365 days) average conditions for each airport or airspace system. The condition is defined by the number and type of operations, routing structure, runway use, aircraft weight, and weather. All scenarios must be modeled using a yearly average to insure an unbiased comparison among alternatives.

- The flight schedules developed and used for both the Total Airport and Airspace Model (TAAM) and the Noise Integrated Routing System (NIRS) analysis maintained the same percentage of operations and fleet mix. The NIRS schedules reflected an average annual day condition that involve only Instrument Flight Rules (IFR) planned flights that may include overflights as well as representative military flights.

- The Baseline Conditions flight schedule was based on actual 2000 operation data collected via Enhanced Traffic Management System (ETMS) data, Official Airline Guide schedule data, Collection and Analysis of Terminal Records system (CATER) data, local radar data, and other supplemental sources of data.

- For Existing Conditions (2000), runway use and day/night distribution for the NIRS modeling were provided by actual operations data from radar data collected by airports with airport noise monitoring systems and ETMS data for other airports. The Future No

[1/] *Federal Aviation Regulation Part 150*. Sec. A150.103(b). Federal Aviation Administration.

Action Airspace Alternative scenario runway use component relied upon similar percentages based on the Existing Conditions data. The day/night distribution calculations for the Future No Action Airspace Alternative scenarios were generally based on the forecast flight schedules developed in the operational forecasting analysis (see Appendix B, Aviation Demand Forecasts). These schedules were then evaluated based on the TAAM simulation output to determine if any operational delays would accumulate and cause flights to shift into the nighttime hours. Similarly, the TAAM output stream provided the runway use and day/night distribution for future-year Alternative scenarios.

- ✈ The study area boundaries within which noise modeling was conducted were defined by a complex polygon encompassing the region. **Exhibit 1** illustrates the Study Area used for the noise analysis. These boundaries determined the extent of the population data that was extracted from the 2000 U.S. Census data, as well as the extent of modeled flight track definitions. A maximum altitude of 14,000 feet MSL bounded the study area, based on FAA policy to model traffic to 10,000 feet AGL as indicated in FAA Order 1050.1E and the fact that the highest point in the study area is at 4,000 feet MSL (Hunter Mountain within the Catskills located in the northeast quadrant of the study area). The location for the study "center" reference point was LaGuardia Airport (KLGA) airport reference point with an altitude of 22.0 feet MSL.

- ✈ The TAAM analysis evaluated the four primary operating airspace configurations in the area; however, that do not account for a full annual average day condition at all 21 airports in the study. Additional information regarding traffic streams to and from specific runways was developed for each airport in order to adequately cover the average annual day condition.

Airports within the Study Area

Exhibit E.1

ENVIRONMENTAL IMPACT STATEMENT

NEW YORK/NEW JERSEY/PHILADELPHIA METROPOLITAN AIRSPACE REDESIGN PROJECT

2. NOISE ANALYSIS OBJECTIVES

Modeling the airspace in the NY/NJ/PHL area required the model to take into account the numerous operating configurations; the number and proximity of airports; the multiple layers of controlled airspace involving two TRACON facilities, one military facility, one Air Route Traffic Control Center (ARTCC); and the complex interaction among the traffic flows that enter and exit the airspace. Due to the size of the study area, number of aircraft entering and exiting the NY/NJ/PHL airspace, and the numerous runway use patterns, it was necessary to model several thousand NIRS flight tracks within the study area. The objectives of the noise analysis are discussed below. The process of meeting the following objectives is discussed in **Section 4** of this document.

2.1 Noise Model

For purposes of this study, a noise analysis of the entire NY/NJ/PHL airspace was considered appropriate. Due to the expected size and complexity of the study, the FAA-approved regional noise model, the Noise Integrated Routing System (NIRS) is being utilized in modeling cumulative noise exposure. The NIRS model is described in detail in **Section 4**.

The FAA's NIRS model provides a detailed tool to evaluate the effects of high-altitude and regional airspace changes from the ground level up to the maximum study altitude on noise-sensitive areas. Information to be disclosed in the Environmental Impact Statement (EIS) include the number of people within predefined DNL noise exposure ranges, and any resulting net increases or decreases in the number of people exposed to those levels of noise for the various airspace scenarios.

2.2 Compute Average 24-hour Noise Levels

For each of the noise modeling scenarios, the yearly average day/night sound level (DNL) metric levels were calculated for each of the population locations (centroids) within the study area. These points were based on 2000 U.S. Census data. Each input file contained specific airport operations categorized by runway, operation mode, and day/night. Total exposure for each input file at each centroid location was calculated. Using exposure levels from each file, the noise levels are annualized (log-added) at each centroid, which results in an annualized DNL level.

Additional noise-exposure calculations were performed for locations in noise-sensitive areas, including DOT Sec303/4f sites. These areas were covered either by individual or regularly-spaced arrays of grid points in the sensitive areas. The noise exposure in these areas was determined in the same manner as for population locations. The grid points served primarily as indicators of noise exposure at locations that do not have nearby population locations in the 2000 U.S. Census data. See **Section 3.3.11** for definition of the grids that were used for this analysis.

DNL Noise Metric

For aviation noise analysis, FAA requires that the 24-hour cumulative noise energy exposure of individuals to noise resulting from the operation of airports be established in terms of yearly day/night average sound level (DNL) as stated in FAA Order 1050.1E, "Policies and Procedures for Considering Environmental Impacts," and 5050.4A, "Airport Environmental Handbook." Therefore, the DNL metric is the primary noise descriptor for this EIS.

The DNL metric averages the total amount of noise energy produced in a 24-hour period. However, to account for the greater annoyance caused by a noise event at night (when people are trying to sleep and ambient noise levels are lower), the DNL metric imposes a penalty for nighttime noise. This is accomplished by requiring that the sound levels occurring between 10:00 p.m. and 7:00 a.m. (nighttime) be augmented by 10 dB. Essentially, the 10 dB weighting equates one night flight to ten day flights by the same aircraft. The DNL levels are calculated by adding the computed Sound Exposure Levels (SELs) of individual aircraft operations that affect a given location during a 24-hour period and weighting nighttime events by 10 dB.

2.3 Model All Typical Traffic Routes Over Entire Study Area

In order to meet the AAD requirements, all significant routes that can occur over a year were identified and modeled. Radar flight tracks were used to evaluate and model typical flight routes and flows throughout the NY/NJ/PHL airspace. All developed routes originated from actual real-time data provided by both Automated Radar Terminal System (ARTS) data and ETMS for 2000 Existing Conditions. In order to provide a system-wide source, the ARTS and ETMS data were merged together using key identifying characters (i.e., flight number and aircraft type) and geographic location. For some airports, ETMS data was the only available source used to identify traffic and runway use patterns. For the Future No Action Airspace Alternative conditions, the 2000 ARTS and ETMS data was combined with a sample of 2002 ETMS data and TAAM output to develop the modeled flight routes. For the future proposed alternatives, the TAAM airspace analysis in conjunction with additional configuration information provided by the airspace designers was utilized to make necessary adjustments to the No Action routes to reflect the alternative design.

2.4 Model Standard Aircraft Procedure Profiles with ATC Altitude Control Points

Aircraft within the study area operate in accordance with standard air traffic control procedures. To model traffic in existing and alternative airspace scenarios, NIRS arrival and departure profiles:

a. **Met specific altitude restrictions above 3,000 feet AGL as set by air traffic control, and**

b. **Used standard procedure profile data provided by NIRS (based on the FAA's Integrated Noise Model) below 3,000 feet AGL.**

The use of standard procedures below 3,000 feet AGL is required by FAA's Office of Environment and Energy (AEE). Related to the Existing Conditions analysis and Future No Action Airspace Alternative, all altitude restrictions set by air traffic control were incorporated in the NIRS analysis based upon the NY/NJ and PHL TRACON Standard Operating Procedures Manual and actual radar data. The TAAM simulation results were used for future alternatives. See **Section 3.3.9**, "**Aircraft Climb/Descent Profiles**," for further details.

2.5 Evaluation of Noise Level Changes Due to Alternative Scenarios

Airspace scenarios consist of one baseline scenario for current conditions, four scenarios for No Action and Alternative airspace conditions in 2006, and five scenarios for No Action and Alternative airspace conditions in 2011. This gives a total of ten data sets that will be modeled for noise impacts, as follows:

- 2000 Baseline Conditions – existing airspace and routes
- Interim 2006 No Action – projected 2006 airspace and routes without redesign
- Interim 2006 Modifications to Existing Airspace Alternative
- Interim 2006 Ocean Routing Alternative
- Interim 2006 Integrated Airspace without ICC Alternative
- Future Year 2011 No Action – projected 2011 airspace and routes without redesign
- Future Year 2011 Modifications to Existing Airspace Alternative
- Future Year 2011 Ocean Routing Alternative
- Future Year 2011 Integrated Airspace without ICC Alternative
- Future Year 2011 Integrated Airspace with ICC Alternative

The year 2000 is used as a baseline for this analysis for several reasons. At the onset of this study, 2000 was the most recently complete calendar year for which air traffic statistics were available. Although a study of this scope and magnitude takes a number of years to fully develop, the noise modeling of future conditions and final alternatives is based on the input data developed from the baseline conditions (2000). Thus, continual revisions of the baseline year would make it impossible to finalize the noise modeling for the study. Finally, 2000 was the last full robust year of air traffic activity prior to the aviation slowdown resulting from terrorist activities and economic down turns. Consequently, 2000 remains the best year that represents traffic levels that are similar to those being experienced currently in 2005.

As required by FAA Order 1050.1E, the difference in DNL between the Future No Action Airspace Alternative and a proposed future Alternative defines the term "change" in this analysis. The method used to identify change and the degree or threshold of such change is described in **Section 3.2.6**.

2.6 Identify and Quantify Noise Impact Changes and Causes

The change in DNL at each location between Future No Action Airspace Alternative and the proposed alternative airspace scenarios was quantified and reported for each population centroid location. In areas where any substantive changes in noise exposure occur, an analysis was conducted in order to provide a more detailed explanation of the changes. FAA criteria for substantive changes are defined in **Section 3.2.6**.

2.7 Produce Easily Interpreted, Informative Tables and Graphics to Report Results

The complexity (number of flight routes, configurations, airports, operations, etc.) of the study creates challenges in reporting noise-modeling results in a useful format for analysis. The tables and graphics presented in this appendix, as well as the main body of the EIS document were designed to summarize the data in an easily understandable format.

2.8 Noise Modeling Quality Control

The data used to model noise impacts were subjected to a series of consistency checks to maintain the consistency of data across airspace scenarios and constituent configurations. The first check involved a quality assurance analysis of the TAAM airspace modeling output. An airspace model philosophy hinges upon the concept of time and/or efficiency. Routes are usually defined over a single path that often does not represent detailed actual conditions, but meets the need to direct aircraft in and out of the airspace along key points of the route. Noise modeling philosophy focuses more heavily on precise locations and altitudes to ensure noise exposure calculations on the ground are reasonably accurate and precise. In order to ensure that the No Action conditions were modeled accurately and that each alternative was interpreted appropriately and modeled accurately, a collaborative review effort was undertaken. This process involved integrating the operational modeling (TAAM) output, the No Action NIRS flight tracks and profiles, and the airspace alternative design documentation to evaluate each of the differences between the alternative TAAM and the No Action NIRS routes. The FAA's Design Team, the operational simulation modelers and the noise analysts reviewed each alternative on an airport-by-airport, route-by-route, and sometimes even a flight track-by-flight track basis. The result was an agreement on the fundamentals of the Future No Action Airspace Alternative airspace along with the design elements of each alternative.

Other elements of consistency checks involved NIRS input development. Flight routes and the corresponding profiles were evaluated to assure that dispersion and altitude profile calculations were made accurately, as well as for general operational appearance. NIRS output quality assurance checks included operation levels throughput to insure all operations entered into the model are accounted for in the output. Other key elements such as runway use and day/night distribution were also verified. Finally, in addition to the population centroids, noise levels were also computed at some 92,000+ grid points throughout the Study Area. These points included densly spaced points near the major airport, as well as evenly distributed points throughout the study area. The noise results and noise changes at these grid locations provided a means of investigating anomalous results and assisted in the quality control of the final noise modeling.

3. NOISE MODELING METHODOLOGY

In order to adequately inform concerned parties and decision makers it is necessary to evaluate the expected noise levels for future conditions. Since future noise levels cannot be directly measured, it is necessary to simulate the expected future condition through noise modeling. Furthermore, noise modeling is the only way that various alternative airspace designs can be compared to one another to identify the relative noise effects for each proposal.

The noise modeling effort undertaken for this EIS was developed with unprecedented care and to an extraordinary level of detail. In order to ensure that the estimations of future noise conditions presented in this document represent the best possible results, the noise modeling input assumptions were refined to a level of detail well beyond that of any previous study of this kind.

The following sub-sections describe the model to be used in the analysis, the data required for input into the model, noise model development procedures, and the output formats from the modeling process.

3.1 Noise Integrated Routing System (NIRS)

Prior to the development of the Noise Integrated Routing System (NIRS), limited technology was available to examine noise impacts associated with high-altitude air traffic changes. The FAA-accepted methodology to examine high altitude noise impacts was published in FAA Notice 7210.360, "Noise Screening for Certain Air Traffic Actions Above 3,000 Feet AGL," on September 14, 1990. The process outlined in this notice provided guidance to the development of the Air Traffic Noise Screening (ATNS) computer model which was first developed in 1995. However, the ATNS noise screening tool was limited in its application because it could examine only one route at a time. The FAA recognized that there was a need to evaluate multiple proposed high altitude air traffic changes and that there was also the potential to create changes in noise levels at or below 3,000 feet when more efficient arrival and departure procedures are used. Furthermore, the FAA's Integrated Noise Model (INM), which was designed to estimate noise exposure in the vicinity of airports, was not well suited for projects involving multiple airports or en route traffic over large geographic areas. Consequently, the FAA combined airspace design criteria and noise modeling technology to examine the cumulative effect of multiple route changes and their effect on noise levels over a large geographical area containing multiple airports. The result was the creation of a noise modeling tool called the Noise Integrated Routing System.

NIRS was initially developed in 1995 by the FAA Office of Environment and Energy, in cooperation with FAA Air Traffic for assessing the noise impacts of regional airspace design projects covering large geographic areas. Its purpose is to assist the FAA in evaluating the environmental noise impacts of airspace routing and procedural alternatives designed to improve system safety and efficiency. It is specifically tailored to evaluate complex air traffic applications involving high-altitude (up to 18,000 feet AGL-Above Ground Level) routing, broad area airspace changes affecting multiple airports, and other airspace modifications in the terminal and enroute environments that cannot be assessed using other methods. The NIRS model computes 13 predefined noise metrics that include cumulative sound exposure, maximum sound level and time above metrics from the A-Weighted and the Perceived tone-corrected noise metrics. Primarily NIRS is used to evaluate noise impact by calculating the Day/Night Average Sound Levels (DNL) for specific locations on the ground. These locations are based on either census data known as population centroids or user defined grid locations. NIRS Version 1.0 was released in June, 1998 as a prototype model and Version 2.0 was released in December of 2001. In June of 2003 the version numbers for NIRS were changed to coincide with the INM version number scheme. At that point NIRS 6.0c2 was released which matched noise engine capabilities found in INM version 6.0c. In August of 2005 NIRS version 6.0c3 was release and used for all calculation pertaining to this project. NIRS provides a powerful computational environment and graphical user interface, and includes the following major capabilities:

- Provides automated quantitative comparison of noise impacts across alternative airspace designs.
- Imports and display tracks and operation data from airspace models, and population and community data from other sources.
- Enables users to specify air traffic control altitudes requirements, and automatically calculates required aircraft thrusts and speeds necessary for noise using the same up-to-date database included in the FAA's Integrated Noise Model (INM).
- Calculates estimated noise levels and impacts at population centroids (or other specially defined points) in large study areas.
- Provides automated means of annualizing noise impact based on different operational configurations and/or runway usage statistics.
- Identifies and map all areas of change in noise impact.
- Identifies air traffic elements that are the principal causes of change in noise impact in each area of change.
- Provide data for quantification of mitigation goals and identification of mitigation opportunities.
- Assemble tables and exhibits for noise impact data analysis and report generation.
- Provide multiple levels of data checking and quality control.

These capabilities make it possible for a noise-impact assessment to be performed thoroughly and rapidly as a concurrent portion of the airspace assessment and design process. NIRS represents the international state-of-the art broad-area noise assessment and integration of such assessment into the airspace design and management process.

NIRS was initially verified and validated against INM in 1997 by the FAA's Office of Environment and Energy. This process involved providing both models with identical inputs, and performing a detailed comparison of the resulting outputs for representative jet, turboprop, and propeller aircraft for both arrival and departure operations. The models were found to give the same results in terms of both final noise values and intermediate aircraft state parameters (position, altitude, thrust, and speed). An on-going program ensures compatibility of the two models. Based on these results and on technical oversight of the NIRS development process, the FAA Office of Environment and Energy (AEE-120) has approved the use of NIRS for airspace applications. The NIRS noise assessment methodology, interpretation guidelines, and population-impact results have been briefed at several levels throughout the FAA and U.S. Environmental Protection Agency (USEPA). In addition, FAA Air Traffic and AEE-120 assure that model integrity is maintained in terms of noise standards and equations, consistency with airport methodology, and reliability of use. NIRS is the best available tool to model noise exposure changes for a study of this magnitude and is specifically referenced in FAA Order 1050.1E as the model to be applied for this type of analysis.

To support NIRS analysis, four categories of input data are required: general study data, airport runway and configuration data, area population and grid location information, and flight event/track data.

General Study Data: NIRS requires general information about the study to perform the noise calculations. Study area information such as the coordinates of the center of the study, the length and width of the study area and the altitude ceiling of the study are necessary inputs. Also required is climatologically data such as average headwind speed, average annual temperature and average annual pressure. Finally, any special regions within the study area need to be identified.

Airport Runway and Configuration Data: Another user input for NIRS is information specific to each airport in the study. The location of each runway at the airport needs to be entered into the study. Also required are the elevation of the runway ends, and the length of each runway.

Input data for configuration data includes annual percentage use for each operational configuration for each airport within the study. This data includes annual configuration use for the airports and runways use for each of those configurations.

Population and Grid Location Data: Users input population centroid identification, location, and population counts. Typically these are referred to as population centroids and are center points of census blocks. Census blocks are statistical subdivisions of a county developed by the US Census Bureau. Users can also input grid information to create user defined grids to receive additional noise information for noise-sensitive areas. Using the population centroids, NIRS is able to output both population impact and change-of-exposure reports and graphics. Change of noise exposure for each point in the study area is evaluated based on FAA guidance and local requirements to determine the degree of the change in noise exposure. Also, where possible, NIRS identifies the principal source of the change of exposure.

Flight Event/Track Data: Each flight is made up to two types of information. Flight events include such data as flight identification, city-pair, time, runway, and airframe/engine type. Flight tracks provide the geometry of the fight in series of points that define latitude, longitude and altitude. Flight tracks are general or average tracks that can also include data that describes dispersion characteristics. Dispersion data includes information about the number of subtracks, the weight of the subtracks, and the distance subtrack from the center track. NIRS also includes a special capability to fly custom altitude profiles. With this component NIRS allows the user to specify four different altitude controls along the track. These controls are:

- ✈ No altitude control – or fly the standard profile
- ✈ Fly to a specified altitude or higher
- ✈ Fly to a specified altitude

- Fly to a specified altitude or lower

The user of NIRS has two choices when defining the flight profile characteristics for flight tracks. By default if no altitude controls are specified NIRS will use the standard profiles as they are defined within NIRS/INM performance database. When the flight track represents a departure, NIRS uses the aircrafts performance data and settings required to fly the profile specified in the flight track up to 10,000 feet Above Field Elevation (AFE). Above 10,000 feet AFE, NIRS use the maximum climb thrusts to reach the final altitude. For flight tracks representing arrivals above 6,000 feet AFE, NIRS uses a straight-line geometric descent as defined by the user. Below 6,000 feet AFE, NIRS uses the NIRS/INM aircraft performance data to fly the standard profile to the runway.

When altitude controls are specified in the flight track, NIRS simulates a standard profile for all aircraft below 3,000 feet AFE. When a flight track contains altitude controls greater than 3,000 feet AFE, NIRS will simulate the aircraft's performance in order to meet the designer's specified altitudes.

The following section presents an overview of the input data and analytical methods used to develop the NIRS noise modeling for this EIS study.

3.2 Modeling Procedures

The NIRS model processes flight-track and operation data through several major steps: input development, data quality assurance, calculation of flight dynamics (thrust and speed), noise exposure computation, annualization of noise exposures, change of exposure analysis, and report generation. Key aspects of this processing are discussed below.

3.2.1 Input Data

Prior to running NIRS, the required input data was developed and integrated using the Airspace Design Tool (ADT), a proprietary pre-processing software with integrated tool-sets that allow for radar data analysis, traffic flow identification, NIRS backbone and dispersion analysis, and flight schedule assignments. The input data was categorized by airport, runway, operation mode, and day/night. The information was imported into NIRS in the required traffic file format. Airport definition data, population centroids, grid points, and terrain data was also imported.

3.2.2 Model Input Data Quality Assurance

After the quality assurance checks previously described in **Section 2.8** were performed, the pre-processed input was put through the NIRS Flight Segment Generator (FSG) function, which reviews the profile and operation components within each input traffic file. Components that were found to be outside the set rules were identified and further modified by the user prior to noise calculations. The rules set are as follows:

Flag Type	Rule
Climb/Descent	No angles greater than 30 degrees
Altitude Controls	There must be at least one altitude set above ground level
Aircraft	Aircraft must be an INM profile aircraft type
Runways	Assigned runways must be longer than aircraft takeoff distance

A manual check was made to confirm that operation counts (output) meet expected counts (input), and that modeled fleet mix tables are reviewed for consistency with the noise modeling assumptions.

3.2.3 Calculation of Flight Dynamics

As described in the NIRS User Manual, calculation of flight dynamics takes place in the FSG function of the model.[2/] The program combines the databases that correlate aircraft performance and noise level data for each unique aircraft type with the designed flight tracks, altitude profiles, and the quantity of each unique aircraft operation. The necessary data is provided by the traffic input files and unique aircraft type performance databases, which are standard not only for NIRS, but also the FAA's Integrated Noise Model (INM). FSG begins with each route and breaks it up based on the state of flight (i.e., takeoff, max-climb, acceleration, etc.). The engine power settings or thrust component for each flight segment are then calculated based on the same algorithms used in INM. The resulting file contains the necessary flight paths with aircraft assigned to the paths and the thrust settings assigned to each unique aircraft as it operates along the flight path.

3.2.4 Noise Exposure Computations

With the necessary flight components (aircraft type, operation frequency, track location, altitude, speed, and thrust), the information is inputted into the NIRS noise-calculation engine to calculate noise levels at each specific population centroid and/or grid point. Noise levels were calculated for each unique traffic/flight input file. In order to arrive at an average annual noise level result, each resulting noise file per traffic file needs to be combined or annualized.

3.2.5 Annualize Airport-Based Noise Levels

For each scenario (airport), runway, operation mode, and day/night, NIRS calculated airport-specific noise exposures at all population centroids and grid points. Then NIRS utilized the annual use percentages associated with each scenario component to calculate the total annual noise exposure at each population centroid and grid point. For all scenarios, the annual use percentage of each component equals 100%, because ratios involving runway use and track utilization for each airport was inherent within each traffic file. The result of the annualization task was a net exposure due to the mixture of noise from each scenario component. A sample of a NIRS annualization tree is provided in **Figure 1**.

[2/] *NIRS Noise Impact Routing System User's Guide-Version 6.0c*. Gulding, John and Dr. Terry Thompson. December 2001.

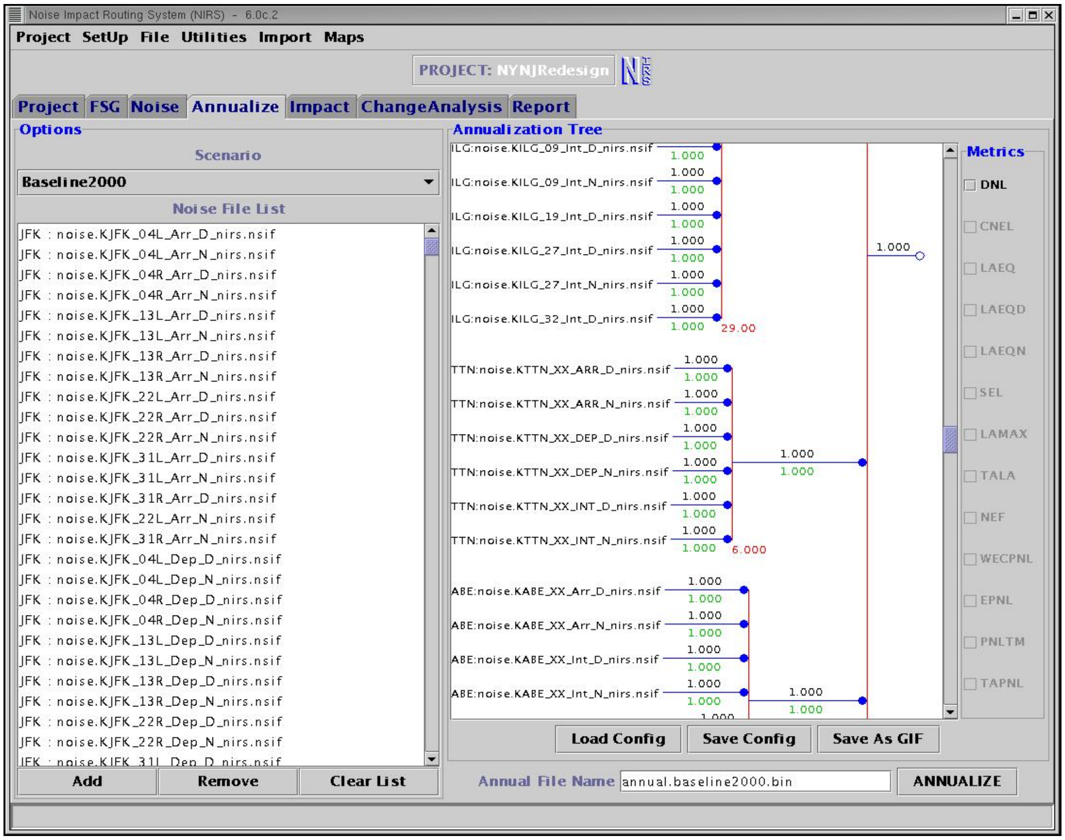


Figure 1: NIRS Annualization Tree Sample

3.2.6 Impact Analysis

After all noise calculations were completed, NIRS was used to determine noise impacts by locating and categorizing changes in noise values between scenarios. Using FAA scoring criteria, maps and tables depicting various types of change in annualized noise exposure between scenarios were produced within NIRS for the entire study area.

The FAA has considered the matter of threshold levels above which aircraft noise causes an adverse impact on people. The FAA established 65 DNL as the threshold above which aircraft noise is considered to be not compatible in residential areas. The FAA also determined that a significant impact occurs if a proposed action would result in an increase of 1.5 DNL or more on any noise-sensitive area within the 65 DNL exposure level.[3/]

In 1992, the Federal Interagency Committee on Noise (FICON)[4] recommended that in cases where increases of 1.5 DNL or more occur at noise-sensitive locations at or above 65 DNL, further evaluation should be completed to assess whether or not noise increases of 3 DNL or more occur at noise sensitive locations located between 60 and 65 DNL. Increases of this magnitude below 65 DNL are not to be considered as "significant impacts," but they are to receive consideration for possible mitigation options. The FAA adopted FICON's recommendation into FAA Order 1050.1E.

3/ FAA Order 1050.1E; FAR Part 150 Section 150.21(a)(2)(d); FICON 1992, Pp. 3-5.

4 FICON 1992, Pp. 3-5.

For the purpose of this EIS, increases of 1.5 DNL above 65 DNL are considered significant. Increases of 3 DNL between 60 and 65 DNL are considered “slight to moderate impacts,” as are increases of 5 DNL or greater at levels between 45 DNL to 60 DNL. The increase in noise at these levels is enough to be noticeable and potentially disturbing to some people, but the cumulative noise level is not high enough to constitute a “significant impact.” The FAA determined that within the Study Area 45 DNL is the minimum level at which noise needed to be considered because “even distant ambient noise sources and natural sounds such as wind in trees can easily exceed this [45 DNL] value.”[5]

The FAA scoring criteria are used to compare DNL changes at the population locations in the study area. For each scenario, all population in the study area is divided into three categories: (1) those receiving an increase in noise exposure relative to No Action; (2) those receiving a decrease; and (3) those having no change. The rules defining the increase, decrease, and no change categories and the sources for each rule are presented in **Table 1**.

Table 1
Noise Impact Scoring Criteria

DNL Noise Exposure With Proposed Action	Minimum Increase in DNL With Proposed Action	Level of Impact
65 DNL or higher	1.5 DNL	Significant
60 to 65 DNL	3.0 DNL	Slight to Moderate
45 to 60 DNL	5.0 DNL	Slight to Moderate

Source:
(1) FAA Order 1050.1E, Appendix A, 14.3 Part 150, Sec. 150.21(2)(d) FICON 1992.
(2) FAA Order 1050.1E, Appendix A, 14.4c FICON 1992.
(3) FAA Order 1050.1E, Appendix A, 14.5e.

Using a color-scheme as described below, NIRS also produces an Impact Map for each scenario comparison. All population locations receiving changes as determined by the FAA criteria are plotted, and each is colored according to its change category. In conjunction with the mapping, a summary of the population impacts associated with the change analysis is provided. **Table 2** presents an example of the change analysis summary table along with the color scheme used for the mapping.

[5] Expanded East Coast Plan – Changes in Aircraft Flight Patterns Over the State of New Jersey. Federal Aviation Administration. 1995, Pp. 5-9.

Table 2
Sample Population Impact Change Analysis Summary

	DNL Noise Exposure With Alternative		
	65 dB or higher	60 to 65 dB	45 to 60 dB
Minimum Change in DNL With Alternative	1.5 dB	3.0 dB	5.0 dB
Level of Impact	Significant	Slight to Moderate	Slight to Moderate
Noise Increases			
2006	0	0	0
2011	0	0	0
Noise Decreases			
2006	0	0	0
2011	0	0	0

The various colors have been assigned to the levels of change associated with a project alternative for ease of interpretation. Yellow, orange, red, and pink cover various degrees of alternative exposure for population receiving increases under the alternative; violet, blue, green, and light green cover various degrees of baseline exposure for population receiving decreases under the alternative. The following descriptions apply to the color scheme used in the noise change analysis:

Noise Increases

- Red: Population centroids, or census blocks, that would experience a noise increase of 1.5 DNL or more to levels at or above 65 DNL with the project. – Significantly Impacted
- Orange: Population centroids/blocks that would experience a noise increase of 3.0 DNL or more to levels at or above 60 DNL with the project. – Slight to Moderate Impact
- Yellow: Population centroids/blocks that would experience a noise increase of 5.0 DNL or more to levels at or above 45 DNL with the project. – Slight to Moderate Impact

Noise Decreases

- Green: Population centroids/blocks at 65 DNL or more that would experience a noise decrease of 1.5 DNL or more. – Significantly Relieved
- Blue: Population centroids/blocks at 60 DNL or more that would experience a noise decrease of 3.0 DNL or more. – Slight to Moderate relief.
- Purple: Population centroids/blocks at 45 DNL or more that would experience a noise decrease of 5.0 DNL or more. – Slight to Moderate relief.

3.3 NIRS Input Data

As outlined in the previous sections, noise modeling requires several types of input and supporting data. All the input data types mentioned are required to be based on the local average annual day condition. This EIS involved the collection of all such inputs for 21 airports, each involving multiple runways and users that operate within close proximity of each other. The information also required route descriptions that go beyond the airport environment and extend from the ground up to 14,000 feet MSL. Airport layouts within the study area are used as the source for runway descriptions. Operation levels, mix of different aircraft types (fleet mix), and airspace segment and stage length (trip length) are based on the design day flight schedules developed for each planning horizon as part of the operational forecasting effort documented in Appendix B.

The Baseline 2000 noise modeling was primarily based on the analysis of several extensive datasets regarding current operations at airports in the study area. These included Collection and Analysis of Terminal Records system (CATER) data, local radar data, as well as other supplemental sources of data. Extensive radar flight tracks were used to evaluate and model typical flight routes and flows throughout the NY/NJ/PHL airspace. All developed routes originated from actual real-time data provided by both Automated Radar Terminal System (ARTS) data and ETMS for 2000 Existing Conditions. In order to provide a system-wide source for the entire Study Area, the ARTS and ETMS data were merged together using key identifying characters (i.e., flight number and aircraft type) and geographic location. For some airports, ETMS data was the only available source used to identify traffic and runway use patterns.

The estimated noise levels for the year 2006 and 2011 Future No Action Airspace Alternative conditions were developed through a rigorous and detailed NIRS noise modeling effort. The detailed NIRS modeling data developed for the baseline conditions served as a foundation for building the NIRS model input for the future conditions. This data was then modified to reflect the future operational levels that were forecast for 2006 and 2011. In general, the flight routes, tracks, and route dispersions that were developed from the 2000 radar data sample were left unchanged with only two exceptions. The Future No Action Airspace Alternative modeling incorporated any route or procedure changes that were in place or expected to be in place by 2006. Thus, the Robbinsville-Yardley “Flip-Flop” Procedure and the Dual Modena Procedure, discussed in Section 1.2.6.4 of Chapter 1, were incorporated into the baseline flight tracks for modeling the future conditions. In addition, the PHL Runway 17-35 Extension Project was qualitatively considered in this evaluation. Since the Draft EIS for this project was published in September of 2004 and the Record of Decision was not issued until April of 2005, both well after the No Action noise modeling for this airspace redesign was underway and complete, it was not possible to directly model the PHL Runway 17-35 extension in this analysis. However, at the time of this writing, a qualitative evaluation of the results presented in the PHL Runway 17-35 Extension Project Final EIS was undertaken. That evaluation found that the PHL 17-35 runway extension was not expected to be complete until 2007, thus the 2006 noise modeling for this airspace redesign EIS could not be affected by that project. The evaluation further concluded that the noise changes revealed in the PHL 17-35 EIS were not significant in terms of the 2011 noise evaluation for this EIS. Furthermore, since the insignificant effects of the PHL Runway 17-35 extension would apply to both the No Action and each airspace alternative, the resulting 2011 noise change analysis presented in this section would be unaffected.

In order to develop input for NIRS, the project team started with the Future No Action Alternative. For each Proposed Action alternative, the project team then incorporated the changes to the Future No Action Alternative routing that constitute the alternative. Each alternative was then validated through a collaborative effort that included the Airspace Redesign Team and the operational simulation modelers (TAAM modelers). These teams reviewed each alternative on an airport-by-airport, route-by-route, and sometimes even a flight track-by-flight basis. The result was a comprehensive understanding of the design elements of each alternative and detailed insight into the NIRS model input changes from Future No Action Airspace Alternative that would accurately reflect the design.

Details of the NIRS input data for the Baseline current conditions and the Future No Action Airspace Alternative conditions are discussed below. The NIRS input modifications associated with each alternative airspace design will be discussed in later sections dedicated to the noise analysis results for each alternative.

3.3.1 Airport and Runway Data

Twenty-one airports within the NY/NJ/PHL study area were evaluated in this analysis, as shown in **Exhibit 1**. **Table 3** presents a listing of the 21 airports modeled in the NIRS noise analysis along with the runways modeled for each airport. These airport and runway definitions were used for the NIRS modeling of all current and future scenarios in this study effort.

Table 3
Modeled Airports and Runways

Identifier	Airport	Modeled Runways
LGA	La Guardia	04, 13, 22, 31
JFK	John F. Kennedy International	04L/R, 13L/R, 22L/R, 31L/R
EWR	Newark Liberty International	04L/R, 11, 22L/R, 29
TEB	Teterboro	01, 06, 19, 24
PHL	Philadelphia International	08, 09L/R, 17, 26, 27L/R, 35
MMU	Morristown Municipal	05, 12, 23, 30
ISP	Islip Long Island MacArthur	06, 15R, 24, 33L
HPN	White Plains/Westchester County	11, 16, 29, 34
ABE	Allentown/Lehigh Valley International	06, 13, 24, 31
ACY	Atlantic City International	04, 13, 22, 31
BDR	Bridgeport/Igor I. Sikorsky Memorial	06, 11, 24, 29
CDW	Caldwell/Essex County	04, 09, 22, 27
FOK	Westhampton Beach/The Francis S. Gabreski	06, 15, 24, 33
LDJ	Linden	09, 27
WRI	McGuire AFB	06, 18, 24, 36
SWF	Newburgh/Stewart International	09, 16, 27, 34
HVN	New Haven/Tweed-New Haven	02, 14, 20, 32
PNE	Northeast Philadelphia	06, 15, 24, 33
FRG	Republic	01, 14, 19, 32
TTN	Trenton/Mercer County	06, 16, 24, 34
ILG	Wilmington/New Castle County	01, 09, 14, 19, 27, 32

3.3.2 Environmental Variables and Terrain Data

The annual average temperature calculated for this study was based on the long-term historic weather reports made at EWR between 1979 and 1999. The average annual temperature for the

20-year period was 55.5 degrees Fahrenheit (13.1 degrees Celsius) and the relative humidity was set at 64.6%. The standard atmospheric pressure (29.92 inches Hg or 1013.25 millibars) and the NIRS default airport average headwind (8 knots) were used throughout the study area.

NIRS uses terrain data from the U.S. Geological Survey (USGS) to account for effects that variations in terrain will have on noise propagation. The terrain data produced by USGS, portrays the elevation of the land in the Study Area. Each point of interest is placed not only at the correct two-dimensional location, but also the height above Mean Sea Level (MSL).

FAA Order 1050.1E specifies that for airspace actions such as this redesign project, NIRS will be used to determine noise impacts from the ground to 10,000 feet AGL. Since the study area for this project covers such a large area and a wide variety of terrain, it was determined that the ceiling for the NIRS analysis should be 10,000 feet above the highest point in the study area. As a result, air traffic up to 14,000-feet above sea level (MSL) is included in the NIRS modeling. The local environmental variables identified in this section were for the NIRS modeling of all current and future scenarios evaluated in this study effort.

3.3.3 Operation Levels and Day/Night Distribution

Many aspects of this EIS are based on the forecasts of future aviation activity. The determination of future air traffic requirements calls for activity levels to be expressed at the daily or hourly level. An efficient way to transition from the annual activity forecasts to the daily or hourly level is the use of the design -day flight schedule. Design-day flight schedules, which are very similar in content to any airline flight schedule, contain information about the type of flight, arrival and departure times, the origin and destination of the flight (domestic or international), the operator of the flight, the local airspace arrival and departure segments, and the aircraft type.

Design-day flight schedules were developed for 2000, 2006, and 2011. The design-day schedules used in the noise modeling represented an average annual day (AAD) level of operations. The Year 2000 schedule was based upon actual 2000 radar information supplemented with OAG data, ETMS data, CATER data, and Air Traffic Control Tower Count data. The Year 2006 and Year 2011 schedules were developed based on the results of the system-wide forecasting effort conducted as part of the EIS process. Fleet-mix information was developed during that effort and was based on factors such as airline orders and forecasted enplanements. Further details concerning the development of the forecast and design day schedules are provided in Appendix B.

Existing Baseline Conditions

The Baseline 2000 operational levels were determined for the study area over flights and each of the 21 airports as part of the operational forecasting effort presented in Appendix B. The 2000 annual IFR operations levels were divided by 365 to identify the Average Annual Day (AAD) operations for each airport. Similarly, the day and night distribution of operations at each airport was developed from a three-month sample of radar data (See Flight Track Definition section below) and applied to the average annual day operational levels at each airport developed in the operational forecasting effort. It is important to correctly identify the number of nighttime operations because the DNL noise metric weights nighttime noise levels by 10 dB. In essence, one nighttime flight equates to ten daytime flights. **Table 4** presents the Baseline average annual daily IFR operations that were modeled for each airport along with the time-of-day percentages. It should be noted that for noise modeling purposes, operations are broken down by a number of factors (arrivals, departures, aircraft type, time-of-day, etc). Thus, fractional AAD operations are often modeled resulting from all of the data reduction. The noise model readily accepts this type of input and correctly computes the noise energy from fractional events and whole events alike.

Table 4
2000 Average Daily Operations and Time-of-Day for Noise Modeling

Identifier	Airport	AAD Operations	Day-%	Night-%
LGA	La Guardia	1,063	90.3%	9.7%
JFK	John F. Kennedy International	951	82.7%	17.3%
EWR	Newark Liberty International	1,237	85.4%	14.6%
TEB	Teterboro	395	79.5%	20.5%
PHL	Philadelphia International	1,116	84.0%	16.0%
MMU	Morristown Municipal	100	91.6%	8.4%
ISP	Islip Long Island MacArthur	140	89.7%	10.3%
HPN	White Plains/Westchester County	264	90.5%	9.5%
ABE	Allentown/Lehigh Valley International	122	77.1%	22.9%
ACY	Atlantic City International	70	90.8%	9.2%
BDR	Bridgeport/Igor I. Sikorsky Memorial	22	93.0%	7.0%
CDW	Caldwell/Essex County	14	94.6%	5.4%
FOK	Westhampton Beach/The Francis S. Gabreski	3	93.3%	6.7%
LDJ	Linden	1	94.9%	5.1%
WRI	McGuire AFB	29	91.4%	8.6%
SWF	Newburgh/Stewart International	88	78.4%	21.6%
HVN	New Haven/Tweed-New Haven	22	94.0%	6.0%
PNE	Northeast Philadelphia	37	93.7%	6.3%
FRG	Republic	50	81.6%	18.4%
TTN	Trenton/Mercer County	62	94.8%	5.2%
ILG	Wilmington/New Castle County	63	94.2%	5.8%
OVF	Overflights	446	87.7%	12.3%
	Total	**6,295**	**85.9%**	**14.1%**

Source: 2/00, 4/00, 7/00 Radar data

The general concept of schedule assignment for this analysis was to map the events from the AAD schedule to the backbones in a manner that maintains the flight structure at each airport. The structure was defined by the runway usage and route utilization of the 2000 Radar data.

To maintain the traffic structure, events from the input AAD schedules were mapped to the backbones based on the key characteristics: operation type (arrival/departure), aircraft category, and day/night. Origin-destination airport pair was also used as a key-mapping characteristic for eight airports: ABE, EWR, HPN, ISP, JFK, LGA, PHL, TEB. These airports exhibited a higher level of structure, based on origin-destination pair, than the others.

For each entry in the AAD schedule, the event was split proportionally and assigned to all the backbones that handled flights matching the key characteristics of the AAD schedule entry. As a result, each event from the AAD schedule was mapped in correct proportion to the runways and routes it would be expected to fly.

Future No Action Conditions

The NIRS modeling for the Future No Action Airspace Alternative conditions is largely based on the Baseline 2000 current condition modeling. Noise modeling was developed for overflights and the expected IFR flight plan operations at the 21 airports identified as part of the study. The expected average annual day operational levels for 2006 and 2011 at each airport were derived from the operational forecasts presented in Appendix B. These forecasts also provided the time-of-day information in the form of operational schedules so that the nighttime operations could be identified.

Since traffic volumes at the very busy airports in the study area are expected to increase in the future years, it is possible that delays could increase at these airports under the No Action conditions resulting in some scheduled daytime flights being delayed into the nighttime hours. Consequently, it was necessary to confirm the proper nighttime traffic distribution for the future years at the major airports in the study area. The TAAM operational modeling results for the Future No Action Airspace Alternative conditions were analyzed for LGA, JFK, EWR, and PHL. The TAAM data was supplemented by FAA's Aviation System Performance Metrics (ASPM) data for each airport in order to account for operational configurations not modeled in TAAM. The combined datasets were analyzed to identify the effect of the future traffic volumes in terms of accumulate delays that might cause an increase in nighttime operational levels. The evaluation determined that the delays associated with the future traffic volumes at LGA, JFK, and EWR were not great enough to change the nighttime traffic as defined in the operational schedules. At PHL, however, the analysis revealed that departure delays in the future would result in some scheduled daytime traffic being delayed into the nighttime hours. As a result, some 10 to 20 departures at PHL that were in the operational schedule as daytime flights were reclassified as nighttime flights.

Table 5 presents a summary of the AAD operations and nighttime percentage for each airport for the future conditions.

3.3.4 Aircraft Fleet Mix

Another key characteristic of the operational levels at an airport is the mixture of different aircraft types that make up the airport's total operations. This characteristic is often referred to as "Fleet Mix" and literally means the distribution of specific aircraft types (and sometimes specific aircraft/engine combinations) across the operations at an airport. This is an important element in the noise modeling process because even subtle variations in aircraft types can result in significant changes in noise levels.

Table 5
Future Forecast Average Daily Operations and Time-of-Day Summary

		2006		2011	
Identifier	**Airport**	**AAD Operations**	**Nighttime Percentage**	**AAD Operations**	**Nighttime Percentage**
LGA	La Guardia	1141	10.1%	1141	10.3%
JFK	John F. Kennedy International	1134	12.5%	1237	12.9%
EWR	Newark Liberty International	1389	17.1%	1436	17.5%
TEB	Teterboro	446	18.2%	505	19.3%
PHL	Philadelphia International	1508	10.5%	1640	10.5%
MMU	Morristown Municipal	112	1.8%	126	1.6%
ISP	Islip Long Island MacArthur	176	9.1%	203	7.9%
HPN	White Plains/Westchester County	319	10.4%	343	10.0%
ABE	Allentown/Lehigh Valley International	131	24.4%	143	25.4%
ACY	Atlantic City International	75	13.3%	83	15.7%
BDR	Bridgeport/Igor I. Sikorsky Memorial	24	25.0%	26	26.9%
CDW	Caldwell/Essex County	15	26.7%	15	26.7%
FOK	Westhampton Beach/The Francis S. Gabreski	4	25.0%	4	25.0%
LDJ	Linden	1	100.0%	1	100.0%
WRI	McGuire AFB	29	17.2%	29	17.2%
SWF	Newburgh/Stewart International	111	21.6%	149	18.8%
HVN	New Haven/Tweed-New Haven	24	16.7%	26	19.2%
PNE	Northeast Philadelphia	41	19.5%	45	17.8%
FRG	Republic	55	14.3%	59	16.7%
TTN	Trenton/Mercer County	57	1.8%	66	1.5%
ILG	Wilmington/New Castle County	72	8.3%	84	8.3%
OVF	Overflights	63.5	17.2%	68.2	17.2%

Existing Baseline Conditions

The mix of specific types of aircraft flown were developed for the 2000 AAD flight schedule based on actual radar data supplemented by Official Airline Guide (OAG) and other forms of data. Each aircraft in the AAD fleet mix was specified in terms of an airframe/engine combination consistent with the databases maintained within NIRS. During input development, aircraft were grouped as follows:

1. H – Heavy Jet (turbo-jet aircraft weighing 255,000 pounds or more)

2. M – Medium Jet (turbo-jet aircraft weighing between 75,000 and 255,000 pounds)

3. R – Regional Jet (turbo-jet aircraft weighing less than 75,000 pounds used for regional air service)

4. L – Stage 3 Light Jet (noise certified Stage 3 jets weighing less than 75,000 pounds)

5. K – Stage 2 Light Jet (noise certified Stage 2 jets weighing less than 75,000 pounds)

6. T – Turbo Propeller

7. P – Piston Propeller

These categories were used to assist in identifying traffic flows that may be used primarily by unique aircraft type. **Table 6** presents a generalized summary of the Baseline 2000 fleet mix modeled for each of the 21 airports. Note that the Jet category in the summary table includes the H, M, R, L, and K categories listed above.

Table 6
General Fleet Mix Summary - Baseline 2000

Identifier	Airport	Jets	Turboprops	Props
LGA	La Guardia	80.9%	19.1%	0.0%
JFK	John F. Kennedy International	67.9%	32.1%	0.0%
EWR	Newark Liberty International	85.3%	14.6%	0.0%
TEB	Teterboro	82.0%	7.8%	10.1%
PHL	Philadelphia International	72.7%	26.4%	1.0%
MMU	Morristown Municipal	68.2%	12.2%	19.6%
ISP	Islip Long Island MacArthur	64.8%	34.6%	0.6%
HPN	White Plains/Westchester County	46.9%	52.9%	0.2%
ABE	Allentown/Lehigh Valley International	52.8%	45.2%	2.0%
ACY	Atlantic City International	50.8%	38.2%	11.0%
BDR	Bridgeport/Igor I. Sikorsky Memorial	46.0%	18.1%	35.8%
CDW	Caldwell/Essex County	2.9%	12.1%	85.0%
FOK	Westhampton Beach/The Francis S. Gabreski	70.4%	14.8%	14.8%
LDJ	Linden	0.0%	12.5%	87.5%
WRI	McGuire AFB	94.0%	5.3%	0.7%
SWF	Newburgh/Stewart International	71.6%	25.8%	2.6%
HVN	New Haven/Tweed-New Haven	20.4%	65.7%	13.9%
PNE	Northeast Philadelphia	41.0%	19.3%	39.7%
FRG	Republic	39.8%	19.2%	41.0%
TTN	Trenton/Mercer County	40.0%	45.2%	14.7%
ILG	Wilmington/New Castle County	62.5%	20.7%	16.8%

Source: 2/00, 4/00, 7/00 Radar data

Detailed tables that present operations levels by each aircraft type and time-of-day for each airport are presented in Attachment A, Aircraft Operations and Fleet Mix Tables at the end of this report.

Future No Action Conditions

The mix of aircraft types expected to operate at the study airports in the future was also developed in the forecasting effort documented in Appendix B. **Table 7** presents a generalized summary of the future fleet mix modeled for each of the 21 airports.

Table 7
Generalized Fleet Mix Summary - Future Forecast Conditions

		Percent Fleet Mix					
		2006			2011		
Identifier	**Airport**	**Jets**	**Turbo-props**	**Props**	**Jets**	**Turbo-props**	**Props**
LGA	La Guardia	98.5%	1.2%	0.3%	99.4%	0.4%	0.2%
JFK	John F. Kennedy International	89.6%	10.3%	0.2%	99.4%	0.6%	0.0%
EWR	Newark Liberty International	96.0%	3.5%	0.5%	98.7%	0.9%	0.4%
TEB	Teterboro	66.2%	21.6%	12.2%	69.9%	19.1%	11.0%
PHL	Philadelphia International	87.1%	12.1%	0.8%	95.6%	3.7%	0.7%
MMU	Morristown Municipal	67.0%	19.3%	13.8%	64.5%	21.8%	13.7%
ISP	Islip Long Island MacArthur	74.3%	24.0%	1.7%	89.6%	8.9%	1.5%
HPN	White Plains/Westchester County	70.7%	27.8%	1.6%	88.6%	10.0%	1.5%
ABE	Allentown/Lehigh Valley International	73.3%	22.9%	3.8%	85.9%	11.3%	2.8%
ACY	Atlantic City International	62.7%	32.0%	5.3%	62.7%	32.5%	4.8%
BDR	Bridgeport/Igor I. Sikorsky Memorial	50.0%	29.2%	20.8%	50.0%	30.8%	19.2%
CDW	Caldwell/Essex County	6.7%	66.7%	26.7%	6.7%	60.0%	33.3%
FOK	Westhampton Beach/The Francis S. Gabreski	75.0%	25.0%	0.0%	75.0%	25.0%	0.0%
LDJ	Linden	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%
WRI	McGuire AFB	79.3%	20.7%	0.0%	79.3%	20.7%	0.0%
SWF	Newburgh/Stewart International	84.7%	11.7%	3.6%	89.9%	7.4%	2.7%
HVN	New Haven/Tweed-New Haven	50.0%	45.8%	4.2%	80.8%	15.4%	3.8%
PNE	Northeast Philadelphia	36.6%	34.1%	29.3%	40.0%	33.3%	26.7%
FRG	Republic	51.8%	30.4%	17.9%	53.3%	30.0%	16.7%
TTN	Trenton/Mercer County	43.9%	52.6%	3.5%	68.2%	28.8%	3.0%
ILG	Wilmington/New Castle County	62.5%	23.6%	13.9%	61.9%	25.0%	13.1%
OVF	Overflights	91.2%	7.3%	1.5%	91.2%	7.3%	1.5%

Source: Landrum & Brown, 2001

Detailed tables that present operations levels by each aircraft type and time-of-day for each airport are presented in Attachment A, Aircraft Operations and Fleet Mix Tables at the end of this report.

It should be noted that the AAD input schedules developed for the Baseline 2000 and future 2006 & 2011 conditions were developed in the forecasting effort for this study. That effort prepared current and future operational levels directly in terms of INM compatible aircraft types. Thus, complex aircraft substitutions were not necessary in order to model the forecast fleet mix. Consequently, all of the significant aircraft types used in the NIRS input either directly represented the forecast aircraft types or was a substitution on the FAA's Pre-Approved substitution list.

3.3.5 Runway Use

The runway use percentages define which runways are to be used for arrivals and departures on an average annual basis. Generally, the primary factor determining runway use at an airport is the weather, aircraft type, and prevailing wind conditions at the time of a flight. Additionally, several other key factors also have a strong influence on runway selection. These factors include: taxiing aircraft crossing active runways or Land and Hold Short (LAHSO) rules, the current make up of the traffic (many arrivals or many departures), and even the flight's origin or destination. The interdependence of air traffic between geographically close airports in the Study Area is also a factor in runway use.

Existing Baseline Conditions

The average annual runway use proportions for the 2000 Baseline conditions were developed from the radar data sample of radar flight tracks (See Flight Track Definition section below) for each airport. The Existing Conditions runway utilization for the major study area airports was calculated based on actual operation data from 2000, collected from CATER and ARTS , that was provided by the Port Authority of New York/New Jersey and the City of Philadelphia. Runway use for the remaining airports in the study was developed through a runway use analysis that provided results representative of an Existing Conditions AAD using 2000 ETMS data. Detailed tables that present runway use proportions by each aircraft category and time-of-day for each airport are presented in Attachment B, Runway Use Tables at the end of this appendix.

Future No Action Conditions

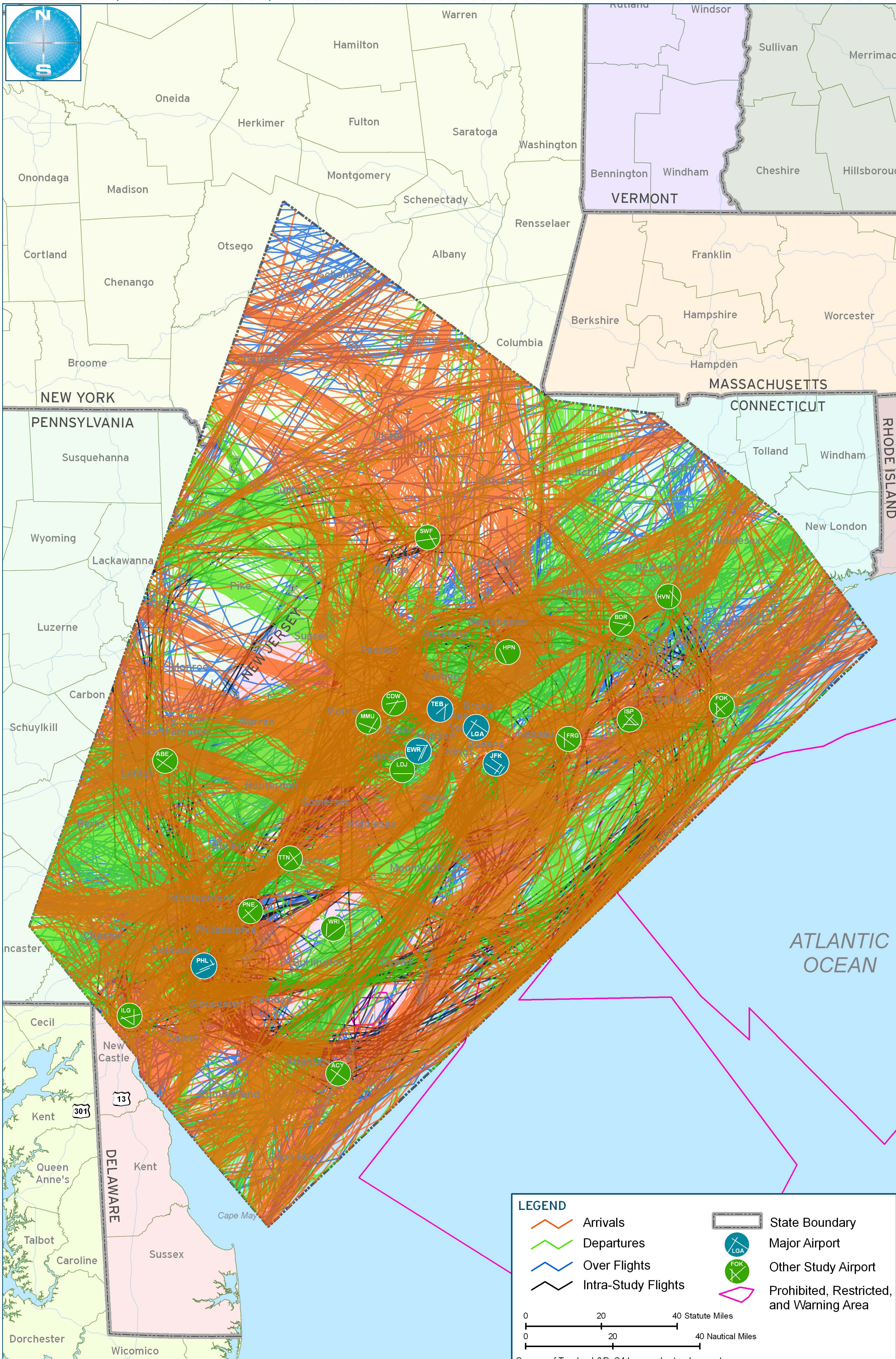
In general the runway use proportions modeled at each airport for the Baseline 2000 conditions were held constant for the Future No Action Airspace Alternative noise modeling. Some slight variations occurred due to changes in the future fleet mix as some categories of aircraft may operate more or less prevalently on specific runways. The detailed tables that present runway use proportions by each aircraft category and time-of-day for each airport are presented in Attachment B, Runway Use Tables at the end of this appendix.

3.3.6 Flight Track Definitions

To determine projected noise levels on the ground, it is necessary to determine not only how many aircraft are present, but also where they fly. Therefore, flight route information is a key element of NIRS input data. Flight routes to and from an airport are generally a function of the geometry of the airport's runways and the surrounding airspace structure in the vicinity of the airfield. For this project an extensive effort was undertaken to ensure an accurate portrayal of flight routes both near the airport (terminal) and further out in the study area (en route).

Existing Baseline Conditions

Terminal and en route tracks for the baseline condition were developed from a sample of detailed radar data. A three month sample of radar tracks from February, April, and July of 2000 was acquired from multiple sources in order to cover the entire Study Area. The sample provided some 425,000+ radar flight tracks for analysis. **Exhibit 2** illustrates a single day of radar flight



Radar Flight Tracks

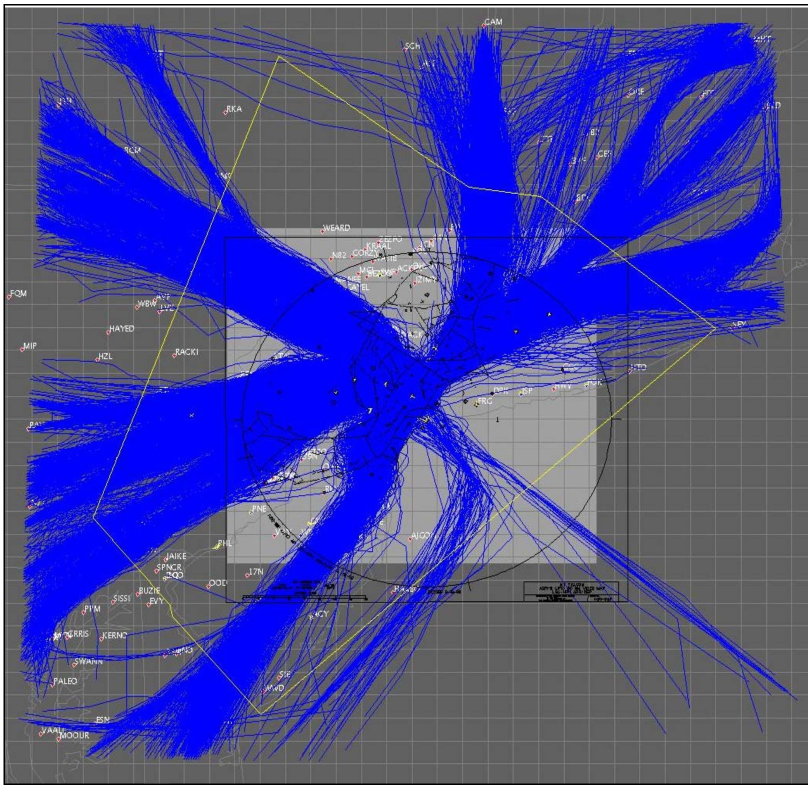
Exhibit E.2

tracks from the three-month sample used for the flight track development analysis. Both arrival and departure traffic is shown for the 21 airports as well as the days over flights of the area.

The Airspace Design Tool (ADT)[6] was used for the detailed analysis of the radar data for each of the 21 airports in the study. The data was separated first by airport and then by operation type (arrival, departure). ADT was then used to develop bundles of radar tacks based on runway, aircraft category (jet, prop), and route similarity. The radar bundling process also included a review of the 3-dimentional aspect of each group of radar tracks. Bundles were split as necessary to isolate groups of tracks with restricted climb or descent profiles. Such groups generally represent flights that experienced specific ATC climb or descent procedures. Once the radar track bundles were complete, the development of noise modeling input tracks was initiated.

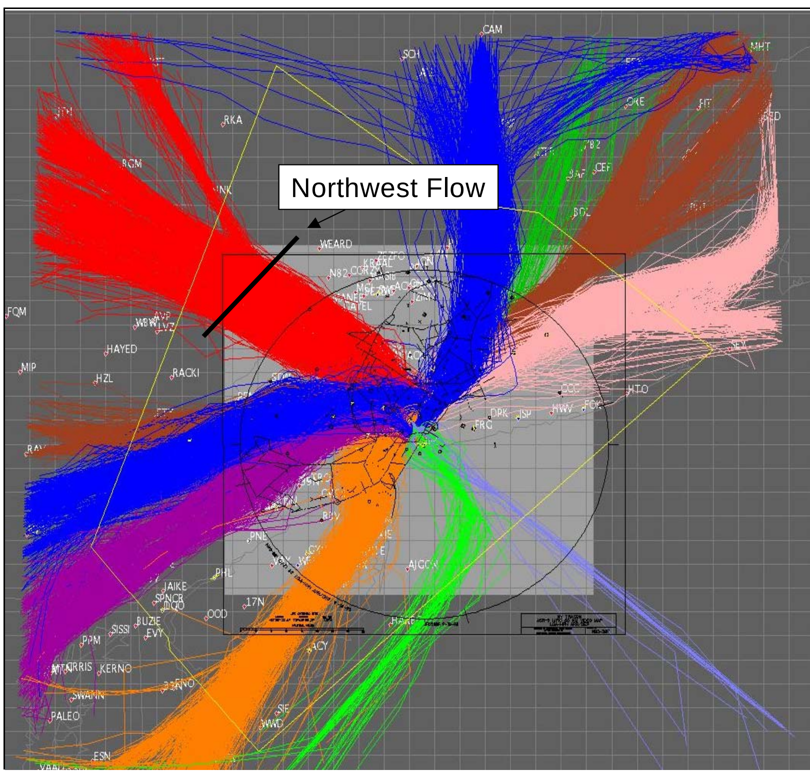
The ADT program allows for the development of primary, or "backbone", flight tracks for each radar track bundle. A representative sample of the process is provided in the series of plates illustrated in **Exhibit 3**. Once the traffic flows were identified, a statistical center track (backbone) was calculated for each one based on the average mean of track density within each flow as shown in the sample provided by **Figure 2**.

[6] Developed by Metron Aviation, Inc.



Step 1: Import Flight Track Radar Data

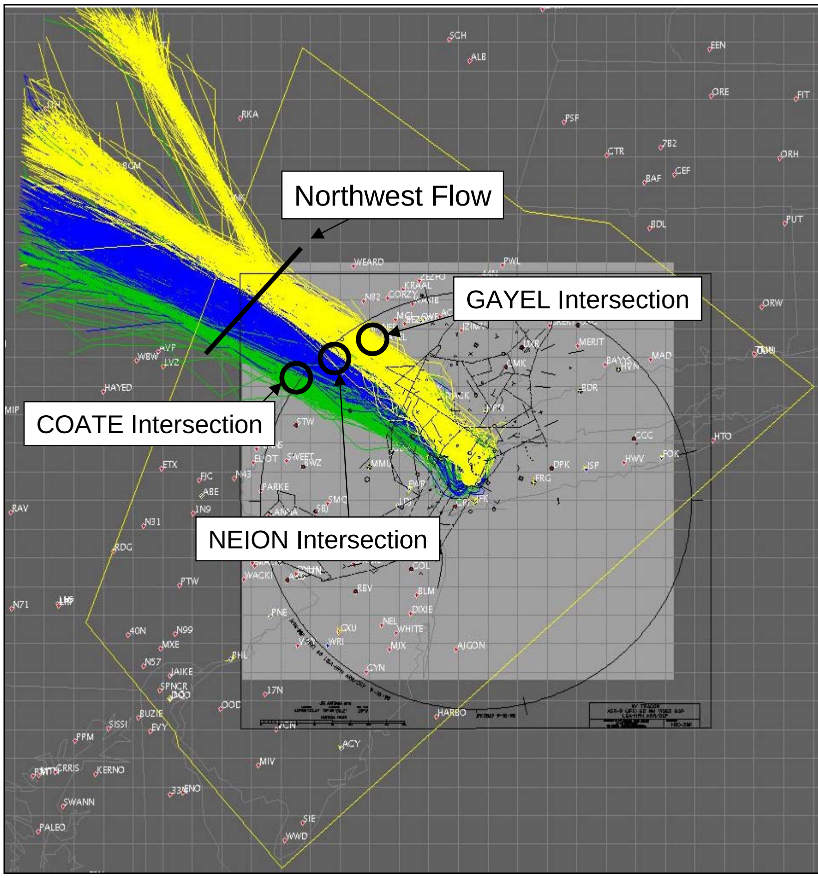
Flight track data was initially parsed based on airport, operation type (arrival/departure), runway and day/night. This sample shows the starting point for identifying unique traffic departure flows during the daytime hours for KLGA Runway 13. Initially, numerous flows can be identified based on direction or final headings at a distance from the airport. The first step was to place each unique flow into its own layer.



Step 2: General Flow Identification

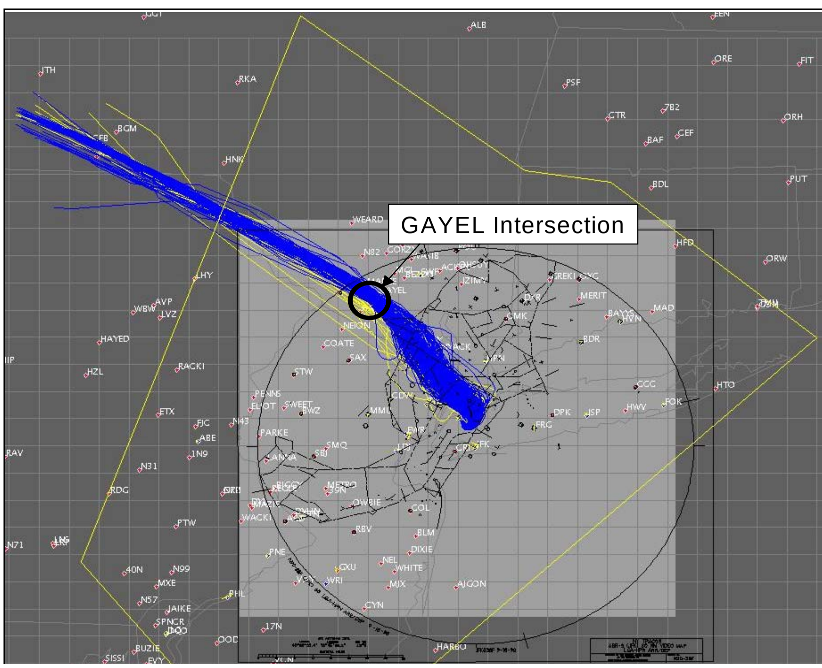
Each general flow was bundled in separate layers that are then reviewed separately for further unique characteristics such as departure headings, departure intersections, aircraft category and altitude.

Exhibit 3: Example Flight Route Identification Process – Step 1 through 2



Step 3: Departure Route Refinement

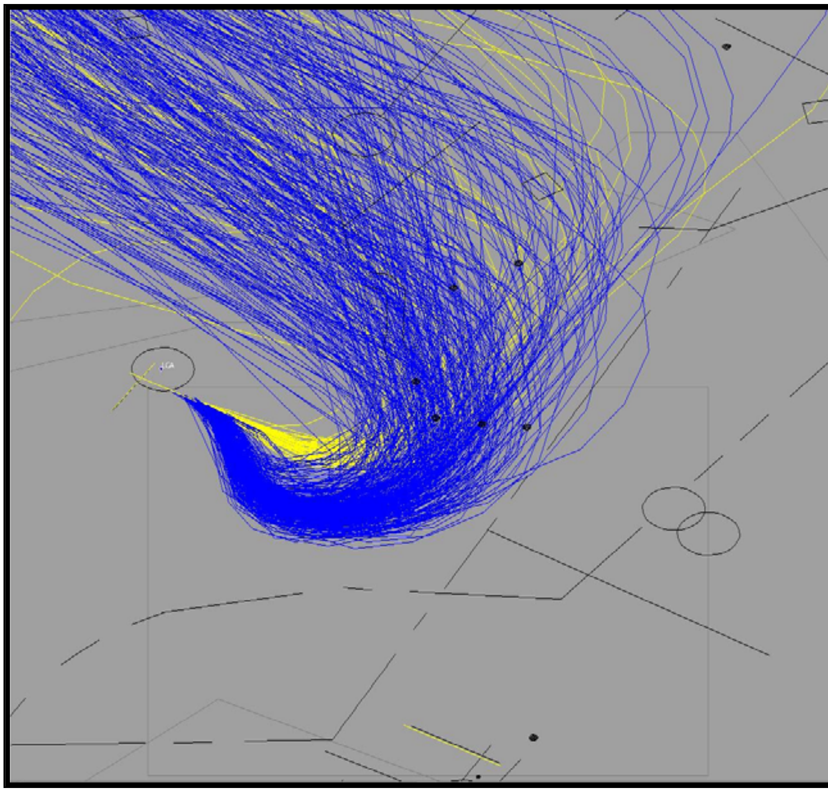
This example singles the Northwest depar flow identified from previous step. Three unique flows were identified based on t routes identified via departure fixes. In tl case, there were thre separate departure fi At this point, unique aircraft categories ar identified and separa into a unique layer. example shows jet a: departing from KLG Runway 13 to either GAYEL, NEION or COATE departure intersection.



Step 4: Runway Hea Identification

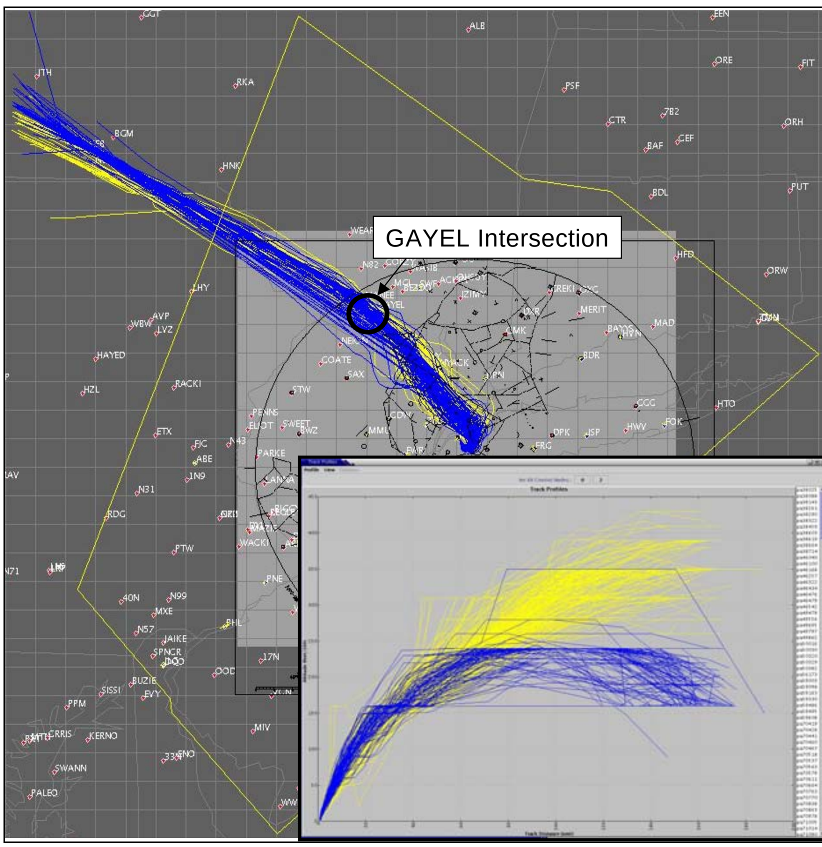
This example single the KLGA-Runway Northwest-GAYEL Intersection-Jet-Day Departure flow iden from the previous st Two unique flows w identified based on t different headings is from Runway 13. In case, there were two separate departure c procedures used for Runway 13. The ne› example provides a view of the differen

Exhibit 3 (continued): Example Flight Route Identification Process – Step 3 through 4



Step 4 (continued): Runway Heading Identification

The yellow flow shows actual use of the "Flushing Climb" for Runway 13 as described on the LA GUARDIA NINE DEPARTURE Procedure plate. The blue flow depicts the use of the "Whitestone Climb."



Step 5: Flight Profile Differentiation

This example shows the KLGA-Runway 13-Northwest-GAYEL Intersection-Whitestone Climb-Daytime-Jet-Departure flow divided into two separate flows based on the altitude profiles flown along the route. Each flow identified was reviewed for any differentiations in altitude as well as location. The inset shows the difference in altitude profiles operated by aircraft on this specific route. The reason for this was most likely related to short-haul destinations just outside the Study Area.

Exhibit 3 (continued): Example Flight Route Identification Process – Step 4 through 5

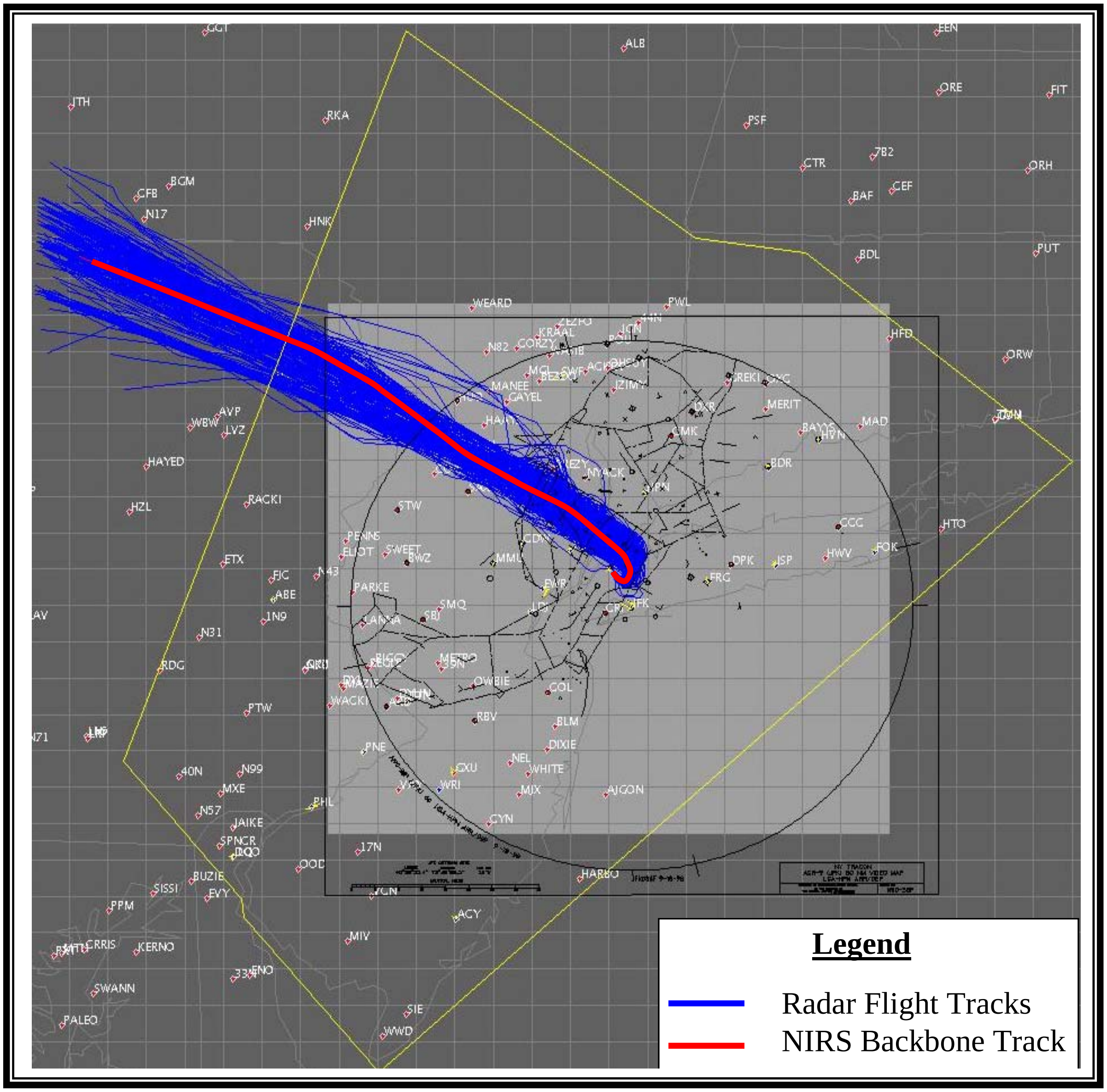


Figure 2: Sample Flight Tracks in NIRS

A unique category of flight tracks called “intra-study” routes were also built based on existing radar data. “Intra-study” routes are flights that depart and arrive at two study airports. The significance of a particular route between two study airports was determined based on whether the route contained at least one flight for an average day using the three months of radar data. Routes with less than one operation per day were considered significant and therefore modeled.

The radar data analysis resulted in the development of some 7,000+ individual NIRS backbone tracks. All event data from the radar data was maintained for use of calculating runway use and flight track/route utilization percentages. The information was used to assign flight schedule information to the appropriate runways and traffic flows based on the actual proportions that occurred in 2000 as evidenced in the 3-month sample of ARTS data.

Future No Action Conditions

The modeled NIRS backbone flight tracks developed for the No Actions modeling was held constant from the Baseline 2000 modeling input. Only the flight tracks associated with the Yardley-Robbinsville "Flip-Flop" Procedure and the Dual Modena Procedure were adjusted to represent those known changes for the future conditions. Four weeks of ETMS radar data (one week in July and three weeks in August) for 2002 were used to assist in the adjustment of the Existing Condition (2000) routes to meet expected future No Action conditions. Runway use and track utilization was carried over from the Existing Conditions analysis for each year (2006/2011). In cases where a new route was to be used in conjunction with an existing route, traffic utilization was calculated using 2002 data sample and the appropriate flight events were dispersed based on the results.

3.3.7 Flight Track Dispersion

To accurately predict noise exposure at each centroid location and grid point, NIRS utilizes dispersed flight tracks rather than one centrally defined backbone track for each arrival and departure flow. Lateral displacement of dispersed tracks and percentages of operations on each dispersed track model the natural variation of individual flight tracks due to various operational factors, such as vector turns, holds, variations in piloting, wind conditions, and weather patterns.

Existing Baseline Conditions

Dispersion data for the terminal portion of each Existing Conditions route was derived primarily from radar-based data (2000). NIRS provides a user the option to designate the number of dispersed tracks split evenly on both sides of the backbone (i.e., five subtracks: two on the left, two on the right, and one backbone). Using the radar track flows (or bundles) identified in the Track Definitions phase described above, the user designated the number of dispersed tracks based on not only a bundle's characteristics, such as width and track density, but also to ensure adequate coverage over areas that encounter a significant number of overflights.

The ADT software system also allows for the simultaneous computation of sub-tracks that are located adjacent to the backbone track. This is done through cross-sectional analysis along the flow to determine where each sub-track should be located based on the underlying radar data These sub-tracks account for the dispersion of actual flights about the primary flight corridor based on the distribution of radar tracks within each bundle. The system uses the statistical distribution of the radar track locations along the backbone track determine the spacing between the sub-tracks at that point. The number of sub-tracks developed is determined by the user dependant on the number of radar tracks in the bundle and their general spread thought the route.

The system also computes an operational weighting factor for each sub-track that allows aircraft operations to be assigned to the backbone tracks and then automatically distributed to each of the corresponding sub-tracks. This weighting factor is computed based on the average lateral distribution of the radar tracks throughout the bundle with respect to the backbone track position. The resulting distribution generally approximates a "normal", or bell curve, distribution with the highest percentage on the backbone track and progressively lower percentages on the adjacent sub-tracks. The resulting geometry of each sub-track is unique to itself, not necessarily a mirror image of the backbone. Each calculated NIRS track maintains a correlation to the radar data events used to calculates its geometry. The radar events were used to determine proportion of traffic to use on each sub-track.

The process of calculating dispersion weighting began with the center track or backbone that represents a bundle of underlying radar data for a specific flow. The backbone was also assigned a series of events (aircraft operations) that flew along the backbone track. **Exhibit 4** shows a schematic of how the event weight division algorithm (a step-by-step mathematical procedure) works for a backbone with two sub-tracks applied to the underlying tracks. The figure depicts 13 underlying tracks drawn in green, three backbone sub-tracks drawn in blue with two nodes each drawn as black solid circles, and three sub-track bins outlined by the red dashed lines. The number of bins is equal to the number of backbone sub-tracks (three in the example). The width of each bin, in this example, was determined by taking an equal portion of the total dispersed underlying track width. Other methods can be used to create unequal-sized bin widths, but the overall function of the algorithm remains the same.

Once the bins have been created, the algorithm steps along every node in the backbone sub-tracks and keeps a running average of the number of underlying tracks found in each bin. In Exhibit 4, bin 1 contains six tracks at the first node and six tracks at the second node for an average of six tracks. Bin 2 contains four tracks at the first node and three tracks at the second node for an average of three and a half tracks. Likewise, bin 3 contains three tracks and four tracks at the first and second nodes for an average of three and a half tracks. This example is only referring to the nodes displayed in Exhibit 4, but the actual algorithm accounts for all the nodes in the backbone sub-tracks.

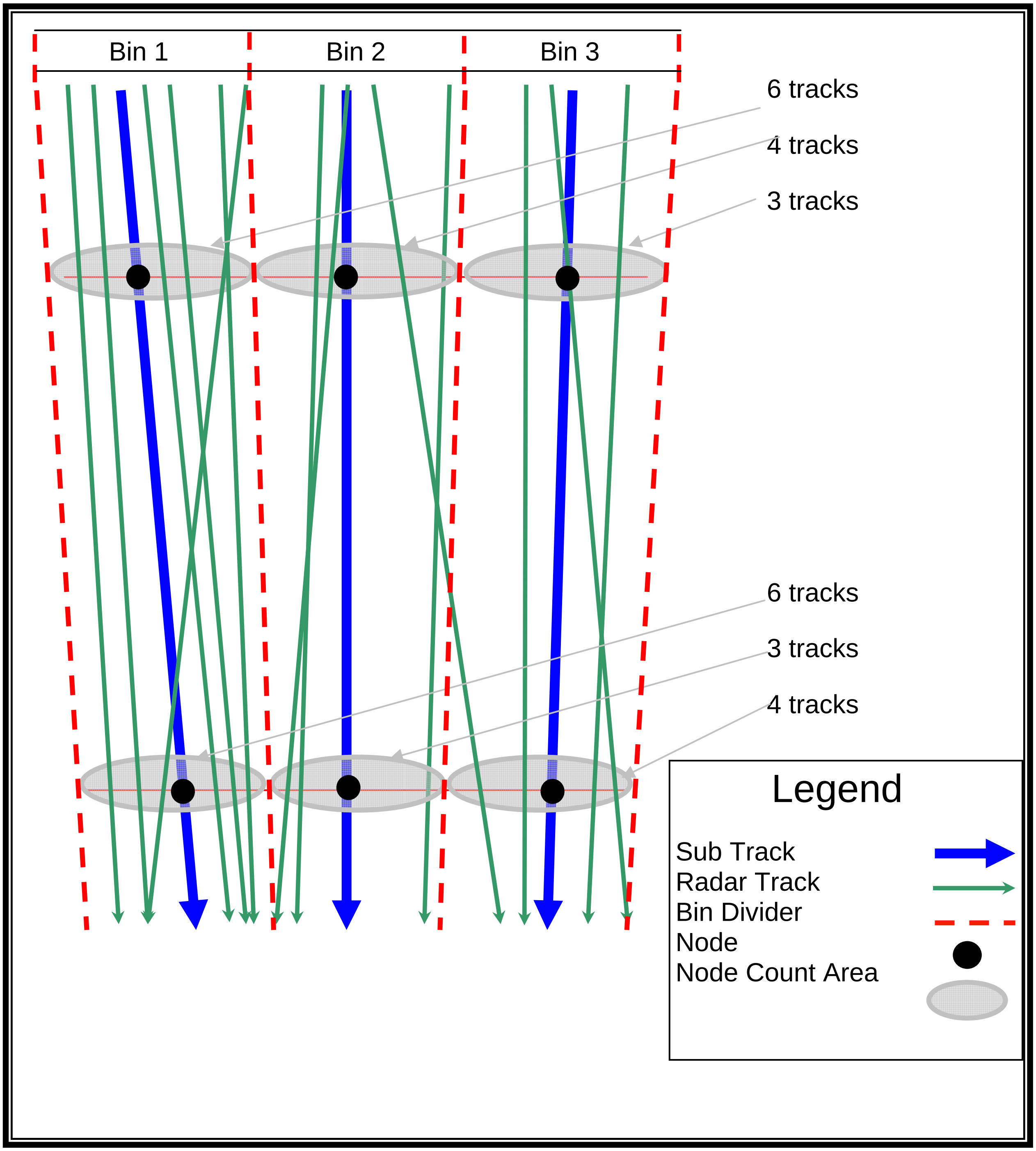
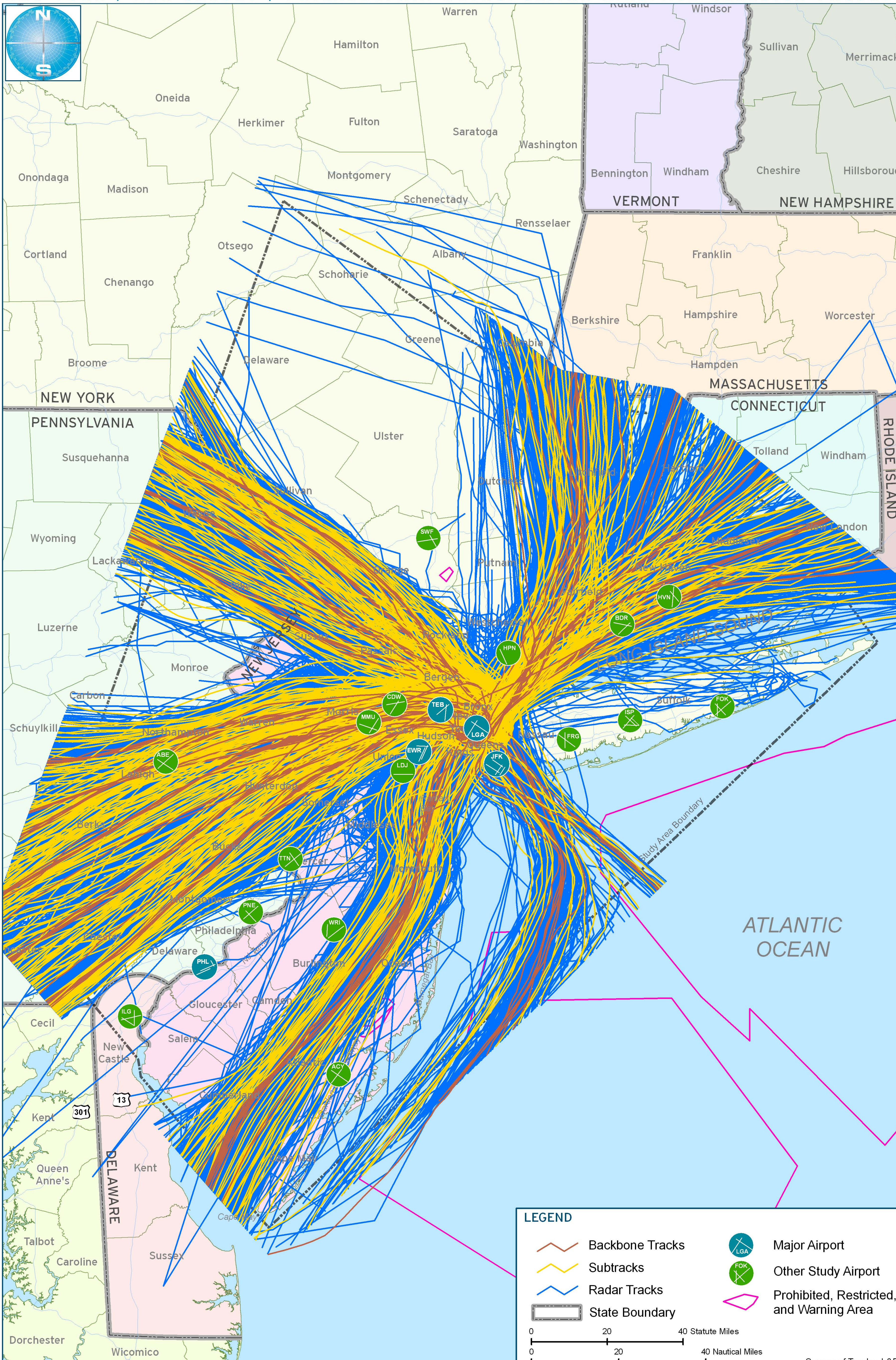


Exhibit 4: Sub-Track Weighting Process Example

After the average number of tracks for each bin has been computed, the algorithm divides those numbers by the total number of underlying radar tracks (13 in the example) to normalize the distribution. It then uses the resulting fractions as event-weight-multipliers for all events on each backbone sub-track. For our example, each event on sub-track 1 (bin 1) will have its original weight multiplied by the result of dividing 6 by 13, and each event on sub-track 2 (bin 2) will have its original weight multiplied by the product of 3.5 divided by 13, and each event on sub-track 3 (bin 3) will also have its original weight multiplied by the fraction of 3.5/13.

The radar data analysis resulted in the development of some 7,000+ individual NIRS backbone tracks with approximately 15,000+ associated sub-tracks. Thus, some 22,000+ unique NIRS tracks were developed for model input. **Exhibit 5** presents an example of the NIRS departure tracks for LGA in contrast to the radar data that was used to create the model tracks. The dark red lines represent the backbone tracks with the lighter red tracks indicating the sub tracks.



NIRS Departure Tracks for LGA

Exhibit E.5

Future No Action Conditions

The modeled flight tracks and dispersion for the Future No Action Airspace Alternative condition modeling was held constant from the Baseline 2000 modeling input. Only the flight tracks associated with the Yardley-Robbinsville "Flip-Flop" Procedure and the Dual Modena Procedure were adjusted to represent those known changes for the future conditions. **Exhibits 6 through 8** present the resulting NIRS backbone modeling tracks developed for several of the study airports for the Future No Action Airspace Alternative conditions. It should be noted that the sub-tracks associated with these backbone tracks have been turned off to facilitate and ease of understanding of the major flight routes in the area. In all cases extensive dispersion was modeled in NIRS through extensive sub-tracks associated with each backbone track as was previously illustrated in Exhibit 5 above.

Exhibit 6 presents the Future No Action Airspace Alternative backbone tracks for LGA as an example of a large air carrier airport in the study area. The illustration presents a study-wide view of both arrival (green) and departure (red) tracks for all runways at LGA. The inset picture presents a closer view of the area immediately around LGA to illustrate the detailed flight patterns near the airport. The Future No Action Airspace Alternative backbone flight tracks for HPN are presented in **Exhibit 7** as an example of the flight routes for a smaller air carrier airport in the study area. Again the same color scheme is used to delineate arrival and departure tracks. A comparison of these two exhibits reveals that, on a large scale, the flight routes are very similar for both airports. This is generally the case for the airports in the New York City area since they all typically use the same arrival and departure gates defined by air traffic control. Of course, a comparison of the close-in flight routes for each airport reveals distinct differences.

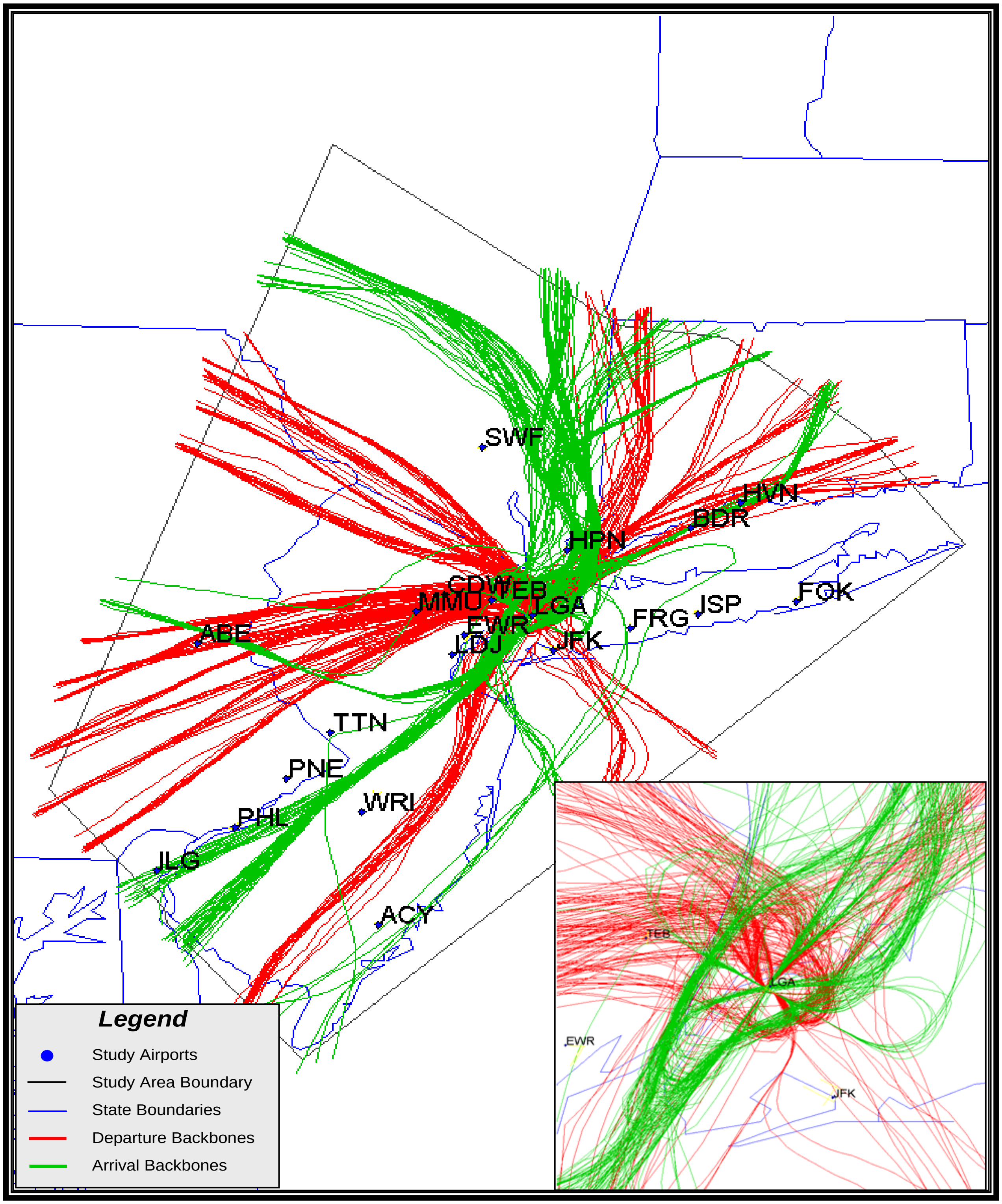


Exhibit 6
Future No Action NIRS Backbone Tracks – LGA

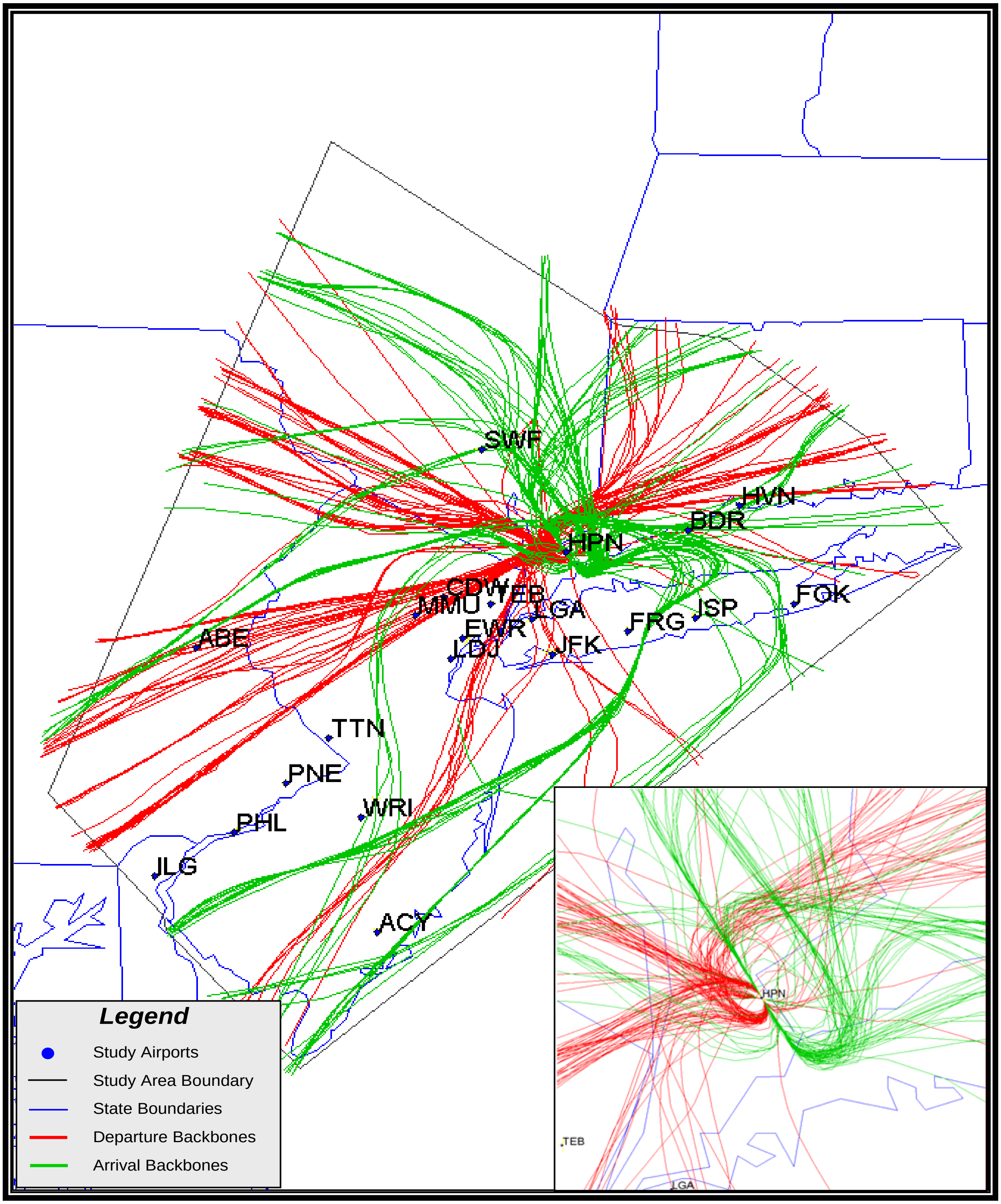


Exhibit 7
Future No Action NIRS Backbone Tracks – HPN

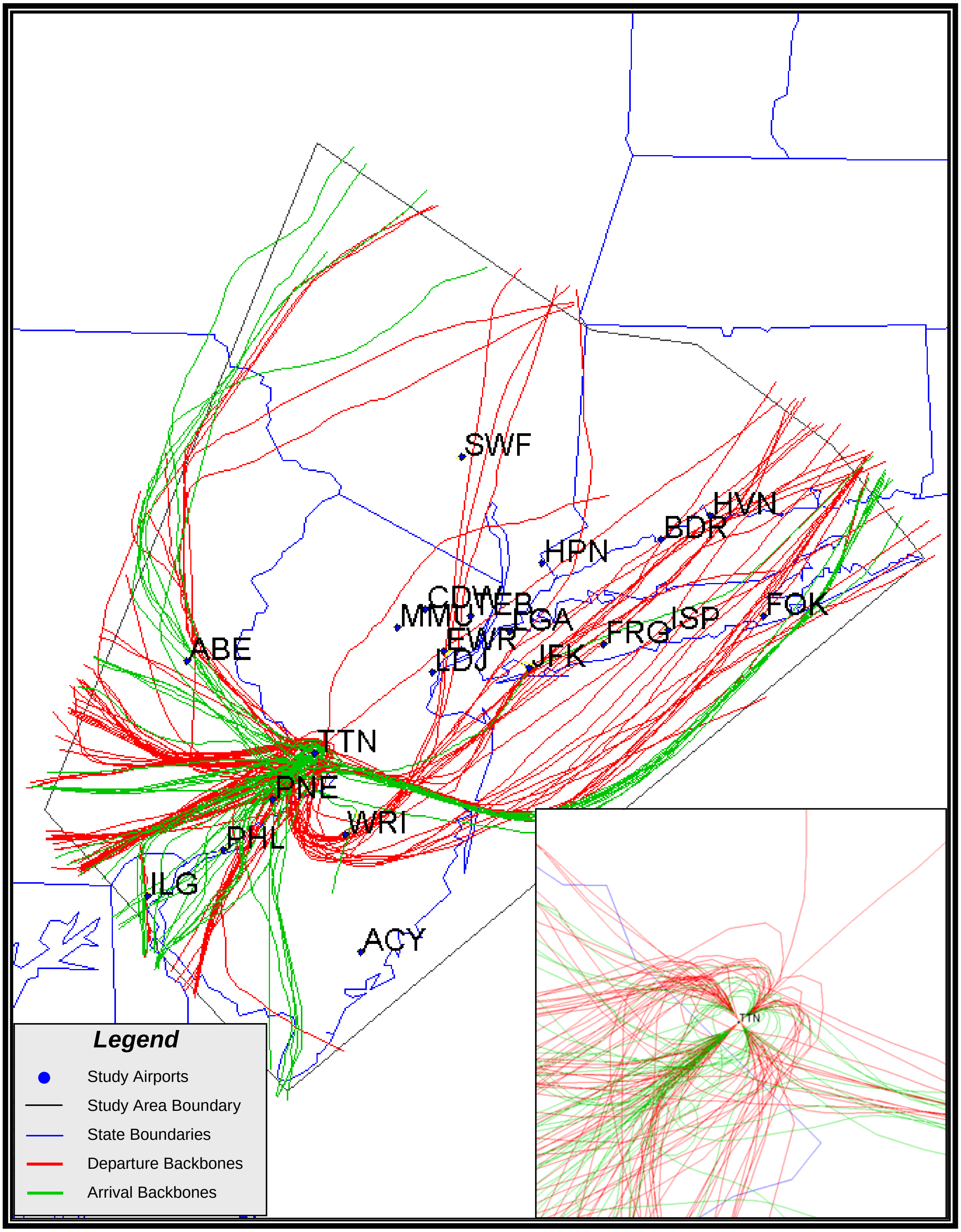


Exhibit 8
Future No Action NIRS Backbone Tracks - TTN

This is typical when comparing any two airports and is due to runway geometry, traffic volume and type, as well as airport-specific air traffic control procedures. As an example of a smaller (as compared to the large air carrier airports in the study) general aviation type airport, Exhibit 8 illustrates the NIRS backbone tracks for TTN for the Future No Action Airspace Alternative conditions. A comparison of the large-scale TTN routes to those of the NY area airports reveals considerable differences. This is due to the fact that TTN is traffic is largely routed in accordance with the PHL area traffic. Since different arrival and departure gates are used for the airports in this area, the TTN traffic follows a different pattern than that noted for the NY airports. In general, the routs for other airports in the PHL area are similar to the TTN routes shown on a large scale.

3.3.8 Stage Length

Stage length is the term used in NIRS to refer to the length of the trip planned for each aircraft operation from origin to destination. The trip length is needed in noise calculations because it influences the take-off weight (and therefore the thrust and performance) of the aircraft, which is higher for longer trips and lower for shorter trips. The most direct arc on the surface of the Earth (great-circle distance) between the origin and destination is typically used to calculate a stage length for each aircraft operation. Seven categories for departure stage length and one for arrival stag length are used in NIRS, as shown in **Table 8**.

Stage length designations for each flight modeled in the Baseline current conditions, as well as all future conditions were based on the travel distance associated with the destination identified in the flight schedules prepared in the forecast analysis.

Table 8
NIRS Stage Length and Trip Distance Summary

Stage length Category	Approximate Trip Distance (nautical miles)
Departures:	
D-1	Less than 500
D-2	500 to 999
D-3	1000 to 1499
D-4	1500 to 2499
D-5	2500 to 3499
D-6	3500 to 4499
D-7	Greater than 4500
Arrivals:	
A-1	Any Distance

3.3.9 Aircraft Climb/Descent Profiles

In order to more accurately model noise exposure, NIRS has the capability to follow specified altitude restrictions incorporated in the track and operation data. The modeled aircraft trajectory in NIRS can reflect altitude information provided by the airspace designer, rather than following a standard profile as is ordinarily done in INM noise studies. NIRS automatically generates profiles for each aircraft operation on each flight track that are consistent both with the specified altitudes and the NIRS aircraft-performance database. Four types of altitude control at points along the flight track can be encoded in NIRS input files, as follows: (1) no altitude control; (2) be at or above a specified altitude; (3) be at a specified altitude; and (4) be at or below a specified altitude.

Adherence to altitude controls is only applied above altitudes of 3,000 feet AGL (3,018 feet MSL for this study). This means that for all flight tracks that contain points with altitudes greater than 3,000 feet AGL, the NIRS standard procedure profile was used up to 3,000 feet AGL. At higher altitudes, the profile followed the altitude controls in the airspace input data where appropriate. **Figure 3** shows a sample altitude profile as modeled in NIRS.

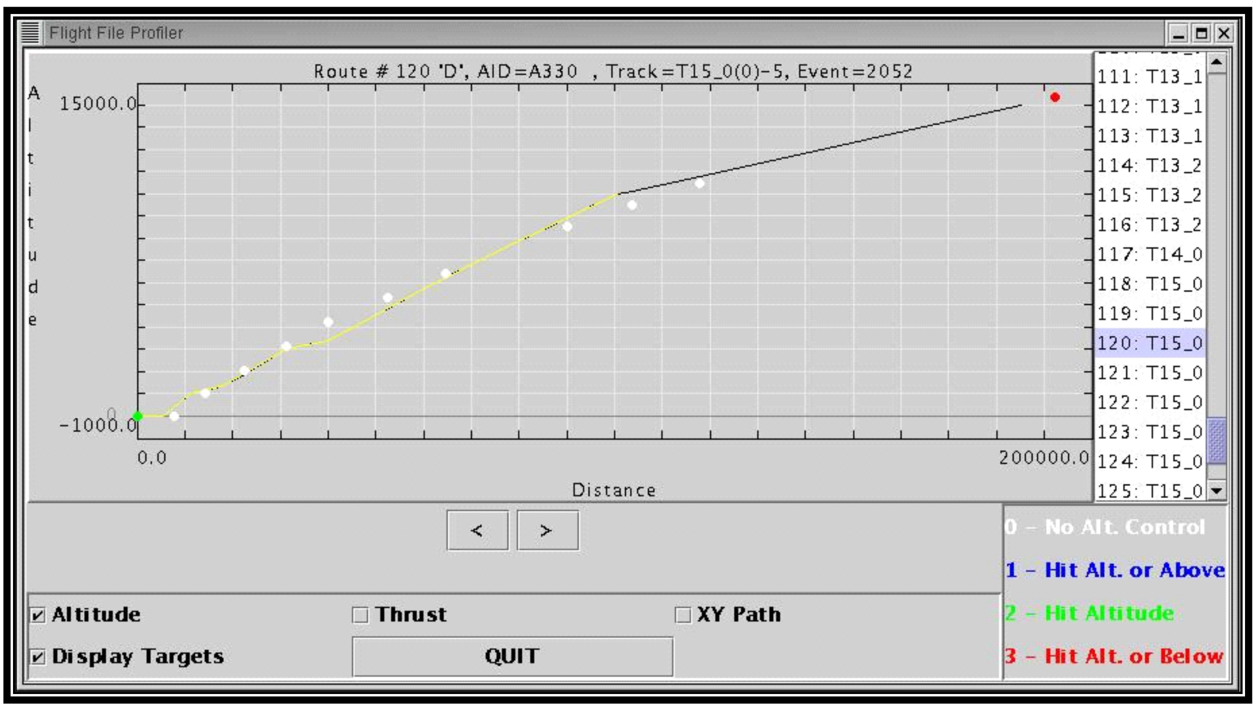


Figure 3: Sample NIRS Profile - Departure

"Intra-study" flights are treated somewhat differently. The highest altitude on such a route is identified. For departures, the standard-procedure profile is used until reaching 3,000 ft. AGL, and then followed by altitude control nodes along the remaining track distance associated with that highest altitude. For arrivals, altitude controls are applied from the highest altitude to 3,000 ft. AGL near the destination airport. At 3,000 ft. AGL, the standard-procedure profile is followed.

All routes are checked for violations of general profile constraints, such as maximum climb and descent angles. If necessary, the route was flagged for further modification to remedy such violations.

3.3.10 Population Data

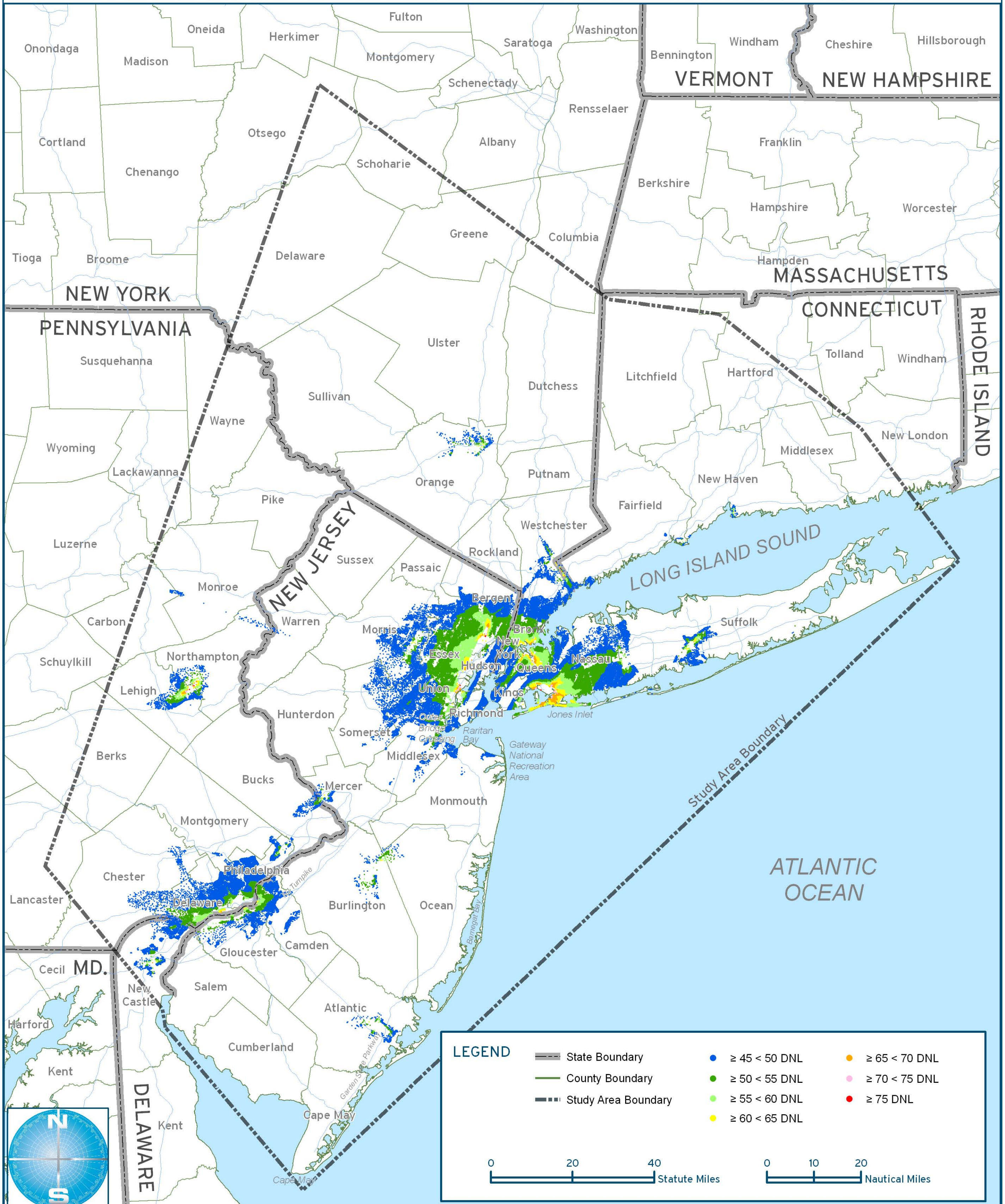
A detailed analysis of noise from aircraft operating between the surface and 14,000 feet above ground level (AGL) was performed at more than 400,000 locations throughout the 30,000+ square mile study area. The analysis evaluates noise conditions for specific locations on the ground based on population centroids (centers of census blocks) and grid points using the Day/Night Average Sound Level (DNL) metric. Population centroids are center points of census blocks, which are statistical subdivisions of a county and do not cross county boundaries. The spatial size of census blocks varies widely depending on the density of the population. The number of people exposed to noise is estimated as the number residing in the census block corresponding to the centroid (based on 2000 Census Data). For this analysis, the population centroid counts represent the maximum potential population within the census block that could be exposed to modeled DNL levels. The actual number of people impacted can be less than the total population represented by a single centroid because noise levels actually will vary throughout the census block. A total number of 325,682 centroids were analyzed. **Exhibit 9** illustrates the centroid locations with a population greater than zero as well as the population density for the 2000 conditions.

The population levels for the future conditions were developed through a forecasting effort based on the 2000 census data. Population levels for each census block (centroid) were forecast for 2006 and 2011 so that a reasonable estimate of future noise impacts could be determined. In all cases, the location of each population centroid remained constant throughout the analysis. Only the numbers of people associated with each centroid varied by year based on the population forecast results. Detailed information regarding the population forecasting effort is available in **Appendix B** of the EIS document.

Baseline 2000 Aircraft Noise Exposure

Exhibit E.9

ENVIRONMENTAL IMPACT STATEMENT



3.3.11 Supplemental Grid Points

A number of supplemental grid points were defined throughout the study area to account for noise-sensitive regions such as DOT Section 303/4f sites and to assist in quality control analysis of the NIRS output.

In addition to the population census blocks, there were three types of grid areas analyzed in this study. First, low-density grids were used to cover the entire study area with 5,000 feet inter-point spacing between each grid point (33,018 points). These points allowed for full coverage of the study area, as well as coverage where population census blocks were sparse. Second, high density grid points (43,065) at approximately 500 foot intervals were defined around the major airports in the study area. These grids, in combination with the low-density grids, provided results used for quality control analysis of the NIRS output. When anomalous results were identified these grids assisted in tracking down the input error and facilitated corrections for the final NIRS runs. Finally, specific grid points were used to identify noise-sensitive locations, which include:

- Historic/Cultural Places (14,976 points)
- National Parks (281 points)
- State Forests (43 points)
- State Parks (1,583 points)
- Tribal Lands (35 points)
- Wildlife Refuges (385 points)
- Local Parks (72 points)

In all cases, the location of each supplemental grid point remained constant throughout the analysis for both current and future conditions.

4. NOISE MODELING ANALYSIS

Community exposure to aircraft noise attributable to the current Baseline, Future No Action Airspace Alternative Airspace Alternative conditions, and each of the Proposed Action Airspace Redesign Alternatives is assessed in this section. The analysis includes determination of current aircraft noise exposure in the study area, as well as for the years 2006 and 2011. The evaluation primarily focuses on the change in aircraft noise associated with each Proposed Action Airspace Redesign Alternative as compared to the Future No Action Airspace Alternative conditions. The analysis presented in this section focuses on the noise conditions for specific locations at the population centroids (centers of census blocks) discussed in previous sections using the Day/Night Average Sound Level (DNL) noise metric for aircraft operations. The number of people exposed to various noise levels is estimated based on the number of persons residing in the census block corresponding to the centroid being evaluated. The noise exposure results are presented in terms of noise level and change criteria set forth by FAA policy as discussed in **Section 3.2.6** of this report.

Comparative noise impact results were tabulated for the Future No Action Airspace Alternative and each alternative at the previously described population centroids. Where zones of notable change occurred due to the alternative, an investigation of the cause of the change was conducted. The process of change investigation involved the following steps:

Step 1 Zone Selection – The zones to be investigated are selected. This normally includes all zones shown in an impact map, corresponding to all population in the color-highlighted regions of the impact graph.

Step 2 Automated Analysis – The NIRS Change Analysis tool is applied to the selected zones. This tool automatically compares all pairs of corresponding traffic files between scenarios to determine which file or files are the primary causes of the change of exposure associated with each zone. Since traffic files are organized by airport, arrival/departure, and runway the cause can be identified down to the level of a group of tracks and associated events. The Change Analysis tool retrieves centroid-specific data from the noise files derived from each traffic file and uses these noise values to determine the causative traffic files.

Step 3 Manual Analysis – A NIRS analyst further investigates the traffic data causing the change for each zone. Given specific pairs of causal traffic files, the analyst generates detailed maps of the tracks and the affected population centroids in each change zone, and identifies tracks and/or events that differ between scenarios. NIRS provides a graphical track query tool that enables the analyst to determine differences in track location, aircraft type, day/night event counts, runway utilization, and dispersion.

The following sub-sections provide the results of the noise analysis for the current Baseline condition, the Future No Action Airspace Alternative conditions, and each alternative investigated for 2006 and 2011. The sections begin with a brief summary of the major design elements of each scenario along with a general overview of the noise modeling input data changes incorporated in order to model the alternative. The results of the noise modeling are then presented for each year of interest in graphical and tabular form. The noise exposure changes from the No Action condition are presented for each alternative and year in total and by change zone. Additionally, brief explanations of the causes associated with each change zone are presented.

4.1 Baseline Conditions

The Baseline condition represents the aviation activity and airspace structure and procedures as they were in the year 2000. While not the primary focus of the noise considerations, this analysis provides a context for contemplation of the noise modeling results for future conditions with and without various airspace redesign alternatives. It provides a conduit for the translation of current real-world experiences into toe noise modeling domain.

4.1.1 Baseline Noise Model Input

The NIRS input for the Baseline 2000 conditions was used as described in **Section 3.3** of this report.

It should be noted that as a result of comments received on the DEIS, some minor changes in the noise analysis methodology were incorporated into the analysis presented in the FEIS document. These changes reflect a modest refinement in the methodology.

The first refinement in the noise methodology affects the way noise impacts are tallied. Specifically, the DEIS used the internal NIRS software calculation methodology to identify impact based on FAA's noise impact thresholds. The original computations in the DEIS are based on using the computed noise values out to six decimal places. Thus, a centroid whose noise value was 64.999998 DNL would not be considered in the 65 DNL range. However, spreadsheets provided to the public via the project website included noise values rounded to one decimal place. Consequently, the centroid that was 64.999998 DNL in NIRS became 65.0 DNL in the spreadsheets. This led to confusion for those who used the spreadsheets to compute the number of centroids/persons exposed to change at FAA's threshold levels. Often the spreadsheet computation did not match what was in the DEIS as computed by the NIRS software. The FAA received numerous comments to this effect and decided to present the results of the analysis in the Final EIS document based on rounding to one decimal place.

This change in methodology only results in slightly more impacts. The rounding to one decimal place generally makes no difference at most points, but some that were very close to the thresholds are tipped into the category of a FAA threshold based impact. These refinements in the modeling are reflected in the Existing Condition noise results in this Chapter, as well as in the Airspace Redesign Alternatives results presented in Chapters Four and Five.

The second refinement was related to the noise modeling itself. Specifically, the issue relates to how the Noise Integrated Routing System (NIRS) model handles multiple airports with differing airfield and runway elevations in a large study area. NIRS relates all aircraft flight profiles (arrival and departure) to the NIRS Study Center elevation, which was set at 22 feet at LGA for this project. At the same time, the model uses the US Geological Survey terrain data to correctly place the noise receptors (census block centroids or grid points) at the correct ground elevation throughout the Study Area. Some airports in the study, such as HPN and SWF, have airfield elevations that are substantially higher (400 feet) than the 22 feet elevation near LGA, JFK, EWR, and PHL. Thus as the NIRS model departs and lands aircraft at the Study Center elevation of 22 feet, some centroids near these airport may be exposed to aircraft passing at unusually small slant-range (line-of-sight) distances. For centroids located near the "higher" airports this could mean that the noise exposure levels for both the Future No Action Airspace and Proposed Action Airspace Alternatives would be greater than would be expected. Refinements to the NIRS model were made to incorporate various airport elevations to more closely model these differences at the higher elevation airports.

The results of these two refinements were reflected in the Noise Mitigation Report. After publication of the Noise Mitigation Report it was discovered that the NIRS model ignored the adjustment made to account for the higher airports, ie. the model disregarded the airport elevation settings because the terrain feature was activated. The result was that the refined NIRS completed for the Noise Mitigation Report as well as the FEIS still reflected the Study Center Elevation of 22 feet as was the case in the DEIS. Therefore, a sensitivity analysis was conducted to confirm the reasonableness of the analysis as well as to document the limited effect of the airport elevation issue. It was expected that adjustments to an airport elevation would generally result in a slight reduction in computed noise levels for all scenarios near these higher elevation airports. The sensitivity analysis presented in Section E.3 of this appendix confirms this expectation and indicates that the results presented in this FEIS document are not materially affected by this issue.

4.1.2 Baseline Noise Impact Results

The results for Year 2000 Existing Conditions are presented below for the population centroid locations in the Study Area. The FAA does not require comparisons to be made to Existing Conditions. Its purpose is to provide the reader the opportunity to equate current personal experience to the noise metrics recorded as well as the degree of exposure. Information provided refers to exposure levels only within the Study Area.

Exhibit 9 provides a graphical representation of the Year 2000 Existing Conditions noise exposure levels for the entire Study Area. The color of each population centroid is thematically colored based on the following DNL ranges:

- 45 to less than 50 DNL – dark blue
- 50 to less than 55 DNL – light blue
- 55 to less than 60 DNL – green
- 60 to less than 65 DNL – yellow
- 65 to less than 70 DNL – orange
- Greater than or equal to 70 DNL – red

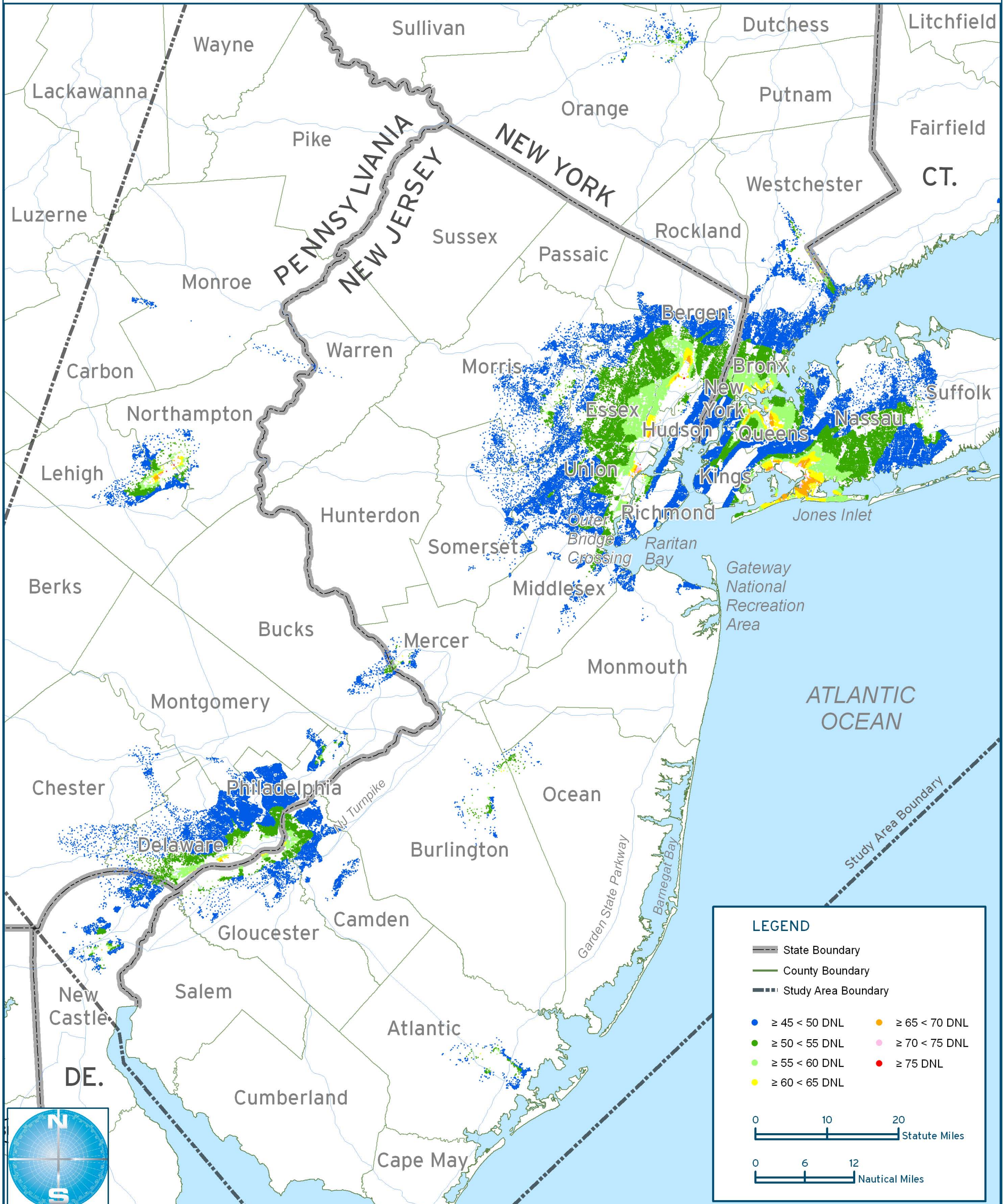
In general, the vast majority of the Study Area is exposed to aircraft noise levels less than 45 DNL. As would be expected, the areas closer to the primary airports are exposed to the highest aircraft noise exposure levels. **Exhibit 10** provides a closer view showing areas such as JFK, EWR, LGA, and PHL where most population census blocks near the airports are exposed to 45 DNL levels or more.

As the figure indicates, the areas exposed to aircraft noise levels 60 DNL or more are located relatively close to each of the major airports. These areas are generally aligned with the primary runways and flight patterns and typically extend from three to five miles away from the runway ends.

Baseline 2000 Aircraft Noise Exposure
Enlarged View

Exhibit E.10

ENVIRONMENTAL IMPACT STATEMENT



Around JFK, the 60 DNL noise pattern mostly stays south of the Southern Parkway and is largely over Jamacia Bay. To the northeast the noise pattern does extend beyond the Southern Parkway into the residential area in the Valley Stream vicinity. To the southeast, the noise pattern extends east and out over the largely residential areas of North Woodmere, Woodmere, and western Hewlett Bay. It also extends south over Far Rockaway and west to the Belle Harbor area.

In the vicinity of LGA, the 60 DNL noise area extends northwest of the airport over the Hunts Point industrial area and into the residential areas just northeast of the Bruckner Expressway. To the northeast, the 60 DNL noise pattern extends over residential area located west of the Whitstone Expressway (I-678) just north of Clason Point. To the southeast the 60 DNL noise pattern extends over residential and commercial areas just east of the Van Wyck Expressway to a point just southeast of Kissena Park.

The 60 DNL noise pattern around EWR generally runs north and south along the orientation of the main runways. To the north the noise pattern extends over largely commercial, industrial, and multi family residential areas to near the Lyndhurst area. To the south the 60 DNL noise pattern extend over commercial and residential areas of Elizabeth, NJ and portions of Staten Island to an area just north of Carteret.

In the area around TEB, the 60 DNL noise pattern is also oriented in a north-south configuration. To the north the pattern extends over commercial, industrial, and some residential area to a point just south of Route 4 and the New Bridge area. South of the airport, the pattern extends over mostly industrial and wetland area to near the Meadowlands Sports Complex. A portion of the 60 DNL noise pattern also extends to the southwest along State Route 17 to just southwest of Riggin Memorial Field in Rutherford.

In the area around PHL, the 60 DNL noise pattern generally extends in an east-west orientation aligned with the main runways at PHL. To the east, the noise pattern extends over mostly commercial and industrial area located along the Delaware River to a point over residential areas along the eastern bank of the river near Gloucester City, NJ. To the west the noise pattern also extend along the river over residential areas in Tinicum Township and Essington.

Table 9
Baseline 2000 Maximum Population Exposed to Aircraft Noise

DNL Range (dB)	Population	Percentage of Total
Less than 45	15,140,168	51.15%
45 to less than 50	7,336,023	24.78%
50 to less than 55	4,295,229	14.51%
55 to less than 60	2,102,580	7.10%
60 to less than 65	526,221	1.78%
65 to less than 70	163,870	0.55%
70 to less than 75	38,026	0.13%
Greater than or equal to 75	316	0.00%
Total	29,602,433	100.00%

As shown in **Table 9**, the majority (51%) of people residing within the study area were exposed to less than 45 DNL. Approximately 202,210 people (0.68 percent of the study area population) would experience 65 DNL or more within the study area under current conditions.

4.2 Future No Action Conditions

The Future No Action Airspace Alternative Airspace Alternative represents the expected future conditions if no changes were implemented as a result of the airspace redesign project. This analysis provides the basis for comparing the effects of each of the proposed redesign alternatives. The estimated noise conditions were evaluated for the 2006 and 2011 time frames.

4.2.1 Future No Action Noise Model Input

As detailed in **Sections 3.3** and **4.1.1** of this report, the NIRS modeling for the Future No Action Airspace Alternative conditions is largely based on the Baseline 2000 current condition modeling. Only two notable changes have been made to the current airspace structure to accommodate initiatives that are expected to be in place by 2006 regardless of the airspace redesign project. The flight tracks associated with the Yardley-Robbinsville "Flip-Flop" Procedure and the Dual Modena Procedure were adjusted to represent those known changes for the future conditions. These procedures are discussed in **Chapter 1, Project Background and Purpose and Need for the Action,** of the EIS document.

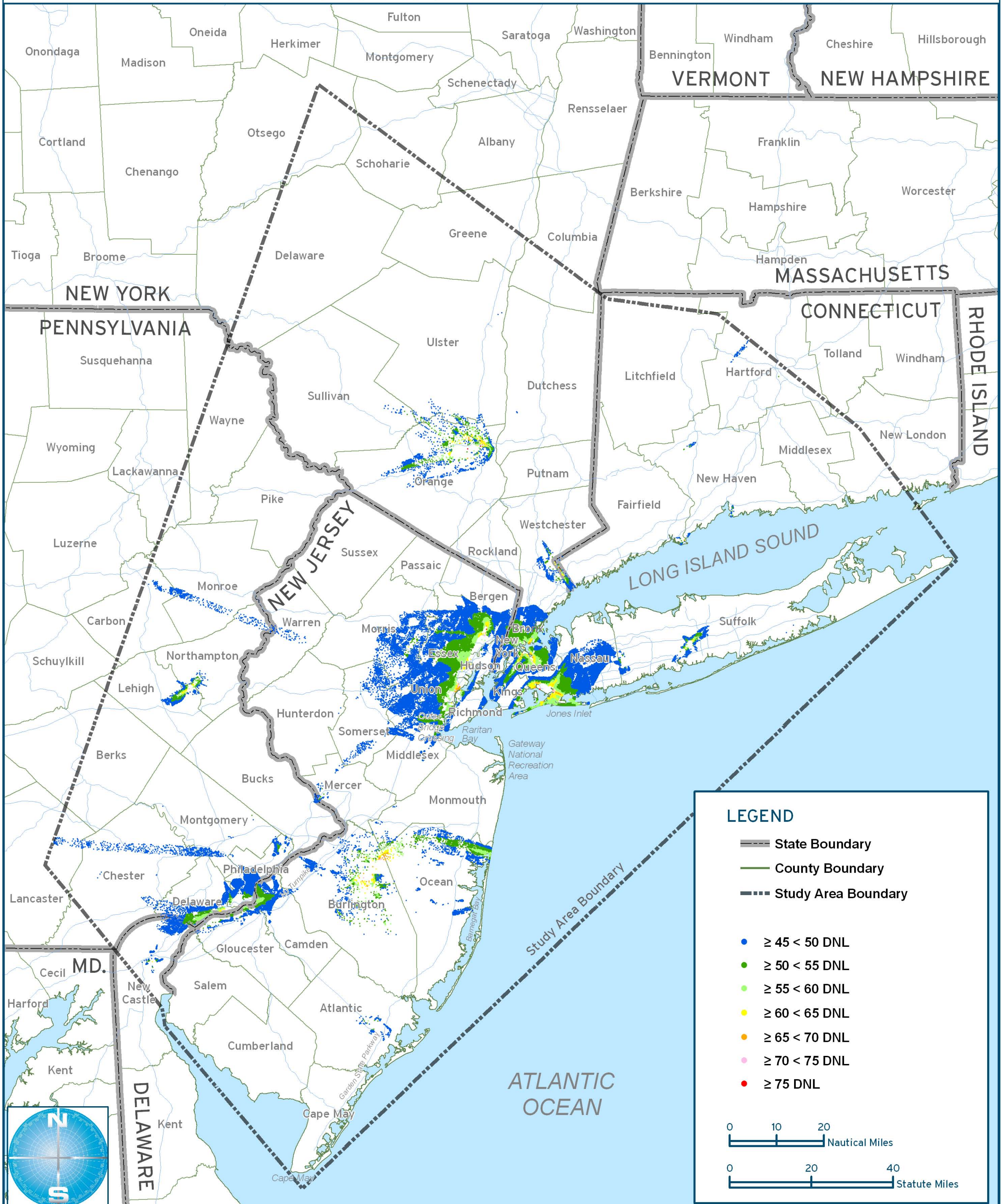
4.2.2 Future No Action Noise Impact Results

The NIRS noise analysis focuses on aircraft noise exposure in areas affected by DNL 45 and greater. The analysis evaluates the noise levels at each population census block in the Study Area and computes the maximum potential population exposed to noise based on the criteria discussed in **Section 3.2.6** of this report. **Exhibit 11** presents the estimated DNL noise exposure pattern for the 2006 No Action conditions throughout the study area. Similarly, **Exhibits 12a and 12b** present enlarged views of the 2006 No Action DNL noise exposure at the population census blocks in the NY/NJ Metropolitan Area (including JFK, LGA, EWR, and TEB) and the PHL Metropolitan Area, respectively. It should be noted that for noise mapping purposes throughout this study the entire census block associated with the population centroid where noise values were computed are color shaded by noise level range or noise change level.

2006 Future No Action Airspace Alternative Noise Exposure

Exhibit E.11

ENVIRONMENTAL IMPACT STATEMENT



2006 Future No Action Airspace Alternative Noise Exposure - NY/NJ Metropolitan Area

Exhibit E.12a

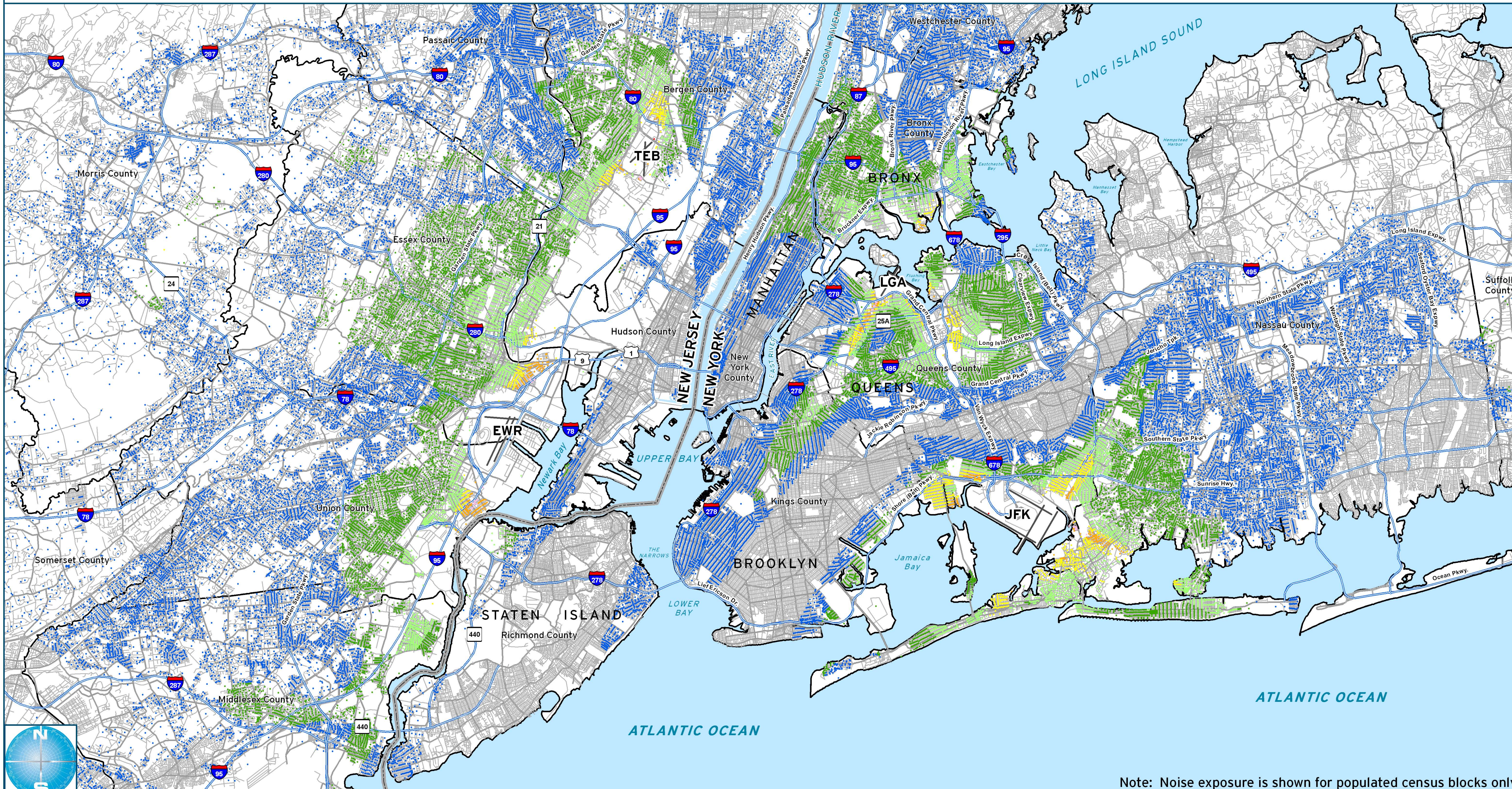
ENVIRONMENTAL IMPACT STATEMENT

LEGEND

- State Boundary
- County Boundary
- ≥ 45 < 50 DNL
- ≥ 50 < 55 DNL
- ≥ 55 < 60 DNL
- ≥ 60 < 65 DNL
- ≥ 65 < 70 DNL
- ≥ 70 < 75 DNL
- ≥ 75 DNL

0 1 2 Statute Miles

0 1 2 Nautical Miles



Note: Noise exposure is shown for populated census blocks only

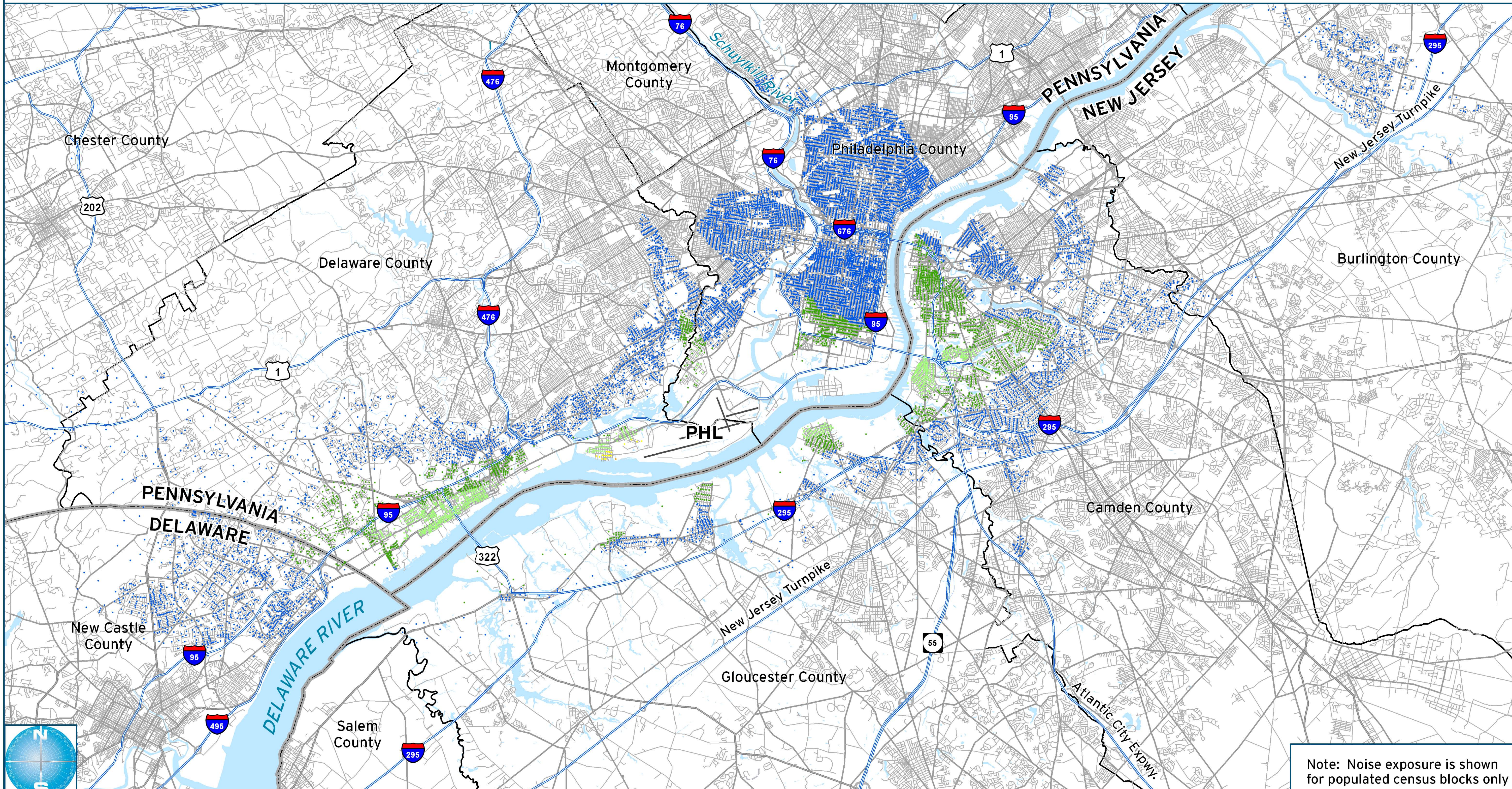
2006 Future No Action Airspace Alternative Noise Exposure - PHL Metropolitan Area

Exhibit E.12b

ENVIRONMENTAL IMPACT STATEMENT

LEGEND

- State Boundary
- County Boundary
- ≥ 45 < 50 DNL
- ≥ 50 < 55 DNL
- ≥ 55 < 60 DNL
- ≥ 60 < 65 DNL
- ≥ 65 < 70 DNL
- ≥ 70 < 75 DNL
- ≥ 75 DNL



Note: Noise exposure is shown for populated census blocks only

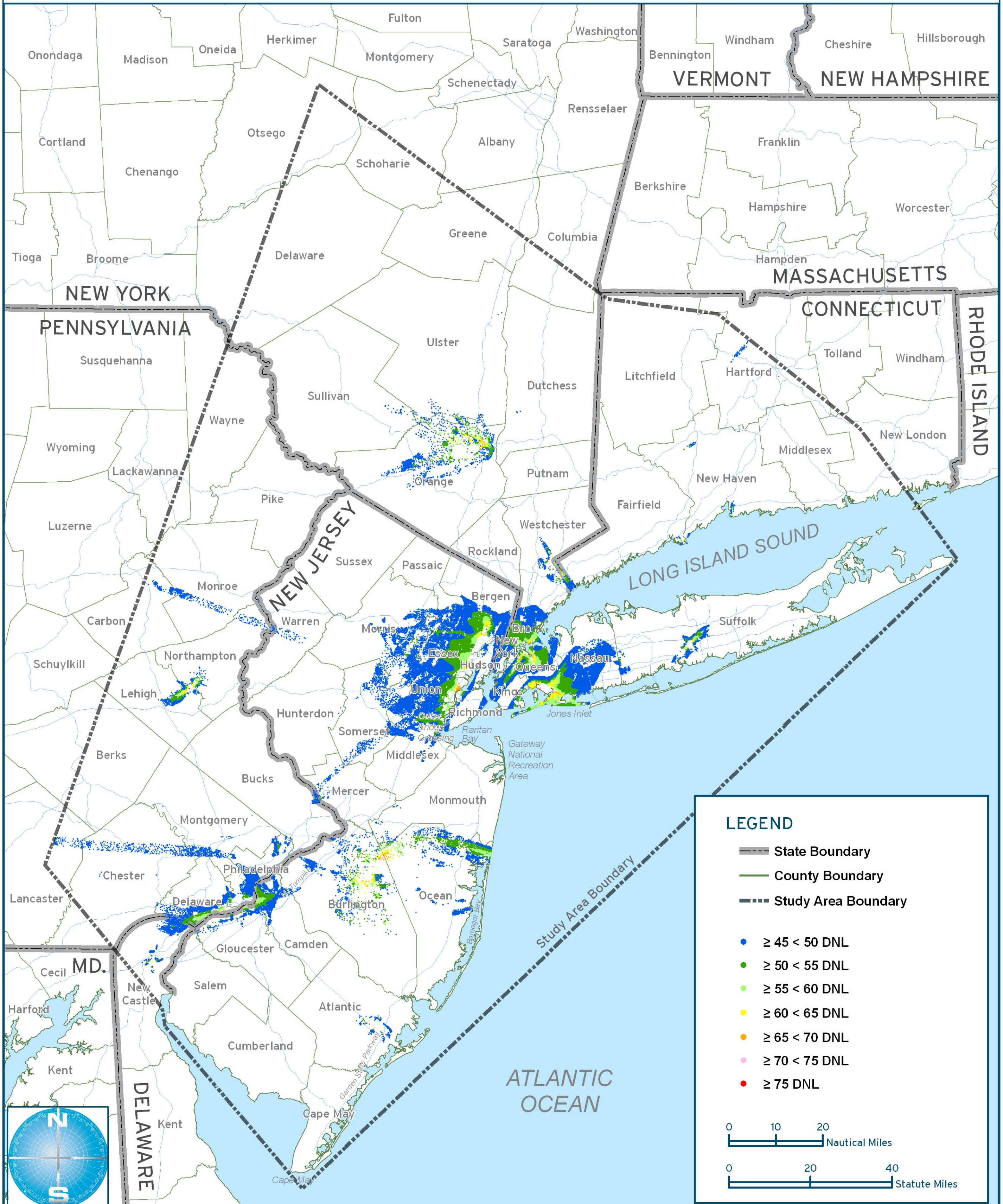
As the graphics indicate, the areas that are expected to be exposed to aircraft noise above 45 DNL are concentrated in the New York City area, around the Philadelphia International Airport, and in close to the other airports evaluated in the Study Area. The maps illustrate that higher aircraft noise levels are expected in proximity to each airport. The size of the noise pattern around each airport is generally a function of the operational levels and fleet mix at each airport. The shape of the noise pattern is most influenced by the orientation of the runways and their usage along with the predominant flight routes near the airport. The estimated 2006 aircraft noise exposure pattern is similar in size and shape to the Baseline 2000 noise exposure pattern presented in Chapter 3. In some cases, the size of the 2006 noise pattern is reduced slightly from the 2000 conditions, despite increases in operational levels. This effect is generally the result of fleet mix changes from older noisier aircraft to new quieter aircraft.

Exhibits 13, and 14a and 14b, present the estimated DNL aircraft noise patterns for the 2011 No Action condition for the entire study area, for EWR, TEB, JFK, and LGA, and for PHL, respectively. As expected, the noise patterns for 2011 are very similar in size and shape to those indicated for 2006. Only slight growth in the patterns is noted in some cases due to the modest increases in aircraft operations expected between 2006 and 2011. In other areas, some slight reduction in noise is expected due to further retirement of older noisier aircraft in the fleet by 2011.

2011 Future No Action Airspace Alternative Noise Exposure

Exhibit E.13

ENVIRONMENTAL IMPACT STATEMENT



2011 Future No Action Airspace Alternative Noise Exposure - NY/NJ Metropolitan Area

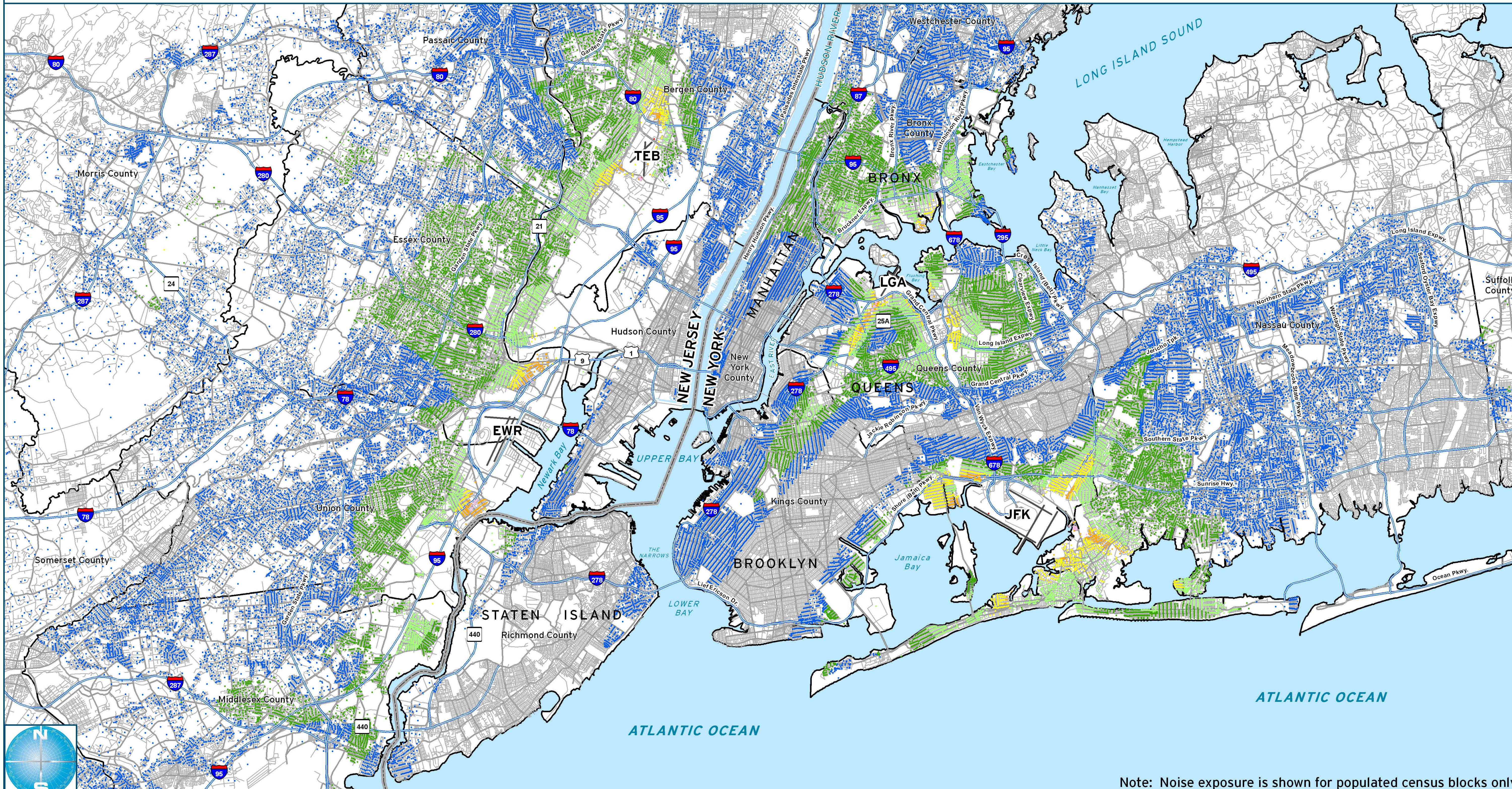
Exhibit E.14a

LEGEND

- State Boundary
- County Boundary
- ≥ 45 < 50 DNL
- ≥ 50 < 55 DNL
- ≥ 55 < 60 DNL
- ≥ 60 < 65 DNL
- ≥ 65 < 70 DNL
- ≥ 70 < 75 DNL
- ≥ 75 DNL

0 1 2 Statute Miles

0 1 2 Nautical Miles



Note: Noise exposure is shown for populated census blocks only

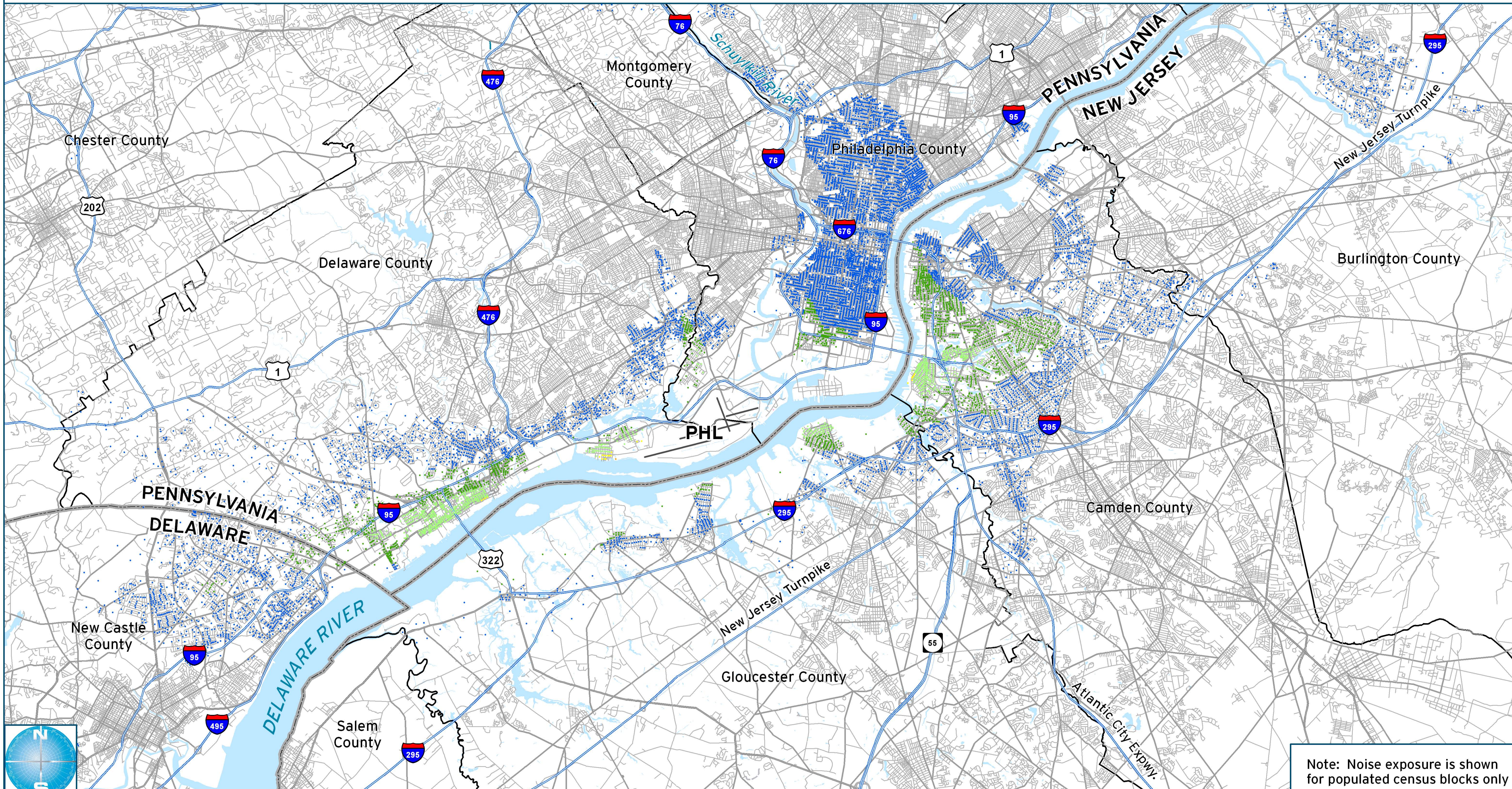
2011 Future No Action Airspace Alternative Noise Exposure - PHL Metropolitan Area

Exhibit E.14b

ENVIRONMENTAL IMPACT STATEMENT

LEGEND

- State Boundary
- County Boundary
- ≥ 45 < 50 DNL
- ≥ 50 < 55 DNL
- ≥ 55 < 60 DNL
- ≥ 60 < 65 DNL
- ≥ 65 < 70 DNL
- ≥ 70 < 75 DNL
- ≥ 75 DNL



Note: Noise exposure is shown for populated census blocks only

Table 10 presents the maximum potential population exposed to aircraft noise by DNL ranges for the Future No Action Airspace Alternative. As shown in Table 11, approximately 0.2 percent of the Study Area population is estimated to be exposed to aircraft noise levels greater than 65 DNL in 2006 and 2011. Approximately 214,000 and 210,000 persons, or about 0.7 percent of the Study Area population, are expected to be exposed to aircraft noise in the 60 to 65 DNL range for 2006 and 2011 respectively. The population within the 45 to 60 DNL range in 2006 and 2011 is expected to be 39 and 38 percent of the Study Area population, or 11,774,446 persons and 11,688,798 persons, respectively.

Table 10
Future No Action Airspace Alternative - Estimated Population within DNL Ranges

DNL Range	Year	
	2006	2011
45-60 DNL	11,774,446	11,688,798
60-65 DNL	213,692	209,793
65+ DNL	72,141	75,459
Total Population in Study Area	30,401,564	31,156,051

It is expected that approximately 12.06 million persons within the Study Area would be exposed to noise levels of 45 DNL and greater due to aircraft noise in 2006 if no design changes are made. By the year 2011, it is estimated that the population exposed to noise levels above 45 DNL will decrease slightly to just over 11.97 million persons. However, the number of persons exposed to noise of 65 DNL and greater is expected to increase 4.6 percent between 2006 and 2011 for the Future No Action Airspace Alternative. These increases are due to both the expected growth in aircraft operations and the forecast population growth in the Study Area through 2011.

4.3 Modifications to Existing Airspace Alternative

This alternative includes minor modifications to today's airspace and routing, improving operations as much as possible within the limitations of current ATC facility boundaries. This alternative builds on the Future No-Action Alternative. This section presents the results for the Modification to Existing Airspace Alternative for the years 2006 and 2011.

4.3.1 Modifications to Existing Airspace Alternative Noise Model Input

The NIRS modeling for the future Modification to Existing Airspace Alternative is directly based on the Future No Action Airspace Alternative noise modeling input. Only the elements of the alternative design that are expected to be different from the No Action procedures or design were modified for the NIRS modeling.

As with the No Action analysis, noise modeling was developed for IFR overflights and the projected IFR flight plan operations at the 21 airports identified as part of the study, as well as the area overflights. The runways, local environmental variables, operations levels, and fleet mix used for the No Action modeling were also used in the future Modification to Existing Airspace Alternative modeling. In general the runway use proportions modeled at each airport for the No Action conditions were held constant for this alternative noise modeling. The day-night split proportions from the No Action modeling were also used for this alternative analysis except for the traffic at PHL. The operational simulation (TAAM) analysis indicated that this alternative provided enough delay reduction at PHL to allow some of the scheduled daytime departures that had been pushed into the nighttime hours in the No Action condition to be moved back to daytime operations.

The majority of the modeled flight tracks and dispersion for the No Action modeling was also held constant for the Modification to Existing Airspace Alternative modeling input. Only the flight tracks associated with the design element of the alternative were adjusted to represent those known changes for the alternative. The following points summarize the noise model changes made to the No Action input data in order to model the alternative.

- Close-in departure procedures changed i.e. headings added (LGA, EWR, PHL));
- South gate shifted (NY area airports); and
- PHL East departure gate shifted to avoid shifted south departure gate for the NY area.

Each of these items represents a group of flight track adjustments that were required in order to model the alternative design. Only those No Action tracks that were affected by the design changes were moved. These movements generally only involved portions of the route within the study area as dictated by the design. Flight tracks dispersion was only modified where route changes would likely have an effect on dispersion patterns.

A series of graphics illustrating the NIRS backbone track changes associated with this alternative is presented in **Section 1** of **Attachment C** to this appendix. The graphics only show the backbone tracks that were changed for noise modeling the alternative. Both the No Action backbones and the resulting alternative backbones are color coded in the illustrations. Only tracks that changed are shown. Similarly, in order to assist in the clarity of the diagram, the sub-tracks associated with the changed backbone tracks are generally not shown. In some cases annotations are included to clarify concepts.

Chapter 2 of the EIS document provides a more detailed discussion of the design changes associated with this alternative and further detail is provided in the operational modeling report in **Appendix C** of the EIS.

4.3.2 Modifications to Existing Airspace Alternative Impact Results

The route and procedural changes associated with the Modifications to Existing Airspace Alternative would result in the population likely to be exposed to 65 DNL and greater, increasing to approximately 78,920 persons in 2006, or 9.4 percent as compared to the Future No Action Airspace Alternative. Conversely, by 2011, the alternative would reduce the expected number of persons within the 65 DNL noise level from 75,459 with the Future No Action Airspace Alternative to 72,439 with the Modifications to Existing Airspace Alternative.

The number of persons that would be exposed to 60 to 65 DNL is expected to increase from 213,692 with No Action to 252,657 with the Modifications to Existing Airspace Alternative in 2006. A similar shift is expected in 2011. The number of persons exposed to 60-65 DNL noise would increase from 209,793 persons with No Action to 249,780 persons with the Modifications to Existing Airspace Alternative.

This alternative would result in a 1.4 percent increase in the number of persons expected to be exposed to noise levels between 45 and 60 DNL in 2006. By 2011, the alternative would increase the estimated persons exposed to aircraft noise between 45 and 60 DNL by about 2.7 percent over the Future No Action Airspace Alternative conditions, to approximately 12 million persons.

Table 11 presents a summary of the population likely to be exposed to particular noise levels for the Modifications to Existing Airspace Alternative as compared to the Future No Action Airspace Alternative for both future years.

Table 11

Potential Population Exposure & Change - Modifications to Existing Airspace Alternative

Scenario	**DNL Range>**	**45-60**	**60-65**	**65 +**	**Total 45+**
2006					
No Action		11,774,446	213,692	72,141	12,060,279
Alternative		11,938,721	252,657	78,920	12,270,298
Difference		*164,275*	*38,965*	*6,779*	*210,019*
2011					
No Action		11,688,798	209,793	75,459	11,974,050
Alternative		12,007,618	249,780	72,439	12,329,837
Difference		*318,820*	*39,987*	*-3,020*	*355,787*

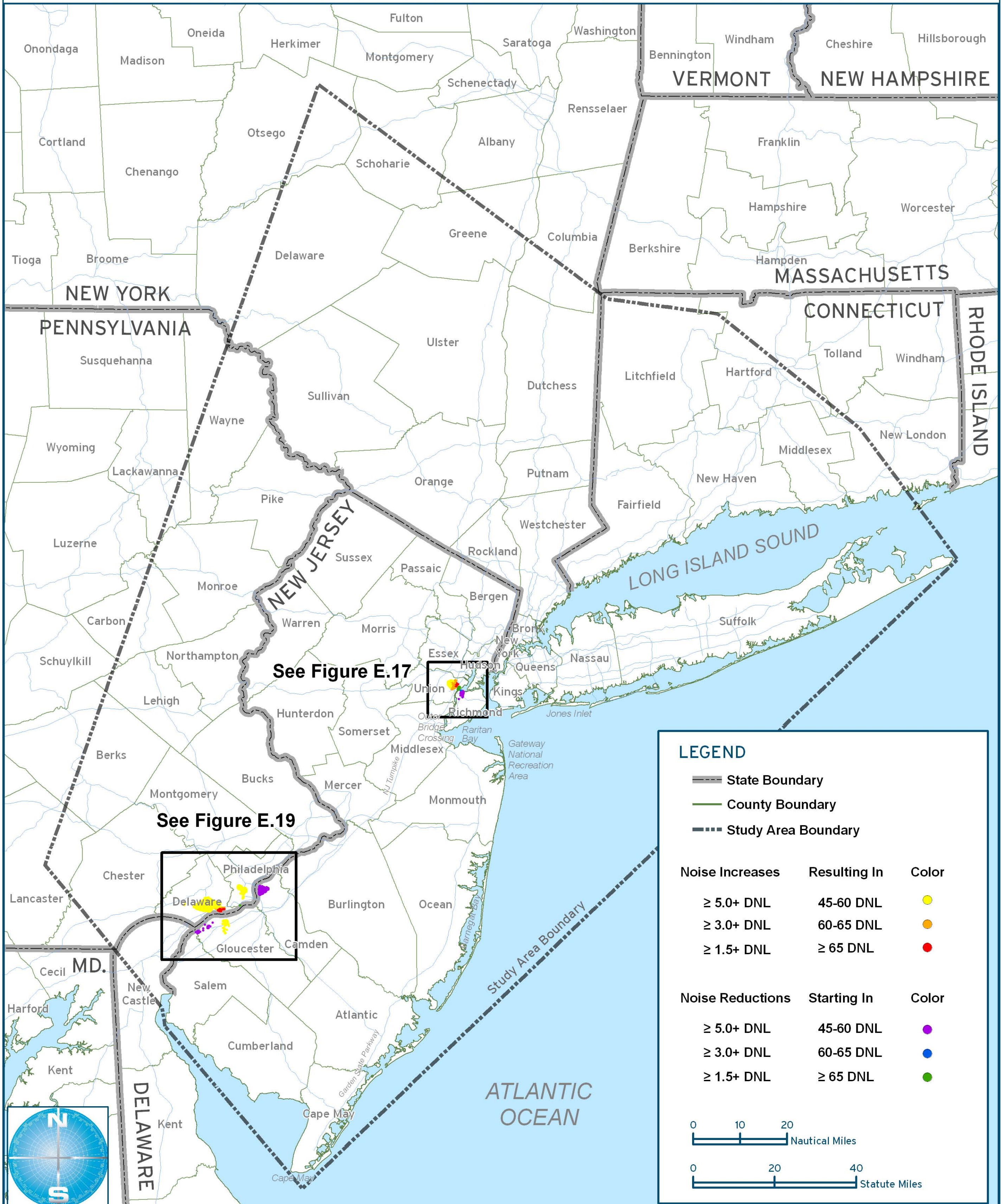
Source: NIRS Analysis, Landrum & Brown/Metron Aviation, Inc. 2007.

In order to determine the potential significance of the changes in noise exposure associated with the Modifications to Existing Airspace Alternative, an analysis of the changes relative to the FAA's noise impact criteria was completed. **Exhibits 15 and 16** present a map of the Modifications to Existing Airspace Alternative noise changes at the census block centroids for both 2006 and 2011, respectively. Only census blocks that are populated and meet the noise exposure criteria discussed in Section 4.1 are shown. The census blocks centroids are color-coded to identify the criterion that they meet and whether the noise increased or decreased.

2006 Modifications To Existing Airspace Alternative Change In Noise Exposure

Exhibit E.15

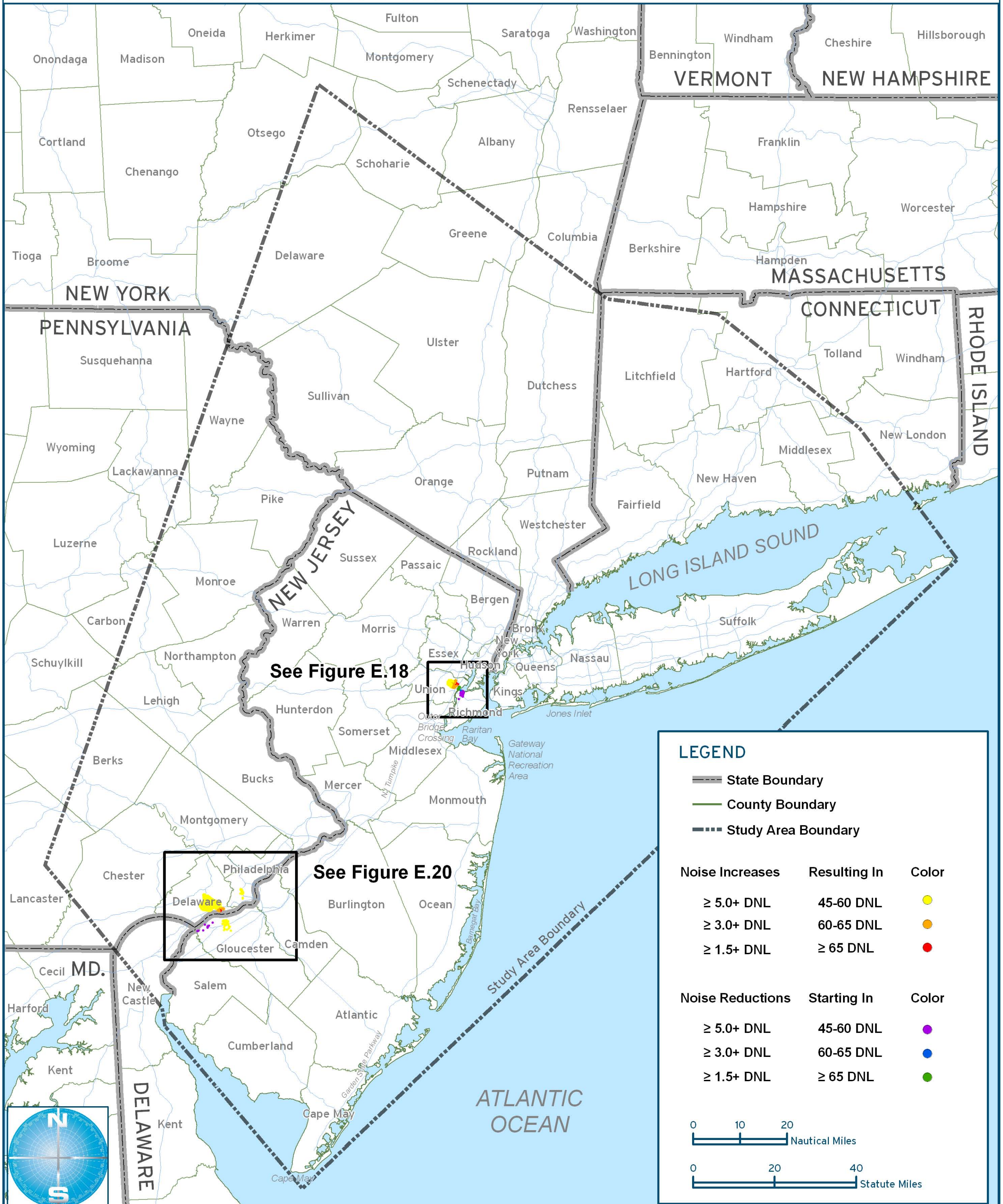
ENVIRONMENTAL IMPACT STATEMENT



2011 Modifications To Existing Airspace Alternative Change In Noise Exposure

Exhibit E.16

ENVIRONMENTAL IMPACT STATEMENT



NEW YORK / NEW JERSEY / PHILADELPHIA METROPOLITAN AIRSPACE REDESIGN PROJECT

As the figures indicate, the changes associated with this alternative are generally clustered around EWR and PHL. There were no other changes meeting the FAA criterion found near any of the other airports modeled in the analysis.

Table 12 summarizes the estimated change in population exposed to aircraft noise levels that meet the FAA criteria resulting from the Modifications to Existing Airspace Alternative airspace design. The cells in the table are color-coded similar to the scheme used on the figures so that specific numbers of persons can be related to the maps illustrating the noise change.

Table 12
Modifications to Existing Airspace Alternative - Population Impact Change Analysis Summary

	DNL Noise Exposure With Alternative		
	65 DNL or higher	60 to 65 DNL	45 to 60 DNL
Minimum Change in DNL With Alternative	1.5 DNL	3.0 DNL	5.0 DNL
Level of Impact	Significant	Slight to Moderate	Slight to Moderate
Noise Increases			
2006	8,755	37,627	146,056
2011	1,010	34,279	110,720
Noise Decreases			
2006	5,970	1	39,426
2011	5,094	22	8,588

Source: NIRS Analysis, Landrum & Brown/Metron Aviation Inc. 2007.

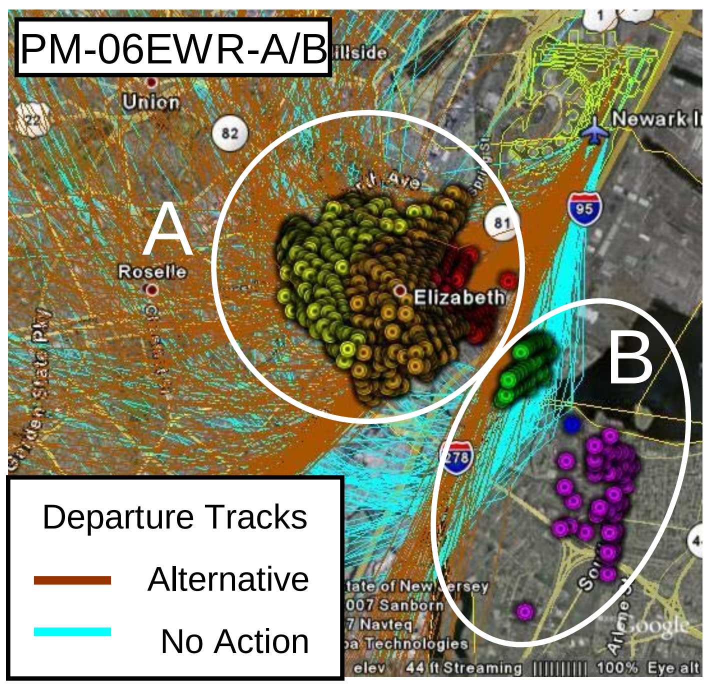
Based on the NIRS analysis it is estimated that 8,755 persons would be exposed to a significant (+1.5 DNL at 65 DNL or higher) change in noise in 2006 resulting from the Modifications to Existing Airspace Alternative. This number would decrease in 2011 to approximately 1,010 persons. The alternative would, at the same time, provide noise reduction of 1.5 DNL or more in other areas exposed to 65 DNL or greater in the Future No Action Airspace Alternative. In 2006, this level of reduction would be experienced by 5,970 persons and would decrease in 2011 to just over 5,000 persons.

Slight to moderate impacts are also evident at lower noise levels due to the Modifications to Existing Airspace Alternative. In the 60 to 65 DNL range, it is expected that 37,627 persons would experience an increase in noise levels of greater than or equal to 3.0 DNL or more in 2006. This number is expected to decrease slightly to 34,279 persons by 2011. There would essentially be no decreases of greater than or equal to 3.0 DNL at noise levels of 60 to 65 DNL expected as a result of this alternative in either 2006 or 2011. At the lowest analyzed noise levels (45 to 60 DNL), where Slight to Moderate (±5.0 DNL) impacts were identified, this alternative is expected to result in potential noise increases for 146,056 persons in 2006. This potential impact is expected to be reduced in 2011 by approximately 23 percent to 110,720 persons. Also, a reduction in noise exposure at these lower noise levels results from the implementation of the Modifications to Existing Airspace Alternative. In 2006, 39,426 persons exposed to between 45 and 60 DNL would experience a noise level reduction of greater than or equal to 5.0 DNL. By 2011, the noise relief at these levels is expected to be experienced by a net total of 8,588 persons

In order to provide a better understanding of the noise impacts resulting from this change analysis the areas of change within the study area were divided into small zones of change for discussion purposes. These zones are generally associated with a specific airport and are identified with a unique code name. The following paragraphs discuss change in noise exposure associated with this alternative in terms of these change zones. Exhibits are provided with enlarged views of the various change zones along with the name of each zone. The change in noise impact is discussed for each zone along with the cause for the noise changes in the zone. Where applicable, inset diagrams are included to illustrate the flight route changes that were primarily responsible for the changes in the zone of interest.

Exhibits 17 and 18 present an enlarged view of the noise changes at the census blocks and change zones associated primarily with EWR for 2006 and 2011, respectively. Each change zone shown on the figures is discussed in the following paragraphs.

PM-06EWR-A (Exhibit 17): The estimated increases in noise occurring west of Interstate 95 and over the Elizabeth, NJ area are caused by the new departure headings off of Runways 22L/R to the north and east gates. Headings were moved from 190° to 260° and 240°. As a result of this change, 6,167 persons, represented by 45 census blocks, are expected to experience an increase in noise of greater than or equal to 1.5 DNL above 65 DNL. Similarly, 36,166 persons, represented by 203 census blocks, are expected to experience an increase in noise of greater than or equal to 3.0 DNL between 60 and 65 DNL and, 29,433 persons, represented by 134 census blocks, are expected to experience an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.



PM-06EWR-B (Exhibit 17): The estimated reductions in noise occurring east of Interstate 95 over Elizabethport NJ and Arlington NY are caused by the new departure headings off of Runways 22L/R to the north and east gates. By moving a portion of the traffic from the 190° to 260° or 240° headings, some 5969 persons, represented by 31 census blocks, are expected to experience a decreases in noise of greater than or equal to 1.5 DNL within the 65 DNL. Similarly, one person represented by one census block is expected to experience a

2006 Modifications To Existing Airspace Alternative Change In Noise Exposure - NY/NJ Metropolitan Area

Exhibit E.17

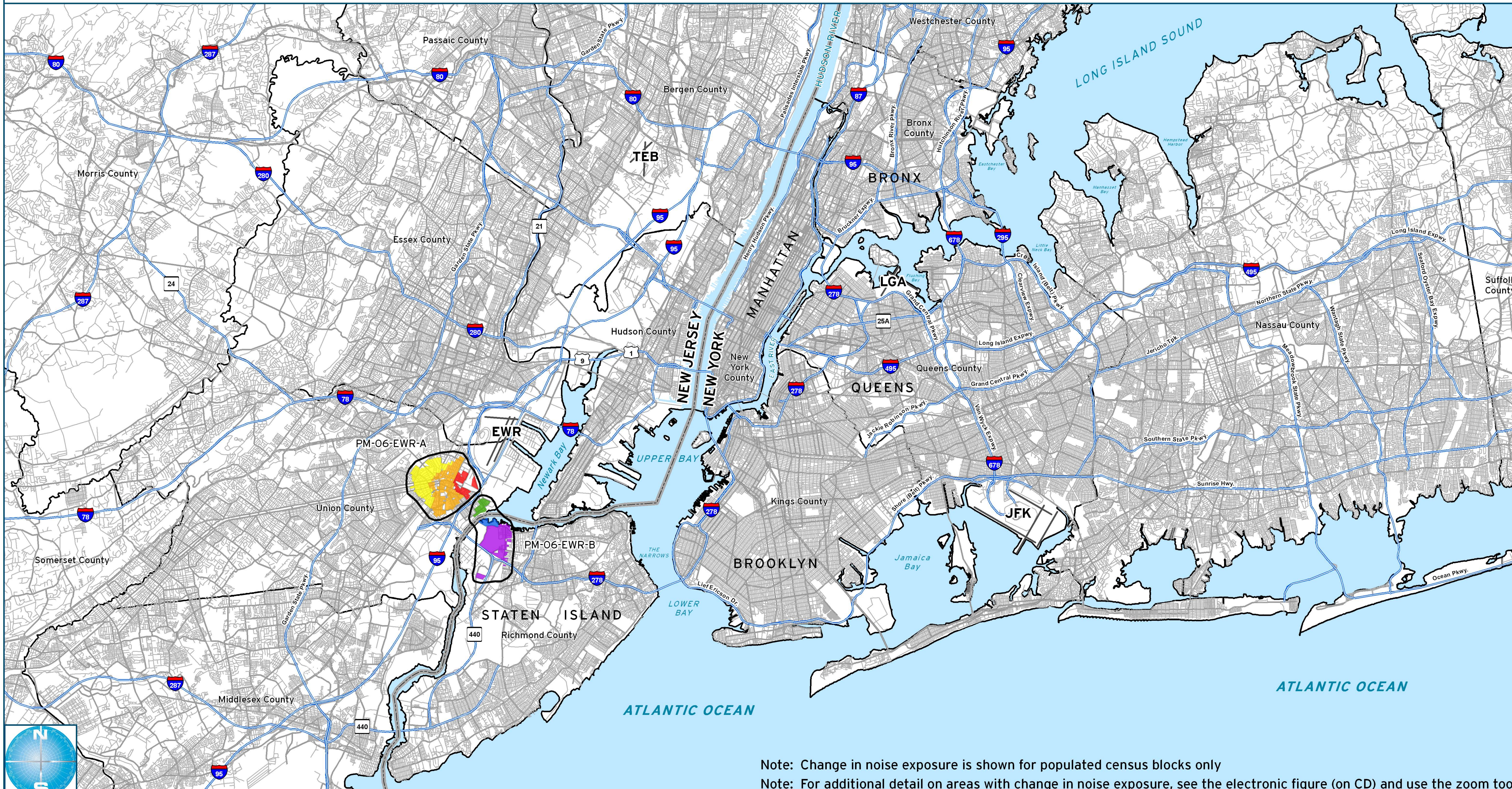
ENVIRONMENTAL IMPACT STATEMENT

LEGEND

State Boundary
County Boundary

Noise Increases	Resulting In	Color	Significant Noise Increases	Resulting In	Color	Noise Reductions	Starting In	Color	Noise Reductions	Starting In	Color
≥ 5.0+ DNL	45-60 DNL	Yellow	≥ 1.5+ DNL	≥ 65 DNL	Red	≥ 5.0+ DNL	45-60 DNL	Purple	≥ 1.5+ DNL	≥ 65 DNL	Green
≥ 3.0+ DNL	60-65 DNL	Orange				≥ 3.0+ DNL	60-65 DNL	Blue			

0 1 2 Statute Miles
0 1 2 Nautical Miles



Note: Change in noise exposure is shown for populated census blocks only

Note: For additional detail on areas with change in noise exposure, see the electronic figure (on CD) and use the zoom tool

2011 Modifications To Existing Airspace Alternative Change In Noise Exposure - NY/NJ Metropolitan Area

Exhibit E.18

ENVIRONMENTAL IMPACT STATEMENT

LEGEND

State Boundary
County Boundary

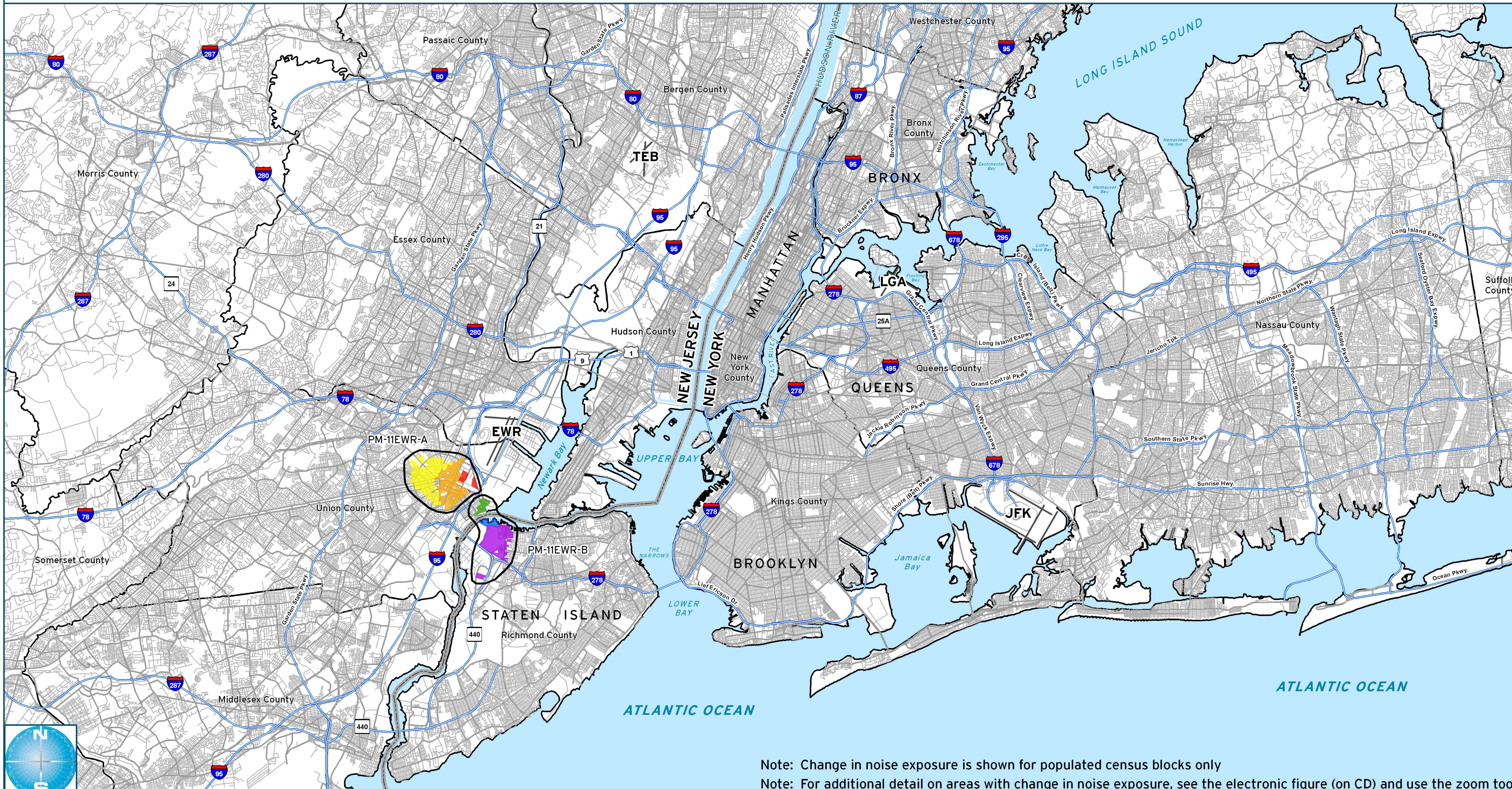
Noise Increases	Resulting In	Color
≥ 5.0+ DNL	45-60 DNL	Yellow
≥ 3.0+ DNL	60-65 DNL	Orange

Significant Noise Increases	Resulting In	Color
≥ 1.5+ DNL	≥ 65 DNL	Red

Noise Reductions	Starting In	Color
≥ 5.0+ DNL	45-60 DNL	Purple
≥ 3.0+ DNL	60-65 DNL	Blue

Noise Reductions	Starting In	Color
≥ 1.5+ DNL	≥ 65 DNL	Green

0 1 2 Statute Miles
0 1 2 Nautical Miles



Note: Change in noise exposure is shown for populated census blocks only

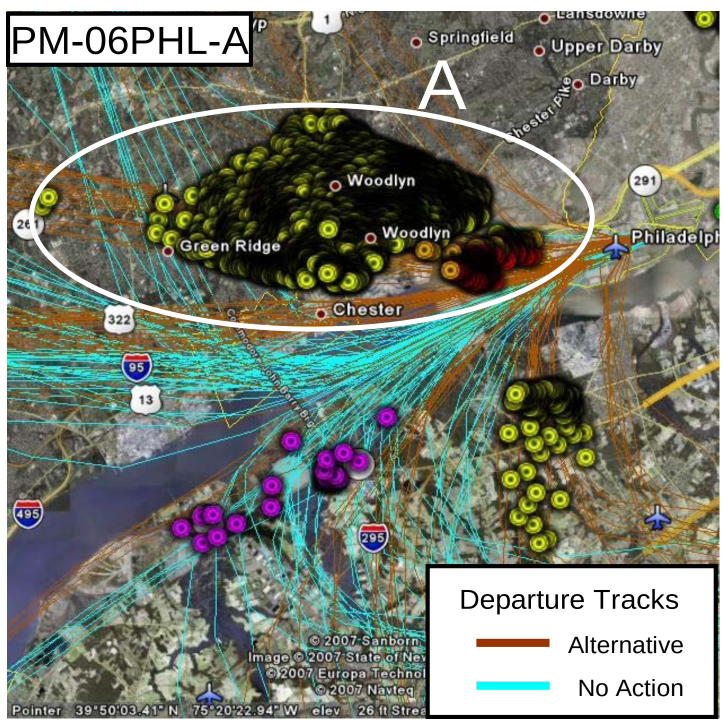
Note: For additional detail on areas with change in noise exposure, see the electronic figure (on CD) and use the zoom tool

decrease in noise of greater than or equal to 3.0 DNL between 60 and 65 DNL and 8,035 persons, represented by 40 census blocks, are expected to experience a decrease in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

PM-11EWR-A (Exhibit 17): The estimated increases in noise occurring west of Interstate 95 and over the Elizabeth, NJ area are caused by the new departure headings off of Runways 22L/R to the north and east gates. Departure headings were changed from 190° to 260° and 240°. As a result of this change, 768 persons, represented by eight census blocks, would receive an increase in noise of greater than or equal to 1.5 DNL above 65 DNL. Similarly, 31,115 persons, represented by 186 census blocks, would receive an increase in noise of greater than or equal to 3.0 DNL between 60 and 65 DNL, and additionally 34,572 persons, represented by 149 census blocks, would receive an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

PM-11EWR-B (Exhibit 18): The estimated reductions in noise occurring east of Interstate 95 over Elizabethport NJ and Arlington NY are caused by the new departure headings off of Runways 22L/R to the north and east gates. By changing a portion of the traffic from the 190° heading to 260° or 240°, 5,094 persons represented by 26 census blocks, would experience a decrease in noise of greater than or equal to 1.5 DNL within the 65 DNL. Similarly, 22 persons represented by two census blocks would receive a decrease in noise of greater than or equal to 3.0 DNL between 60 and 65 DNL and 8,436 person, represented by 40 census blocks, would receive a decrease in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

Exhibits 19 and 20 present an enlarged view of the noise changes at the population census blocks and change zones associated with PHL for 2006 and 2011. Each change zone shown on the figures is discussed in the following paragraphs.



PM-06PHL-A (Exhibit 19): This region is located west and north of the Airport and is approximately 20 square miles in area. The region ranges from the Airport north nearly to Baltimore Avenue, and west nearly to SR-261 (Valleybrook Rd.). Communities within this region include Essington, Crum Lynne, Woodlyn, Wallingford, Rose Valley, Parkside, Brookhaven, and southeastern Chester Heights. These potential increases in noise are caused by the new departure headings off of Runways 27L/R to the north and west gates. Departure headings were changed

2006 Modifications To Existing Airspace Alternative Change In Noise Exposure - PHL Metropolitan Area

Exhibit E.19

E N V I R O N M E N T A L   I M P A C T   S T A T E M E N T

LEGEND

State Boundary
County Boundary

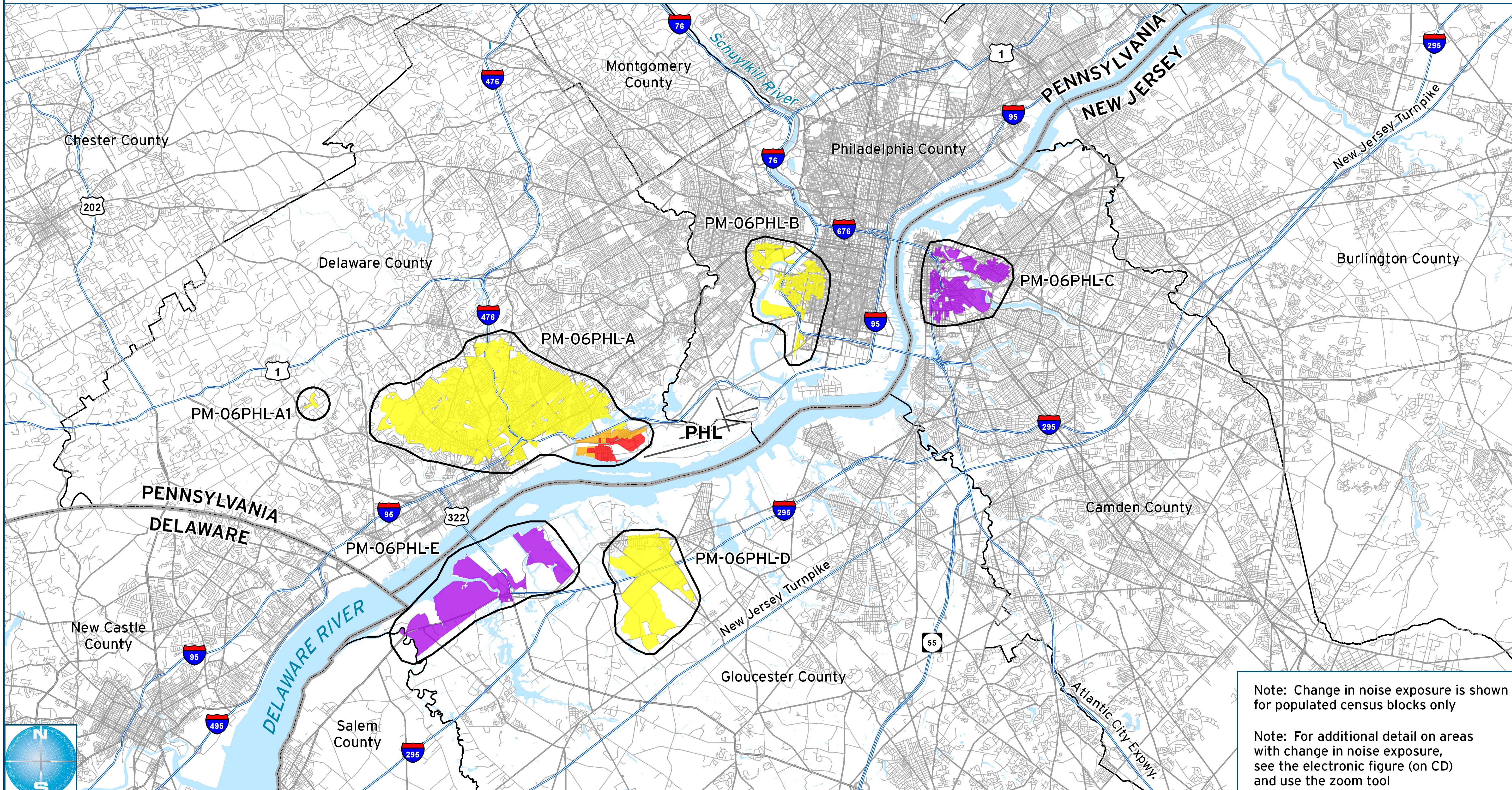
Noise Increases	Resulting In	Color
≥ 5.0+ DNL	45-60 DNL	Yellow
≥ 3.0+ DNL	60-65 DNL	Orange

Significant Noise Increases	Resulting In	Color
≥ 1.5+ DNL	≥ 65 DNL	Red

Noise Reductions	Starting In	Color
≥ 5.0+ DNL	45-60 DNL	Purple
≥ 3.0+ DNL	60-65 DNL	Blue

Noise Reductions	Starting In	Color
≥ 1.5+ DNL	≥ 65 DNL	Green

0 1 2 Statute Miles
0 1 2 Nautical Miles



Note: Change in noise exposure is shown for populated census blocks only

Note: For additional detail on areas with change in noise exposure, see the electronic figure (on CD) and use the zoom tool

2011 Modifications To Existing Airspace Alternative Change In Noise Exposure - PHL Metropolitan Area

Exhibit E.20

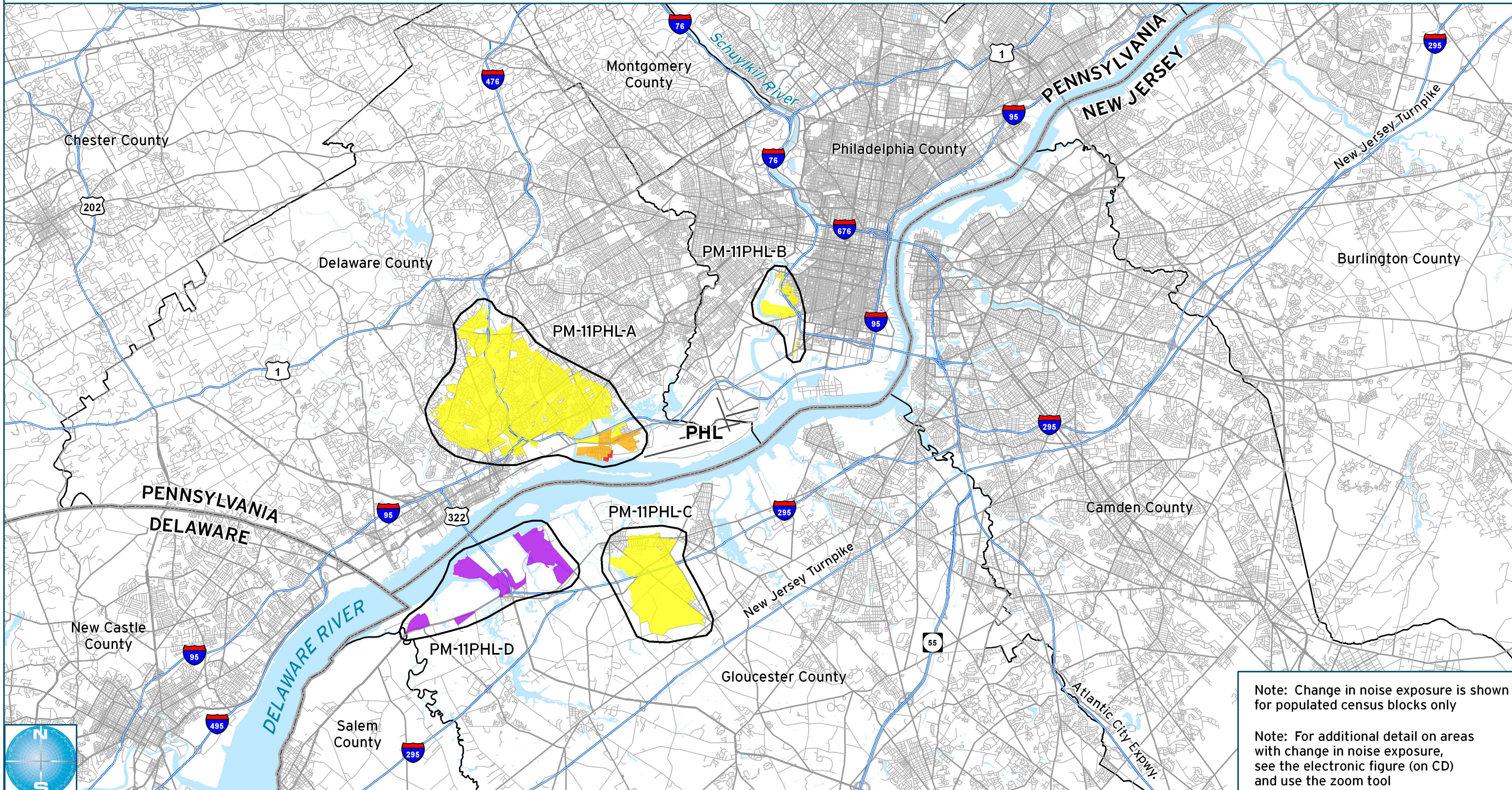
ENVIRONMENTAL IMPACT STATEMENT

LEGEND

- State Boundary
- County Boundary

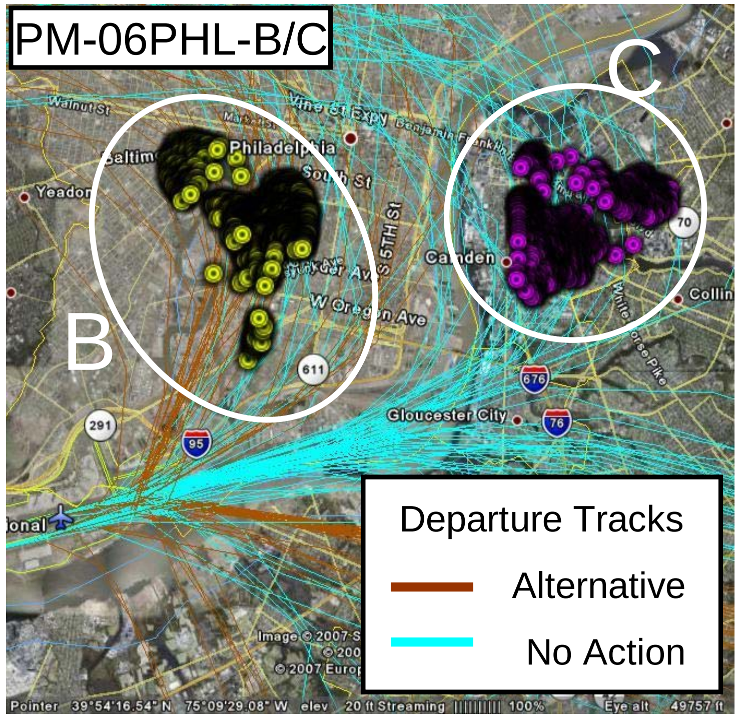
Noise Increases	Resulting In	Color	Significant Noise Increases	Resulting In	Color	Noise Reductions	Starting In	Color	Noise Reductions	Starting In	Color
≥ 5.0+ DNL	45-60 DNL	Yellow	≥ 1.5+ DNL	≥ 65 DNL	Red	≥ 5.0+ DNL	45-60 DNL	Purple	≥ 1.5+ DNL	≥ 65 DNL	Green
≥ 3.0+ DNL	60-65 DNL	Orange				≥ 3.0+ DNL	60-65 DNL	Blue			

Scale: 0, 1, 2 Statute Miles; 0, 1, 2 Nautical Miles



Note: Change in noise exposure is shown for populated census blocks only

Note: For additional detail on areas with change in noise exposure, see the electronic figure (on CD) and use the zoom tool



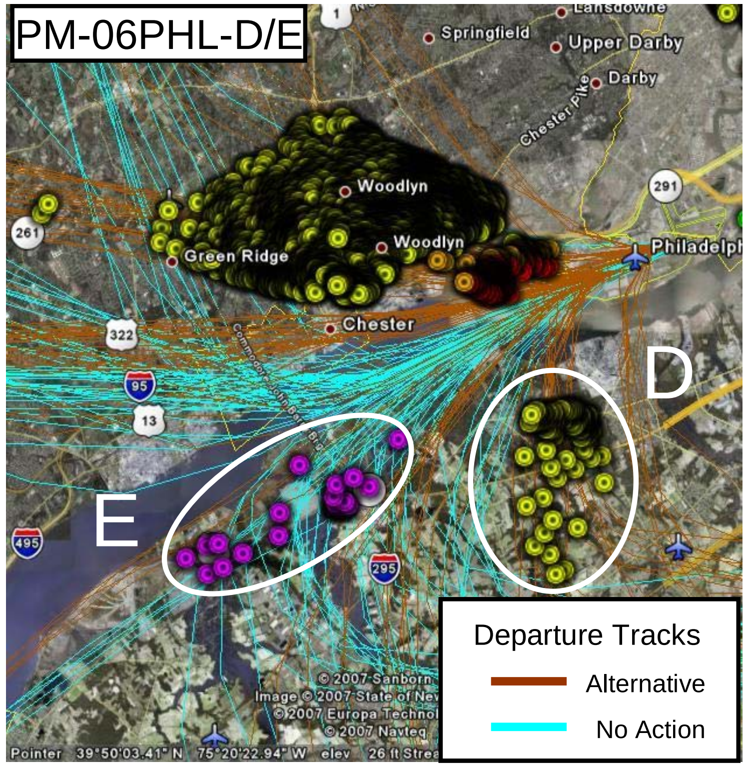
from the current 240° and 255° headings off of Runways 27R/L to 330° for the north gate and 290° and 270° for the west gate. Nearly 2,590 persons represented by 54 population census blocks are expected to experience an increase in noise of greater than or equal to 1.5 DNL for this alternative. Approximately 1,461 persons represented by 29 census blocks are expected to experience an increase in noise of greater than or equal to 3.0 DNL between 60 and 65 DNL and 75,289 persons represented by 1,006 census blocks are expected to experience an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

PM-06PHL-B (Exhibit 19): This region is located north and slightly east of the Airport and is approximately five square miles in area. The region includes portions of South Philadelphia and central Philadelphia; the eastern edge is near 22nd Street, and the northern edge is near Walnut Street. Also, an area on the west side of the Schuykill River is included in this region. The area is approximately bounded by Walnut Street to the north and 43rd Street to the west. These potential increases in noise are caused by the new departure headings off of Runways 9L/R to the north and west gates. Departure headings were changed from the current 085° heading to 070° for the north gate and 030° for the west gate. Approximately, 38,754 persons represented by 436 census blocks are expected to experience an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

PM-06PHL-C (Exhibit 19): This region is located northeast of the airport and is approximately four square miles in area. The main community within the region is Camden, NJ. The area is approximately bounded by Ferry Avenue in the south, Broadway Street in the west, State Street in the north, and Crescent Blvd. in the east. These potential reductions in noise are caused by the new departure headings off of Runways 9L/R to the north and west gates. Departure headings were changed from the current 085° heading to 070° for the north gate and 030° for the west gate. Some 30,884 persons represented by 390 census blocks are expected to experience a reduction in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

PM-06PHL-D (Exhibit 19): This region is located south of the Airport, and is approximately six square miles in area. The region is approximately two miles wide, containing the majority of Gibbstown, NJ north of I-295 and extending about two miles south of I-295. These potential increases in noise are primarily caused by the new departure headings off of Runways 27L/R to the east departure gate. Departure headings were changed from the current 240° and 255° off of Runways 27L/R to 190°. Approximately

2,580 persons represented by 65 census blocks are expected to experience an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.



PM-06PHL-E (Exhibit 19): This region is located southwest of the Airport and is approximately six square miles in area. Bridgeport, NJ is the main community within this region at the interchange of US-130 and US-322. The region extends west approximately three miles to Nortonville, NJ and north nearly two miles to the Delaware River. These potential reductions in noise are caused by the new departure headings off of Runways 27L/R to the south and east gates. Departure headings were changed from the current 240° and 255° headings to 230° and 250° for the south gate and 190° for the east gate. Approximately 507 persons represented by 22 census blocks are expected to experience a reduction in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

PM-11PHL-A (Exhibit 20): This region is located west and north of the Airport, and is approximately 20 square miles in area. The region includes the area from the Airport to slightly north of Baltimore Avenue, and slightly west of SR-452. Communities within this region include Essington, Crum Lynne, Woodlyn, Wallingford, Swarthmore, Rose Valley, and Parkside.

These potential increases in noise are caused by the new departure headings off of Runways 27L/R to the north and west gates. Departure headings were changed from the current 240° and 255° to 330° for the north gate and 290° and 270° for the west gate. Approximately 240 persons represented by six population census blocks are expected to experience an increase in noise of greater than or equal to 1.5 DNL above the 65 DNL. Similarly, approximately 3,160 persons represented by 61 census blocks are expected to experience an increase in noise of greater than or equal to 3.0 DNL between 60 and 65 DNL and 68,918 persons represented by 960 census blocks are expected to experience an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

PM-11PHL-B (Exhibit 20): This region is located north and slightly east of the Airport, and is approximately two square miles in area. The region mainly runs along I-76 bordering the west edge of South Philadelphia. The southern edge of the region is near Pattison Avenue, and the northern edge is near Washington Avenue. These potential increases in noise are caused by the new departure headings off of Runways 9L/R to the north and west gates. Departure headings were changed from the current 085° heading to 070° for the north gate and 030° and 050° for the west gate. Approximately 4,360 persons represented by 50 census blocks are expected to experience an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

PM-11PHL-C (Exhibit 20): This region is located south of the Airport and is approximately six square miles in area. The region is approximately two miles wide, containing the majority of Gibbstown, NJ north of I-295 and extending about two miles south of I-295. These potential increases in noise are primarily caused by the new departure headings off of runways 27L/R to the east departure gate. Departure headings were changed from the current 240° and 255° headings to 190° for the east departure gate. Approximately 2,870 persons represented by 65 census blocks are expected to experience an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

PM-11PHL-D (Exhibit 20): This region is located southwest of the Airport and is approximately six square miles in area. The region extends west approximately three miles to Nortonville, NJ and north nearly two miles to the Delaware River. Bridgeport, NJ is the main community within this region and is located at the interchange of US-130 and US-322. These potential reductions in noise are caused by the new departure headings off of Runways 27L/R to the south and east gates. Departure headings were changed from the current 240° and 255° headings to 230° and 250° for the south gate and 190° for the east gate. Approximately 152 persons represented by nine census blocks are expected to experience a reduction in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL..

4.4 Ocean Routing Alternative

The Ocean Routing Airspace Alternative is a proposal that was originally developed by the NJ Citizens for Environmental Research, Inc. (NJCER) at the request of the NJ Coalition Against Aircraft Noise (NJCAAN). This alternative sends all EWR departing flights over the Raritan Bay to the Atlantic Ocean before turning them back over land to head to their departure gates. This section presents the results for the Ocean Routing Alternative for the years 2006 and 2011.

4.4.1 Ocean Routing Alternative Noise Model Input

The NIRS modeling for the future Ocean Routing Alternative is directly based on the future No Action Alternative noise modeling input. Only the elements of the alternative design that are expected to be different from the No Action procedures or design were modified for the NIRS modeling.

As with the No Action analysis, noise modeling was developed for IFR overflights and the projected IFR flight plan operations at the 21 airports and overflights identified as part of the study. The runways, local environmental variables, operations levels, and fleet mix used for the No Action modeling were also used in the future Ocean Routing Alternative modeling. In general, the runway use proportions modeled at each airport for the No Action conditions were held constant for this alternative noise modeling. Similarly, the day-night split proportions from the No Action modeling were also used for this alternative analysis except for the traffic at EWR. The operational simulation (TAAM) analysis indicated that this alternative created extensive departure delays at EWR in the late evening hours. Consequently, some 15 to 19 (depending on year) late evening departures were pushed into the nighttime hours for noise modeling. No changes were mad from the No Action conditions at other airports.

The majority of the modeled flight tracks and dispersion for the No Action modeling was also held constant for the Ocean Routing Alternative modeling input. Only the flight tracks associated with the design element of the alternative were adjusted to represent those known changes for the alternative. The following points summarize the noise model changes made to the No Action input data in order to model the alternative.

- EWR and JFK departures rerouted over ocean per NJCER design.
- LGA Departures climb to specified altitude before crossing the Hudson River per NJCER design
- LGA south arrivals increase altitude over Raritan Bay.
- JFK south arrivals shifted to east. North and western arrivals stay north of JFK and are routed further east.

Each of these items represents a group of flight track adjustments that were required in order to model the alternative design. Only those No Action tracks that were affected by the design changes were moved. These movements generally only involved portions of the route within the study area as dictated by the design. Flight tracks dispersion was only modified where route changes would likely have an effect on dispersion patterns.

A series of graphics illustrating the NIRS backbone track changes associated with this alternative are presented in **Section 2** of **Attachment C** to this appendix. The graphics only show the backbone tracks that were changed for noise modeling the alternative. Both the No Action backbones and the resulting alternative backbones are color coded in the illustrations. Only those tracks that were changed are shown. Similarly, in order to assist in the clarity of the diagram, the sub-tracks associated with the changed backbone tracks are generally not shown. In some cases annotations are included to clarify concepts.

Chapter 2 of the EIS document provides a moderately detailed discussion of the design changes associated with this alternative and further detail is provided in the operational modeling report in **Appendix C** of the EIS.

4.4.2 Ocean Routing Alternative Noise Impact Results

The route and procedural changes associated with the Ocean Routing Airspace Alternative would result in the population likely to be exposed to 65 DNL and greater decreasing to some 68,660 persons in 2006, or some 4.8 percent as compared to the Future No Action Airspace Alternative. Similarly, by 2011, the alternative would reduce the expected number of persons within the 65 DNL noise level from 75,459 in Future No Action Airspace Alternative to 72,929 with the Ocean Routing Airspace Alternative.

The number of persons that would be exposed to 60-65 DNL is expected to increase from 213,692 persons with No Action to 213,783 persons with the Ocean Routing Airspace Alternative in 2006. A similar shift is expected in 2011. The number of persons exposed to 60-65 DNL is expected to increase from 209,793 with the Future No Action Airspace Alternative to 214,487 persons with the Ocean Routing Airspace Alternative.

This alternative would result in a 2.4 percent decrease in the number of persons expected to be exposed to noise levels between 45 and 60 DNL in 2006 to approximately 11.5 million persons. Similarly, in 2011 the alternative would decrease the estimated persons exposed to aircraft noise between 45 and 60 DNL by about two percent to approximately 11.4 million persons.

Table 13 presents a summary of the population exposed to noise levels for the Ocean Routing Alternative e as compared to the No Action scenario for both future years. The table highlights the areas where the alternative caused increases in population exposure for the specific DNL ranges as well as the decreases.

In order to determine the significance of the changes in noise exposure associated with the Ocean Routing Alternative, an analysis of the changes relative to FAA's noise impact criteria was done. **Exhibits 21 and 22** present a map of the Ocean Routing Alternative noise changes at the population census blocks for both 2006 and 2011, respectively. Only the non-zero population census blocks are shown where the noise exposure changed in such a way that it met the noise threshold criteria discussed in the previous section. Both increases and decreases in noise levels meeting the criteria are shown. The census blocks are color coded to identify the criterion that they meet and whether the noise increased or decreased.

Table 13
Potential Population Exposure & Change - Ocean Routing Airspace Alternative

2006				
Scenario DNL Range>	**45-60**	**60-65**	**65 +**	**Total 45+**
No Action	11,774,446	213,692	72,141	12,060,279
Alternative	11,493,555	213,783	68,660	11,775,998
Difference	*-280,891*	*91*	*-3,481*	*-284,281*
2011				
No Action	11,688,798	209,793	75,459	11,974,050
Alternative	11,446,984	214,487	72,929	11,734,400
Difference	*-241,814*	*4,694*	*-2,530*	*-239,650*

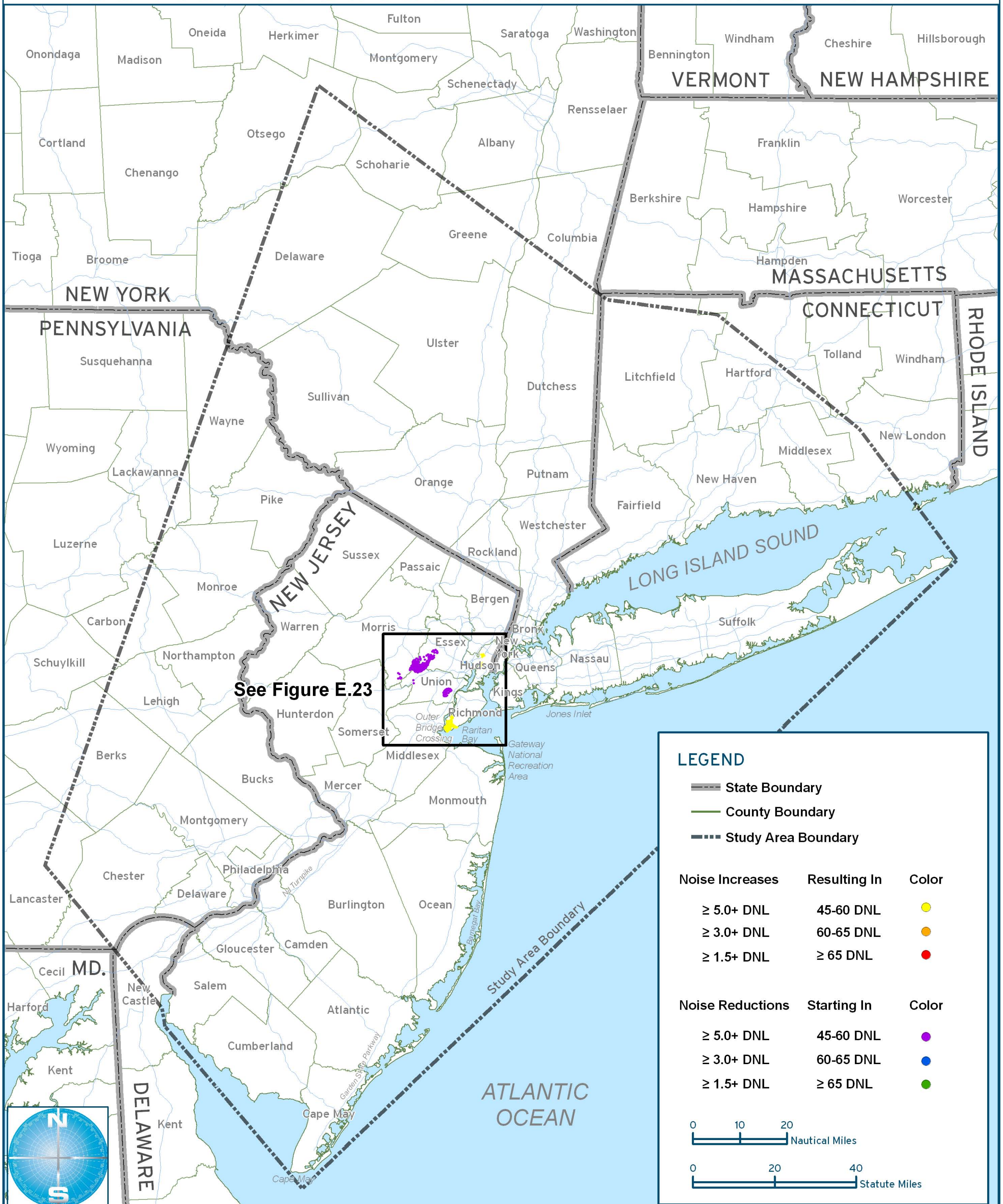
Source: NIRS Analysis, Landrum & Brown/Metron Aviation, Inc. 2007.

As the exhibits indicate, the changes associated with this alternative are generally clustered around EWR. There were no other changes meeting the FAA criterion found near any of the other airports modeled in the analysis.

2006 Ocean Routing Airspace Alternative
Change In Noise Exposure

Exhibit E.21

ENVIRONMENTAL IMPACT STATEMENT



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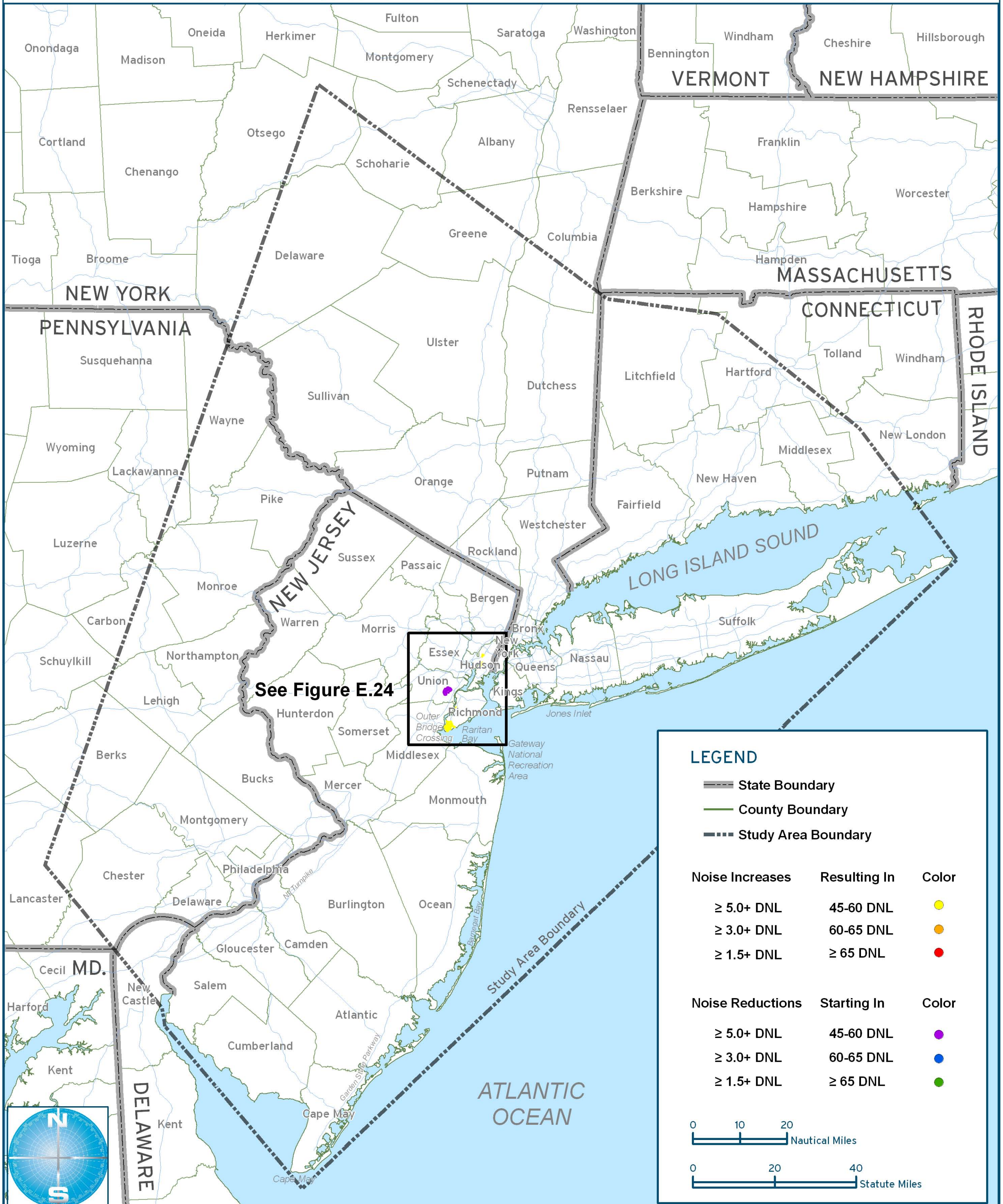
2011 Ocean Routing Airspace Alternative Change In Noise Exposure

Exhibit E.22

ENVIRONMENTAL IMPACT STATEMENT



The color coding of the census blocks reveals that there are both increases and decreases in noise in both future years resulting from the alternative design. **Table 14** presents a summary for the estimated change in population exposed to aircraft noise levels that meet the FAA criteria resulting from the Ocean Routing Alternative airspace design. The cells in the table are color coded similar to the scheme used on the exhibits so that specific numbers of persons can be related to the maps of the noise change.

Based on the NIRS analysis, it is estimated that the Ocean Routing Airspace Alternative will not provide a noise reduction or increase of 1.5 DNL or more in areas exposed to 65 DNL or more. While this alternative does provide Slight to Moderate impact relief at lower noise levels, there are also increases created too.. In the 60 to 65 DNL range it is expected that some 675 persons would experience a decrease in noise levels of 3.0 DNL or more in 2006. These benefits are expected to decrease to zero by 2011.

Table 14
Ocean Routing Airspace Alternative Population Impact Change Analysis Summary

	DNL Noise Exposure With Alternative		
	65 DNL or higher	60 to 65 DNL	45 to 60 DNL
Minimum Change in DNL With Alternative	1.5 DNL	3.0 DNL	5.0 DNL
Level of Impact	Significant	Slight to Moderate	Slight to Moderate
Noise Increases			
2006	0	0	26,498
2011	0	0	18,748
Noise Decreases			
2006	0	675	51,108
2011	0	0	17,525

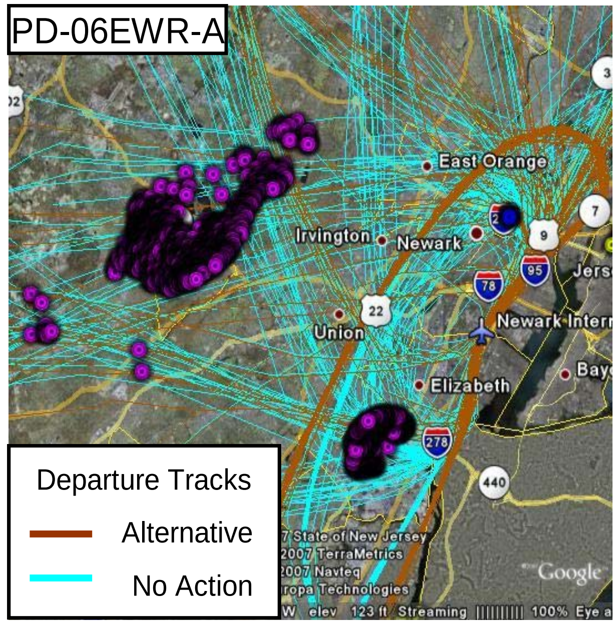
Source: NIRS Analysis, Landrum & Brown/Metron Aviation Inc. 2007.

At the lowest noise levels (45 to 60 DNL) where Slight to Moderate (±5.0 DNL) impacts are identified, the Ocean Routing Airspace Alternative is expected to result in noise increases for 26,498 persons in 2006. This impact is expected to decrease slightly in 2011 to 18,748 persons. There is also a potential reduction in noise exposure at these lower noise levels with this alternative. Approximately 51,000 persons are estimated to experience a 5.0 DNL reduction in noise levels between 45 and 60 DNL in 2006. By 2011, the noise reduction at these levels is expected to be reduced to approximately 17,525 persons.

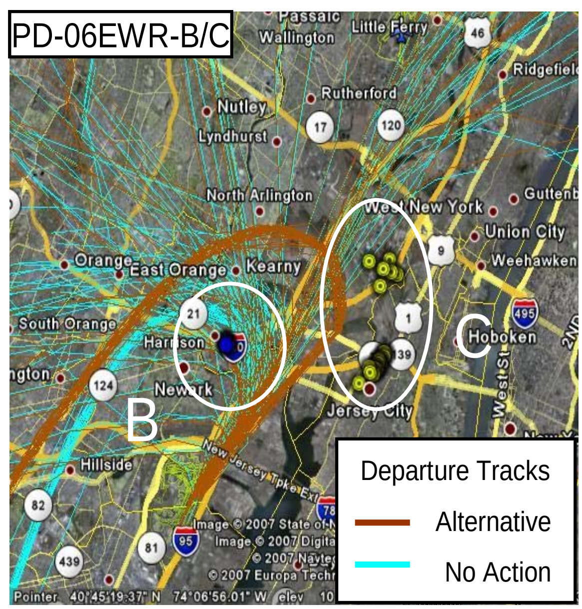
In order to provide a better understanding of the noise impacts resulting from this change analysis the areas of change within the study area were divided into small zones of change for discussion purposes. These zones are generally associated with a specific airport and are identified with a unique code name. The following paragraphs discuss change in noise exposure associated with this alternative in terms of these change zones. Exhibits are provided with enlarged views of the various change zones along with the name of each zone. The change in noise impact is discussed for each zone along with the cause for the noise changes in the zone. Where applicable, inset diagrams are included to illustrate the flight rout changes that were primarily responsible for the changes in the zone of interest.

Exhibits 23 and 24 present an enlarged view of the noise changes at the population census blocks and change zones associated with the alternative for 2006 and 2011, respectively. Each change zone shown on the exhibits is discussed in the following paragraphs.

PD-06EWR-A (Exhibit 23): The estimated reductions in noise occur over three areas: east of the Garden State Parkway and over the village of Linden, NJ and then further west to Chatham and Summit NJ. These changes are caused primarily by the new departure routes off of Runways 22L/R. These routes have changed from turning directly to the west, north, northeast, or northwest to following the Ocean Routing procedure to the south and east over the ocean. As a result 51,108 persons represented by 684 census blocks are expected to experience a reduction in noise of greater than or equal to 5.0 DNL between 45 to 60 DNL.



PD-06EWR-B (Exhibit 23): The estimated reductions in noise occurring north of EWR and over the village of Harrison, NJ are caused by strict adherence to the departure procedure for Runways 4L/R included in the Ocean Routing Airspace Alternative. This procedure requires aircraft fly four NM before turning toward their departure fix. At that point, the new departure routes off of Runways 4L/R would turn west and then south to the Raritan Bay. As a result 675 persons represented by 5 census blocks are expected to experience a decrease in noise of greater than or equal to 3.0 DNL between 60 and 65 DNL.



PD-06EWR-C (Exhibit 23): The estimated increases in noise occurring northeast of EWR and over the village of Jersey City, NJ are caused by strict adherence to the departure procedure for Runways 4L/R included in the Ocean Routing Airspace Alternative. This procedure requires aircraft to fly four NM before turning to their departure fix. At that point, the new departure routes off of Runways 4L/R would turn west and then south to the Raritan Bay. As a result, 5,399 persons represented by 20

2006 Ocean Routing Airspace Alternative Change In Noise Exposure - NY/NJ Metropolitan Area

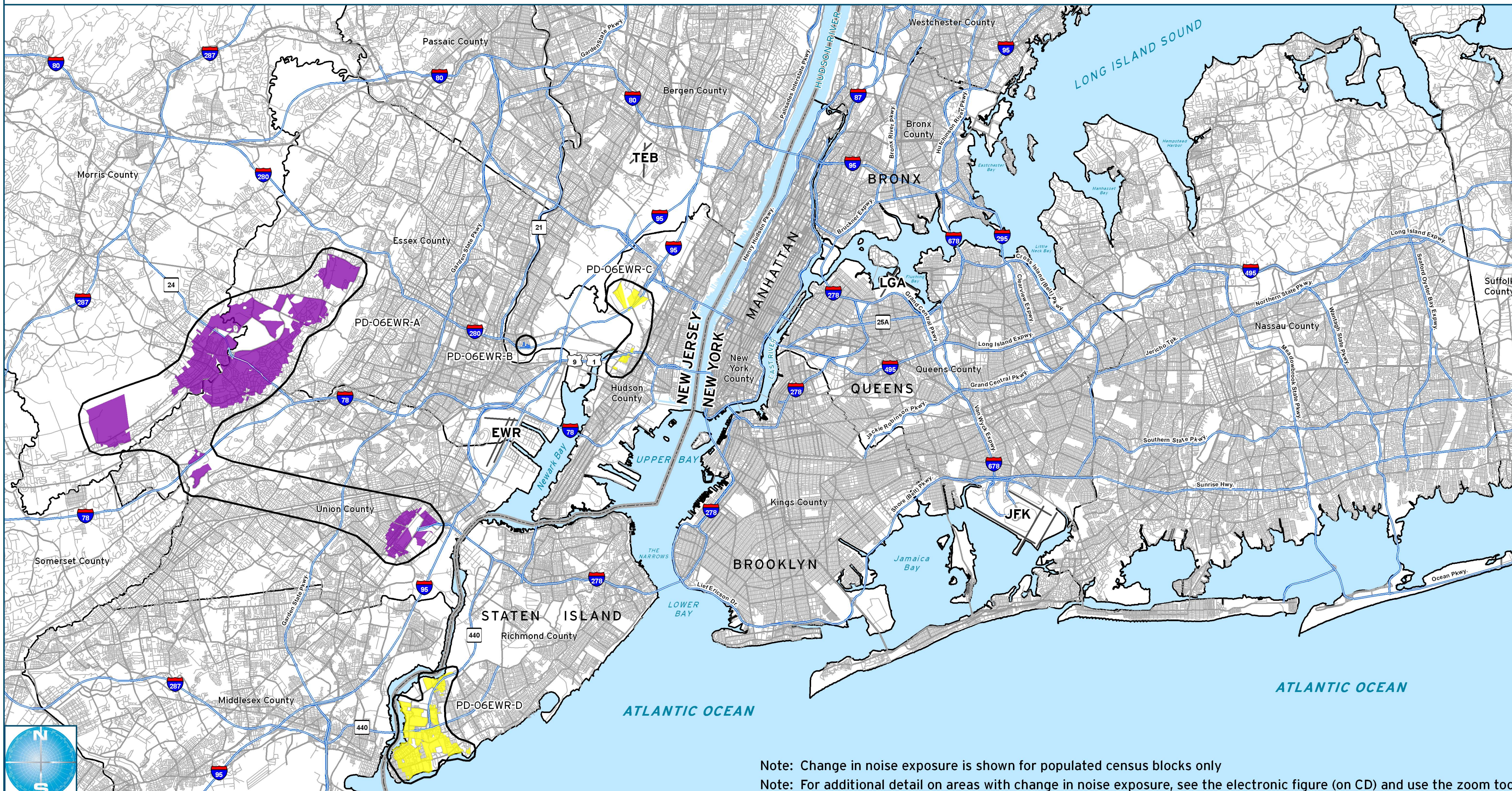
Exhibit E.23

ENVIRONMENTAL IMPACT STATEMENT

LEGEND

	Noise Increases	Resulting In	Color	Significant Noise Increases	Resulting In	Color	Noise Reductions	Starting In	Color	Noise Reductions	Starting In	Color
State Boundary (grey dashed line)	≥ 5.0+ DNL	45-60 DNL	Yellow	≥ 1.5+ DNL	≥ 65 DNL	Red	≥ 5.0+ DNL	45-60 DNL	Purple	≥ 1.5+ DNL	≥ 65 DNL	Green
County Boundary (black line)	≥ 3.0+ DNL	60-65 DNL	Orange				≥ 3.0+ DNL	60-65 DNL	Blue			

Scale: 0 1 2 Statute Miles; 0 1 2 Nautical Miles



Note: Change in noise exposure is shown for populated census blocks only

Note: For additional detail on areas with change in noise exposure, see the electronic figure (on CD) and use the zoom tool

2011 Ocean Routing Airspace Alternative Change In Noise Exposure - NY/NJ Metropolitan Area

Exhibit E.24

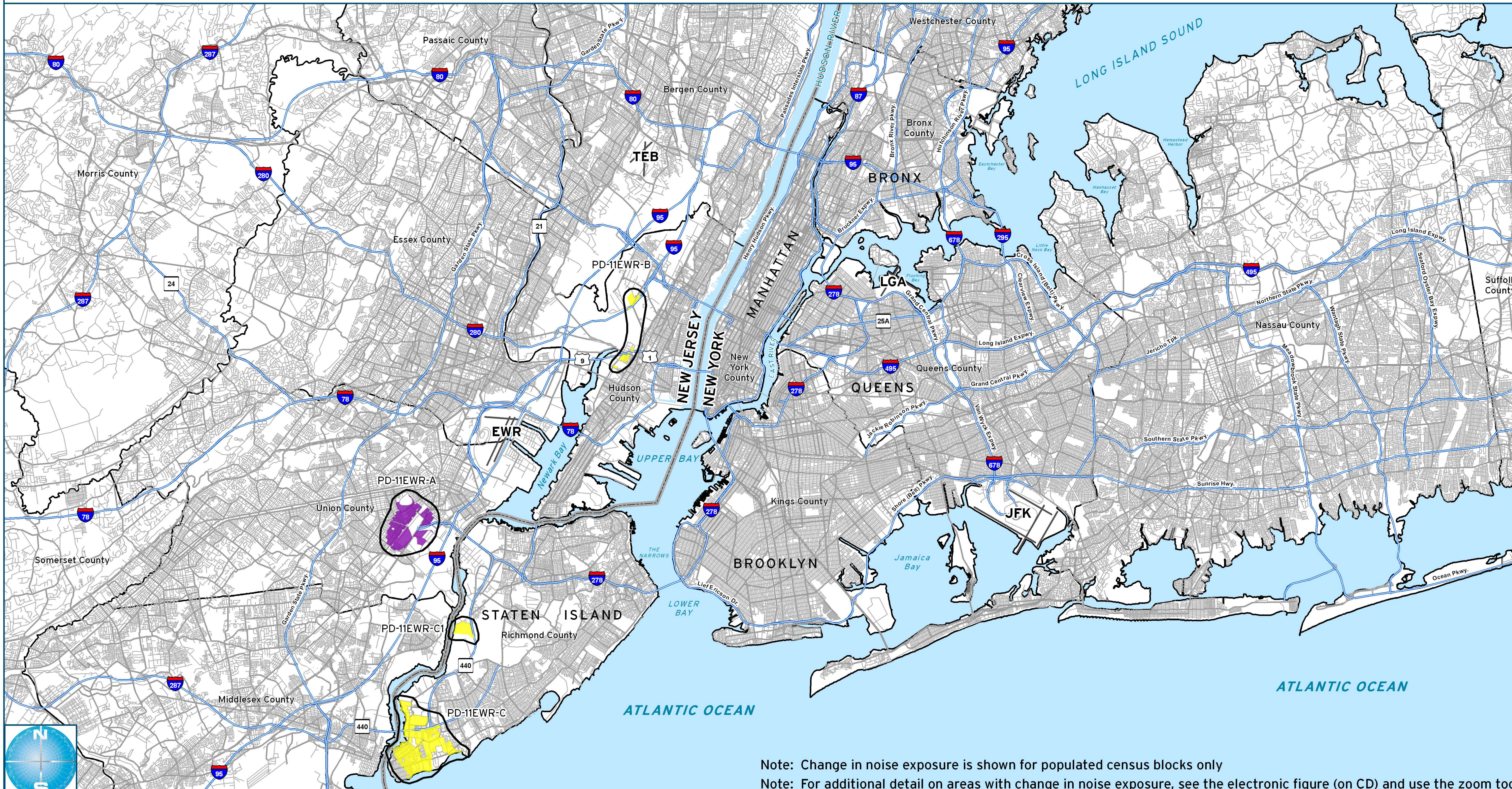
ENVIRONMENTAL IMPACT STATEMENT

LEGEND

State Boundary
County Boundary

Noise Increases	Resulting In	Color	Significant Noise Increases	Resulting In	Color	Noise Reductions	Starting In	Color	Noise Reductions	Starting In	Color
≥ 5.0+ DNL	45-60 DNL	Yellow	≥ 1.5+ DNL	≥ 65 DNL	Red	≥ 5.0+ DNL	45-60 DNL	Purple	≥ 1.5+ DNL	≥ 65 DNL	Green
≥ 3.0+ DNL	60-65 DNL	Orange				≥ 3.0+ DNL	60-65 DNL	Blue			

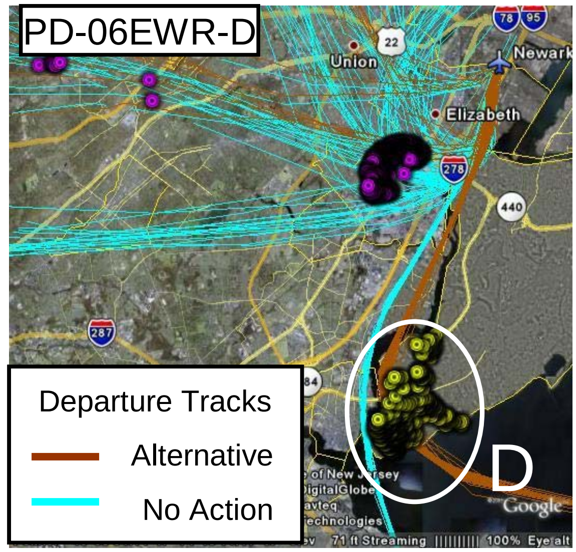
0 1 2 Statute Miles
0 1 2 Nautical Miles



Note: Change in noise exposure is shown for populated census blocks only

Note: For additional detail on areas with change in noise exposure, see the electronic figure (on CD) and use the zoom tool

census blocks are expected to experience increases in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.



PD-06EWR-D (Exhibit 23): The estimated increases in noise occurring south of EWR and over southern tip of Staten Island in the towns of Tottenville, NY and Richmond Valley, NY are caused by the new departure routes off of Runways 22L/R. These routes would change from turning directly west to following the Ocean Routing procedure to the south and east over the ocean. Departures off of these runways will be held down at 6,000 feet to allow LGA arrivals to fly direct to LGA from the south. As a result, 21,099 persons represented by 194 census blocks are expected to receive an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

PD-11EWR-A (Exhibit 24): The estimated reductions in noise occurring west of Interstate 95 and over the village of Linden, NJ are caused primarily by the new departure routes off of Runways 22L/R that would change from turning directly to the west, north, northeast, and northwest. These routes would follow the current procedure off the runway, fly south to the Raritan Bay and then east over the ocean. As a result, 17,525 persons represented by 224 census blocks are expected to experience a decrease in noise of greater than or equal to 5.0 DNL between 45 to 60 DNL.

PD-11EWR-B (Exhibit 24): The estimated increases in noise occurring northeast of EWR and between Interstate 95 and the village of Jersey City, NJ are caused by strict adherence to the departure procedure for Runways 4L/R. In the procedure aircraft are required to go four NM before turning toward their departure fix. At that point, the new departure routes off of Runways 4L/R would turn west and then south to the Raritan Bay. As a result, 4,243 persons represented by 17 census blocks are expected to experience increases in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

PD-11EWR-C (Exhibit 24): The estimated increases in noise occurring south of EWR and over Staten Island in the towns of Tottenville, NY and Richmond Valley, NY are caused by the new departure routes off of Runways 22L/R. These routes changed from turning directly west to go further south to the Raritan Bay and then east over the ocean. Departures off of these Runways will be held down at 6,000 feet to allow LGA arrivals to fly direct to LGA from the south. As a result, 14,498 persons represented by 129 census blocks are expected to experience an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

PD-11EWR-C-1 (Exhibit 24): The estimated increases in noise occurring south of EWR and over Staten Island near the town of Travis, NY is caused by the new departure routes off of Runways 22L/R. These routes changed from turning directly west to go further south to the Raritan Bay and then east over the ocean. As a result, 7 persons represented by one census block is expected to experience an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

4.5 Integrated without ICC Alternative

The Integrated Airspace Alternative integrates the NY terminal airspace with portions of surrounding Centers' airspace to operate more seamlessly in either a standalone or consolidated manner. The initial phase involves modifications to a departure gate, as well as close-in departure procedures. This phase is called the Integrated Airspace Alternative without Integrated Control Complex (ICC). The final phase will have two variations. The first variation maintains the same changes that were implemented in phase one, supporting future traffic growth. This, again, is called the Integrated Airspace Alternative without ICC because the airspace structure does not change from phase one. The second variation involves full airspace consolidation as previously described, as well as modifications to multiple departure gates, additional arrival posts, and additional close-in departure procedures. The second variation will be called the Integrated Airspace Alternative with ICC. This section presents the results for the Integrated without ICC Alternative for the years 2006 and 2011.

4.5.1 Integrated without ICC Alternative Noise Model Input

The NIRS modeling for the future Integrated without ICC Alternative is directly based on the Future No Action Alternative noise modeling input. Only the elements of the alternative design that are expected to be different from the No Action procedures or design were modified for the NIRS modeling.

As with the No Action analysis, noise modeling was developed for IFR overflights and the projected IFR flight plan operations at the 21 airports identified and the overflights as part of the study. The runways, local environmental variables, operations levels, and fleet mix used for the No Action modeling were also used in the future Integrated without ICC Alternative modeling. In general the runway use proportions modeled at each airport for the No Action conditions were held constant for this alternative noise modeling. Similarly, the day-night split proportions from the No Action modeling were also used for this alternative analysis except for the traffic at PHL. The operational simulation (TAAM) analysis indicated that this alternative provided enough delay reduction at PHL to allow some of the scheduled daytime departures that had been pushed into the nighttime hours in the No Action condition to be moved back to daytime operations.

The majority of the modeled flight tracks and dispersion for the No Action modeling was also held constant for the Integrated without ICC Alternative modeling input. Only the flight tracks associated with the design element of the alternative were adjusted to represent those known changes for the alternative. The following points summarize the noise model changes made to the No Action input data in order to model the alternative.

- West departure gate shifted and expanded – Added a jet airway (all airports)

- ✈ Close-in departure procedures changed i.e. headings added (LGA, EWR, PHL)
- ✈ South departure route added (ISP only)
- ✈ HPN Arrivals from the south turn closer to airport (HPN only)

Each of these items represents a group of flight track adjustments that were required in order to model the alternative design. Only those No Action tracks that were affected by the design changes were moved. These movements generally only involved portions of the route within the study area as dictated by the design. Flight tracks dispersion was only modified where route changes would likely have an effect on dispersion patterns.

A series of graphics illustrating the NIRS backbone track changes associated with this alternative are presented in **Section 3** of **Attachment C** to this report. The graphics only show the backbone tracks that were changed for noise modeling the alternative. Both the No Action backbones and the resulting alternative backbones are color coded in the illustrations. Similarly, in order to assist in the clarity of the diagram, the sub-tracks associated with the changed backbone tracks are generally not shown. In some cases annotations are included to clarify concepts.

Chapter 2 of the EIS document provides a moderately detailed discussion of the design changes associated with this alternative and further detail is provided in the operational modeling report in **Appendix C** of the EIS.

4.5.2 Integrated without ICC Alternative Noise Impact Results

The route and procedural changes associated with the Integrated Airspace Alternative Variation without ICC would result in the population likely to be exposed to 65 DNL and greater increasing to approximately 78,860 persons in 2006, or 9.3 percent as compared to the Future No Action Airspace Alternative. On the other hand, by 2011 the alternative would reduce the expected number of persons within the 65 DNL noise level from 75,459 with the Future No Action Airspace Alternative to 72,600 with the Integrated Airspace Alternative Variation without ICC.

In the 60 to 65 DNL range the population is expected to increase from 213,692 persons with the Future No Action Airspace Alternative to 252,590 persons with the Integrated Airspace Alternative Variation without ICC in 2006. A similar shift is expected in 2011 with 209,793 persons in the Future No Action Airspace Alternative increasing to 249,537 persons with the Integrated Airspace Alternative Variation without ICC.

This variation would result in a very small percentage decrease in the number of persons expected to be exposed to noise levels between 45 and 60 DNL in 2006 from 11.77 million to approximately 11.76 million persons. Conversely, in 2011 this variation would increase the estimated persons exposed to aircraft noise between 45 and 60 DNL by about 1.5 percent from approximately 11.69 million to 11.86 million persons.

Table 15 presents a summary of the population exposed to noise levels for the Integrated without ICC Alternative as compared to the No Action scenario for both future years. The table highlights the areas where the alternative caused increases in population exposure for the specific DNL ranges as well as the decreases.

Table 15
Potential Population Exposure & Change - Integrated Airspace Alternative Variation without ICC

Scenario DNL Range>	**45-60**	**60-65**	**65 +**	**Total 45+**
2006				
No Action	11,774,446	213,692	72,141	12,060,279
Alternative	11,769,148	252,590	78,866	12,100,604
Difference	*-5,298*	*38,898*	*6,725*	*40,325*
2011				
No Action	11,688,798	209,793	75,459	11,974,050
Alternative	11,863,633	249,537	72,600	12,185,770
Difference	*174,835*	*39,744*	*-2,859*	*211,720*

Source: NIRS Analysis, Landrum & Brown/Metron Aviation, Inc. 2007.

In order to determine the significance of the changes in noise exposure associated with the Integrated without ICC Alternative, an analysis of the changes relative to FAA's noise impact criteria was done. **Exhibits 25 and 26** present a map of the Integrated without ICC Alternative noise changes at the population census blocks for both 2006 and 2011, respectively. Only the non-zero population census blocks are shown where the noise exposure changed in such a way that it met the noise threshold criteria discussed in the previous section. Both increases and decreases in noise levels meeting the criteria are shown. The census blocks are color coded to identify the criterion that they meet and whether the noise increased or decreased.

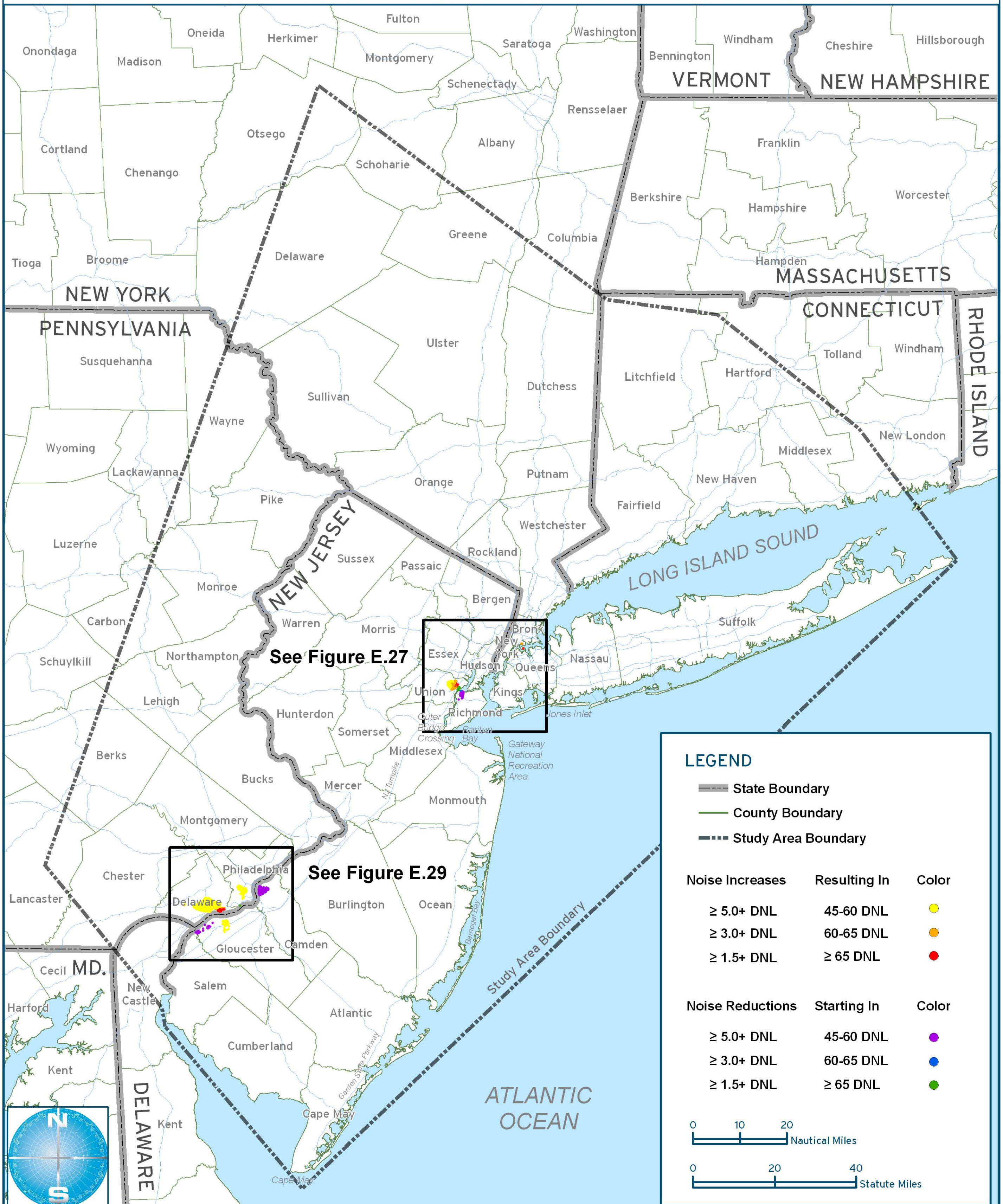
As the exhibits indicate, the changes associated with this alternative are generally clustered around EWR and PHL with a small amount of change evidenced near LGA. There were no other changes meeting the FAA criterion found near any of the other airports modeled in the analysis.

The color coding of the census blocks reveal that there are both increases and decreases in noise in both future years resulting from the alternative design. **Table 16** presents a summary for the estimated change in population exposed to aircraft noise levels that meet the FAA criteria resulting from the Integrated without ICC Alternative airspace design. The cells in the table are color coded similar to the scheme used on the exhibits so that specific numbers of persons can be related to the maps of the noise change.

2006 Integrated Airspace Alternative Variation Without ICC Change In Noise Exposure

Exhibit E.25

ENVIRONMENTAL IMPACT STATEMENT



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2011 Integrated Airspace Alternative Variation Without ICC
Change In Noise Exposure

Exhibit E.26

ENVIRONMENTAL IMPACT STATEMENT

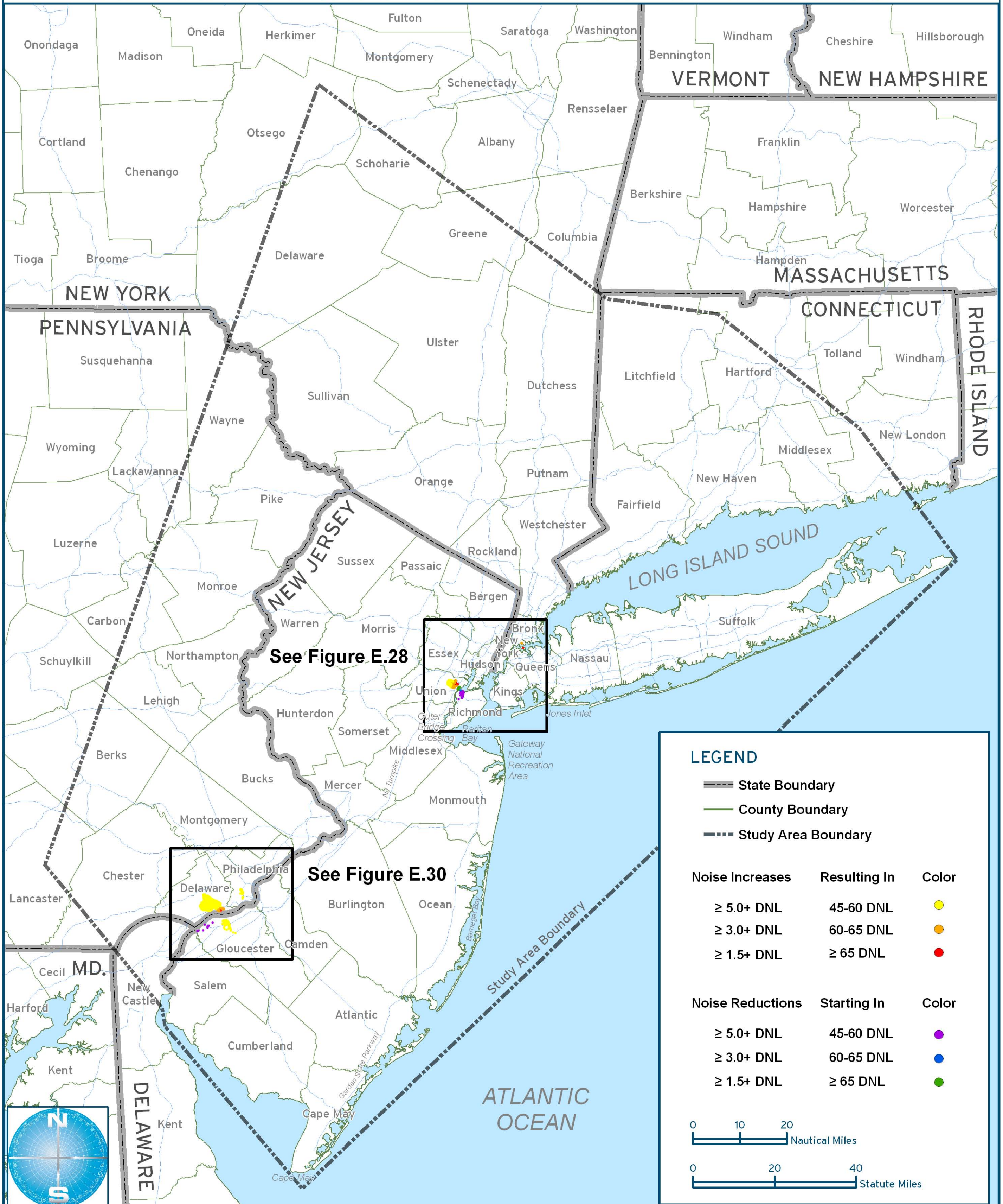


Table 16
Integrated Airspace Alternative Variation without ICC Population Impact Change Analysis Summary

	DNL Noise Exposure With Alternative		
	65 DNL or higher	60 to 65 DNL	45 to 60 DNL
Minimum Change in DNL With Alternative	1.5 DNL	3.0 DNL	5.0 DNL
Level of Impact	Significant	Slight to Moderate	Slight to Moderate
Noise Increases			
2006	21,399*	37,558	142,517
2011	13,856**	34,140	111,413
Noise Decreases			
2006	5,970	1	39,400
2011	5,094	22	9,895

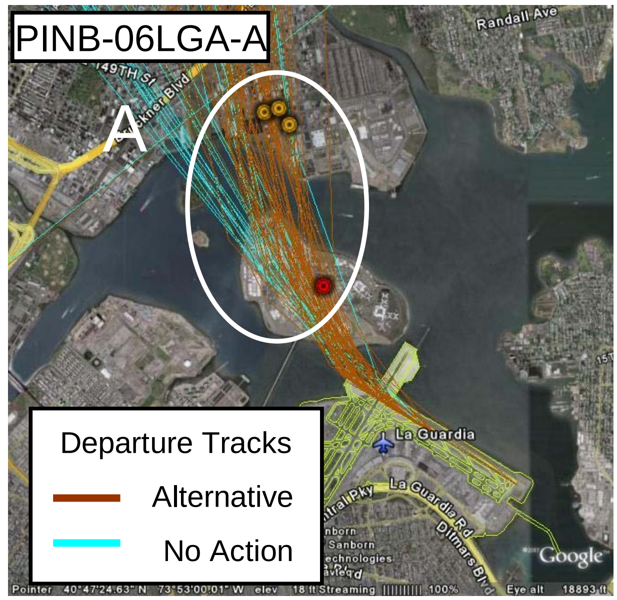
*Note that 12,834 persons of this total are transient population passing through the jail on Rikers Island.
**Note that 12,846 persons of this total are transient population passing through the jail on Rikers Island.
Source: NIRS Analysis, Landrum & Brown/Metron Aviation Inc. 2007.

Based on the NIRS analysis, it is estimated that 21,399 persons would be exposed to a significant (+1.5 DNL at 65 DNL or higher) change in noise in 2006 resulting from the implementation of the Integrated Airspace Alternative Variation without ICC. This number would decrease in 2011 to approximately 13,856 persons. This variation would, at the same time, provide a noise reduction of 1.5 DNL or more in some areas exposed to 65 DNL or higher. In 2006 this level of noise reduction would be experienced by 5,970 persons and would decrease in 2011 to just over 5,000 persons.

Slight to moderate impacts would also be evident at lower noise levels due to this variation. In the 60 to 65 DNL range it is expected that 37,558 persons would experience an increase in noise levels of 3.0 DNL or more in 2006. This number is expected to decrease slightly to 34,140 persons by 2011. There are very slight decreases of 3.0 DNL at noise levels of 60 to 65 DNL expected as a result of this variation in both 2006 and 2011. At the lowest noise levels (45 to 60 DNL) where Slight to Moderate (±5.0 DNL) impacts are identified, this variation is expected to result in noise increases for 142,517 persons in 2006. This impact is expected to be reduced in 2011 by approximately 22 percent to 111,413 persons. There is also a potential reduction in noise exposure at these lower noise levels with this variation. Approximately 39,4000 persons are estimated to experience a 5.0 DNL reduction in noise levels between 45 and 60 DNL in 2006. By 2011, the noise reduction at these levels is expected to be experienced by 9,895 persons.

Exhibits 27 and 28 present noise changes at the population census blocks and change zones associated with the alternative for LGA and EWR, for 2006 and 2011, respectively. Each change zone shown on the exhibits is discussed in the following paragraphs.

PINB-06LGA-A (Exhibit 27): This region is located north of LGA including Rikers Island and on a small portion of the Hunts Point region in Bronx, NY. The region in Hunts Point extends north about 0.5 miles onto shore ending approximately at Oak Point Ave. These potential increases in noise are primarily caused by the new departure headings off of Runway 31 to the north and west gates. Departure headings were changed from approximately 005° to 020° and 350° to 005°. Approximately 12,800 persons represented by one census block are expected to experience an increase in noise of greater than or equal to 1.5 DNL within the 65 DNL. It should be noted that this single red census block is located on Rikers Island and it represents the estimated jail inmate population. The nature of this facility is such that the population would be considered transient. Additionally, in the area north of LGA, approximately 25 persons represented by two census blocks are expected to experience an increase in noise of greater than or equal to 3.0 DNL between 60 and 65 DNL.



PINB-11LGA-A (Exhibit 28): This region is located north of LGA including Rikers Island, and on a small portion of the Hunts Point region in Bronx, NY. The region in Hunts Point extends north about 0.5 miles onto shore ending approximately at Oak Point Ave. These potential increases in noise are caused by the new departure headings off of Runway 31 to the north and west gates. Departures were changed from approximately heading 005° to 020° and heading 350° to 005°. Approximately 12,846 persons represented by one census block are expected to experience an increase in noise of 1.5 DNL within the 65 DNL. It should be noted that this single red census block is located on Rikers Island and represents the estimated prison inmate population. One person represented by one census block is expected to experience an increase in noise of greater than or equal to 3.0 DNL between 60 and 65 DNL.

PINB-06EWR-A (Exhibit 27): The estimated increases in noise occurring west of Interstate 95 and over the Elizabeth, NJ area are caused by the new departure headings off of Runways 22L/R. Departure headings to the north and east gates were changed from 190° to 260° and 240°. As a result of this change, 5,977 persons represented by 42 census blocks are expected to experience an increase in noise of greater than or equal to 1.5 DNL above 65 DNL. Additionally, 36,072 persons represented by 204 census blocks are expected to receive an increase in noise of greater than or equal to 3.0 DNL between 60 and 65 DNL,

2006 Integrated Airspace Alternative Variation Without ICC Change In Noise Exposure - NY/NJ Metropolitan Area

Exhibit E.27

ENVIRONMENTAL IMPACT STATEMENT

LEGEND

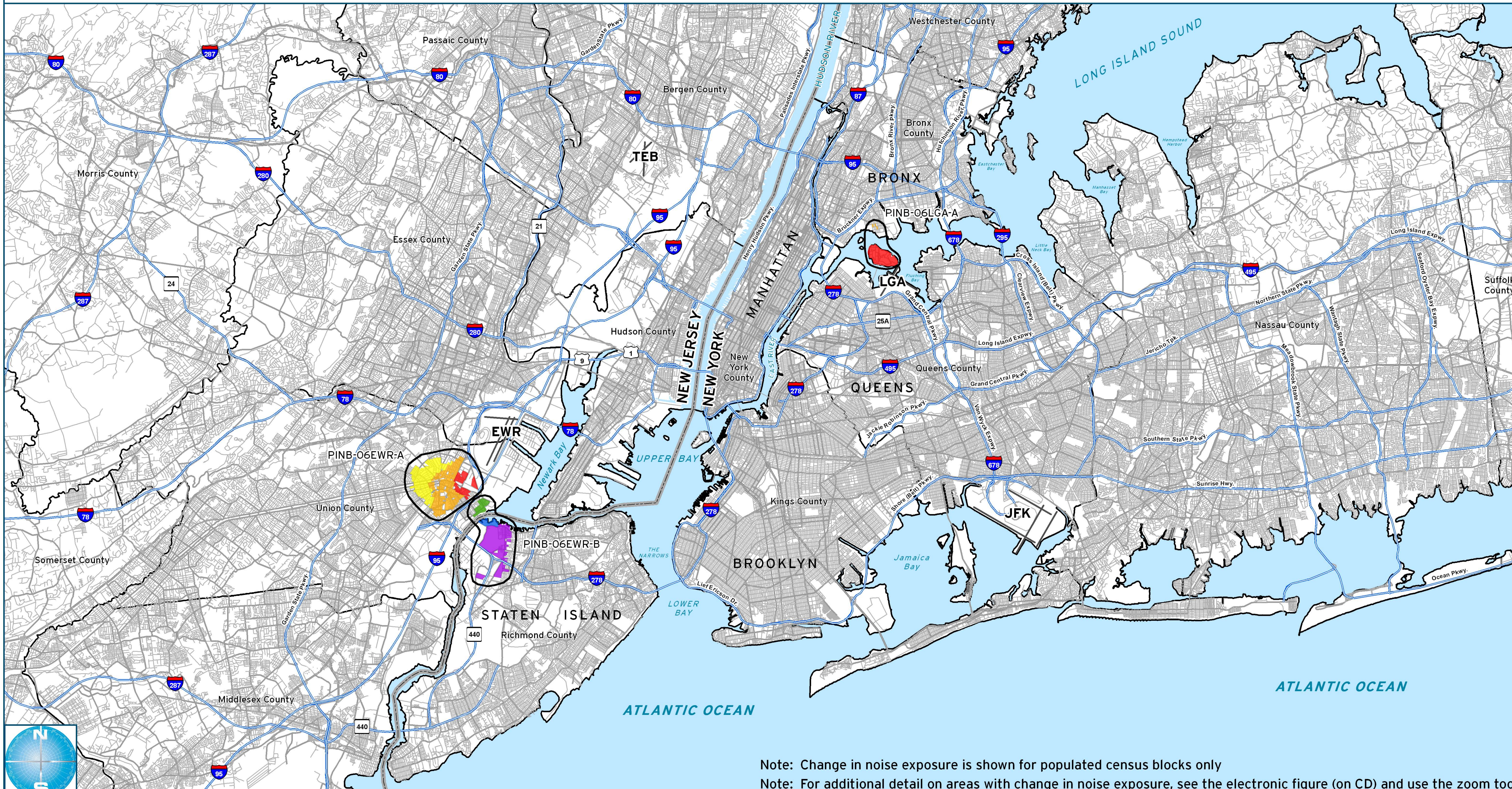
State Boundary

County Boundary

Noise Increases	Resulting In	Color	Significant Noise Increases	Resulting In	Color	Noise Reductions	Starting In	Color	Noise Reductions	Starting In	Color
≥ 5.0+ DNL	45-60 DNL	Yellow	≥ 1.5+ DNL	≥ 65 DNL	Red	≥ 5.0+ DNL	45-60 DNL	Purple	≥ 1.5+ DNL	≥ 65 DNL	Green
≥ 3.0+ DNL	60-65 DNL	Orange				≥ 3.0+ DNL	60-65 DNL	Blue			

0 1 2 Statute Miles

0 1 2 Nautical Miles



Note: Change in noise exposure is shown for populated census blocks only

Note: For additional detail on areas with change in noise exposure, see the electronic figure (on CD) and use the zoom tool

2011 Integrated Airspace Alternative Variation Without ICC Change In Noise Exposure - NY/NJ Metropolitan Area

Exhibit E.28

ENVIRONMENTAL IMPACT STATEMENT

LEGEND

State Boundary

County Boundary

Noise Increases	Resulting In	Color
≥ 5.0+ DNL	45-60 DNL	Yellow
≥ 3.0+ DNL	60-65 DNL	Orange

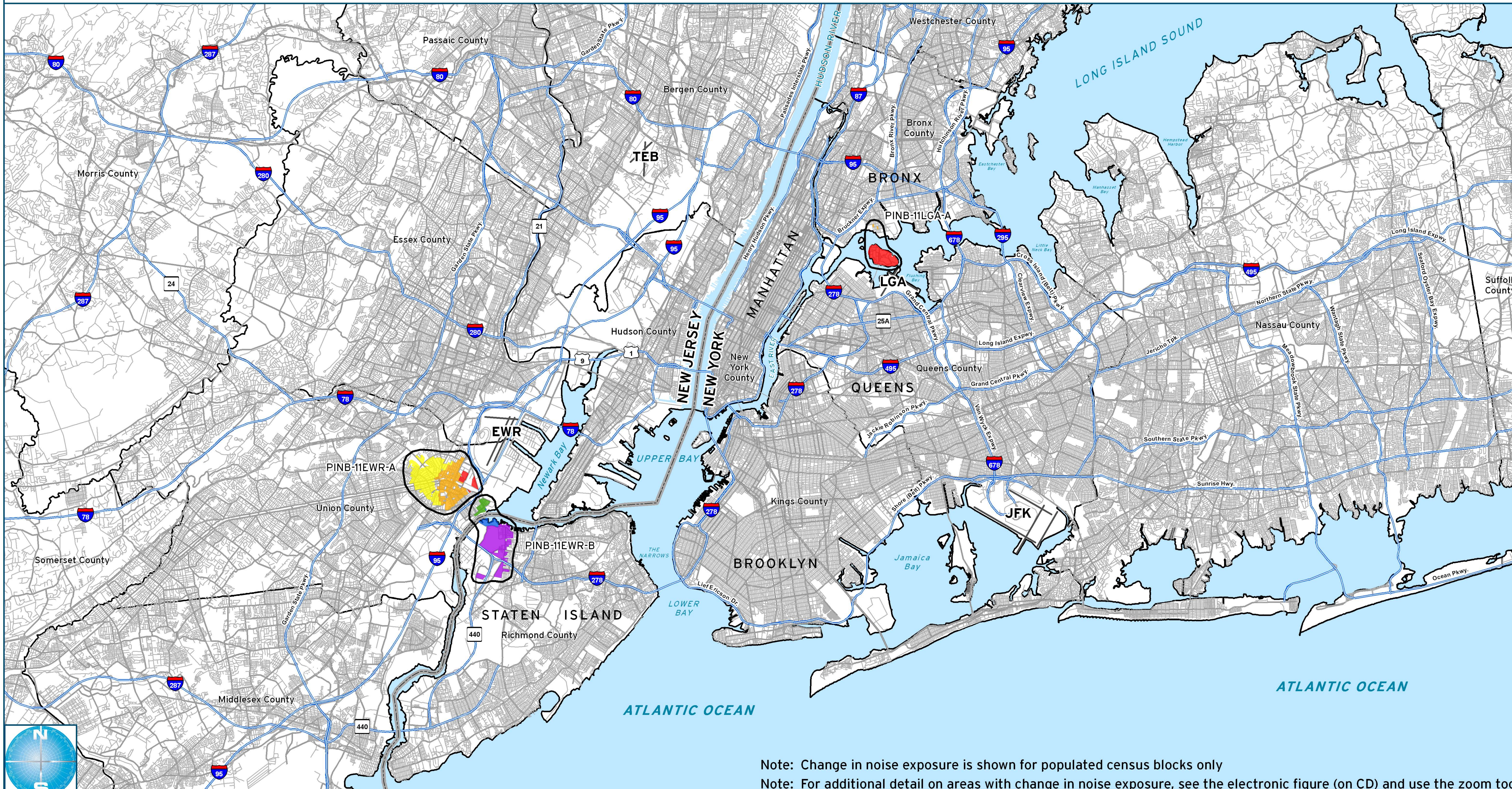
Significant Noise Increases	Resulting In	Color
≥ 1.5+ DNL	≥ 65 DNL	Red

Noise Reductions	Starting In	Color
≥ 5.0+ DNL	45-60 DNL	Purple
≥ 3.0+ DNL	60-65 DNL	Blue

Noise Reductions	Starting In	Color
≥ 1.5+ DNL	≥ 65 DNL	Green

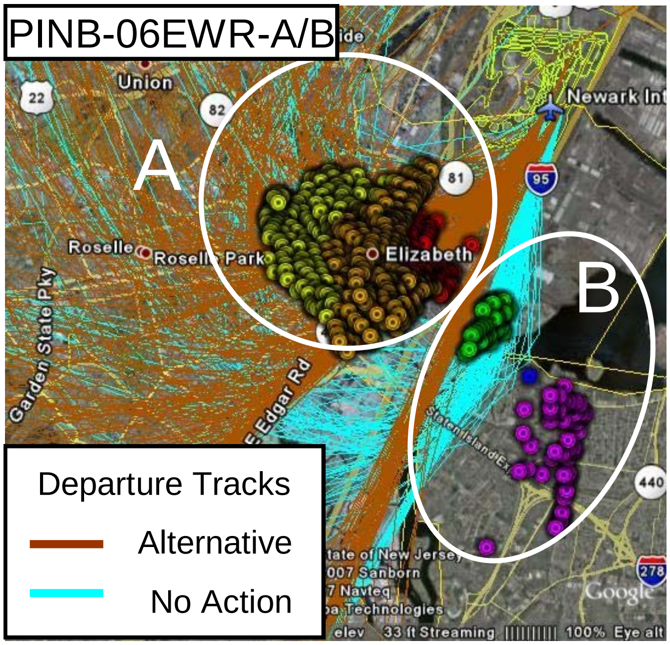
0 1 2 Statute Miles

0 1 2 Nautical Miles



Note: Change in noise exposure is shown for populated census blocks only

Note: For additional detail on areas with change in noise exposure, see the electronic figure (on CD) and use the zoom tool



and 29,380 persons represented by 133 census blocks are expected to receive an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

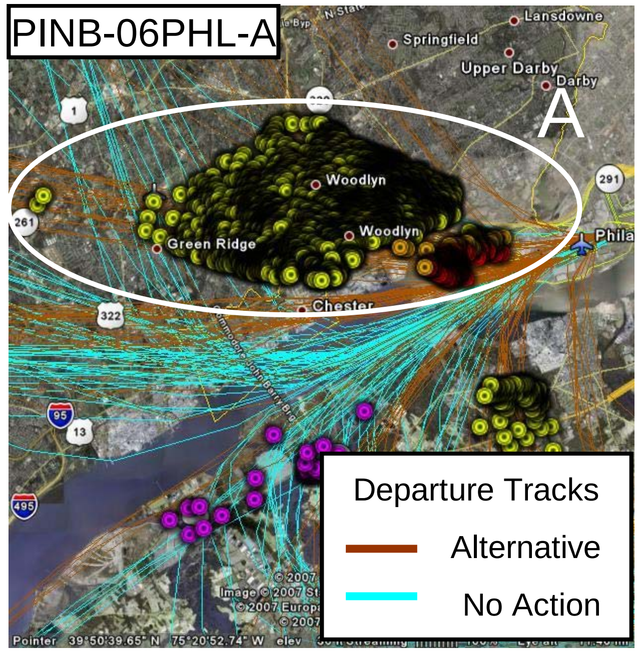
PINB-06EWR-B (Exhibit 27): The estimated reductions in noise occurring east of Interstate 95 over Elizabethport, NJ and Arlington, NY are caused by the new departure headings off of Runways 22L/R. The departure headings to the north and east gates were changed by moving a portion of the traffic from the 190° to 260° or 240° headings. Approximately 5,969 persons represented by 31 census blocks are expected to experience a decrease in noise of greater than or equal to 1.5 DNL within 65 DNL. Additionally, one person represented by one census block is expected to experience a decrease in noise of greater than or equal to 3.0 DNL between 60 and 65 DNL, and 8,622 persons represented by 43 census blocks are expected to experience a decrease in noise of greater than or equal to 5.0 DNL between 45 DNL and 60 DNL.

PINB-11EWR-A (Exhibit 28): The estimated increases in noise occurring west of Interstate 95 and over the Elizabeth. NJ area are caused by the new departure headings off of Runways 22L/R. Departure headings to the north and east gates were changed from 190° to 260° and 240°. As a result of this change, 768 persons represented by 8 census blocks are expected to experience an increase in noise of greater than or equal to 1.5 DNL above 65 DNL. Additionally, 30,975 persons represented by 186 census blocks are expected to experience an increase in noise of greater than or equal to 3.0 DNL between 60 and 65 DNL, and 34,521 persons represented by 148 census blocks are expected to experience an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

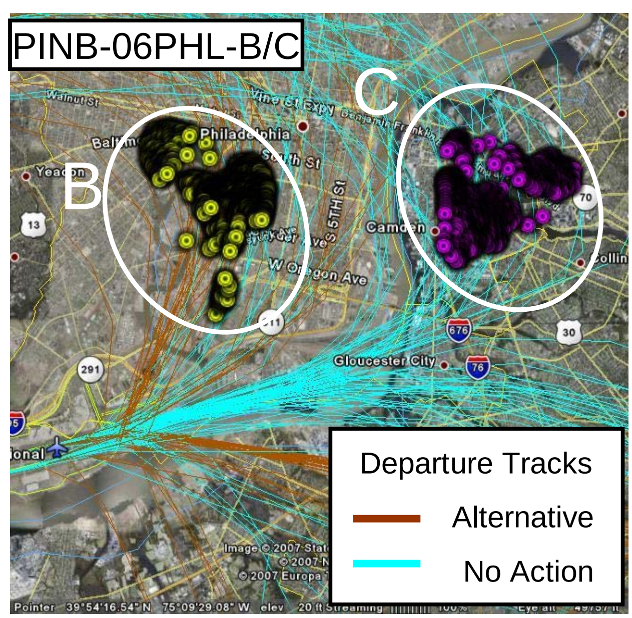
PINB-11EWR-B (Exhibit 28): The estimated reductions in noise occurring east of Interstate 95 over Elizabethport, NJ and Arlington, NY are caused by the new departure headings off of Runways 22L/R. The departure headings to the north and east gates were changed by moving a portion of the traffic from the 190° to 260° or 240° headings. Approximately 5,094 persons represented by 26 census blocks are expected to experience a decrease in noise of greater than or equal to 1.5 DNL within 65 DNL. Additionally, 22 persons represented by 2 census blocks are expected to experience a decrease in noise of greater than or equal to 3.0 DNL between 60 and 65, and 9,743 persons represented by 43 census blocks are expected to experience a decrease in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

Exhibits 29 and 30 present an enlarged view of the noise changes at the population census blocks and change zones associated with PHL for 2006 and 2011, respectively. Each change zone shown on the exhibits is discussed in the following paragraphs.

PINB-06PHL-A (Exhibit 29): This region is located west and north of the Airport, and is approximately 20 square miles in area. The region ranges from the Airport north nearly to Baltimore Avenue, and west nearly to SR-261 (Valleybrook Rd.). Communities within this region include: Essington, Crum Lynne, Woodlyn, Wallingford, Rose Valley, Parkside, Brookhaven and southeastern Chester Heights. These potential increases in noise are caused by the new departure headings off of Runways 27L/R to the north and west gates. Departure headings were changed from the current 240° and 255° to 330° for the north gate and 290° and 310° for the west gate. Approximately 2,600 persons represented by 54 census blocks are expected to experience an increase in noise of greater than or equal to 1.5 DNL within the 65 DNL. Additionally, approximately 1,460 persons represented by 29 census blocks are expected to experience an increase in noise of greater than or equal to 3.0 DNL between 60 and 65 DNL. Approximately 75,240 persons represented by 1,005 census blocks are expected to experience an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.



PINB-06PHL-B (Exhibit 29): This region is located north and slightly east of the Airport, and is approximately five square miles in area. The region includes portions of South Philadelphia and Central Philadelphia, the eastern edge of which is near 22nd Street, and the northern edge is near Walnut Street. Also, an area on the west side of the Schuylkill River is included in this region. The area is approximately bounded by Walnut Street to the north and 43rd Street to the west. The potential increases in noise are caused by the new departure headings off of Runways 9L/R to the north and west gates. Departure headings were changed from the current 085° heading to 070° for



2006 Integrated Airspace Alternative Variation Without ICC Change In Noise Exposure - PHL Metropolitan Area

Exhibit E.29

ENVIRONMENTAL IMPACT STATEMENT

LEGEND

State Boundary
County Boundary

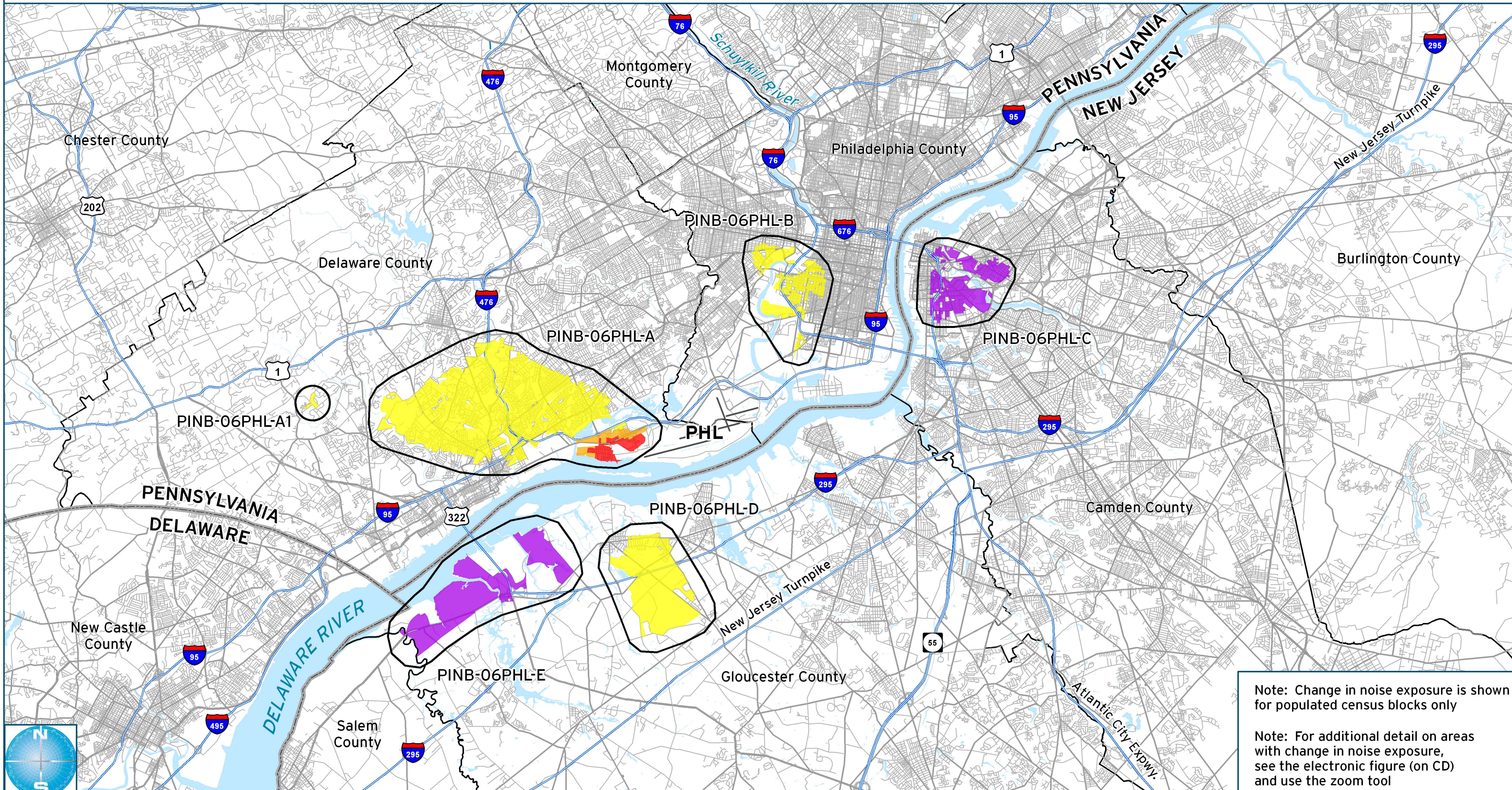
Noise Increases	Resulting In	Color
≥ 5.0+ DNL	45-60 DNL	Yellow
≥ 3.0+ DNL	60-65 DNL	Orange

Significant Noise Increases	Resulting In	Color
≥ 1.5+ DNL	≥ 65 DNL	Red

Noise Reductions	Starting In	Color
≥ 5.0+ DNL	45-60 DNL	Purple
≥ 3.0+ DNL	60-65 DNL	Blue

Noise Reductions	Starting In	Color
≥ 1.5+ DNL	≥ 65 DNL	Green

0 1 2 Statute Miles
0 1 2 Nautical Miles



Note: Change in noise exposure is shown for populated census blocks only

Note: For additional detail on areas with change in noise exposure, see the electronic figure (on CD) and use the zoom tool

2011 Integrated Airspace Alternative Variation Without ICC Change In Noise Exposure - PHL Metropolitan Area

Exhibit E.30

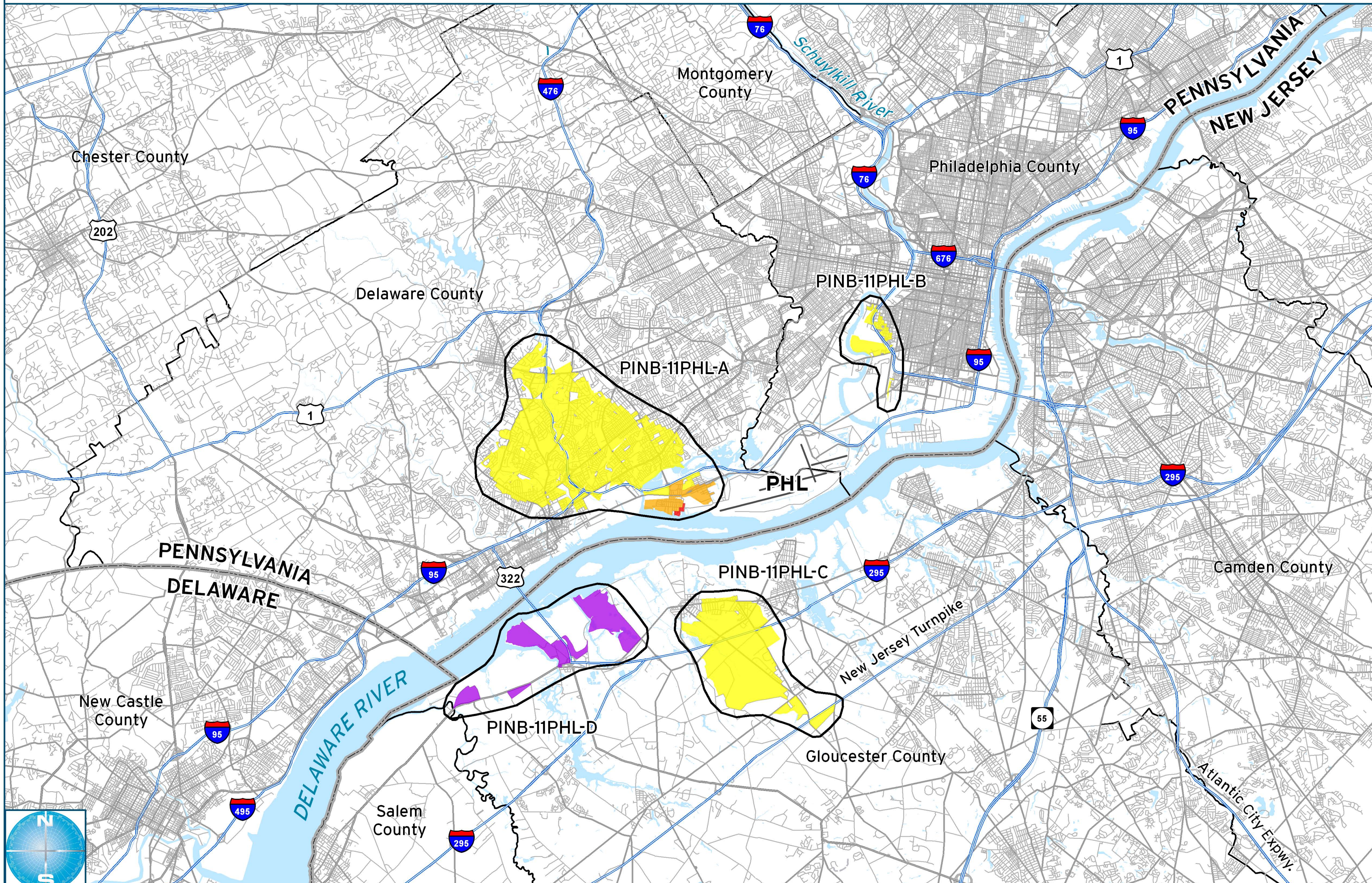
ENVIRONMENTAL IMPACT STATEMENT

LEGEND

State Boundary
County Boundary

Noise Increases	Resulting In	Color	Significant Noise Increases	Resulting In	Color	Noise Reductions	Starting In	Color	Noise Reductions	Starting In	Color
≥ 5.0+ DNL	45-60 DNL	Yellow	≥ 1.5+ DNL	≥ 65 DNL	Red	≥ 5.0+ DNL	45-60 DNL	Purple	≥ 1.5+ DNL	≥ 65 DNL	Green
≥ 3.0+ DNL	60-65 DNL	Orange				≥ 3.0+ DNL	60-65 DNL	Blue			

0 1 2 Statute Miles
0 1 2 Nautical Miles



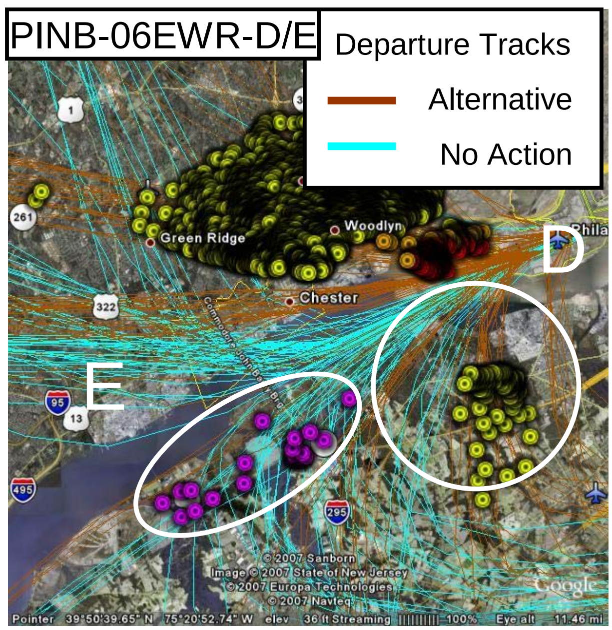
Note: Change in noise exposure is shown for populated census blocks only

Note: For additional detail on areas with change in noise exposure, see the electronic figure (on CD) and use the zoom tool

the north gate and 030 and 050° for the west gate. Approximately 35,400 persons represented by 416 census blocks are expected to experience an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

PINB-06PHL-C (Exhibit 29): This region is located northeast of the Airport, and is approximately four square miles in area. The main community within the region is Camden, NJ. The area is approximately bounded by Ferry Ave. in the south, Broadway St. in the west, State St. in the north, and Crescent Blvd. in the east. The potential reductions in noise are caused by the new departure headings off of Runways 9L/R to the north and west gates. Departure headings were changed from the current 085° heading to 070° for the north gate and 030° and 050° for the west gate. Approximately 30,271 persons, represented by 389 census blocks, are expected to experience a reduction in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL for this variation.

PINB-06PHL-D (Exhibit 29): This region is located south of the Airport, and is approximately six square miles in area. The region is approximately two miles wide, containing the majority of Gibbstown, NJ north of I-295 and extending about two miles south if I-295. The potential increases in noise are primarily caused by the new departure headings off of Runways 27L/R to the east departure gate. Departure headings were changed from the current 240° and 255° headings to 190°. Approximately 2,400 persons represented by 61 census blocks are expected to experience an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.



PINB-06PHL-E (Exhibit 29): This region is located southwest of the Airport, and is approximately six square miles in area. Bridgeport, NJ, the main community within this region, is at the interchange of US-130 and US-322. The region extends west approximately three miles to Nortonville, NJ and north nearly two miles to the Delaware River. The potential reductions in noise are caused by the new departure headings off of Runways 27L/R to the south and east gates. Departure headings were changed from the current 240° and 255° headings to 230° and 250° for the south gate and 190° for the east gate. Approximately 500 persons represented by 22 census blocks are expected to experience a reduction in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

PINB-11PHL-A (Exhibit 30): This region is located west and north of the Airport, and is approximately 20 square miles in area. The region ranges from the Airport to slightly north of Baltimore Ave., and slightly west of SR-452. Communities within this region include: Essington, Crum Lynne, Woodlyn, Wallingford, Swarthmore, Rose Valley, and Parkside. The potential increases in noise are caused by the new departure headings off of Runways 27L/R to the north and west gates. Departure headings were changed from the current 240° and 255° headings to 330° for the north gate and 290° and 310° for the west gate. Approximately 240 persons represented by six census blocks are expected to experience an increase in noise of greater than or equal to 1.5 DNL within 65 DNL. Additionally, approximately 3,100 persons representing 61 census blocks are expected to experience an increase in noise of greater than or equal to 3.0 DNL between 60 and 65 DNL. Approximately 68,800 persons represented by 958 census blocks are expected to experience an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

PINB-11PHL-B (Exhibit 30): This region is located north and slightly east of the Airport, and is approximately two square miles in area. The region mainly runs along I-76 bordering the west edge of South Philadelphia. The southern edge of the region is near Pattison Avenue, and the northern edge is near Washington Avenue. The potential increases in noise are caused by the new departure headings off of Runways 9L/R to the north and west gates. Departure headings were changed from the current 085° heading to 070° for the north gate and 030° and 050° for the west gate. Approximately 4,650 persons represented by 56 census blocks are expected to experience an increase in noise of greater than or equal to 5.0 DNL at levels between 45 and 60 DNL.

PINB-11PHL-C (Exhibit 30): This region is located south of the Airport, and is approximately six square miles in area. The region is approximately two miles wide, containing the majority of Gibbstown, NJ north of I-295 and extending about two miles south of I-295. The potential increases in noise are primarily caused by the new departure headings off of Runways 27L/R to the east departure gate. Departure headings were moved from the current 240° and 255° headings to 190° for the east departure gate. Approximately 3,400 persons represented by 72 census blocks are expected to experience an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

PINB-11PHL-D (Exhibit 30): This region is located southwest of the Airport and is approximately six square miles in area. Bridgeport, NJ is the main community within this region at the interchange of US-130 and US-322. The region extends west approximately three miles to Nortonville, NJ and north nearly two miles to the Delaware River. The potential reductions in noise are caused by the new departure headings off of Runways 27L/R to the south and east gates. Departure headings were moved from the current 240° and 255° headings to 230° and 250° for the south gate and 190° for the east gate. Approximately 150 persons represented by nine census blocks are expected to experience a reduction in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

4.6 Integrated with ICC Alternative

The second variation of the Integrated Airspace Alternative involves full airspace consolidation, as well as modifications to multiple departure gates, additional arrival posts, and additional close-in departure procedures. The second variation is called the Integrated Airspace with ICC Alternative.

This alternative represents a full airspace consolidation and is a completely new approach to the redesign of airspace from New York to Philadelphia. Where current en route airspace separation rules of five nautical miles are typically used, this airspace redesign alternative would use three nautical mile terminal airspace separation rules over a larger geographical area and up to 23,000 feet MSL in some areas (see Chapter 2 for details). The ICC airspace would be comprised of the majority of current terminal airspace and NY Center airspace, as well as some sectors from Washington Center and Boston Center. Boston Center could take the high-altitude parts of the current NY Center airspace structure. This section presents the expected results for the Integrated Airspace with ICC Alternative for the forecasted 2011 conditions.

4.6.1 Integrated with ICC Alternative Noise Model Input

The NIRS modeling for the future Integrated with ICC Alternative is directly based on the Future No Action Alternative noise modeling input. Only the elements of the alternative design that are expected to be different from the No Action procedures or design were modified for the NIRS modeling.

As with the No Action analysis, noise modeling was developed for IFR overflights and the projected IFR flight plan operations at the 21 airports and overflights identified as part of the study. The runways, local environmental variables, operations levels, and fleet mix used for the No Action modeling were also used in the future Integrated with ICC Alternative modeling. In general the runway use proportions modeled at each airport for the No Action conditions were held constant for this alternative noise modeling. There were however; some design elements of this alternative that resulted in modified runway use at both EWR and JFK.

Similarly, the day-night split proportions from the No Action modeling were also used for this alternative analysis except for the traffic at PHL. The operational simulation (TAAM) analysis indicated that this alternative provided enough delay reduction at PHL to allow some of the scheduled daytime departures that had been pushed into the nighttime hours in the No Action condition to be moved back to daytime operations. In general, the runway use proportions modeled art each airport for the No Action conditions was held constant for this alternative noise modeling.

The majority of the modeled flight tracks and dispersion for the No Actions modeling was held constant for the Integrated with ICC Alternative modeling input. Only the flight tracks associated with the design element of the alternative were adjusted to represent those known changes for the alternative. The following points summarize the noise model changes made to the No Action input data in order to model the alternative.

- West departure gates shifted and Expanded – Two jet airways added (all airports);
- Close-in departure procedures changed i.e. headings added (LGA, EWR, PHL);
- EWR and LGA west arrival flow split into two arrival flows, one to the north and one to the south;
- Both EWR parallel runways used for arrivals;
- Access to West departure gate added for JFK and ISP westerly departures;
- South departure gate expanded;
- Ocean departure gate added for EWR;
- West departure gate for PHL expanded;
- Arrival route added for PHL (for arrivals from the west).

Each of these items represents a group of flight track adjustments that were required in order to model the alternative design. Only those No Action tracks that were affected by the design changes were moved. These movements generally only involved portions of the route within the study area as dictated by the design. Flight tracks dispersion was only modified where route changes would likely have an effect on dispersion patterns.

A series of graphics illustrating the NIRS backbone track changes associated with this alternative are presented in **Section 4** of **Attachment C** to this appendix. The graphics only show the backbone tracks that were changed for noise modeling the alternative. Both the No Action backbones and the resulting alternative backbones are color coded in the illustrations. Only those tracks that changed are shown. Similarly, in order to assist in the clarity of the diagram, the sub-tracks associated with the changed backbone tracks are generally not shown. In some cases annotations are included to clarify concepts.

Chapter 2 of the EIS document provides a moderately detailed discussion of the design changes associated with this alternative and further detail is provided in the operational modeling report in **Appendix C** of the EIS.

4.6.2 Integrated with ICC Alternative Noise Impact Results

The route and procedural changes associated with the Integrated Airspace Alternative Variation with ICC would result in the population likely to be exposed to 65 DNL and greater decreasing to 74,833 persons in 2011.

The number of persons that would be exposed to 60-65 DNL is expected to increase from 209,793 persons with the Future No Action Airspace Alternative to 252,361 persons with the Integrated Airspace Alternative Variation with ICC in 2011.

This variation would result in a 4.6 percent increase in the number of persons expected to be exposed to noise levels between 45 and 60 DNL in 2011 from 11.69 million persons to 12.22 million persons.

Table 17 presents a summary of the population exposed to noise levels for the Integrated with ICC Alternative as compared to the No Action scenario for the 2011 conditions evaluated.. The table highlights the areas where the alternative caused increases in population exposure for the specific DNL ranges as well as the decreases.

Table 17
Potential Population Exposure & Change - Integrated Airspace Alternative Variation with ICC

2011				
Scenario DNL Range>	**45-60**	**60-65**	**65 +**	**Total 45+**
No Action	11,688,798	209,793	75,459	11,974,050
Alternative	12,222,280	252,361	74,833	12,549,474
Difference	*533,482*	*42,568*	*-626*	*575,424*

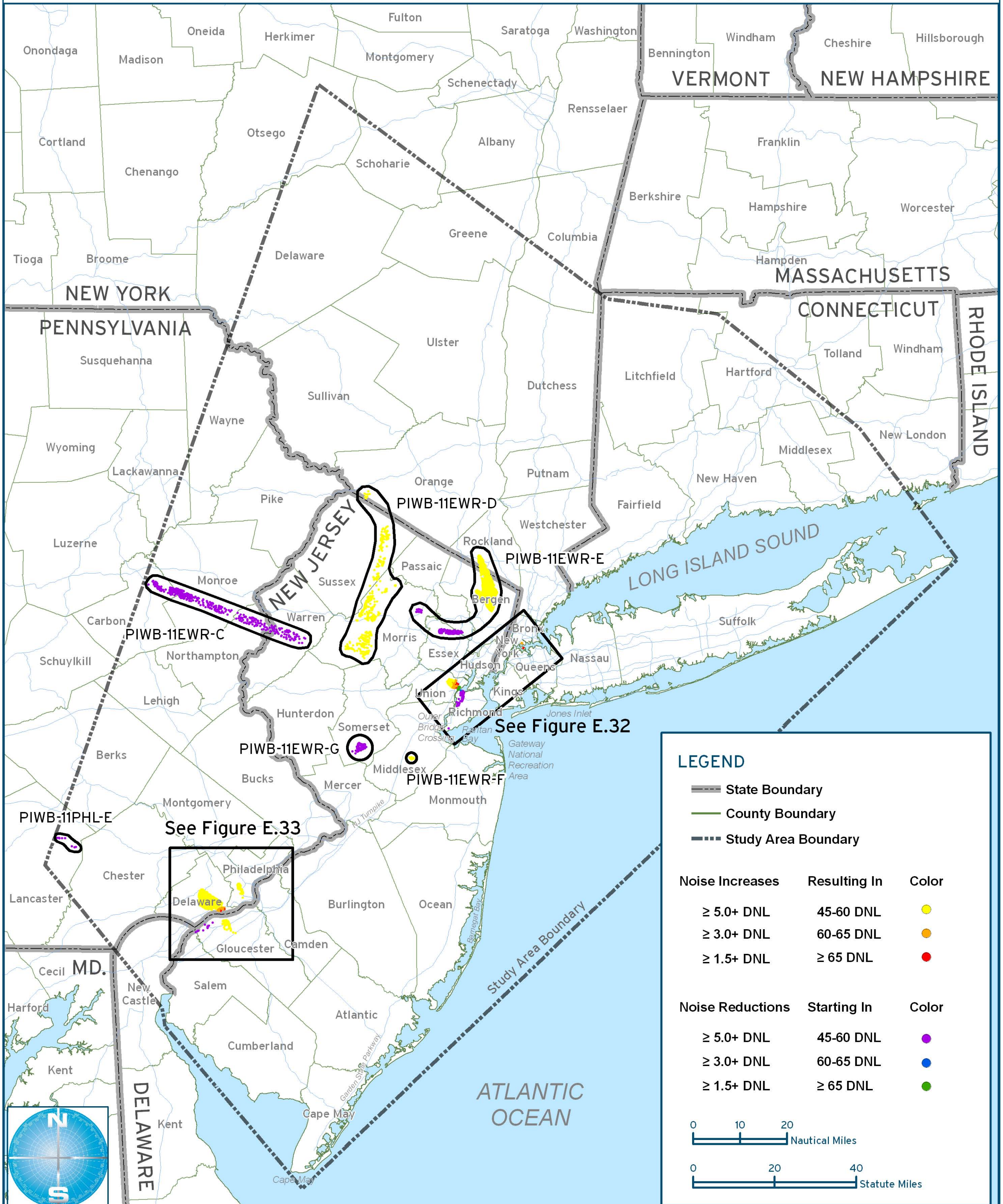
Source: NIRS Analysis, Landrum & Brown/Metron Aviation, Inc. 2007.

In order to determine the significance of the changes in noise exposure associated with the Integrated without ICC Alternative, an analysis of the changes relative to FAA's noise impact criteria was done. **Exhibit 31** presents a map of the Integrated with ICC Alternative noise changes at the population census blocks for the 2011 future conditions. Only the non-zero population census blocks are shown where the noise exposure changed in such a way that it met the noise threshold criteria discussed in the previous section. Both increases and decreases in noise levels meeting the criteria are shown. The census blocks are color coded to identify the criterion that they meet and whether the noise increased or decreased.

2011 Integrated Airspace Alternative Variation With ICC Change In Noise Exposure

Exhibit E.31

ENVIRONMENTAL IMPACT STATEMENT



NEW YORK / NEW JERSEY / PHILADELPHIA METROPOLITAN AIRSPACE REDESIGN PROJECT

As the figures indicate, the changes associated with this alternative are evident both close-in to the airports as well as at distances further out in the Study Area. As with previous alternatives changes are clustered around EWR and PHL with a small amount of change evidenced near LGA. However, several areas of changes associated with EWR traffic are located north, west and south of the airport. Similarly, a small pocket of change associated with PHL is also located at a distance west of the airport near the edge of the Study Area. There were no other changes meeting the FAA criterion found near any of the other airports modeled in the analysis.

Table 18 presents a summary for the estimated change in population exposed to aircraft noise levels that meet the FAA criteria resulting from the Integrated without ICC Alternative airspace design. The cells in the table are color coded similar to the scheme used on the exhibits so that specific numbers of persons can be related to the maps of the noise change.

Table 18
Integrated Airspace Alternative Variation with ICC - Population Impact Change Analysis Summary

	DNL Noise Exposure With Alternative		
	65 DNL or higher	60 to 65 DNL	45 to 60 DNL
Minimum Change in DNL With Alternative	1.5 DNL	3.0 DNL	5.0 DNL
Level of Impact	Significant	Slight to Moderate	Slight to Moderate
Noise Increases			
2011	15,826*	34,824	290,758
Noise Decreases			
2011	6,984	22	62,537

*Note that 12,846 persons of this total are transient population passing through the jail on Rikers Island.
Source: NIRS Analysis, Landrum & Brown/Metron Aviation Inc., 2007.

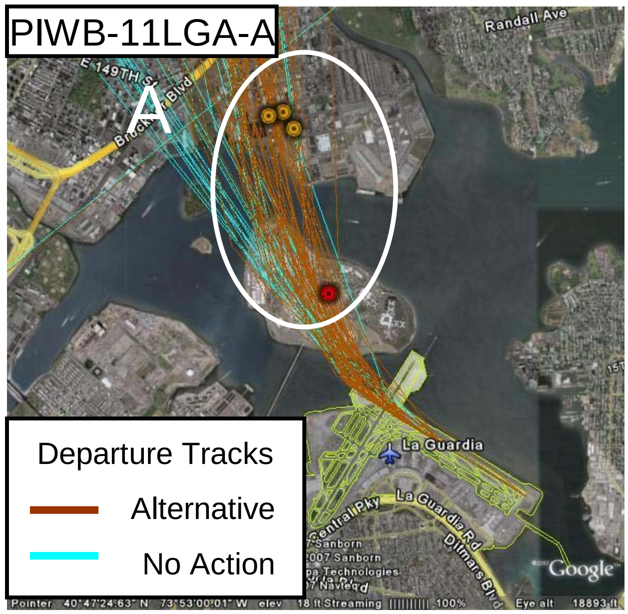
Based on the NIRS analysis, it is estimated that 15,826 persons would be exposed to a significant (+1.5 DNL at 65 DNL or higher) change in noise in 2011. This variation would, at the same time, provide noise reduction of 1.5 DNL or more in areas exposed to 65 DNL or more. In 2011 this level of reduction would be experienced by 6,984 persons.

Slight to moderate impacts are also evident at lower noise levels due to this variation's airspace design. In the 60 to 65 DNL range, it is expected that 34,824 persons would experience an increase in noise levels of 3.0 DNL or more in 2011. There would be only small decreases of 3.0 DNL at noise levels of 60 to 65 DNL expected due to this design. At the lowest noise levels (45 to 60 DNL) where Slight to Moderate (±5.0 DNL) impacts are identified, the implementation of this variation is expected to result in noise increases for 290,758 persons in 2011. A reduction in noise exposure at these lower noise levels is also evident from the variation's design. Approximately 62,600 persons are estimated to experience a 5.0 DNL reduction in noise levels between 45 and 60 DNL in 2011.

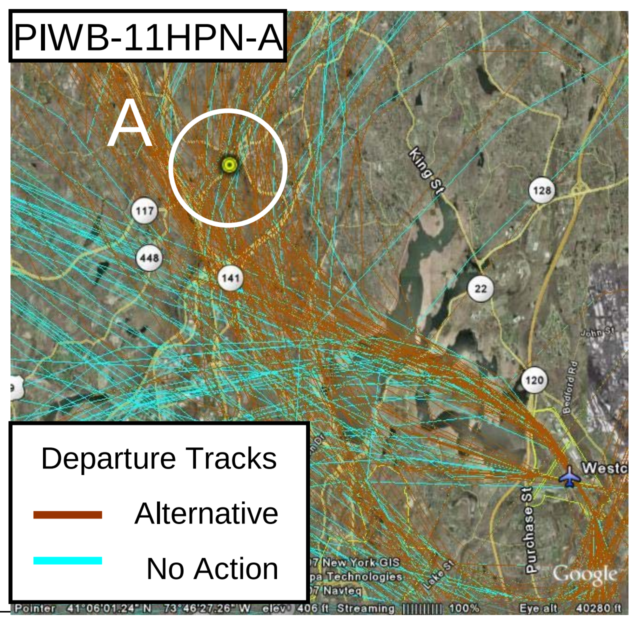
In order to provide a better understanding of the noise impacts resulting from this change analysis the areas of change within the study area were divided into small zones of change for discussion purposes. These zones are generally associated with a specific airport and are identified with a unique code name. The following paragraphs discuss change in noise exposure associated with this alternative in terms of these change zones. Exhibits are provided with enlarged views of the various change zones along with the name of each zone. The change in noise impact is discussed for each zone along with the cause for the noise changes in the zone. Where applicable, inset diagrams are included to illustrate the flight rout changes that were primarily responsible for the changes in the zone of interest.

Exhibit 32 presents an enlarged view of the noise changes at the population census blocks and change zones associated with LGA and EWR for the 2011 conditions. Each change zone shown on the exhibits is discussed in the following paragraphs.

PIWB-11LGA-A (Exhibit 32): This region is located north of LGA (including Rikers Island) and on a small portion of the Hunts Point region in Bronx, NY. The portion in Hunts Point extends north about 0.5 miles onto shore ending approximately at Oak Point Avenue. The potential increases in noise to the northwest of LGA are caused by the new departure headings off of Runway 31 to the north and west gates. Departure headings were changed from approximately 005° to 020° and 350° to 005°. Approximately 12,800 persons represented by one census block are expected to experience an increase in noise of greater than or equal to 1.5 DNL within the 65 DNL. It should be noted that the single red census block is located on Rikers Island and represents the estimated jail inmate population. The nature of this facility is such that the population would be considered transient. Approximately 26 persons represented by two census blocks are expected to experience an increase in noise of greater than or equal to 3.0 DNL between 60 and 65 DNL.



PIWB-11HPN-A (Exhibit 31): This region is located northwest of HPN near Pleasantville, NY. The area is



2011 Integrated Airspace Alternative Variation With ICC Change In Noise Exposure - NY/NJ Metropolitan Area

Exhibit E.32

ENVIRONMENTAL IMPACT STATEMENT

LEGEND

State Boundary
County Boundary

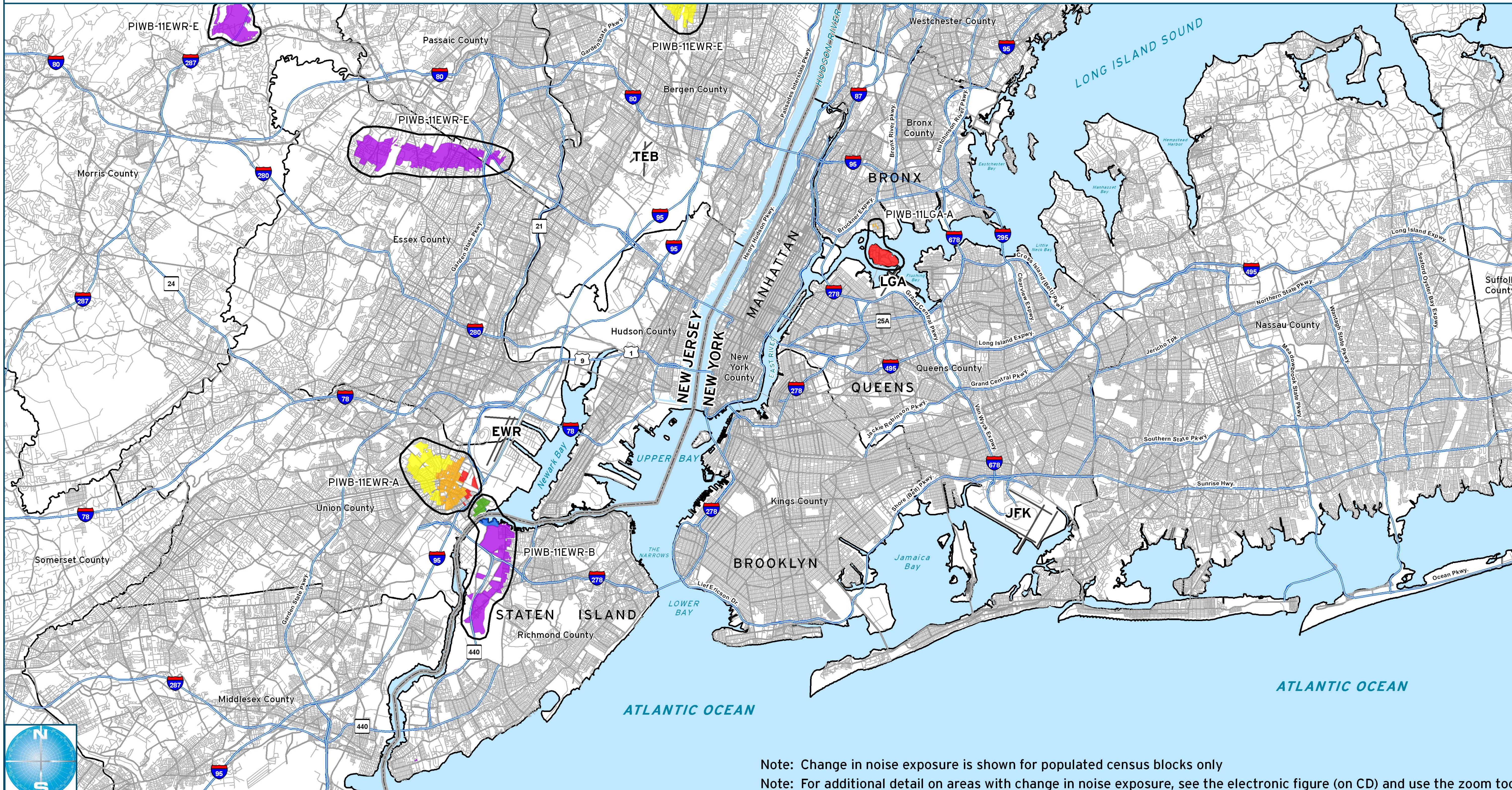
Noise Increases	Resulting In	Color
≥ 5.0+ DNL	45-60 DNL	Yellow
≥ 3.0+ DNL	60-65 DNL	Orange

Significant Noise Increases	Resulting In	Color
≥ 1.5+ DNL	≥ 65 DNL	Red

Noise Reductions	Starting In	Color
≥ 5.0+ DNL	45-60 DNL	Purple
≥ 3.0+ DNL	60-65 DNL	Blue

Noise Reductions	Starting In	Color
≥ 1.5+ DNL	≥ 65 DNL	Green

0 1 2 Statute Miles
0 1 2 Nautical Miles

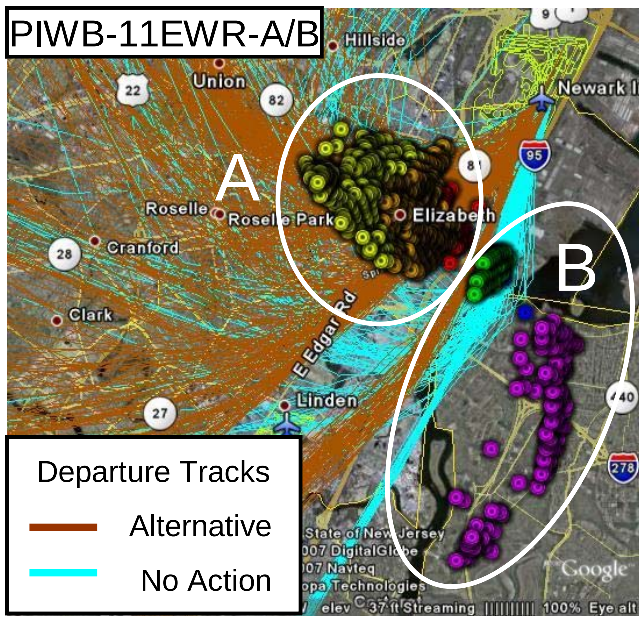


Note: Change in noise exposure is shown for populated census blocks only

Note: For additional detail on areas with change in noise exposure, see the electronic figure (on CD) and use the zoom tool

immediately adjacent to the intersection of the Saw Mill Parkway and Bedford Road. The potential increases in noise in this area are caused by the northward shift of the north and west-bound departures out of HPN. This flow was shifted slightly to the north to allow for the dual arrival streams into EWR that are part of this design. Approximately 40 persons represented by one census block are expected to experience an increase in noise of greater than or equal to 5.0 DNL at levels between 45 and 60 DNL. It should be noted that the single yellow census block was generated as a result of the change in methodology to rounding to a single decimal point. Consequently, other census blocks in the vicinity, while changing some amount as a result of the alternative design, did not trip FAA's threshold of change at these lower noise levels.

PIWB-11EWR-A (Exhibit 32): The estimated increases in noise occurring west of Interstate 95 and over the Elizabeth, NJ area are caused by the new departure headings off of Runways 22L/R. Departure headings to the north and east gates were changed from 190° to 260° and 240°. As a result, 2,729 persons represented by 17 census blocks are expected to experience an increase in noise of greater than or equal to 1.5 DNL above 65 DNL. Similarly, 31,161 persons represented by 187 census blocks are expected to experience an increase in noise of greater than or equal to 3.0 DNL between 60 and 65 DNL, and 33,340 persons represented by 143 census blocks are expected to experience an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

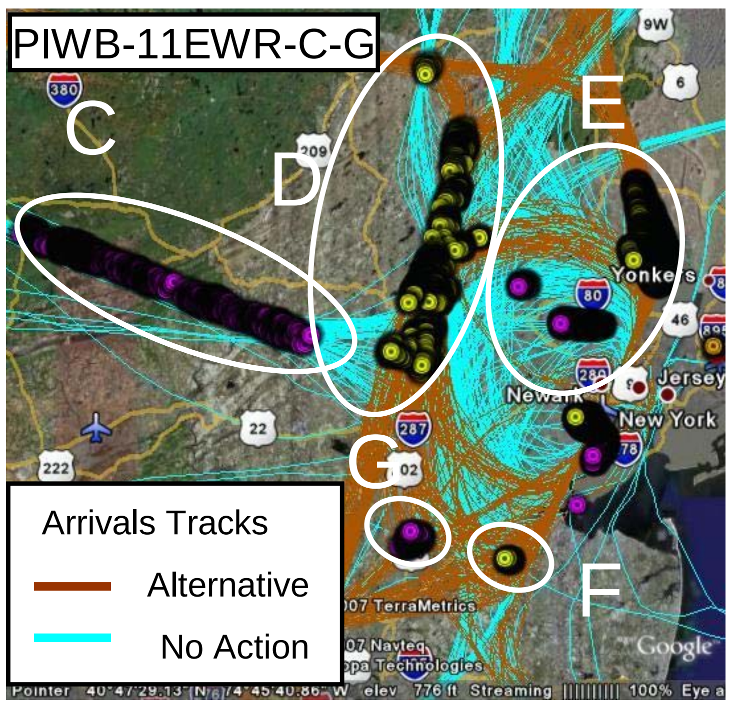


PIWB-11EWR-B (Exhibit 32): The estimated reductions in noise occurring east of Interstate 95 over Elizabethport, NJ and Arlington, NY are caused by the new departure headings off of Runways 22L/R. Departure headings to the north and east gates changed by moving a portion of the traffic from the 190° to 260° or 240° headings. Approximately 6,984 persons represented by 33 census blocks are expected to experience a decrease in noise of greater than or equal to 1.5 DNL resulting in noise exposure below 65 DNL. Similarly 22 persons represented by 2 census blocks are expected to experience a decrease in noise of greater than or equal to 3.0 DNL between 60 and 65 DNL , and 18,761 persons represented by 93 census blocks are expected to experience a decrease in noise of greater than or equal to 5.0 DNL between 45 DNL and 60 DNL.

PIWB-11EWR-B-1 (Exhibit 32): The estimated reductions in noise occurring on the southern end to Staten Island and over the town of Tottenville, NY are caused by the new departure headings off of Runways 22L/R. Departure headings to the north and east gates changed by moving a portion of the traffic from the 190° to 260° or 240° headings. Approximately 137 persons represented by 1 census block are expected to experience a decrease in noise of greater than or equal to 5.0 DNL between 45 DNL and 60 DNL.

PIWB-11EWR-C (Exhibit 32): The estimated reduction in noise occurring west of EWR and over the counties of Carbon PA, Monroe PA, Northampton PA, and Warren NJ, is caused by the removal of the arrival route through PENNS. This traffic would be split between two new arrival fixes. All jet traffic would flow to the north along Interstate 84 (arrival fix IEAW2) and all turbo prop traffic would flow south of Reading PA (arrival fix IASTW). As a result, 20,765 persons represented by 540 census blocks are expected to experience a decrease in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

PIWB-11EWR-D (Exhibit 32): The estimated increase in noise occurring west of EWR and over the counties of Morris NJ and Sussex NJ, is primarily caused by two airspace changes: the westward shift of the downwind leg for Runways 4L/R and the increased traffic resulting from the movement of the PENNS arrival route. As a result, 41,743 persons represented by 517 census blocks are expected to experience an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.



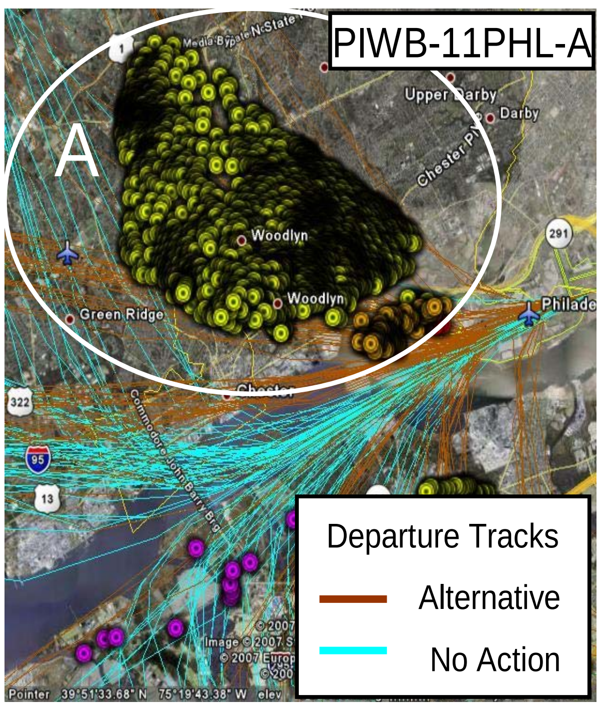
PIWB-11EWR-E (Exhibit 32): The estimated increases and reductions in noise occurring north of EWR and over the villages of Cedar Grove, NJ (reductions), Montville, NJ (reductions), Monsey, NJ (increases), Hillsdale, NJ (increases), Westwood, NJ (increases), New Millford, NJ (increases) and Oradell, NJ (increases) are caused by the eastward shift and extension of the base leg and final approach to Runways 22L/R. As a result, 16,953 persons represented by 199 census blocks are expected to experience a reduction in noise greater than 5.0 DNL between 45 and 60 DNL, while 100,574 persons represented by 1,607 census blocks are expected to experience an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

PIWB-11EWR-F (Exhibit 32): The estimated increases in noise occurring southwest of EWR and near the village of Spotswood, were caused by the extension of the base leg and final approach to Runways 4L/R. As a result, 1,773 persons represented by 17 census blocks are expected to experience an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

PIWB-11EWR-G (Exhibit 32): The estimated reductions in noise occurring southwest of EWR and over the village of Montgomery, NJ were caused by the extension of the base leg and final approach to Runways 4L/R. As a result, 5,231 persons represented by 49 census blocks are expected to experience a decrease in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

Exhibit 33 presents an enlarged view of the noise changes at the population census blocks and change zones associated with PHL for 2011. Each change zone shown on the exhibits is discussed in the following paragraphs.

PIWB-11PHL-A (Exhibit 33): This region is located to the west and north of the Airport and is approximately 25 square miles in area. The region ranges from the Airport north to US-1 and slightly west of SR-452. Communities within this region include Essington, Crum Lynne, Woodlyn, Wallingford, Swarthmore, Media, Rose Valley, and Parkside. These potential increases in noise are caused by the new departure headings off of Runways 27L/R to the north and west gates. Departure headings were changed from the current 240° and 255° headings to 330° for the north gate and 290° and 310° for the west gate. Approximately 250 persons represented by three census blocks are expected to experience a significant increase in noise of greater than or equal to 1.5 DNL within 65 DNL. Additionally, 3,637 persons represented by 72 census blocks are expected to experience an increase in noise of greater than or equal to 3.0 DNL between 60 and 65 DNL. Approximately 86,700 persons represented by 1,282 census blocks are expected to experience an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.



2011 Integrated Airspace Alternative Variation With ICC Change In Noise Exposure - PHL Metropolitan Area

Exhibit E.33

ENVIRONMENTAL IMPACT STATEMENT

LEGEND

State Boundary
County Boundary

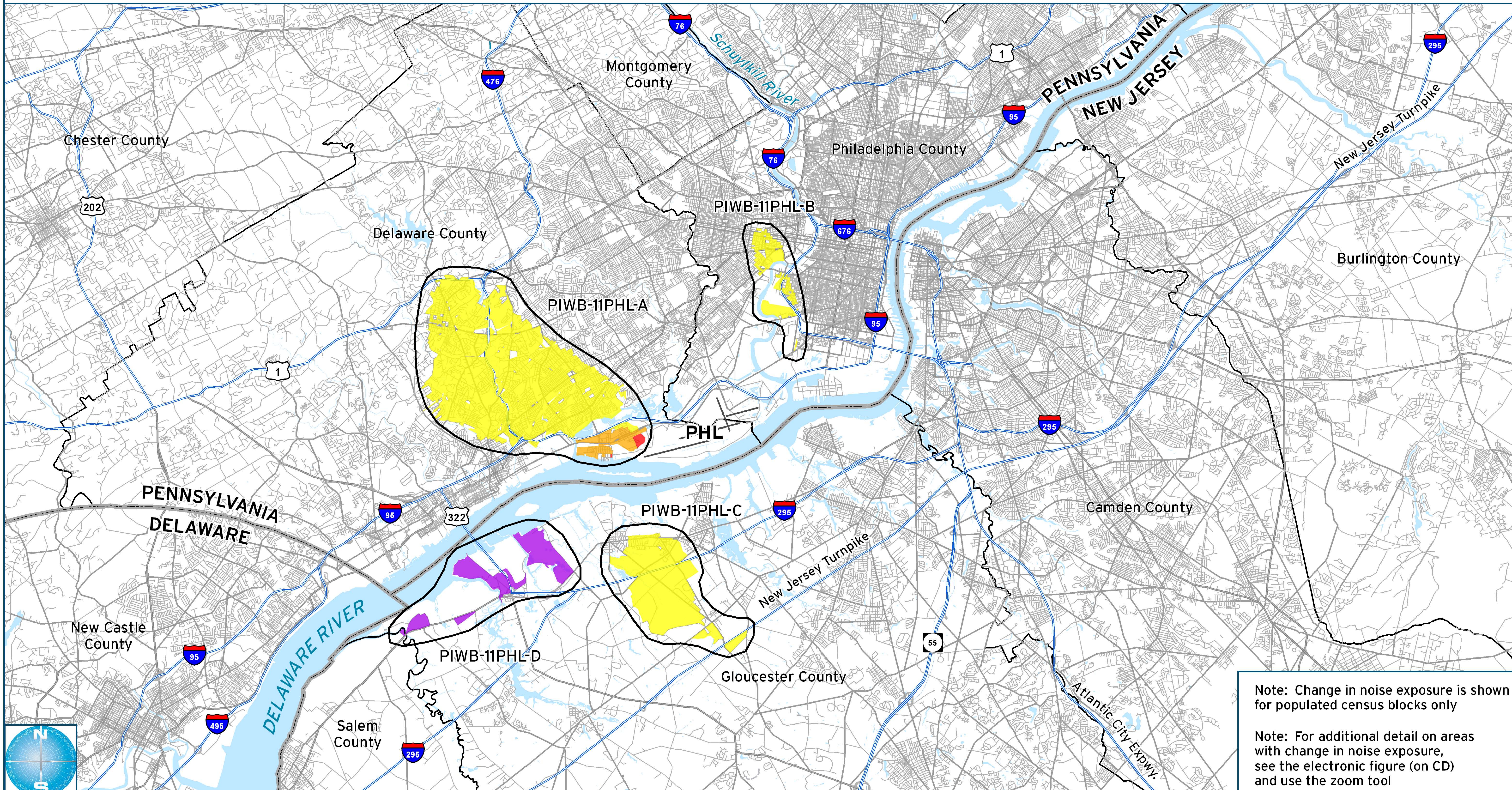
Noise Increases	Resulting In	Color
≥ 5.0+ DNL	45-60 DNL	Yellow
≥ 3.0+ DNL	60-65 DNL	Orange

Significant Noise Increases	Resulting In	Color
≥ 1.5+ DNL	≥ 65 DNL	Red

Noise Reductions	Starting In	Color
≥ 5.0+ DNL	45-60 DNL	Purple
≥ 3.0+ DNL	60-65 DNL	Blue

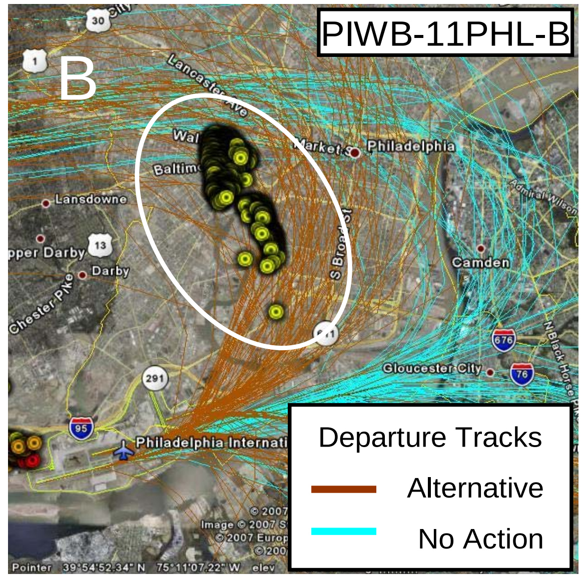
Noise Reductions	Starting In	Color
≥ 1.5+ DNL	≥ 65 DNL	Green

0 1 2 Statute Miles
0 1 2 Nautical Miles



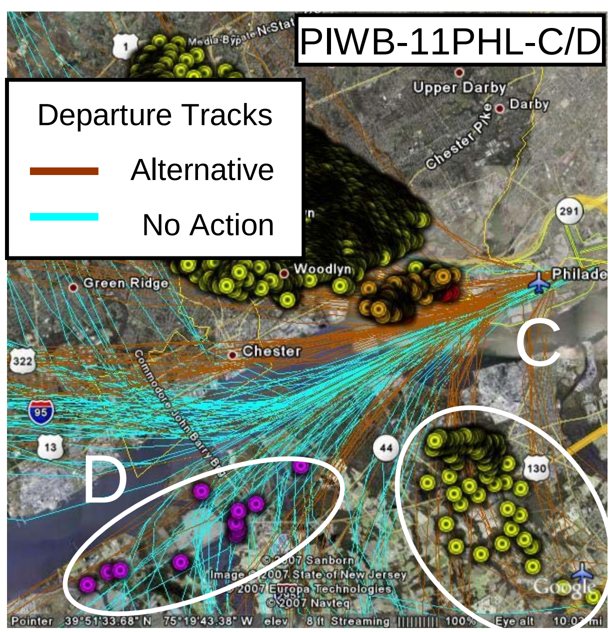
Note: Change in noise exposure is shown for populated census blocks only

Note: For additional detail on areas with change in noise exposure, see the electronic figure (on CD) and use the zoom tool



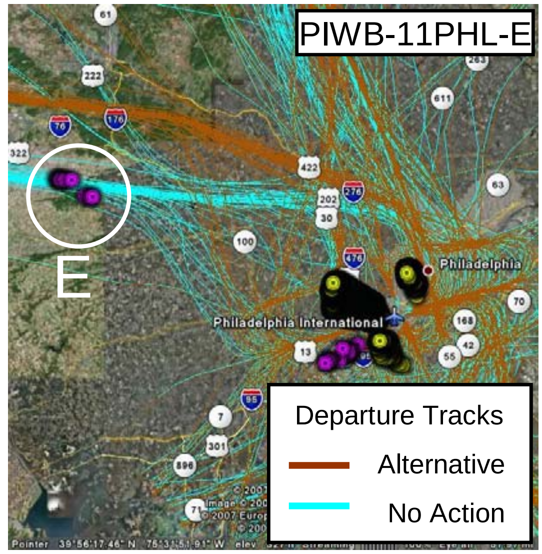
PIWB-11PHL-B (Exhibit 33): This region is located to the north and slightly east of the Airport and is approximately four square miles in area. The region mainly runs along I-76 bordering the west edge of South Philadelphia. The southern edge of the region is near Pattison Avenue. Also, an area on the west side of the Schuylkill River is included in this region. The area is approximately bounded by Chestnut Street to the north and 43rd Street to the west. The potential increases in noise are caused by the new departure headings off of Runways 9L/R to the north and west gates. Departure headings were changed from the current 085 heading to 070° for the north gate and 030° and 050° for the west gate. Approximately 23,200 persons represented by 175 census blocks are expected to experience an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

PIWB-11PHL-C (Exhibit 33): This region is located south of the Airport, and is approximately seven square miles in area. The region is approximately two miles wide, containing the majority of Gibbstown, NJ north of I-295 and extending about two miles south if I-295. There is a slim portion of the region which extends south to the New Jersey Turnpike. These potential increases in noise are primarily caused by the new departure headings off of Runways 27L/R to the east departure gate. Departure headings were changed from the current 240° and 255° headings off of Runway 27R/L to 190° for the east departure gate. Approximately 3,400 persons represented by 72 census blocks are expected to experience an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.



PIWB-11PHL-D (Exhibit 33): This region is located southwest of the Airport and is approximately six square miles in area. Bridgeport, NJ is the main community within this region. The region extends west approximately three miles to Nortonville, NJ and north nearly two miles to the Delaware River. The potential reductions in noise are caused by the new departure headings off of Runways 27L/R to the south and east gates. Departure headings were changed from the current 240°

and 255° headings to 230° and 250° for the south gate and 190° for the east gate. Approximately 175 persons represented by 11 census blocks are expected to experience a reduction in noise greater than or equal to 5.0 DNL between 45 and 60 DNL.



PIWB-11PHL-E (Exhibit 31): This region is located about 40 miles west-northwest of the Airport and contains an approximately six mile long strip of land. The strip runs near US-322 and includes the communities of Navron, PA and East Earl, PA. These potential reductions in noise are caused by a northward relocation of the primary western PHL arrival route to accommodate the additional west gate departure fix. Approximately 515 persons represented by nine census blocks are expected to experience a reduction in noise greater than or equal to 5.0 DNL between 45 and 60 DNL.

4.7 Ambient Noise Comparison

In addition to the noise modeling analysis presented in the previous section, the noise measurement data presented in **Appendix D, Noise Measurement Report**, was analyzed in conjunction with the noise modeling computations for each of the 18 unique noise measurement sites in the Study Area. This analysis was conducted in order to provide a general understanding of the effects of the proposed project alternatives at each location. By including the measured noise along with the modeled changes for each alternative, an estimation of each alternative's contribution to the total noise picture at each site is possible. Accordingly, aircraft noise from modeled aircraft operations, as well as all other aircraft operations can be considered. While this type of analysis can only be done specific to each noise measurement location, it does provide some insights as to the project alternatives contribution to the total noise in the area.

The noise levels measured at each of the 18 noise measurement sites contains contributions from all noise sources, including both aircraft and non-aircraft noise events. As described in Appendix D, radar data was correlated with the measurement date to identify noise events associated with aircraft overflights at each site. These aircraft noise events were then subtracted out of the total noise recorded at each site and a DNL value was computed. This resulting value represents an estimation of the background noise at each site including various local noise sources which may include other aircraft activity that was not included in the NIRS modeling. This might include VFR flights traversing the area or traffic from airports not modeled in NIRS. For the purposes of this analysis, these computed background noise levels were assumed to be reasonable estimations of the future background noise levels that might be found at each site in 2006 and 2011.

These "Background" DNL values were then added to the future NIRS modeled noise levels (representing IFR aircraft only) to create an estimated "Total" noise level for each site. This was done for the No Action as well as each project alternative for each future year. **Table 19** presents the results of this computation along with the measured background DNL values at each site.

In order to investigate the changes associated with each project alternative when all noise sources are considered, the No Action total noise levels are subtracted from the total noise levels associated with each alternative in each year. **Table 20** presents the estimated differences in total noise at each site for each alternative in each of the future years.

Table 19

Comparison of Total DNL Noise Values at Measurement Sites

		2006 Total Noise (background + modeled)				2011 Total Noise (background + modeled)				
Measurement Site	Measured Background DNL	No Action	Ocean	Modifications	Integrated w/o ICC	No Action	Ocean	Modifications	Integrated w/o ICC	Integrated w/ICC
Site 1a	40.3	41.3	41.3	41.3	41.3	41.2	41.2	41.2	41.2	40.5
Site 1b	62.7	62.7	62.7	62.7	62.7	62.7	62.7	62.7	62.7	62.7
Site 2	46.6	46.7	46.7	46.7	46.7	46.7	46.7	46.7	46.7	46.8
Site 3	59.5	59.5	59.5	59.5	59.5	59.5	59.5	59.5	59.5	59.5
Site 4	53.7	53.8	53.8	53.8	53.8	53.8	53.8	53.8	53.8	53.8
Site 5	67.3	67.3	67.3	67.3	67.3	67.3	67.3	67.3	67.3	67.3
Site 6	56.8	57.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0
Site 7a	61.5	62.3	62.5	61.7	61.7	62.3	62.5	61.7	61.7	61.6
Site 7b	58.7	60.7	60.9	59.1	59.1	60.5	61.0	59.1	59.1	59.0
Site 8	65.4	66.3	66.6	66.3	66.3	66.3	66.6	66.3	66.3	66.3
Site 9	60.8	61.0	60.9	61.0	61.0	60.9	60.9	60.9	60.9	60.8
Site 10	57.4	57.7	57.5	57.7	57.6	57.6	57.5	57.7	57.6	57.7
Site 11	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.7
Site 12	61.7	61.8	61.8	61.8	61.8	61.8	61.8	61.8	61.8	61.8
Site 13	64.1	64.2	64.2	64.1	64.1	64.1	64.1	64.1	64.1	64.1
Site 14	59.1	59.1	59.1	59.1	59.1	59.1	59.1	59.1	59.1	59.1
Site 15	60.6	60.8	60.8	60.8	60.8	60.9	60.9	60.8	60.8	60.8
Site 16	57.8	58.4	58.4	58.4	58.4	58.4	58.4	58.4	58.4	58.5

Source: Landrum & Brown analysis, 2003-2005

Table 20

Difference in Total Noise for Project Alternatives at Measurement Sites

	2006 Change in Total Noise - DNL			2011 Change in Total Noise - DNL			
Measurement Site	Ocean	Modifications	Integrated w/o ICC	Ocean	Modifications	Integrated w/o ICC	Integrated w/ICC
Site 1a	0.0	0.0	0.0	0.0	0.0	0.0	-0.7
Site 1b	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Site 2	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Site 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Site 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Site 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Site 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Site 7a	0.1	-0.7	-0.7	0.7	-0.6	-0.6	-0.6
Site 7b	0.3	-1.6	-1.6	0.5	-1.4	-1.4	-1.4
Site 8	0.3	0.0	0.0	0.3	0.0	0.0	0.0
Site 9	0.0	0.0	0.0	0.0	0.0	0.0	-0.1
Site 10	-0.2	0.0	-0.1	-0.1	0.0	0.0	0.0
Site 11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Site 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Site 13	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Site 14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Site 15	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Site 16	0.0	0.0	0.0	0.0	0.0	0.0	0.1

Source: Landrum & Brown analysis, 2005

As the table indicates, only Sites 7a and 7b exhibit any notable changes in total noise with any of the project alternatives. This is expected since these two sites were generally the closest (Staten Island near the EWR south departure route) to any major airport activity. Thus, the total noise picture at these sites would be expected to have a large component from aircraft noise. The slight increases from the Ocean Routing alternative are reasonable as even more departure traffic would be routed close to the sites down Arthur Kill to Raritan Bay where they turn east for the over-ocean routing. Conversely, the changes to the close-in procedures (initial departure headings) at EWR would route less traffic over the sites explaining the total noise reductions evident in the table. Much smaller changes are evident from some alternatives at a few sites; however, these sites are not as close to major airports, hence the total noise picture is not as influenced by aircraft noise

Overall, the resulting changes in total noise for each alternative confirm that the changes in noise associated with each project alternative tend to be very small in the context of the total noise picture for locations that are not situated very near a major airport. For those areas close to airports, the analysis indicates that the NIRS modeling provides a reliable, if not overstated, understanding of the changes in noise to be expected with each alternative.

4.8 Aircraft Noise Impacts– Summary

Table 21 presents a summary of the 2006 population impacts for each alternative in terms of the FAA threshold criteria. The table is color coded based on the census block mapping scheme presented in the earlier exhibits. A similar comparison for the 2011 conditions is presented in **Table 22**. As the analysis indicates, each of the alternatives creates some changes where noise is increased within one of the FAA criterion thresholds. Similarly, there are also some corresponding decreases of similar magnitude evident in each alternative.

In terms of significant noise impact changes (+1.5 DNL in 65 DNL) the noise analysis indicates that with the exception of the Ocean Routing Airspace Alternative, each alternative viable airspace alternative is expected to generate some significant changes in the future. This is largely due to the fact that each of the alternatives contains departure heading changes at the major airports while the Ocean Routing Airspace Alternative uses the current headings in the noise modeling. The Modifications to Existing Airspace Alternative tends to create the fewest significant impacts at this level and has the best aggregate significant impact totals. The Integrated Airspace Alternatives (with and without ICC) both generate similar levels of significant impacts in the future.

In the slight to moderate noise impact range of ±3.0DNL between the 60 and 65 DNL levels, the impacts from the Modifications to Existing Airspace Alternative and the Integrated Airspace Alternative without ICC are very similar. The Integrated Airspace Alternative with ICC generates just slightly more impacts in this noise range. Again, due to the absence of modified departure headings, the Ocean Routing Alternative shows the fewest impacts in this range in both future years.

Finally, in the slight to moderate noise impact range of ±5.0 DNL between the 60 and 65 DNL levels a somewhat similar relationship among alternative is seen with the Modifications to Existing Airspace Alternative and the Integrated Airspace Alternative without ICC having very similar impact levels. However, Integrated Airspace Alternative with ICC generates nearly double the aggregate impacts in this range as compared to those alternatives. Again, the Ocean Routing Alternative shows the fewest impacts in this range in both future years.

Table 21

Project Alternative Comparison – 2006 Population Impact Change Analysis Summary

	DNL Noise Exposure With Proposed Action		
	65 DNL or higher	60 to 65 DNL	45 to 60 DNL
Minimum Change in DNL With Alternative	1.5 DNL	3.0 DNL	5.0 DNL
Level of Impact	Significant	Slight to Moderate	Slight to Moderate
Noise Increases			
Modifications to Existing Airspace	8,755	37,627	146,056
Ocean Routing Airspace	0	0	26,498
Integrated Airspace Variation without ICC	21,399*	37,558	142,517
Noise Decreases			
Modifications to Existing Airspace	5,970	1	39,426
Ocean Routing Airspace	0	675	51,108
Integrated Airspace Variation without ICC	5,970	1	39,400

*Note that 12,834 persons of this total are transient population passing through the jail on Rikers Island.
Source: NIRS Analysis, Landrum & Brown/Metron Aviation Inc. 2007.

Table 22

Project Alternative Comparison – 2011 Population Impact Change Analysis Summary

	DNL Noise Exposure With Proposed Action		
	65 dB or higher	60 to 65 dB	45 to 60 dB
Minimum Change in DNL With Alternative	1.5 dB	3.0 dB	5.0 dB
Level of Impact	Significant	Slight to Moderate	Slight to Moderate
Noise Increases			
Modifications to Existing Airspace	1,010	34,279	110,720
Ocean Routing	0	0	18,748
Integrated without ICC	13,856*	34,140	111,413
Integrated with ICC	15,826*	34,824	290,758
Noise Decreases			
Modifications to Existing Airspace	5,094	22	8,588
Ocean Routing	0	0	17,525
Integrated without ICC	5,094	22	9,895
Integrated with ICC	6,984	22	62,537

*Note that 12,846 persons of these totals are transient population passing through the jail on Rikers Island.
Source: NIRS Analysis, Landrum & Brown/Metron Aviation Inc. 2007.

Attachment A

AIRCRAFT OPERATIONS AND FLEET MIX TABLES

		EWR Operations Totals					
		2000		2006		2011	
Category	**AC Type**	**Day**	**Night**	**Day**	**Night**	**Day**	**Night**
H	747400	4.8	3.5	7.0	3.0	8.0	4.0
	767300	24.8	5.6	31.0	13.0	45.0	15.0
	777200	11.1	0.5	21.0	2.0	25.0	3.0
	74710Q	1.1	0.8	8.0	2.0	0.0	2.0
	74720B	4.0	0.4	1.0	0.0	0.0	1.0
	767CF6	0.0	0.0	2.0	2.0	15.0	2.0
	A300	6.2	4.1	3.0	7.0	4.0	8.0
	A310	6.8	2.5	9.0	4.0	9.0	6.0
	A330	1.0	0.9	3.0	1.0	4.0	1.0
	A340	2.2	0.5	5.0	1.0	6.0	1.0
	DC1030	28.1	14.8	7.0	8.0	7.0	8.0
	DC1040	0.0	2.0	0.0	4.0	0.0	3.0
	DC870	3.3	5.5	9.0	5.0	9.0	6.0
	MD11GE	0.0	2.2	1.0	1.0	1.0	2.0
	L1011	0.0	0.2	0.0	0.0	0.0	0.0
M	737300	85.4	12.8	94.0	36.0	49.0	45.0
	737400	8.0	1.0	0.0	0.0	0.0	0.0
	737500	111.2	9.2	34.0	4.0	5.0	1.0
	737700	94.5	15.6	375.0	49.0	492.0	67.0
	727EM2	26.4	24.9	4.0	11.0	0.0	0.0
	737N17	24.5	4.2	0.0	0.0	0.0	0.0
	757PW	101.9	20.4	108.0	24.0	90.0	22.0
	A319	4.4	0.0	33.0	1.0	34.0	1.0
	A320	18.4	1.4	32.0	7.0	33.0	6.0
	DC93LW	14.7	1.0	1.0	0.0	1.0	0.0
	DC95HW	30.2	2.3	0.0	0.0	0.0	0.0
	F10065	3.6	0.0	6.0	1.0	6.0	1.0
	MD83	161.7	22.3	38.0	9.0	14.0	3.0
	MD9025	2.4	1.0	28.0	4.0	30.0	6.0
	717200	2.6	0.9	0.0	0.0	0.0	0.0
L	CL600	0.0	0.2	24.0	5.0	25.0	5.0
	CL601	18.4	0.4	45.0	3.0	45.0	3.0
	GIV	0.0	0.1	4.0	1.0	5.0	1.0
	LEAR35	0.0	0.0	4.0	0.0	5.0	0.0
	MU3001	0.0	0.2	5.0	2.0	4.0	2.0
	FAL20	0.0	0.2	0.0	0.0	0.0	0.0
R	EMB145	85.2	5.8	164.0	15.0	204.0	14.0
K	LEAR25	0.0	0.8	0.0	1.0	0.0	1.0
	GIIB	0.0	0.1	0.0	0.0	0.0	0.0
T	CNA441	0.0	0.1	0.0	0.0	0.0	0.0
	DHC6	23.7	0.6	1.0	0.0	1.0	0.0
	DHC8	100.3	3.8	39.0	3.0	4.0	3.0
	GASEPF	1.1	4.4	0.0	4.0	0.0	4.0
	HS748A	14.3	1.0	0.0	0.0	0.0	0.0

	SF340	29.4	2.6	1.0	0.0	1.0	0.0
	CVR580	0.0	0.1	0.0	0.0	0.0	0.0
P	BEC58P	0.0	0.5	2.0	0.0	1.0	0.0
	GASEPV	0.0	0.0	1.0	4.0	1.0	4.0

		JFK Operations Totals					
		2000		2006		2011	
Category	**AC Type**	**Day**	**Night**	**Day**	**Night**	**Day**	**Night**
H	747400	43.8	11.8	57.0	9.0	53.0	11.0
	767300	109.2	16.5	176.0	28.0	199.0	31.0
	777200	1.1	1.8	22.0	7.0	37.0	8.0
	74710Q	1.3	1.8	1.0	1.0	1.0	0.0
	74720B	20.7	15.8	8.0	3.0	4.0	3.0
	767CF6	65.7	14.8	34.0	5.0	8.0	1.0
	A300	31.2	9.3	8.0	1.0	10.0	1.0
	A310	14.1	1.9	9.0	2.0	7.0	2.0
	A330	5.4	0.7	7.0	1.0	5.0	0.0
	A340	4.5	1.1	8.0	2.0	14.0	3.0
	DC1030	1.1	3.2	6.0	0.0	7.0	1.0
	DC1040	4.6	2.2	4.0	0.0	2.0	0.0
	DC870	5.1	8.2	14.0	6.0	19.0	6.0
	KC135	0.0	0.0	1.0	0.0	1.0	0.0
	MD11GE	4.5	2.2	3.0	0.0	1.0	0.0
	L1011	1.2	1.0	0.0	0.0	0.0	0.0
	CONCRD	6.7	0.0	0.0	0.0	0.0	0.0
M	737300	17.9	5.8	97.0	21.0	140.0	30.0
	737500	0.0	0.0	2.0	2.0	2.0	2.0
	737700	5.8	2.1	32.0	4.0	52.0	6.0
	727EM2	13.2	5.0	2.0	0.0	2.0	0.0
	737N17	3.3	0.3	0.0	0.0	0.0	0.0
	757PW	59.3	14.9	72.0	12.0	70.0	11.0
	A319	0.4	0.0	4.0	1.0	4.0	1.0
	A320	20.4	2.1	95.0	7.0	135.0	14.0
	DC95HW	6.0	2.9	1.0	0.0	1.0	0.0
	MD83	47.8	4.2	30.0	3.0	1.0	0.0
L	CL600	0.0	0.1	11.0	2.0	13.0	2.0
	CL601	0.8	0.0	64.0	0.0	119.0	2.0
	GIV	0.0	0.0	1.0	0.0	2.0	0.0
	LEAR35	0.0	0.3	1.0	1.0	1.0	1.0
	MU3001	0.0	0.1	4.0	1.0	2.0	2.0
R	EMB145	20.2	3.1	108.0	12.0	157.0	20.0
K	LEAR25	0.0	0.0	0.0	0.0	0.0	0.0
	GIIB	0.0	0.0	0.0	0.0	0.0	0.0
T	C130	0.0	0.0	1.0	0.0	1.0	0.0
	CNA441	1.1	1.6	4.0	0.0	3.0	0.0
	DHC6	11.9	1.6	0.0	0.0	0.0	0.0
	GASEPF	0.0	1.4	1.0	1.0	1.0	1.0
	SD330	0.0	0.0	1.0	0.0	1.0	0.0
	SF340	257.8	27.1	99.0	9.0	0.0	0.0
P	BEC58P	0.0	0.0	2.0	0.0	0.0	0.0

		LGA Operations Totals					
		2000		2006		2011	
Category	**AC Type**	**Day**	**Night**	**Day**	**Night**	**Day**	**Night**
H	767300	6.1	2.3	9.0	2.0	16.0	3.0
	767CF6	6.9	0.5	1.0	0.0	0.0	0.0
M	737300	111.9	15.5	139.0	14.0	127.0	14.0
	737400	22.4	3.6	14.0	2.0	6.0	0.0
	737500	5.1	0.4	0.0	0.0	0.0	0.0
	737700	22.5	4.4	175.0	29.0	119.0	16.0
	727EM2	110.2	10.6	0.0	0.0	0.0	0.0
	737N17	15.7	1.8	8.0	0.0	0.0	0.0
	757PW	68.5	14.8	118.0	21.0	192.0	35.0
	A319	12.8	0.3	13.0	3.0	0.0	0.0
	A320	37.1	4.9	85.0	10.0	125.0	16.0
	DC93LW	24.3	2.7	7.0	1.0	0.0	0.0
	DC95HW	39.0	2.6	0.0	0.0	0.0	0.0
	F10065	2.5	0.3	9.0	2.0	0.0	0.0
	MD83	155.8	24.2	26.0	4.0	25.0	5.0
	MD9025	0.0	0.0	24.0	4.0	21.0	4.0
	717200	1.4	0.1	0.0	0.0	0.0	0.0
	7373B2	0.6	0.0	0.0	0.0	0.0	0.0
L	CL600	2.1	0.5	17.0	4.0	18.0	4.0
	CL601	71.8	4.2	131.0	10.0	152.0	9.0
	GIV	0.0	0.2	7.0	0.0	8.0	0.0
	LEAR35	0.0	0.0	3.0	2.0	3.0	3.0
	MU3001	0.0	0.1	3.0	1.0	2.0	1.0
	FAL20	0.0	0.0	0.0	0.0	0.0	0.0
R	EMB145	46.9	1.5	219.0	4.0	202.0	5.0
K	GIIB	0.0	0.1	0.0	0.0	0.0	0.0
T	CNA441	0.4	0.0	3.0	0.0	2.0	0.0
	DHC6	12.3	0.7	0.0	0.0	0.0	0.0
	DHC8	121.6	4.6	8.0	0.0	0.0	0.0
	GASEPF	0.0	0.0	2.0	1.0	2.0	1.0
	SF340	62.5	1.7	0.0	0.0	0.0	0.0
P	BEC58P	0.0	0.0	2.0	0.0	1.0	0.0
	GASEPV	0.0	0.0	0.0	1.0	0.0	1.0

		PHL Operations Totals					
		2000		2006		2011	
Category	**AC Type**	**Day**	**Night**	**Day**	**Night**	**Day**	**Night**
H	747400	0.0	0.0	4.0	0.0	4.0	1.0
	767300	5.6	1.7	9.0	1.0	9.0	1.0
	777200	0.0	0.0	2.0	0.0	3.0	0.0
	74710Q	3.0	0.6	0.0	0.0	0.0	0.0
	74720B	0.0	0.2	0.0	1.0	0.0	1.0
	767CF6	2.6	0.1	2.0	0.0	2.0	0.0
	A300	0.4	2.3	2.0	0.0	2.0	0.0
	A310	0.4	1.2	13.0	1.0	15.0	1.0
	A330	0.0	0.0	13.0	1.0	12.0	2.0
	A340	0.0	0.0	1.0	0.0	1.0	0.0
	DC870	2.2	9.0	15.0	1.0	15.0	1.0
	KC135	0.0	0.0	1.0	0.0	1.0	0.0
M	737300	128.7	15.7	142.0	19.0	114.0	26.0
	737400	76.6	5.5	26.0	1.0	1.0	1.0
	737500	13.1	2.1	20.0	4.0	4.0	0.0
	737700	31.8	7.8	174.0	28.0	264.0	45.0
	727EM2	31.5	23.5	12.0	4.0	0.0	0.0
	737N17	19.0	2.4	0.0	0.0	0.0	0.0
	757PW	43.7	18.5	96.0	27.0	130.0	30.0
	A319	27.4	2.1	140.0	14.0	176.0	12.0
	A320	17.4	1.2	91.0	9.0	121.0	14.0
	DC93LW	14.5	1.9	0.0	0.0	0.0	0.0
	DC95HW	74.0	8.0	2.0	0.0	1.0	0.0
	F10065	46.7	2.1	2.0	0.0	2.0	0.0
	MD83	62.7	10.0	46.0	8.0	14.0	1.0
	MD9025	0.0	0.1	33.0	5.0	40.0	7.0
	717200	3.5	0.4	0.0	0.0	0.0	0.0
L	CL600	4.1	0.7	36.0	1.0	43.0	1.0
	CL601	38.0	1.2	113.0	4.0	107.0	2.0
	GIV	0.1	0.2	13.0	0.0	21.0	0.0
	LEAR35	0.9	14.3	15.0	4.0	17.0	4.0
	MU3001	0.9	0.2	10.0	0.0	8.0	0.0
	FAL20	0.2	0.2	0.0	0.0	0.0	0.0
R	EMB145	21.9	1.5	136.0	10.0	275.0	16.0
K	LEAR25	0.5	1.0	1.0	0.0	0.0	0.0
	GIIB	0.3	0.2	0.0	0.0	0.0	0.0
T	CNA441	1.0	12.1	11.0	4.0	11.0	4.0
	DHC6	45.8	4.1	28.0	0.0	0.0	0.0
	DHC8	178.7	12.5	88.0	7.0	11.0	0.0
	GASEPF	0.0	0.0	3.0	0.0	3.0	0.0
	HS748A	6.7	0.1	31.0	3.0	29.0	2.0
	SF340	27.5	3.1	8.0	0.0	0.0	0.0
P	BEC58P	0.9	9.7	8.0	1.0	8.0	1.0
	GASEPV	0.0	0.0	3.0	0.0	3.0	0.0

		ABE Operations Totals					
		2000		2006		2011	
Category	**AC Type**	**Day**	**Night**	**Day**	**Night**	**Day**	**Night**
M	737300	10.7	3.5	16.0	4.0	3.0	1.0
	737400	0.0	0.7	0.0	0.0	0.0	0.0
	737500	0.5	0.4	1.0	1.0	0.0	0.0
	737700	1.6	0.7	2.0	1.0	13.0	3.0
	727EM2	0.9	4.0	0.0	0.0	0.0	0.0
	737N17	5.0	0.6	0.0	0.0	0.0	0.0
	757PW	0.0	0.0	1.0	17.0	1.0	20.0
	A319	0.0	0.0	3.0	0.0	6.0	2.0
	A320	0.0	0.0	2.0	0.0	2.0	0.0
	DC93LW	0.0	0.1	0.0	0.0	0.0	0.0
	DC95HW	8.6	5.6	0.0	0.0	0.0	0.0
	F10065	2.3	0.4	0.0	0.0	0.0	0.0
	MD83	4.0	0.3	0.0	0.0	0.0	0.0
L	CL600	0.0	0.2	8.0	0.0	12.0	0.0
	CL601	8.0	3.0	22.0	6.0	24.0	6.0
	GIV	0.0	0.1	1.0	0.0	1.0	0.0
	LEAR35	0.0	0.3	0.0	0.0	0.0	0.0
	MU3001	0.0	0.0	4.0	0.0	4.0	0.0
	FAL20	0.0	0.1	0.0	0.0	0.0	0.0
R	EMB145	0.0	0.0	6.0	1.0	21.0	3.0
	BAE146	2.5	0.0	0.0	0.0	0.0	0.0
K	GIIB	0.0	0.0	0.0	0.0	0.0	0.0
T	C130	1.1	0.0	1.0	0.0	1.0	0.0
	CNA441	0.0	0.1	7.0	0.0	11.0	0.0
	DHC6	17.9	3.5	0.0	0.0	0.0	0.0
	DHC8	25.1	3.1	17.0	1.0	0.0	0.0
	GASEPF	0.8	0.8	4.0	0.0	4.0	0.0
	SF340	2.3	0.4	0.0	0.0	0.0	0.0
P	BEC58P	0.0	0.1	3.0	0.0	3.0	0.0
	GASEPV	1.6	0.0	0.0	1.0	0.0	1.0

		HPN Operations Totals					
		2000		2006		2011	
Category	**AC Type**	**Day**	**Night**	**Day**	**Night**	**Day**	**Night**
M	737300	1.0	0.2	0.0	0.0	0.0	0.0
	737500	14.1	2.2	10.0	2.0	0.0	0.0
	737700	0.0	0.0	0.0	0.0	6.0	2.0
	A319	0.0	0.0	0.0	0.0	7.0	1.0
	DC95HW	7.3	0.1	0.0	0.0	0.0	0.0
	F10065	11.7	1.7	11.0	3.0	0.0	0.0
	MD9025	0.0	0.0	0.0	0.0	11.0	3.0
L	CL600	22.7	2.9	72.0	11.0	84.0	12.0
	CL601	15.3	0.6	28.0	5.0	28.0	5.0
	GIV	1.5	1.3	17.0	2.0	17.0	2.0
	LEAR35	1.4	0.2	0.0	0.0	0.0	0.0
	MU3001	3.4	0.8	23.0	1.0	22.0	1.0
	FAL20	0.2	0.3	0.0	0.0	0.0	0.0
R	EMB145	9.8	2.4	37.0	2.0	96.0	5.0
	BAE146	17.5	4.8	0.0	0.0	0.0	0.0
K	LEAR25	0.0	0.0	0.0	0.0	0.0	0.0
	GIIB	0.4	0.2	0.0	0.0	0.0	0.0
T	CNA441	0.6	0.1	18.0	3.0	24.0	3.0
	DHC6	57.4	0.8	0.0	0.0	0.0	0.0
	DHC8	48.3	3.6	9.0	1.0	0.0	0.0
	GASEPF	0.0	0.0	7.0	0.0	7.0	0.0
	HS748A	0.0	0.0	37.0	1.0	0.0	0.0
	SF340	23.8	2.7	10.0	2.0	0.0	0.0
P	BEC58P	0.1	0.2	5.0	0.0	5.0	0.0
	GASEPV	0.1	0.0	0.0	0.0	0.0	0.0

		ISP Operations Totals					
		2000		2006		2011	
Category	**AC Type**	**Day**	**Night**	**Day**	**Night**	**Day**	**Night**
M	737300	4.5	0.3	18.0	2.0	24.0	2.0
	737500	0.0	0.0	4.0	2.0	4.0	2.0
	737700	28.7	2.3	50.0	2.0	60.0	2.0
	737N17	15.7	0.7	0.0	0.0	0.0	0.0
	757PW	0.0	0.0	2.0	0.0	3.0	0.0
	DC93LW	5.0	0.0	0.0	0.0	0.0	0.0
	DC95HW	0.9	0.8	0.0	0.0	0.0	0.0
	MD83	9.6	0.4	0.0	0.0	0.0	0.0
L	CL600	0.7	0.3	8.0	2.0	11.0	2.0
	CL601	10.9	3.5	15.0	4.0	21.0	3.0
	GIV	0.1	0.2	2.0	1.0	2.0	1.0
	LEAR35	0.2	0.2	0.0	0.0	0.0	0.0
	MU3001	0.2	0.2	3.0	1.0	3.0	1.0
R	EMB145	2.7	1.9	13.0	1.0	38.0	2.0
K	GIIB	0.3	0.1	0.0	0.0	0.0	0.0
T	C130	0.0	0.0	1.0	0.0	1.0	0.0
	CNA441	0.1	0.1	8.0	0.0	9.0	1.0
	DHC6	11.6	0.7	0.0	0.0	0.0	0.0
	DHC8	14.3	1.7	17.0	1.0	0.0	0.0
	GASEPF	0.0	0.1	7.0	0.0	7.0	0.0
	SF340	18.9	0.9	8.0	0.0	0.0	0.0
P	BEC58P	0.1	0.1	3.0	0.0	3.0	0.0
	GASEPV	0.8	0.1	0.0	0.0	0.0	0.0

		TEB Operations Totals					
		2000		2006		2011	
Category	**AC Type**	**Day**	**Night**	**Day**	**Night**	**Day**	**Night**
M	737300	0.0	0.0	0.0	0.0	0.0	0.0
	737400	0.0	0.0	0.0	0.0	0.0	0.0
	737700	0.0	0.0	0.0	0.0	0.0	0.0
	737N17	0.0	0.1	0.0	0.0	0.0	0.0
	DC93LW	0.0	0.1	0.0	0.0	0.0	0.0
	DC95HW	0.0	0.2	0.0	0.0	0.0	0.0
	BAC111	0.0	0.1	0.0	0.0	0.0	0.0
L	CL600	123.5	14.6	138.0	28.0	160.0	36.0
	GIV	23.3	4.7	29.0	11.0	30.0	15.0
	LEAR35	24.4	17.3	40.0	9.0	61.0	11.0
	MU3001	53.0	5.3	39.0	4.0	38.0	5.0
	FAL20	20.6	4.3	0.0	0.0	0.0	0.0
R	BAE146	0.0	0.0	0.0	0.0	0.0	0.0
K	LEAR25	2.2	1.1	0.0	0.0	0.0	0.0
	GIIB	18.9	4.6	0.0	0.0	0.0	0.0
T	CNA441	22.5	5.1	26.0	5.0	26.0	5.0
	DHC6	0.3	0.1	1.0	0.0	1.0	0.0
	GASEPF	0.6	2.7	60.0	5.0	60.0	5.0
P	BEC58P	12.9	20.6	35.0	12.0	35.0	13.0
	GASEPV	5.5	1.3	0.0	8.0	0.0	8.0

		ACY Operations Totals					
		2000		2006		2011	
Category	**AC Type**	**Day**	**Night**	**Day**	**Night**	**Day**	**Night**
H	74720B	0.0	0.0	0.0	0.0	0.0	0.0
	A300	0.0	0.0	0.0	0.0	0.0	0.0
	A310	0.0	0.0	0.0	0.0	0.0	0.0
	A330	0.0	0.0	0.0	0.0	0.0	0.0
	DC1030	0.2	0.0	0.0	0.0	0.0	0.0
	KC135R	0.0	0.0	0.0	0.0	0.0	0.0
M	737300	0.0	0.0	0.0	0.0	0.0	0.0
	737400	0.0	0.0	0.0	0.0	0.0	0.0
	737700	0.0	0.0	0.0	0.0	0.0	0.0
	727EM2	0.3	0.1	0.0	0.0	0.0	0.0
	737N17	3.4	0.7	0.0	0.0	0.0	0.0
	757PW	0.2	0.0	9.0	3.0	10.0	4.0
	DC93LW	13.5	1.3	0.0	0.0	0.0	0.0
	F10065	0.0	0.0	0.0	0.0	0.0	0.0
	MD83	4.0	0.9	18.0	0.0	19.0	0.0
L	CL600	2.7	0.3	3.0	3.0	2.0	6.0
	CL601	0.1	0.0	8.0	0.0	8.0	0.0
	GIV	0.4	0.0	0.0	0.0	0.0	0.0
	LEAR35	1.9	0.3	0.0	0.0	0.0	0.0
	MU3001	2.3	0.2	0.0	3.0	0.0	3.0
	FAL20	0.3	0.0	0.0	0.0	0.0	0.0
	A7D	0.7	0.1	0.0	0.0	0.0	0.0
	IA1125	0.0	0.0	0.0	0.0	0.0	0.0
R	EMB145	0.0	0.0	0.0	0.0	0.0	0.0
K	LEAR25	1.0	0.1	0.0	0.0	0.0	0.0
	GIIB	0.4	0.0	0.0	0.0	0.0	0.0
T	C130	1.1	0.0	6.0	0.0	6.0	0.0
	CNA441	6.3	0.6	9.0	0.0	12.0	0.0
	DHC6	14.3	1.2	0.0	0.0	0.0	0.0
	DHC8	0.1	0.0	0.0	0.0	0.0	0.0
	GASEPF	0.0	0.0	2.0	1.0	3.0	0.0
	HS748A	0.1	0.0	6.0	0.0	6.0	0.0
	SD330	0.3	0.0	0.0	0.0	0.0	0.0
	SF340	0.4	0.0	0.0	0.0	0.0	0.0
	CVR580	0.0	0.0	0.0	0.0	0.0	0.0
P	BEC58P	2.8	0.2	4.0	0.0	4.0	0.0
	GASEPV	3.8	0.2	0.0	0.0	0.0	0.0

		BDR Operations Totals					
		2000		2006		2011	
Category	**AC Type**	**Day**	**Night**	**Day**	**Night**	**Day**	**Night**
M	DC93LW	0.0	0.0	0.0	0.0	0.0	0.0
L	CL600	4.0	0.5	5.0	2.0	5.0	3.0
	GIV	0.7	0.1	1.0	0.0	1.0	0.0
	LEAR35	0.9	0.0	0.0	0.0	0.0	0.0
	MU3001	2.6	0.2	4.0	0.0	4.0	0.0
	FAL20	0.3	0.0	0.0	0.0	0.0	0.0
	IA1125	0.0	0.0	0.0	0.0	0.0	0.0
R	BAE146	0.0	0.0	0.0	0.0	0.0	0.0
K	LEAR25	0.2	0.1	0.0	0.0	0.0	0.0
	GIIB	0.4	0.1	0.0	0.0	0.0	0.0
T	CNA441	2.8	0.1	3.0	1.0	4.0	1.0
	DHC6	0.1	0.0	0.0	0.0	0.0	0.0
	DHC8	0.0	0.0	0.0	0.0	0.0	0.0
	GASEPF	0.7	0.2	3.0	0.0	3.0	0.0
	HS748A	0.0	0.0	0.0	0.0	0.0	0.0
	SF340	0.0	0.0	0.0	0.0	0.0	0.0
P	BEC58P	2.4	0.1	2.0	2.0	2.0	2.0
	GASEPV	5.2	0.2	0.0	1.0	0.0	1.0

		CDW Operations Totals					
		2000		2006		2011	
Category	**AC Type**	**Day**	**Night**	**Day**	**Night**	**Day**	**Night**
L	LEAR35	0.0	0.0	0.0	0.0	0.0	0.0
	MU3001	0.3	0.0	1.0	0.0	1.0	0.0
K	LEAR25	0.0	0.0	0.0	0.0	0.0	0.0
T	CNA441	1.5	0.0	1.0	2.0	1.0	2.0
	DHC6	0.1	0.0	0.0	0.0	0.0	0.0
	GASEPF	0.2	0.0	7.0	0.0	6.0	0.0
P	BEC58P	4.5	0.4	2.0	2.0	2.0	2.0
	GASEPV	6.6	0.3	0.0	0.0	1.0	0.0

		FOK Operations Totals					
		2000		2006		2011	
Category	**AC Type**	**Day**	**Night**	**Day**	**Night**	**Day**	**Night**
M	727EM2	0.0	0.0	0.0	0.0	0.0	0.0
L	CL600	0.9	0.1	2.0	1.0	2.0	1.0
	CL601	0.0	0.0	0.0	0.0	0.0	0.0
	GIV	0.2	0.0	0.0	0.0	0.0	0.0
	LEAR35	0.2	0.0	0.0	0.0	0.0	0.0
	MU3001	0.4	0.0	0.0	0.0	0.0	0.0
	FAL20	0.1	0.0	0.0	0.0	0.0	0.0
	A7D	0.0	0.0	0.0	0.0	0.0	0.0
K	LEAR25	0.0	0.0	0.0	0.0	0.0	0.0
	GIIB	0.1	0.0	0.0	0.0	0.0	0.0
T	C130	0.1	0.0	1.0	0.0	1.0	0.0
	CNA441	0.2	0.0	0.0	0.0	0.0	0.0
	DHC6	0.1	0.0	0.0	0.0	0.0	0.0
	GASEPF	0.0	0.0	0.0	0.0	0.0	0.0
P	BEC58P	0.2	0.0	0.0	0.0	0.0	0.0
	GASEPV	0.2	0.0	0.0	0.0	0.0	0.0

		FRG Operations Totals					
		2000		2006		2011	
Category	**AC Type**	**Day**	**Night**	**Day**	**Night**	**Day**	**Night**
M	737300	0.0	0.0	0.0	0.0	0.0	0.0
	737400	0.0	0.0	0.0	0.0	0.0	0.0
	737700	0.0	0.0	0.0	0.0	0.0	0.0
	727EM2	0.0	0.0	0.0	0.0	0.0	0.0
	737N17	0.0	0.0	0.0	0.0	0.0	0.0
	A320	0.0	0.0	0.0	0.0	0.0	0.0
	DC93LW	0.0	0.0	0.0	0.0	0.0	0.0
	DC95HW	0.0	0.0	0.0	0.0	0.0	0.0
L	CL600	6.0	0.6	16.0	3.0	17.0	4.0
	GIV	1.6	0.3	2.0	1.0	2.0	1.0
	LEAR35	2.1	0.4	0.0	0.0	0.0	0.0
	MU3001	3.4	0.4	7.0	0.0	7.0	1.0
	FAL20	1.4	0.1	0.0	0.0	0.0	0.0
	CNA500	0.0	0.0	0.0	0.0	0.0	0.0
K	LEAR25	1.4	0.3	0.0	0.0	0.0	0.0
	GIIB	1.2	0.2	0.0	0.0	0.0	0.0
T	CNA441	3.9	0.4	9.0	0.0	10.0	0.0
	DHC6	2.3	0.3	0.0	0.0	0.0	0.0
	DHC8	0.0	0.0	0.0	0.0	0.0	0.0
	GASEPF	0.3	0.0	8.0	0.0	8.0	0.0
	HS748A	0.0	0.0	0.0	0.0	0.0	0.0
	SD330	0.2	0.0	0.0	0.0	0.0	0.0
	SF340	0.0	0.0	0.0	0.0	0.0	0.0
P	BEC58P	6.8	4.3	6.0	4.0	6.0	4.0
	GASEPV	8.0	0.5	0.0	0.0	0.0	0.0

		HVN Operations Totals					
		2000		2006		2011	
Category	**AC Type**	**Day**	**Night**	**Day**	**Night**	**Day**	**Night**
M	DC93LW	0.0	0.0	0.0	0.0	0.0	0.0
L	CL600	1.5	0.1	4.0	0.0	4.0	0.0
	GIV	0.1	0.0	0.0	0.0	0.0	0.0
	LEAR35	0.6	0.0	0.0	0.0	0.0	0.0
	MU3001	1.5	0.0	1.0	0.0	1.0	0.0
	FAL20	0.4	0.0	0.0	0.0	0.0	0.0
R	EMB145	0.0	0.0	6.0	1.0	12.0	4.0
K	LEAR25	0.1	0.0	0.0	0.0	0.0	0.0
	GIIB	0.2	0.0	0.0	0.0	0.0	0.0
T	CNA441	1.2	0.0	1.0	0.0	1.0	0.0
	DHC6	0.0	0.0	0.0	0.0	0.0	0.0
	DHC8	11.9	1.0	5.0	2.0	0.0	0.0
	GASEPF	0.1	0.0	3.0	0.0	3.0	0.0
P	BEC58P	1.4	0.0	0.0	1.0	0.0	1.0
	GASEPV	1.6	0.1	0.0	0.0	0.0	0.0

		ILG Operations Totals					
		2000		2006		2011	
Category	**AC Type**	**Day**	**Night**	**Day**	**Night**	**Day**	**Night**
H	DC870	0.0	0.0	0.0	0.0	0.0	0.0
M	727EM2	0.0	0.0	0.0	0.0	0.0	0.0
	DC93LW	0.1	0.0	0.0	0.0	0.0	0.0
L	CL600	14.8	1.1	29.0	2.0	36.0	2.0
	CL601	0.0	0.0	0.0	0.0	0.0	0.0
	GIV	3.0	0.2	2.0	1.0	2.0	1.0
	LEAR35	5.4	0.2	5.0	0.0	5.0	0.0
	MU3001	3.5	0.1	6.0	0.0	6.0	0.0
	FAL20	3.7	0.4	0.0	0.0	0.0	0.0
	IA1125	0.1	0.0	0.0	0.0	0.0	0.0
K	LEAR25	1.9	0.2	0.0	0.0	0.0	0.0
	GIIB	4.4	0.4	0.0	0.0	0.0	0.0
T	C130	1.6	0.0	3.0	0.0	3.0	0.0
	CNA441	6.3	0.6	9.0	0.0	13.0	0.0
	DHC6	0.4	0.0	0.0	0.0	0.0	0.0
	DHC8	1.9	0.1	0.0	0.0	0.0	0.0
	GASEPF	1.6	0.1	5.0	0.0	5.0	0.0
	HS748A	0.1	0.0	0.0	0.0	0.0	0.0
	CVR580	0.2	0.0	0.0	0.0	0.0	0.0
	L188	0.1	0.0	0.0	0.0	0.0	0.0
P	BEC58P	4.2	0.1	6.0	2.0	6.0	3.0
	GASEPV	6.2	0.1	1.0	1.0	1.0	1.0

		LDJ Operations Totals					
		2000		2006		2011	
Category	**AC Type**	**Day**	**Night**	**Day**	**Night**	**Day**	**Night**
L	CL600	0.0	0.0	0.0	0.0	0.0	0.0
	MU3001	0.0	0.0	0.0	0.0	0.0	0.0
T	CNA441	0.1	0.0	0.0	0.0	0.0	0.0
	DHC6	0.0	0.0	0.0	0.0	0.0	0.0
	GASEPF	0.0	0.0	0.0	1.0	0.0	1.0
P	BEC58P	0.3	0.0	0.0	0.0	0.0	0.0
	GASEPV	0.5	0.0	0.0	0.0	0.0	0.0

		MMU Operations Totals					
		2000		2006		2011	
Category	**AC Type**	**Day**	**Night**	**Day**	**Night**	**Day**	**Night**
M	737N17	0.0	0.0	0.0	0.0	0.0	0.0
L	CL600	27.3	2.4	46.0	2.0	53.0	2.0
	CL601	0.0	0.0	0.0	0.0	0.0	0.0
	GIV	9.0	1.0	10.0	0.0	10.0	0.0
	LEAR35	6.8	0.6	0.0	0.0	0.0	0.0
	MU3001	11.4	0.9	15.0	0.0	15.0	0.0
	FAL20	3.6	0.5	0.0	0.0	0.0	0.0
	IA1125	0.0	0.0	0.0	0.0	0.0	0.0
K	LEAR25	0.8	0.1	0.0	0.0	0.0	0.0
	GIIB	2.9	0.3	0.0	0.0	0.0	0.0
T	CNA441	8.0	0.4	14.0	0.0	20.0	0.0
	DHC6	0.4	0.0	0.0	0.0	0.0	0.0
	GASEPF	0.3	0.1	7.0	0.0	7.0	0.0
	HS748A	0.3	0.0	0.0	0.0	0.0	0.0
	SF340	2.5	0.3	0.0	0.0	0.0	0.0
P	BEC58P	7.0	1.5	16.0	0.0	17.0	0.0
	GASEPV	10.4	0.4	0.0	0.0	0.0	0.0

		PNE Operations Totals					
		2000		2006		2011	
Category	**AC Type**	**Day**	**Night**	**Day**	**Night**	**Day**	**Night**
L	CL600	4.8	0.3	9.0	0.0	12.0	0.0
	GIV	1.1	0.0	1.0	0.0	1.0	0.0
	LEAR35	2.8	0.2	0.0	0.0	0.0	0.0
	MU3001	4.1	0.3	5.0	0.0	5.0	0.0
	FAL20	0.7	0.1	0.0	0.0	0.0	0.0
K	LEAR25	0.5	0.1	0.0	0.0	0.0	0.0
	GIIB	0.2	0.0	0.0	0.0	0.0	0.0
T	CNA441	6.0	0.5	9.0	0.0	10.0	0.0
	DHC6	0.3	0.0	0.0	0.0	0.0	0.0
	GASEPF	0.1	0.0	4.0	1.0	4.0	1.0
	HS748A	0.1	0.0	0.0	0.0	0.0	0.0
P	BEC58P	7.1	0.8	5.0	7.0	5.0	7.0
	GASEPV	6.8	0.2	0.0	0.0	0.0	0.0

		SWF Operations Totals					
		2000		2006		2011	
Category	**AC Type**	**Day**	**Night**	**Day**	**Night**	**Day**	**Night**
H	74720B	0.4	0.2	0.0	0.0	0.0	0.0
	DC870	2.6	1.0	5.0	1.0	6.0	0.0
	KC135	0.0	0.0	3.0	0.0	4.0	0.0
	707QN	0.3	0.0	0.0	0.0	0.0	0.0
M	737700	0.0	0.0	0.0	0.0	24.0	2.0
	727EM2	0.4	1.9	1.0	1.0	1.0	1.0
	757PW	0.0	0.7	7.0	9.0	11.0	10.0
	DC93LW	0.0	0.1	0.0	0.0	0.0	0.0
	DC95HW	0.4	3.4	2.0	1.0	2.0	1.0
	F10065	8.1	2.5	3.0	1.0	0.0	0.0
	MD9025	0.0	0.0	7.0	1.0	10.0	2.0
L	CL600	0.6	0.4	8.0	0.0	10.0	2.0
	CL601	32.7	4.8	31.0	5.0	35.0	5.0
	GIV	1.1	0.2	2.0	1.0	2.0	1.0
	LEAR35	0.0	0.0	0.0	0.0	0.0	0.0
	MU3001	0.5	0.4	5.0	0.0	5.0	0.0
	FAL20	0.0	0.0	0.0	0.0	0.0	0.0
K	LEAR25	0.0	0.1	0.0	0.0	0.0	0.0
	GIIB	0.0	0.0	0.0	0.0	0.0	0.0
T	C130	0.0	0.2	0.0	0.0	0.0	0.0
	CNA441	0.0	0.2	4.0	2.0	6.0	2.0
	DHC6	7.0	1.2	0.0	0.0	0.0	0.0
	DHC8	7.0	0.2	0.0	0.0	0.0	0.0
	GASEPF	0.0	0.0	2.0	1.0	2.0	1.0
	SF340	6.8	0.1	4.0	0.0	0.0	0.0
P	BEC58P	0.2	1.5	3.0	1.0	3.0	1.0
	GASEPV	0.6	0.1	0.0	0.0	0.0	0.0

		TTN Operations Totals					
		2000		2006		2011	
Category	**AC Type**	**Day**	**Night**	**Day**	**Night**	**Day**	**Night**
M	727EM2	0.1	0.0	0.0	0.0	0.0	0.0
	BAC111	0.0	0.0	0.0	0.0	0.0	0.0
L	CL600	6.9	0.5	12.0	1.0	16.0	1.0
	CL601	0.2	0.0	0.0	0.0	0.0	0.0
	GIV	4.3	0.6	4.0	0.0	4.0	0.0
	LEAR35	1.3	0.2	0.0	0.0	0.0	0.0
	MU3001	5.3	0.4	8.0	0.0	8.0	0.0
	FAL20	1.6	0.2	0.0	0.0	0.0	0.0
R	EMB145	0.0	0.0	0.0	0.0	16.0	0.0
K	LEAR25	0.7	0.1	0.0	0.0	0.0	0.0
	GIIB	1.8	0.3	0.0	0.0	0.0	0.0
T	CNA441	4.5	0.3	10.0	0.0	11.0	0.0
	DHC6	0.3	0.0	0.0	0.0	0.0	0.0
	DHC8	21.8	0.5	12.0	0.0	0.0	0.0
	GASEPF	0.4	0.0	7.0	0.0	7.0	0.0
	HS748A	0.0	0.0	0.0	0.0	0.0	0.0
	SD330	0.0	0.0	1.0	0.0	1.0	0.0
P	BEC58P	3.0	0.1	2.0	0.0	2.0	0.0
	GASEPV	5.2	0.1	0.0	0.0	0.0	0.0

		WRI Operations Totals					
		2000		2006		2011	
Category	**AC Type**	**Day**	**Night**	**Day**	**Night**	**Day**	**Night**
H	74710Q	0.0	0.0	0.0	0.0	0.0	0.0
	74720B	0.1	0.0	0.0	0.0	0.0	0.0
	DC1030	12.5	1.3	8.0	1.0	8.0	1.0
	DC870	0.8	0.3	0.0	0.0	0.0	0.0
	KC135	0.1	0.0	11.0	3.0	11.0	3.0
	KC135R	0.4	0.0	0.0	0.0	0.0	0.0
	707QN	4.1	0.6	0.0	0.0	0.0	0.0
	KC135B	3.4	0.1	0.0	0.0	0.0	0.0
M	737300	0.0	0.0	0.0	0.0	0.0	0.0
	737700	0.0	0.0	0.0	0.0	0.0	0.0
	727EM2	0.1	0.0	0.0	0.0	0.0	0.0
	DC93LW	0.1	0.0	0.0	0.0	0.0	0.0
L	CL600	0.1	0.0	0.0	0.0	0.0	0.0
	GIV	0.0	0.0	0.0	0.0	0.0	0.0
	LEAR35	0.3	0.1	0.0	0.0	0.0	0.0
	MU3001	0.1	0.0	0.0	0.0	0.0	0.0
	FAL20	0.0	0.0	0.0	0.0	0.0	0.0
	A7D	0.1	0.0	0.0	0.0	0.0	0.0
K	LEAR25	0.1	0.0	0.0	0.0	0.0	0.0
	GIIB	0.0	0.0	0.0	0.0	0.0	0.0
T	C130	1.4	0.1	5.0	1.0	5.0	1.0
	CNA441	0.9	0.0	0.0	0.0	0.0	0.0
	DHC6	0.4	0.0	0.0	0.0	0.0	0.0
P	BEC58P	0.1	0.0	0.0	0.0	0.0	0.0
	GASEPV	0.4	0.0	0.0	0.0	0.0	0.0

Attachment B

MODELED RUNWAY USE TABLES – BASELINE AND FUTURE CONDITIONS

KABE Baseline & Future No Action Departure Runway Use Percentages											
	A/C Category	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	6	0.0%	0.0%	42.9%	46.2%	48.4%	46.3%	35.3%	29.6%	52.1%	51.1%
	13	0.0%	0.0%	0.0%	0.0%	0.0%	1.5%	3.8%	3.8%	6.6%	0.0%
	24	0.0%	0.0%	53.1%	52.2%	44.6%	43.9%	49.6%	58.9%	35.0%	0.0%
	31	0.0%	0.0%	4.0%	1.6%	7.0%	8.3%	11.3%	7.7%	6.3%	48.9%
2006	6	0.0%	0.0%	43.0%	55.0%	41.0%	62.0%	23.0%	17.0%	56.0%	0.0%
	13	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%	19.0%	13.0%	8.0%	0.0%
	24	0.0%	0.0%	52.0%	44.0%	46.0%	38.0%	46.0%	54.0%	33.0%	0.0%
	31	0.0%	0.0%	4.0%	1.0%	12.0%	0.0%	12.0%	15.0%	2.0%	0.0%
2011	6	0.0%	0.0%	43.0%	53.0%	37.0%	50.0%	25.0%	0.0%	56.0%	0.0%
	13	0.0%	0.0%	0.0%	0.0%	1.0%	3.0%	27.0%	0.0%	8.0%	0.0%
	24	0.0%	0.0%	52.0%	46.0%	47.0%	44.0%	36.0%	0.0%	33.0%	0.0%
	31	0.0%	0.0%	4.0%	1.0%	16.0%	3.0%	12.0%	0.0%	2.0%	0.0%

KABE Baseline & Future No Action
Arrival Runway Use Percentages

	A/C Category	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	6	0.0%	0.0%	48.0%	71.0%	51.0%	67.0%	39.0%	60.0%	76.0%	75.0%
	13	0.0%	0.0%	0.0%	1.0%	1.0%	0.0%	1.0%	6.0%	0.0%	25.0%
	24	0.0%	0.0%	50.0%	26.0%	42.0%	31.0%	51.0%	23.0%	10.0%	0.0%
	31	0.0%	0.0%	3.0%	2.0%	6.0%	2.0%	9.0%	10.0%	14.0%	0.0%
2006	6	0.0%	0.0%	48.0%	70.0%	50.0%	79.0%	30.0%	0.0%	16.0%	87.0%
	13	0.0%	0.0%	1.0%	2.0%	0.0%	0.0%	6.0%	0.0%	0.0%	6.0%
	24	0.0%	0.0%	48.0%	27.0%	47.0%	21.0%	56.0%	0.0%	84.0%	6.0%
	31	0.0%	0.0%	3.0%	2.0%	3.0%	1.0%	9.0%	0.0%	0.0%	2.0%
2011	6	0.0%	0.0%	48.4%	69.6%	54.0%	78.6%	28.2%	0.0%	15.9%	86.5%
	13	0.0%	0.0%	0.5%	1.3%	0.3%	0.0%	10.0%	0.0%	0.0%	5.8%
	24	0.0%	0.0%	48.4%	26.3%	42.5%	20.6%	59.8%	0.0%	84.1%	5.8%
	31	0.0%	0.0%	2.7%	2.8%	3.2%	0.7%	2.0%	0.0%	0.0%	1.9%

KACY Baseline & Future No Action Departure Runway Use Percentages											
	A/C Category	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	4	0.0%	0.0%	2.1%	0.0%	9.7%	21.7%	13.7%	23.1%	22.1%	19.1%
	13	0.0%	20.8%	42.8%	29.3%	40.8%	23.1%	34.1%	32.1%	43.5%	43.2%
	22	0.0%	0.0%	2.7%	6.8%	10.1%	2.0%	13.9%	10.9%	9.2%	12.7%
	31	0.0%	79.2%	52.4%	64.0%	39.3%	53.2%	38.4%	34.0%	25.2%	25.0%
2006	4	0.0%	0.0%	3.5%	5.7%	41.4%	61.6%	11.9%	19.3%	17.5%	0.0%
	13	0.0%	0.0%	42.6%	28.5%	0.9%	0.0%	35.7%	21.1%	46.0%	0.0%
	22	0.0%	0.0%	4.4%	4.9%	45.7%	38.4%	13.4%	14.0%	8.8%	0.0%
	31	0.0%	0.0%	49.4%	61.0%	12.1%	0.0%	38.9%	45.6%	27.7%	0.0%
2011	4	0.0%	0.0%	3.5%	5.7%	9.2%	10.3%	11.9%	0.0%	17.5%	0.0%
	13	0.0%	0.0%	42.6%	28.5%	39.1%	24.2%	35.8%	0.0%	46.0%	0.0%
	22	0.0%	0.0%	4.4%	4.9%	8.0%	5.3%	13.4%	0.0%	8.8%	0.0%
	31	0.0%	0.0%	49.4%	61.0%	43.7%	60.2%	38.9%	0.0%	27.7%	0.0%

KACY Baseline & Future No Action
Arrival Runway Use Percentages

	A/C Category	H		M		L		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	4	0.0%	0.0%	2.4%	3.6%	10.4%	22.5%	8.8%	8.8%	17.7%	49.9%
	13	50.0%	0.0%	53.4%	48.2%	51.2%	47.2%	49.3%	67.9%	40.4%	37.6%
	22	0.0%	0.0%	1.1%	3.6%	5.8%	9.9%	5.1%	0.0%	12.0%	12.5%
	31	50.0%	0.0%	43.1%	44.6%	32.5%	20.4%	36.8%	23.3%	29.9%	0.0%
2006	4	0.0%	0.0%	4.6%	6.2%	5.0%	6.2%	9.2%	0.0%	20.0%	0.0%
	13	0.0%	0.0%	52.8%	47.8%	53.7%	47.8%	50.0%	0.0%	40.6%	100.0%
	22	0.0%	0.0%	2.4%	4.3%	2.2%	4.3%	5.2%	0.0%	14.7%	0.0%
	31	0.0%	0.0%	40.2%	41.6%	39.1%	41.6%	35.6%	0.0%	24.7%	0.0%
2011	4	0.0%	0.0%	4.6%	6.2%	5.1%	6.2%	9.6%	0.0%	20.0%	0.0%
	13	0.0%	0.0%	52.8%	47.8%	53.9%	47.8%	50.4%	0.0%	40.6%	100.0%
	22	0.0%	0.0%	2.4%	4.3%	2.2%	4.3%	5.1%	0.0%	14.7%	0.0%
	31	0.0%	0.0%	40.2%	41.6%	38.9%	41.6%	34.9%	0.0%	24.7%	0.0%

KBDR Baseline & Future No Action Departure Runway Use Percentages											
	A/C Category	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	6	0.0%	0.0%	0.0%	0.0%	18.5%	21.8%	33.3%	75.0%	31.7%	50.0%
	11	0.0%	0.0%	0.0%	0.0%	20.4%	28.2%	17.3%	0.0%	12.9%	20.0%
	24	0.0%	0.0%	0.0%	0.0%	38.2%	24.5%	31.0%	12.5%	33.2%	20.0%
	29	0.0%	0.0%	0.0%	0.0%	23.0%	25.5%	18.4%	12.5%	22.2%	10.0%
2006	6	0.0%	0.0%	0.0%	0.0%	18.5%	25.0%	34.1%	75.0%	0.0%	50.0%
	11	0.0%	0.0%	0.0%	0.0%	20.3%	25.0%	16.5%	0.0%	0.0%	20.0%
	24	0.0%	0.0%	0.0%	0.0%	38.3%	20.8%	31.9%	12.5%	0.0%	20.0%
	29	0.0%	0.0%	0.0%	0.0%	22.9%	29.2%	17.6%	12.5%	0.0%	10.0%
2011	6	0.0%	0.0%	0.0%	0.0%	18.5%	25.0%	34.1%	75.0%	0.0%	50.0%
	11	0.0%	0.0%	0.0%	0.0%	20.3%	25.0%	16.5%	0.0%	0.0%	20.0%
	24	0.0%	0.0%	0.0%	0.0%	38.3%	20.8%	31.9%	12.5%	0.0%	20.0%
	29	0.0%	0.0%	0.0%	0.0%	22.9%	29.2%	17.6%	12.5%	0.0%	10.0%

KBDR Baseline & Future No Action
Arrival Runway Use Percentages

	A/C Category	H		M		L		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	6	0.0%	0.0%	100.0%	0.0%	21.4%	45.5%	45.6%	0.0%	38.2%	50.0%
	11	0.0%	0.0%	0.0%	0.0%	27.5%	22.6%	5.8%	83.3%	4.4%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	31.0%	18.2%	40.8%	16.7%	47.2%	50.0%
	29	0.0%	0.0%	0.0%	0.0%	20.1%	13.7%	7.8%	0.0%	10.2%	0.0%
2006	6	0.0%	0.0%	0.0%	0.0%	21.5%	52.4%	45.3%	0.0%	38.3%	50.0%
	11	0.0%	0.0%	0.0%	0.0%	27.5%	19.0%	5.7%	0.0%	4.4%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	31.0%	14.3%	41.5%	0.0%	47.1%	50.0%
	29	0.0%	0.0%	0.0%	0.0%	20.1%	14.3%	7.5%	0.0%	10.2%	0.0%
2011	6	0.0%	0.0%	0.0%	0.0%	21.5%	52.4%	45.3%	0.0%	38.3%	50.0%
	11	0.0%	0.0%	0.0%	0.0%	27.5%	19.0%	5.7%	0.0%	4.4%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	31.0%	14.3%	41.5%	0.0%	47.1%	50.0%
	29	0.0%	0.0%	0.0%	0.0%	20.1%	14.3%	7.5%	0.0%	10.2%	0.0%

KCDW Baseline & Future No Action Departure Runway Use Percentages											
	A/C Category	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	4	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	30.1%	50.0%	17.1%	20.0%
	9	0.0%	0.0%	0.0%	0.0%	7.2%	0.0%	3.2%	0.0%	4.3%	0.0%
	22	0.0%	0.0%	0.0%	0.0%	85.6%	0.0%	57.2%	0.0%	70.0%	80.0%
	27	0.0%	0.0%	0.0%	0.0%	7.2%	0.0%	9.5%	50.0%	8.5%	0.0%
2006	4	0.0%	0.0%	0.0%	0.0%	28.4%	0.0%	0.0%	0.0%	14.6%	0.0%
	9	0.0%	0.0%	0.0%	0.0%	3.4%	0.0%	0.0%	0.0%	2.9%	0.0%
	22	0.0%	0.0%	0.0%	0.0%	58.1%	0.0%	0.0%	0.0%	78.5%	100.0%
	27	0.0%	0.0%	0.0%	0.0%	10.1%	0.0%	0.0%	0.0%	4.0%	0.0%
2011	4	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	79.2%	17.5%	20.0%
	9	0.0%	0.0%	0.0%	0.0%	7.2%	0.0%	0.0%	0.0%	4.3%	0.0%
	22	0.0%	0.0%	0.0%	0.0%	85.7%	0.0%	0.0%	0.0%	69.7%	80.0%
	27	0.0%	0.0%	0.0%	0.0%	7.1%	0.0%	0.0%	0.0%	8.5%	0.0%

KCDW Baseline & Future No Action Arrival Runway Use Percentages											
	A/C Category	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	4	0.0%	0.0%	0.0%	0.0%	36.1%	0.0%	32.0%	0.0%	19.2%	16.9%
	9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	4.1%	0.0%	3.5%	0.0%
	22	0.0%	0.0%	0.0%	0.0%	63.9%	0.0%	63.9%	0.0%	72.5%	70.2%
	27	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	4.8%	12.9%
2006	4	0.0%	0.0%	0.0%	0.0%	36.8%	0.0%	0.0%	0.0%	17.6%	0.0%
	9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.0%	0.0%
	22	0.0%	0.0%	0.0%	0.0%	63.2%	0.0%	100.0%	0.0%	70.2%	100.0%
	27	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	9.1%	0.0%
2011	4	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	20.3%	6.7%	19.1%	0.0%
	9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.3%	0.0%	3.7%	0.0%
	22	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	78.4%	27.8%	72.4%	0.0%
	27	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.1%	4.8%	0.0%

KEWR Baseline & Future No Action
Departure Runway Use Percentages

A/C Category		H		M		L		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	04L	47.9%	57.3%	49.3%	60.1%	47.8%	58.7%	36.6%	65.8%	24.5%	0.0%
	04R	3.5%	9.9%	1.2%	8.0%	1.3%	2.1%	0.5%	10.5%	0.0%	0.0%
	11	0.0%	0.2%	0.4%	0.8%	1.0%	8.8%	3.0%	1.9%	24.5%	0.0%
	22L	1.9%	1.8%	0.9%	2.4%	0.5%	1.4%	0.3%	0.0%	0.0%	0.0%
	22R	46.8%	30.8%	47.7%	28.5%	48.7%	27.3%	35.2%	20.0%	12.2%	0.0%
	29	0.0%	0.0%	0.4%	0.1%	0.8%	1.7%	24.4%	1.9%	38.8%	0.0%
2006	04L	47.0%	54.0%	49.0%	58.0%	46.1%	51.9%	35.6%	59.0%	6.4%	25.9%
	04R	3.1%	12.0%	1.0%	9.0%	2.1%	2.9%	1.9%	12.0%	10.7%	0.0%
	11	0.0%	0.0%	0.0%	1.0%	3.9%	12.0%	3.0%	1.0%	7.5%	0.0%
	22L	2.9%	3.9%	0.0%	3.0%	0.0%	1.9%	0.9%	6.0%	0.0%	7.1%
	22R	47.0%	30.1%	50.0%	29.0%	47.9%	29.5%	35.7%	20.0%	46.9%	29.5%
	29	0.0%	0.0%	0.0%	0.0%	0.0%	1.9%	22.9%	2.0%	28.6%	37.5%
2011	04L	47.0%	54.0%	49.0%	58.0%	45.9%	54.6%	36.0%	59.0%	12.0%	17.0%
	04R	3.0%	12.0%	1.0%	9.0%	2.3%	1.9%	2.0%	12.0%	10.0%	0.0%
	11	0.0%	0.0%	0.0%	1.0%	3.9%	12.2%	3.0%	1.0%	7.0%	0.0%
	22L	3.0%	4.0%	0.0%	3.0%	0.1%	1.9%	1.0%	6.0%	0.0%	8.0%
	22R	47.0%	30.0%	50.0%	29.0%	47.8%	27.5%	35.0%	20.0%	44.1%	33.0%
	29	0.0%	0.0%	0.0%	0.0%	0.0%	1.9%	23.0%	2.0%	26.9%	42.0%

KEWR Baseline & Future No Action Arrival Runway Use Percentages											
	A/C Category	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	04L	2.3%	18.2%	1.7%	8.0%	1.9%	8.0%	2.1%	11.4%	37.4%	0.0%
	04R	45.8%	55.5%	47.2%	53.3%	47.5%	50.3%	35.7%	41.8%	41.7%	0.0%
	11	0.1%	0.0%	0.2%	0.5%	0.5%	2.1%	16.1%	10.6%	20.9%	0.0%
	22L	50.3%	25.1%	48.3%	35.1%	47.0%	37.9%	35.4%	31.3%	0.0%	0.0%
	22R	1.3%	1.2%	1.4%	3.0%	1.6%	1.4%	3.7%	3.4%	0.0%	0.0%
	29	0.2%	0.0%	1.3%	0.1%	1.5%	0.3%	6.9%	1.5%	0.0%	0.0%
2006	04L	2.4%	17.0%	1.7%	5.9%	3.0%	3.4%	2.2%	15.3%	2.6%	33.3%
	04R	46.1%	54.0%	47.2%	53.1%	46.8%	51.1%	35.7%	48.5%	12.8%	16.7%
	11	0.0%	0.0%	0.2%	0.5%	0.8%	2.0%	16.0%	4.8%	59.0%	0.0%
	22L	49.9%	27.4%	48.1%	35.2%	45.8%	35.8%	35.6%	28.4%	20.5%	16.7%
	22R	1.6%	1.6%	1.4%	3.1%	1.5%	2.2%	3.8%	2.2%	5.1%	0.0%
	29	0.0%	0.0%	1.4%	2.2%	2.2%	5.5%	6.7%	0.9%	0.0%	33.3%
2011	04L	2.4%	17.0%	1.7%	5.9%	2.9%	3.4%	1.8%	14.9%	0.0%	33.3%
	04R	46.1%	54.0%	47.2%	53.1%	46.8%	51.1%	36.5%	47.4%	0.0%	16.7%
	11	0.0%	0.0%	0.2%	0.5%	0.8%	2.0%	15.0%	5.7%	0.0%	0.0%
	22L	49.9%	27.4%	48.1%	35.2%	45.8%	35.8%	36.5%	28.6%	0.0%	16.7%
	22R	1.6%	1.6%	1.4%	3.1%	1.5%	2.2%	3.8%	2.3%	0.0%	0.0%
	29	0.0%	0.0%	1.4%	2.2%	2.2%	5.5%	6.2%	1.1%	0.0%	33.3%

KFOK Baseline & Future No Action Departure Runway Use Percentages											
	A/C Category	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	6	0.0%	0.0%	0.0%	0.0%	51.5%	65.3%	50.6%	33.3%	35.4%	0.0%
	15	0.0%	0.0%	0.0%	100.0%	7.3%	22.1%	17.7%	33.3%	18.4%	100.0%
	24	0.0%	0.0%	0.0%	0.0%	38.7%	12.6%	26.6%	33.3%	37.0%	0.0%
	33	0.0%	0.0%	0.0%	0.0%	2.5%	0.0%	5.0%	0.0%	9.1%	0.0%
2006	6	0.0%	0.0%	0.0%	0.0%	51.4%	0.0%	50.6%	0.0%	0.0%	0.0%
	15	0.0%	0.0%	0.0%	0.0%	7.3%	0.0%	17.7%	0.0%	0.0%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	38.8%	0.0%	26.6%	0.0%	0.0%	0.0%
	33	0.0%	0.0%	0.0%	0.0%	2.5%	0.0%	5.1%	0.0%	0.0%	0.0%
2011	6	0.0%	0.0%	0.0%	0.0%	51.4%	0.0%	50.6%	0.0%	0.0%	0.0%
	15	0.0%	0.0%	0.0%	0.0%	7.3%	0.0%	17.7%	0.0%	0.0%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	38.8%	0.0%	26.6%	0.0%	0.0%	0.0%
	33	0.0%	0.0%	0.0%	0.0%	2.5%	0.0%	5.1%	0.0%	0.0%	0.0%

KFOK Baseline & Future No Action
Arrival Runway Use Percentages

	A/C Category>>	H		M		L		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	6	0.0%	0.0%	100.0%	0.0%	17.8%	21.2%	16.4%	33.3%	6.2%	0.0%
	15	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	2.8%	0.0%	1.5%	0.0%
	24	0.0%	0.0%	0.0%	100.0%	76.2%	78.8%	67.1%	66.7%	87.6%	0.0%
	33	0.0%	0.0%	0.0%	0.0%	5.7%	0.0%	13.8%	0.0%	4.6%	0.0%
2006	6	0.0%	0.0%	0.0%	0.0%	18.3%	20.0%	0.0%	0.0%	0.0%	0.0%
	15	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	75.7%	80.0%	0.0%	0.0%	0.0%	0.0%
	33	0.0%	0.0%	0.0%	0.0%	5.7%	0.0%	0.0%	0.0%	0.0%	0.0%
2011	6	0.0%	0.0%	0.0%	0.0%	18.3%	20.0%	0.0%	0.0%	0.0%	0.0%
	15	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	75.7%	80.0%	0.0%	0.0%	0.0%	0.0%
	33	0.0%	0.0%	0.0%	0.0%	5.7%	0.0%	0.0%	0.0%	0.0%	0.0%

KFRG Baseline & Future No Action
Departure Runway Use Percentages

	A/C Category	H		M		L		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	1	0.0%	0.0%	33.2%	16.1%	36.2%	53.9%	44.3%	46.9%	45.9%	26.9%
	14	0.0%	0.0%	33.3%	33.6%	19.5%	12.1%	14.2%	11.0%	10.8%	2.4%
	19	0.0%	0.0%	0.0%	16.8%	27.4%	23.7%	31.7%	28.1%	34.2%	36.1%
	32	0.0%	0.0%	33.5%	33.6%	16.9%	10.3%	9.8%	13.9%	9.1%	34.6%
2006	1	0.0%	0.0%	0.0%	0.0%	36.3%	47.1%	42.8%	0.0%	44.9%	23.8%
	14	0.0%	0.0%	0.0%	0.0%	19.1%	13.7%	18.0%	0.0%	11.7%	1.3%
	19	0.0%	0.0%	0.0%	0.0%	28.6%	25.5%	27.5%	0.0%	33.9%	42.1%
	32	0.0%	0.0%	0.0%	0.0%	16.0%	13.7%	11.8%	0.0%	9.6%	32.8%
2011	1	0.0%	0.0%	0.0%	0.0%	36.3%	47.1%	42.8%	0.0%	44.9%	23.8%
	14	0.0%	0.0%	0.0%	0.0%	19.1%	13.7%	18.0%	0.0%	11.7%	1.3%
	19	0.0%	0.0%	0.0%	0.0%	28.6%	25.5%	27.5%	0.0%	33.9%	42.1%
	32	0.0%	0.0%	0.0%	0.0%	16.0%	13.7%	11.8%	0.0%	9.6%	32.8%

KFRG Baseline & Future No Action Arrival Runway Use Percentages											
	A/C Category	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	1	0.0%	0.0%	0.0%	0.0%	20.1%	16.7%	21.7%	14.0%	15.4%	16.2%
	14	0.0%	0.0%	47.6%	50.2%	28.3%	45.1%	16.6%	40.6%	32.6%	63.6%
	19	0.0%	0.0%	13.1%	0.0%	29.6%	17.4%	35.4%	17.1%	30.6%	16.6%
	32	0.0%	0.0%	39.3%	49.8%	22.0%	20.8%	26.2%	28.3%	21.4%	3.6%
2006	1	0.0%	0.0%	0.0%	0.0%	19.6%	17.1%	14.7%	0.0%	15.3%	15.8%
	14	0.0%	0.0%	0.0%	0.0%	28.9%	45.9%	12.8%	0.0%	34.2%	64.9%
	19	0.0%	0.0%	0.0%	0.0%	29.8%	15.2%	57.3%	0.0%	30.4%	17.5%
	32	0.0%	0.0%	0.0%	0.0%	21.7%	21.8%	15.2%	0.0%	20.0%	1.8%
2011	1	0.0%	0.0%	0.0%	0.0%	19.6%	16.6%	16.2%	0.0%	15.3%	15.8%
	14	0.0%	0.0%	0.0%	0.0%	29.0%	45.6%	14.3%	0.0%	34.2%	64.9%
	19	0.0%	0.0%	0.0%	0.0%	29.7%	16.2%	53.0%	0.0%	30.4%	17.5%
	32	0.0%	0.0%	0.0%	0.0%	21.7%	21.6%	16.5%	0.0%	20.0%	1.8%

KHPN Baseline & Future No Action Departure Runway Use Percentages											
	A/C Category	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	16	0.0%	0.0%	42.0%	31.1%	45.1%	38.3%	39.4%	28.4%	0.0%	0.0%
	29	0.0%	0.0%	1.1%	0.0%	1.7%	1.3%	5.1%	3.3%	0.0%	100.0%
	34	0.0%	0.0%	56.9%	68.9%	53.2%	60.4%	55.5%	68.3%	0.0%	0.0%
2006	16	0.0%	0.0%	42.0%	25.0%	46.0%	40.0%	39.4%	30.0%	42.7%	0.0%
	29	0.0%	0.0%	1.0%	0.0%	1.1%	1.0%	5.6%	4.0%	19.6%	0.0%
	34	0.0%	0.0%	57.0%	75.0%	52.9%	59.0%	55.0%	66.0%	37.8%	0.0%
2011	16	0.0%	0.0%	42.0%	25.0%	45.7%	40.0%	40.0%	30.0%	42.7%	0.0%
	29	0.0%	0.0%	1.0%	0.0%	1.0%	1.0%	5.0%	4.0%	19.6%	0.0%
	34	0.0%	0.0%	57.0%	75.0%	53.3%	59.0%	55.0%	66.0%	37.8%	0.0%

KHPN Baseline & Future No Action Arrival Runway Use Percentages											
	A/C Category>>	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	11	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.2%	0.0%	12.6%	0.0%
	16	0.0%	0.0%	48.1%	62.8%	48.6%	45.7%	45.7%	47.2%	75.0%	100.0%
	29	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%	0.4%	0.0%	0.0%	0.0%
	34	0.0%	0.0%	51.9%	37.2%	50.8%	54.3%	53.7%	52.8%	12.4%	0.0%
2006	11	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%
	16	0.0%	0.0%	47.0%	60.0%	47.4%	49.6%	43.3%	45.3%	53.0%	0.0%
	29	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.3%	0.0%	2.0%	0.0%
	34	0.0%	0.0%	53.0%	40.0%	52.2%	50.4%	56.3%	54.7%	45.0%	0.0%
2011	11	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
	16	0.0%	0.0%	47.0%	60.0%	47.8%	48.2%	42.7%	47.0%	53.0%	0.0%
	29	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.3%	0.0%	2.0%	0.0%
	34	0.0%	0.0%	53.0%	40.0%	51.8%	51.8%	57.0%	53.0%	45.0%	0.0%

KHVN Baseline & Future No Action
Departure Runway Use Percentages

	A/C Category	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	2	0.0%	0.0%	100.0%	0.0%	77.3%	61.9%	79.3%	66.1%	59.4%	75.0%
	14	0.0%	0.0%	0.0%	0.0%	3.0%	0.0%	5.0%	3.0%	19.9%	0.0%
	20	0.0%	0.0%	0.0%	0.0%	14.9%	12.7%	15.0%	30.9%	16.0%	0.0%
	32	0.0%	0.0%	0.0%	0.0%	4.8%	25.4%	0.7%	0.0%	4.7%	25.0%
2006	2	0.0%	0.0%	0.0%	0.0%	64.6%	0.0%	100.0%	0.0%	45.0%	100.0%
	14	0.0%	0.0%	0.0%	0.0%	4.0%	0.0%	0.0%	0.0%	5.0%	0.0%
	20	0.0%	0.0%	0.0%	0.0%	31.2%	0.0%	0.0%	0.0%	50.0%	0.0%
	32	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%
2011	2	0.0%	0.0%	0.0%	0.0%	74.4%	0.0%	4.8%	0.0%	0.0%	0.0%
	14	0.0%	0.0%	0.0%	0.0%	2.3%	0.0%	10.7%	0.0%	0.0%	0.0%
	20	0.0%	0.0%	0.0%	0.0%	23.3%	0.0%	84.0%	0.0%	0.0%	0.0%
	32	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%	0.0%	0.0%	0.0%

KHVN Baseline & Future No Action Arrival Runway Use Percentages											
	A/C Category	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	2	0.0%	0.0%	0.0%	0.0%	14.5%	17.1%	41.6%	56.2%	16.0%	20.0%
	14	0.0%	0.0%	0.0%	0.0%	17.7%	34.3%	1.3%	3.4%	9.5%	0.0%
	20	0.0%	0.0%	0.0%	0.0%	62.3%	48.6%	51.4%	40.4%	61.3%	80.0%
	32	0.0%	0.0%	0.0%	0.0%	5.5%	0.0%	5.6%	0.0%	13.2%	0.0%
2006	2	0.0%	0.0%	0.0%	0.0%	72.6%	90.0%	48.1%	90.0%	64.8%	0.0%
	14	0.0%	0.0%	0.0%	0.0%	2.6%	0.0%	0.0%	0.0%	15.0%	100.0%
	20	0.0%	0.0%	0.0%	0.0%	18.4%	10.0%	48.4%	10.0%	15.8%	0.0%
	32	0.0%	0.0%	0.0%	0.0%	6.4%	0.0%	3.6%	0.0%	4.4%	0.0%
2011	2	0.0%	0.0%	0.0%	0.0%	78.2%	76.7%	56.9%	0.0%	80.0%	0.0%
	14	0.0%	0.0%	0.0%	0.0%	10.1%	11.1%	4.8%	0.0%	0.0%	0.0%
	20	0.0%	0.0%	0.0%	0.0%	8.5%	12.2%	27.4%	0.0%	20.0%	0.0%
	32	0.0%	0.0%	0.0%	0.0%	3.2%	0.0%	10.9%	0.0%	0.0%	0.0%

KILG Baseline & Future No Action Departure Runway Use Percentages											
	A/C Category	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	1	100.0%	0.0%	33.4%	0.0%	41.0%	58.3%	35.1%	30.5%	29.1%	25.1%
	9	0.0%	0.0%	33.4%	0.0%	14.5%	7.6%	6.9%	17.4%	11.3%	8.4%
	14	0.0%	0.0%	0.0%	0.0%	0.5%	0.0%	2.2%	0.0%	7.1%	0.0%
	19	0.0%	0.0%	0.0%	0.0%	11.9%	5.0%	9.8%	13.1%	9.3%	8.4%
	27	0.0%	0.0%	33.3%	0.0%	31.9%	29.0%	38.9%	39.0%	26.0%	49.9%
	32	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	7.2%	0.0%	17.2%	8.4%
2006	1	0.0%	0.0%	0.0%	0.0%	40.7%	0.0%	37.5%	0.0%	28.0%	30.0%
	9	0.0%	0.0%	0.0%	0.0%	14.5%	0.0%	6.4%	0.0%	12.2%	10.0%
	14	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%	2.0%	0.0%	7.3%	0.0%
	19	0.0%	0.0%	0.0%	0.0%	11.4%	0.0%	9.5%	0.0%	8.9%	20.0%
	27	0.0%	0.0%	0.0%	0.0%	32.9%	0.0%	37.6%	0.0%	25.6%	30.0%
	32	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	6.9%	0.0%	17.9%	10.0%
2011	1	0.0%	0.0%	0.0%	0.0%	40.8%	0.0%	37.0%	0.0%	28.0%	30.0%
	9	0.0%	0.0%	0.0%	0.0%	14.5%	0.0%	6.4%	0.0%	12.2%	10.0%
	14	0.0%	0.0%	0.0%	0.0%	0.5%	0.0%	2.1%	0.0%	7.3%	0.0%
	19	0.0%	0.0%	0.0%	0.0%	11.5%	0.0%	9.6%	0.0%	8.9%	20.0%
	27	0.0%	0.0%	0.0%	0.0%	32.6%	0.0%	37.9%	0.0%	25.6%	30.0%
	32	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	6.9%	0.0%	17.9%	10.0%

KILG Baseline & Future No Action
Arrival Runway Use Percentages

	A/C Category>>	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	1	100.0%	0.0%	33.4%	0.0%	42.4%	49.2%	46.9%	68.3%	53.9%	0.0%
	9	0.0%	0.0%	33.4%	0.0%	11.5%	3.6%	11.1%	5.3%	9.8%	0.0%
	14	0.0%	0.0%	0.0%	0.0%	0.7%	0.0%	2.8%	0.0%	2.9%	0.0%
	19	0.0%	0.0%	0.0%	0.0%	20.3%	20.0%	12.3%	15.8%	13.9%	0.0%
	27	0.0%	0.0%	33.3%	0.0%	24.1%	27.2%	23.4%	10.6%	14.3%	0.0%
	32	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%	3.6%	0.0%	5.3%	0.0%
2006	1	0.0%	0.0%	0.0%	0.0%	42.8%	49.1%	43.9%	0.0%	65.6%	0.0%
	9	0.0%	0.0%	0.0%	0.0%	11.3%	3.8%	10.9%	0.0%	7.2%	0.0%
	14	0.0%	0.0%	0.0%	0.0%	0.5%	0.0%	2.6%	0.0%	2.2%	0.0%
	19	0.0%	0.0%	0.0%	0.0%	20.5%	20.0%	11.6%	0.0%	10.6%	100.0%
	27	0.0%	0.0%	0.0%	0.0%	23.9%	27.0%	24.7%	0.0%	10.3%	0.0%
	32	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%	6.3%	0.0%	4.1%	0.0%
2011	1	0.0%	0.0%	0.0%	0.0%	42.9%	49.1%	44.7%	0.0%	65.6%	0.0%
	9	0.0%	0.0%	0.0%	0.0%	11.4%	3.8%	11.1%	0.0%	7.2%	0.0%
	14	0.0%	0.0%	0.0%	0.0%	0.5%	0.0%	2.7%	0.0%	2.2%	0.0%
	19	0.0%	0.0%	0.0%	0.0%	20.3%	20.0%	11.8%	0.0%	10.6%	100.0%
	27	0.0%	0.0%	0.0%	0.0%	23.9%	27.0%	24.2%	0.0%	10.3%	0.0%
	32	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%	5.5%	0.0%	4.1%	0.0%

KISP Baseline & Future No Action Departure Runway Use Percentages											
	A/C Category	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	6	0.0%	0.0%	43.0%	46.1%	40.1%	46.4%	33.3%	35.2%	39.1%	0.0%
	15R	0.0%	0.0%	0.4%	0.0%	0.3%	0.0%	4.3%	0.9%	17.4%	0.0%
	24	0.0%	0.0%	49.7%	43.4%	55.9%	49.6%	42.3%	31.8%	30.4%	0.0%
	33L	0.0%	0.0%	6.9%	10.6%	3.8%	4.1%	20.1%	32.1%	13.0%	0.0%
2006	6	0.0%	0.0%	43.0%	44.0%	40.4%	49.0%	33.2%	36.0%	50.0%	0.0%
	15R	0.0%	0.0%	0.0%	0.0%	1.8%	0.0%	4.1%	0.0%	5.0%	0.0%
	24	0.0%	0.0%	50.0%	46.0%	50.0%	48.0%	41.2%	34.0%	32.0%	0.0%
	33L	0.0%	0.0%	7.0%	10.0%	7.9%	3.0%	21.5%	30.0%	13.0%	0.0%
2011	6	0.0%	0.0%	43.0%	44.0%	40.5%	49.0%	33.0%	0.0%	50.0%	0.0%
	15R	0.0%	0.0%	0.0%	0.0%	1.8%	0.0%	4.0%	0.0%	5.0%	0.0%
	24	0.0%	0.0%	50.0%	46.0%	50.6%	48.0%	41.0%	0.0%	32.0%	0.0%
	33L	0.0%	0.0%	7.0%	10.0%	7.1%	3.0%	22.0%	0.0%	13.0%	0.0%

KISP Baseline & Future No Action Arrival Runway Use Percentages											
	A/C Category>>	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	05L										
	6	0.0%	0.0%	39.0%	47.3%	35.3%	45.9%	28.9%	50.7%	52.4%	100.0%
	15R	0.0%	0.0%	0.7%	2.9%	3.1%	0.6%	5.1%	0.0%	8.7%	0.0%
	24	0.0%	0.0%	51.2%	49.7%	48.4%	53.4%	48.7%	43.0%	30.2%	0.0%
	33L	0.0%	0.0%	9.1%	0.0%	13.2%	0.0%	17.3%	6.3%	8.7%	0.0%
2006	05L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%
	6	0.0%	0.0%	39.0%	47.0%	42.6%	58.3%	29.2%	0.0%	45.0%	0.0%
	15R	0.0%	0.0%	1.0%	3.0%	3.6%	1.7%	4.3%	0.0%	4.0%	0.0%
	24	0.0%	0.0%	51.0%	50.0%	42.3%	40.0%	50.2%	0.0%	37.0%	0.0%
	33L	0.0%	0.0%	9.0%	0.0%	11.6%	0.0%	16.3%	0.0%	13.0%	0.0%
2011	05L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%
	6	0.0%	0.0%	39.0%	47.0%	43.9%	50.0%	29.0%	38.0%	45.0%	0.0%
	15R	0.0%	0.0%	1.0%	3.0%	3.4%	2.0%	4.0%	0.0%	4.0%	0.0%
	24	0.0%	0.0%	51.0%	50.0%	41.5%	48.0%	51.0%	62.0%	37.0%	0.0%
	33L	0.0%	0.0%	9.0%	0.0%	11.2%	0.0%	16.0%	0.0%	13.0%	0.0%

KJFK Baseline & Future No Action Departure Runway Use Percentages											
	A/C Category	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	04L	10.6%	5.6%	12.0%	7.2%	9.2%	12.8%	11.3%	7.0%	0.0%	0.0%
	04R	0.0%	0.1%	0.1%	0.2%	0.0%	0.0%	0.8%	1.9%	0.0%	0.0%
	13L	4.1%	7.0%	4.4%	8.1%	3.4%	0.8%	7.3%	15.0%	0.0%	0.0%
	13R	32.2%	23.9%	28.7%	20.3%	37.0%	14.6%	25.4%	17.7%	0.0%	0.0%
	22L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%
	22R	6.3%	11.8%	6.2%	11.2%	6.0%	10.3%	10.2%	7.6%	0.0%	0.0%
	31L	46.6%	51.5%	48.4%	52.9%	44.3%	61.5%	26.3%	25.4%	0.0%	0.0%
	31R	0.1%	0.1%	0.2%	0.0%	0.0%	0.0%	18.8%	25.1%	0.0%	0.0%
2006	04L	11.1%	6.0%	12.0%	8.0%	14.9%	9.2%	11.0%	7.0%	12.0%	0.0%
	04R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	2.0%	0.0%	0.0%
	13L	4.0%	7.0%	4.0%	8.0%	2.7%	0.0%	8.0%	15.0%	0.0%	0.0%
	13R	32.1%	24.0%	28.0%	20.0%	33.9%	18.6%	26.0%	18.0%	31.0%	0.0%
	22R	6.0%	12.0%	7.0%	9.0%	7.4%	14.5%	6.0%	6.0%	0.0%	0.0%
	31L	46.7%	51.0%	49.0%	55.0%	41.0%	57.7%	28.0%	25.0%	13.0%	0.0%
	31R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	20.0%	27.0%	44.0%	0.0%
2011	04L	11.1%	6.0%	12.0%	8.0%	13.6%	9.5%	11.0%	7.0%	0.0%	0.0%
	04R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	2.0%	0.0%	0.0%
	13L	4.0%	7.0%	4.0%	8.0%	2.8%	0.0%	8.0%	15.0%	0.0%	0.0%
	13R	32.1%	24.0%	28.0%	20.0%	34.3%	18.4%	26.0%	18.0%	0.0%	0.0%
	22R	6.0%	12.0%	7.0%	9.0%	6.9%	12.3%	6.0%	6.0%	0.0%	0.0%
	31L	46.7%	51.0%	49.0%	55.0%	42.4%	59.8%	28.0%	25.0%	0.0%	0.0%
	31R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	20.0%	27.0%	0.0%	0.0%

KJFK Baseline & Future No Action Arrival Runway Use Percentages											
	A/C Category	H		M		L		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	04L	1.1%	0.7%	1.6%	0.3%	1.5%	0.0%	2.0%	2.0%	0.0%	0.0%
	04R	10.3%	28.9%	9.7%	21.3%	9.8%	14.6%	10.3%	16.8%	0.0%	0.0%
	13L	24.1%	13.7%	32.3%	19.1%	30.3%	23.2%	16.6%	13.5%	0.0%	0.0%
	13R	3.4%	3.6%	4.6%	6.6%	5.3%	10.2%	5.2%	2.9%	0.0%	0.0%
	22L	17.5%	5.5%	7.4%	6.9%	8.3%	7.8%	17.6%	9.0%	0.0%	0.0%
	22R	0.6%	0.2%	0.5%	0.0%	0.3%	0.0%	0.8%	1.6%	0.0%	0.0%
	31L	10.2%	7.7%	9.0%	11.1%	18.2%	9.9%	14.1%	14.0%	0.0%	0.0%
	31R	32.8%	39.7%	34.9%	34.8%	26.3%	34.2%	33.5%	40.2%	0.0%	0.0%
2006	04L	1.0%	1.0%	1.0%	0.0%	1.8%	0.0%	1.9%	1.0%	17.0%	0.0%
	04R	11.0%	30.0%	10.0%	24.0%	9.2%	15.0%	11.0%	14.0%	21.0%	0.0%
	13L	23.1%	14.0%	32.9%	19.0%	22.9%	20.5%	15.6%	14.0%	11.0%	0.0%
	13R	3.1%	3.0%	4.0%	7.0%	12.0%	20.0%	4.9%	2.0%	0.0%	0.0%
	22L	17.9%	6.0%	7.1%	7.0%	9.2%	4.5%	18.0%	11.0%	13.0%	0.0%
	22R	1.0%	0.0%	1.0%	0.0%	0.0%	0.0%	1.0%	1.0%	0.0%	0.0%
	31L	10.0%	6.0%	9.0%	8.0%	21.1%	15.0%	13.7%	12.0%	17.0%	0.0%
	31R	32.9%	40.0%	35.0%	35.0%	23.9%	25.0%	33.9%	45.0%	21.0%	0.0%
2011	04L	1.0%	1.0%	1.0%	0.0%	1.9%	0.0%	1.5%	0.0%	0.0%	0.0%
	04R	11.0%	30.0%	10.0%	24.0%	9.5%	17.1%	11.0%	0.0%	0.0%	0.0%
	13L	23.1%	14.0%	32.9%	19.0%	23.7%	19.9%	19.0%	0.0%	0.0%	0.0%
	13R	3.1%	3.0%	4.0%	7.0%	10.9%	15.7%	4.0%	0.0%	0.0%	0.0%
	22L	17.9%	6.0%	7.1%	7.0%	9.1%	5.1%	18.0%	0.0%	0.0%	0.0%
	22R	1.0%	0.0%	1.0%	0.0%	0.0%	0.0%	1.0%	0.0%	0.0%	0.0%
	31L	10.0%	6.0%	9.0%	8.0%	21.1%	17.1%	12.0%	0.0%	0.0%	0.0%
	31R	32.9%	40.0%	35.0%	35.0%	23.9%	25.0%	33.5%	0.0%	0.0%	0.0%

KLDJ Baseline & Future No Action Departure Runway Use Percentages											
	A/C Category	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
	27	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
2006	9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	27	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%
2011	9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	27	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%	0.0%

KLDJ Baseline & Future No Action
Arrival Runway Use Percentages

	A/C Category	H		M		L		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	9	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	93.5%	50.0%
	27	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	6.5%	50.0%
2006	9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	27	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2011	9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	27	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

KLGA Baseline & Future No Action Departure Runway Use Percentages											
	A/C Category	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	4	20.9%	37.2%	21.5%	29.5%	21.4%	27.7%	20.4%	30.5%	49.9%	0.0%
	13	52.4%	37.3%	51.9%	42.4%	54.3%	49.3%	54.3%	56.4%	50.1%	0.0%
	22	0.0%	0.0%	0.1%	0.2%	0.0%	0.8%	0.0%	0.4%	0.0%	0.0%
	31	26.8%	25.4%	26.5%	27.9%	24.3%	22.2%	25.3%	12.7%	0.0%	0.0%
2006	4	21.0%	37.0%	22.0%	30.0%	22.1%	30.2%	21.0%	0.0%	8.0%	20.0%
	13	52.0%	38.0%	51.7%	42.0%	53.0%	44.3%	54.0%	0.0%	63.0%	80.0%
	31	27.0%	25.0%	26.3%	28.0%	24.8%	25.5%	25.0%	0.0%	29.0%	0.0%
2011	4	21.0%	37.0%	22.0%	29.6%	22.1%	30.2%	21.0%	0.0%	8.0%	20.0%
	13	52.0%	38.0%	51.8%	42.6%	53.0%	44.4%	54.0%	0.0%	63.0%	80.0%
	31	27.0%	25.0%	26.2%	27.8%	24.8%	25.4%	25.0%	0.0%	29.0%	0.0%

KLGA Baseline & Future No Action Arrival Runway Use Percentages											
	A/C Category	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	4	24.6%	21.5%	27.8%	23.8%	26.4%	32.0%	27.3%	22.8%	0.0%	0.0%
	13	2.1%	5.0%	2.1%	7.0%	2.0%	1.7%	2.7%	2.9%	50.0%	0.0%
	24	49.1%	48.1%	46.2%	40.8%	46.0%	38.0%	45.0%	42.4%	0.0%	0.0%
	31	24.2%	25.4%	23.9%	28.4%	25.5%	28.3%	25.0%	31.8%	50.0%	0.0%
2006	4	24.0%	22.0%	28.0%	24.0%	26.0%	28.8%	26.2%	21.0%	53.0%	0.0%
	13	2.0%	5.0%	2.0%	6.9%	2.0%	4.5%	2.9%	3.0%	0.0%	0.0%
	24	50.0%	48.0%	46.0%	41.1%	46.9%	35.8%	46.7%	42.0%	37.0%	0.0%
	31	24.0%	25.0%	24.0%	28.0%	25.0%	30.9%	24.2%	34.0%	10.0%	0.0%
2011	4	24.0%	22.0%	28.0%	24.0%	26.0%	28.8%	24.4%	21.0%	0.0%	0.0%
	13	2.0%	5.0%	2.0%	6.9%	2.0%	4.5%	2.7%	3.0%	0.0%	0.0%
	24	50.0%	48.0%	46.0%	41.1%	46.9%	35.8%	50.4%	42.0%	0.0%	0.0%
	31	24.0%	25.0%	24.0%	28.0%	25.0%	30.9%	22.5%	34.0%	0.0%	0.0%

KMMU Baseline & Future No Action
Departure Runway Use Percentages

	A/C Category	H		M		L		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	5	0.0%	0.0%	100.0%	0.0%	52.2%	70.1%	49.1%	55.1%	48.7%	81.8%
	12	0.0%	0.0%	0.0%	0.0%	2.7%	4.1%	6.8%	3.5%	0.0%	2.3%
	23	0.0%	0.0%	0.0%	0.0%	44.8%	23.2%	43.0%	38.0%	47.0%	15.9%
	30	0.0%	0.0%	0.0%	0.0%	0.3%	2.5%	1.2%	3.5%	4.4%	0.0%
2006	5	0.0%	0.0%	0.0%	0.0%	51.4%	69.0%	52.0%	0.0%	48.0%	0.0%
	12	0.0%	0.0%	0.0%	0.0%	2.5%	4.6%	8.0%	0.0%	0.0%	0.0%
	12	0.0%	0.0%	0.0%	0.0%	45.7%	23.7%	39.0%	0.0%	47.5%	0.0%
	30	0.0%	0.0%	0.0%	0.0%	0.4%	2.7%	0.9%	0.0%	4.5%	0.0%
2011	5	0.0%	0.0%	0.0%	0.0%	51.5%	69.0%	51.3%	0.0%	48.0%	0.0%
	12	0.0%	0.0%	0.0%	0.0%	2.5%	4.6%	7.7%	0.0%	0.0%	0.0%
	23	0.0%	0.0%	0.0%	0.0%	45.6%	23.7%	40.0%	0.0%	47.5%	0.0%
	30	0.0%	0.0%	0.0%	0.0%	0.4%	2.7%	1.0%	0.0%	4.5%	0.0%

KMMU Baseline & Future No Action Arrival Runway Use Percentages											
A/C Category		**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	5	0.0%	0.0%	0.0%	0.0%	41.2%	33.8%	32.8%	37.1%	24.9%	18.7%
	12	0.0%	0.0%	0.0%	0.0%	1.9%	7.8%	1.2%	7.4%	3.6%	10.5%
	23	0.0%	0.0%	100.0%	0.0%	48.1%	53.8%	51.4%	55.5%	60.1%	67.3%
	30	0.0%	0.0%	0.0%	0.0%	8.7%	4.5%	14.6%	0.0%	11.4%	3.5%
2006	5	0.0%	0.0%	0.0%	0.0%	4.0%	46.4%	0.0%	0.0%	6.3%	0.0%
	12	0.0%	0.0%	0.0%	0.0%	38.4%	0.0%	34.5%	0.0%	22.3%	0.0%
	23	0.0%	0.0%	0.0%	0.0%	48.1%	53.6%	51.4%	100.0%	56.9%	100.0%
	30	0.0%	0.0%	0.0%	0.0%	9.5%	0.0%	14.1%	0.0%	14.5%	0.0%
2011	5	0.0%	0.0%	0.0%	0.0%	3.7%	46.4%	0.0%	0.0%	5.6%	0.0%
	12	0.0%	0.0%	0.0%	0.0%	38.9%	0.0%	34.5%	0.0%	23.1%	0.0%
	23	0.0%	0.0%	0.0%	0.0%	48.1%	53.6%	51.4%	100.0%	56.8%	100.0%
	30	0.0%	0.0%	0.0%	0.0%	9.4%	0.0%	14.1%	0.0%	14.4%	0.0%

KPHL Baseline & Future No Action Departure Runway Use Percentages											
	A/C Category	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	8	1.5%	0.5%	0.2%	0.5%	2.7%	8.9%	10.5%	17.6%	7.4%	25.9%
	09L	30.0%	37.2%	32.6%	41.6%	29.3%	22.1%	8.8%	7.4%	0.0%	4.6%
	09R	6.5%	3.7%	0.7%	1.0%	1.0%	1.2%	0.3%	0.1%	0.0%	1.4%
	17	0.2%	0.5%	0.2%	0.8%	1.4%	21.1%	14.4%	24.6%	51.9%	32.5%
	27L	59.2%	54.9%	63.4%	52.5%	59.3%	28.4%	37.5%	27.9%	33.4%	16.0%
	27R	2.1%	2.6%	2.2%	3.2%	3.2%	15.9%	1.6%	3.7%	3.7%	5.4%
	35	0.4%	0.5%	0.6%	0.4%	3.0%	2.4%	26.9%	18.6%	3.7%	14.2%
2006	8	0.3%	0.0%	0.0%	0.1%	7.2%	12.6%	11.1%	22.8%	18.7%	22.1%
	09L	30.8%	38.0%	33.0%	41.5%	24.9%	21.3%	8.5%	2.9%	2.3%	7.4%
	09R	7.7%	4.0%	1.0%	1.0%	1.0%	0.6%	0.0%	0.9%	0.0%	3.2%
	17	1.0%	1.0%	0.0%	1.1%	6.2%	19.0%	14.4%	25.0%	45.3%	23.2%
	27L	57.2%	53.0%	63.0%	53.4%	52.4%	36.5%	35.6%	36.6%	9.8%	21.1%
	27R	1.9%	3.0%	2.0%	2.9%	2.7%	8.9%	1.2%	3.2%	0.8%	3.2%
	35	1.0%	1.0%	1.0%	0.0%	5.6%	1.1%	29.1%	8.7%	23.3%	20.0%
2011	8	0.3%	0.0%	0.0%	0.1%	7.2%	9.7%	11.3%	29.0%	20.0%	22.1%
	09L	30.8%	38.0%	33.0%	41.6%	24.7%	22.0%	8.9%	4.8%	2.4%	7.4%
	09R	7.8%	4.0%	1.0%	1.0%	1.0%	0.5%	0.0%	1.4%	0.0%	3.2%
	17	1.0%	1.0%	0.0%	1.1%	6.6%	17.4%	14.7%	31.7%	41.6%	23.2%
	27L	57.2%	53.0%	63.0%	53.3%	52.3%	41.3%	36.1%	17.6%	10.4%	21.1%
	27R	1.9%	3.0%	2.0%	2.9%	2.7%	8.0%	1.2%	3.1%	0.8%	3.2%
	35	1.0%	1.0%	1.0%	0.0%	5.5%	1.0%	27.9%	12.3%	24.8%	20.0%

KPHL Baseline & Future No Action
Arrival Runway Use Percentages

	A/C Category	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	8	5.2%	6.2%	0.7%	2.4%	2.1%	8.7%	2.2%	5.6%	0.0%	9.7%
	09L	36.5%	40.2%	32.8%	38.3%	29.1%	23.2%	12.7%	15.7%	8.8%	15.1%
	09R	0.2%	0.2%	0.2%	0.1%	2.4%	3.3%	17.9%	13.3%	22.0%	13.0%
	17	0.5%	1.0%	0.3%	0.3%	2.6%	6.7%	6.2%	10.4%	0.0%	22.2%
	27L	4.7%	10.0%	4.8%	9.6%	5.1%	4.2%	6.2%	6.1%	0.0%	3.4%
	27R	52.9%	41.3%	60.6%	48.8%	56.0%	12.3%	15.4%	14.6%	8.8%	2.7%
	35	0.0%	1.1%	0.5%	0.5%	2.7%	41.6%	39.3%	34.5%	60.3%	33.9%
2006	8	1.7%	5.0%	1.1%	2.0%	3.1%	9.8%	1.7%	4.3%	1.0%	9.1%
	09L	37.5%	41.0%	32.8%	38.0%	28.6%	25.4%	13.5%	13.2%	7.0%	16.4%
	09R	0.0%	0.0%	0.0%	0.0%	2.7%	2.7%	17.1%	14.6%	26.0%	18.2%
	17	1.0%	1.0%	0.1%	0.0%	4.5%	6.8%	6.3%	13.6%	9.0%	30.9%
	27L	5.8%	10.0%	5.3%	9.0%	5.1%	4.8%	3.6%	2.9%	0.0%	3.6%
	27R	53.1%	42.0%	60.7%	50.0%	41.9%	16.0%	16.5%	17.1%	4.0%	0.0%
	35	1.0%	1.0%	0.1%	1.0%	14.1%	34.6%	41.4%	34.4%	53.0%	21.8%
2011	8	1.7%	5.0%	1.0%	2.1%	2.7%	7.9%	1.2%	3.2%	1.0%	9.1%
	09L	37.5%	41.0%	32.9%	38.1%	28.5%	23.8%	14.4%	11.9%	7.0%	16.4%
	09R	0.0%	0.0%	0.0%	0.0%	2.6%	4.1%	16.7%	15.5%	26.0%	18.2%
	17	1.0%	1.0%	0.0%	0.1%	4.6%	5.7%	5.9%	18.8%	9.0%	30.9%
	27L	5.8%	10.0%	5.2%	9.2%	5.0%	3.2%	2.7%	4.4%	0.0%	3.6%
	27R	53.1%	42.0%	60.9%	49.5%	41.7%	16.3%	17.2%	11.2%	4.0%	0.0%
	35	1.0%	1.0%	0.0%	1.0%	14.8%	39.1%	41.8%	35.0%	53.0%	21.8%

KPNE Baseline & Future No Action
Departure Runway Use Percentages

	A/C Category	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	6	0.0%	0.0%	0.0%	0.0%	25.7%	38.1%	22.0%	8.4%	19.6%	43.8%
	15	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%	3.4%	0.0%	2.4%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	49.7%	43.8%	43.8%	49.8%	25.7%	25.0%
	33	0.0%	0.0%	0.0%	0.0%	23.5%	18.1%	30.9%	41.8%	52.3%	31.2%
2006	6	0.0%	0.0%	0.0%	0.0%	25.7%	0.0%	21.9%	0.0%	19.5%	43.8%
	15	0.0%	0.0%	0.0%	0.0%	1.1%	0.0%	3.4%	0.0%	2.4%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	49.6%	0.0%	43.8%	0.0%	25.8%	25.0%
	33	0.0%	0.0%	0.0%	0.0%	23.6%	0.0%	30.8%	0.0%	52.3%	31.2%
2011	6	0.0%	0.0%	0.0%	0.0%	25.7%	0.0%	21.9%	0.0%	19.5%	43.8%
	15	0.0%	0.0%	0.0%	0.0%	1.1%	0.0%	3.4%	0.0%	2.4%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	49.6%	0.0%	43.8%	0.0%	25.8%	25.0%
	33	0.0%	0.0%	0.0%	0.0%	23.6%	0.0%	30.8%	0.0%	52.3%	31.2%

KPNE Baseline & Future No Action Arrival Runway Use Percentages											
	A/C Category	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	6	0.0%	0.0%	0.0%	0.0%	26.7%	40.3%	33.6%	30.8%	23.1%	0.0%
	15	0.0%	0.0%	0.0%	0.0%	0.7%	0.0%	2.7%	0.0%	10.6%	37.8%
	24	0.0%	0.0%	0.0%	0.0%	61.8%	54.0%	47.5%	58.9%	53.8%	46.0%
	33	0.0%	0.0%	0.0%	0.0%	10.8%	5.8%	16.2%	10.3%	12.4%	16.2%
2006	6	0.0%	0.0%	0.0%	0.0%	26.1%	0.0%	30.3%	28.5%	21.7%	0.0%
	15	0.0%	0.0%	0.0%	0.0%	0.6%	0.0%	2.5%	0.0%	10.0%	22.6%
	24	0.0%	0.0%	0.0%	0.0%	63.4%	0.0%	52.6%	62.1%	56.5%	67.6%
	33	0.0%	0.0%	0.0%	0.0%	9.9%	0.0%	14.7%	9.5%	11.7%	9.7%
2011	6	0.0%	0.0%	0.0%	0.0%	26.1%	0.0%	30.3%	28.5%	21.7%	0.0%
	15	0.0%	0.0%	0.0%	0.0%	0.6%	0.0%	2.5%	0.0%	10.0%	22.6%
	24	0.0%	0.0%	0.0%	0.0%	63.3%	0.0%	52.6%	62.1%	56.5%	67.6%
	33	0.0%	0.0%	0.0%	0.0%	9.9%	0.0%	14.7%	9.5%	11.7%	9.7%

KSWF Baseline & Future No Action
Departure Runway Use Percentages

	A/C Category	H		M		L		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	9	22.6%	30.8%	32.9%	35.4%	27.0%	15.7%	27.6%	20.3%	50.0%	13.4%
	16	2.4%	2.6%	2.5%	6.4%	2.4%	4.2%	4.7%	0.0%	25.0%	0.0%
	27	72.6%	61.5%	59.2%	56.1%	64.7%	75.7%	58.0%	71.7%	0.0%	17.4%
	34	2.4%	5.1%	5.4%	2.1%	5.9%	4.3%	9.7%	8.0%	25.0%	69.2%
2006	9	1.8%	0.0%	31.2%	38.5%	22.6%	15.8%	28.6%	0.0%	35.4%	0.0%
	16	0.0%	0.0%	2.7%	3.2%	3.9%	1.3%	8.2%	0.0%	2.7%	0.0%
	27	96.5%	0.0%	57.8%	55.5%	63.2%	81.3%	56.1%	0.0%	44.8%	100.0%
	34	1.8%	0.0%	8.4%	2.7%	10.3%	1.6%	7.1%	0.0%	17.1%	0.0%
2011	9	24.1%	0.0%	26.6%	29.9%	25.1%	22.4%	27.3%	0.0%	20.5%	0.0%
	16	1.3%	0.0%	2.5%	5.5%	2.7%	4.1%	4.0%	0.0%	2.3%	0.0%
	27	72.1%	0.0%	61.6%	62.1%	61.7%	71.6%	58.3%	0.0%	34.1%	0.0%
	34	2.5%	0.0%	9.4%	2.4%	10.5%	1.8%	10.4%	0.0%	43.2%	0.0%

KSWF Baseline & Future No Action
Arrival Runway Use Percentages

A/C Category		H		M		L		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	9	38.2%	90.0%	43.5%	83.6%	40.5%	69.5%	45.8%	89.4%	37.8%	42.1%
	16	0.8%	0.0%	0.4%	0.8%	0.4%	1.2%	3.5%	0.0%	4.0%	31.6%
	27	59.5%	10.0%	54.2%	14.2%	53.7%	27.4%	44.6%	9.1%	53.6%	26.3%
	34	1.5%	0.0%	2.0%	1.3%	5.4%	1.8%	6.1%	1.5%	4.6%	0.0%
2006	9	38.2%	0.0%	40.3%	77.9%	39.2%	77.9%	46.5%	89.5%	42.6%	40.0%
	16	0.8%	0.0%	0.8%	0.8%	1.3%	0.8%	4.9%	0.0%	8.8%	30.0%
	27	59.5%	0.0%	55.2%	19.6%	53.2%	19.6%	41.8%	8.8%	38.6%	30.0%
	34	1.5%	0.0%	3.8%	1.7%	6.4%	1.7%	6.8%	1.8%	10.0%	0.0%
2011	9	38.2%	0.0%	40.2%	77.9%	39.3%	77.9%	48.2%	89.5%	42.6%	40.0%
	16	0.8%	0.0%	0.8%	0.8%	1.3%	0.8%	4.8%	0.0%	8.8%	30.0%
	27	59.5%	0.0%	55.4%	19.6%	53.3%	19.6%	40.4%	8.8%	38.6%	30.0%
	34	1.5%	0.0%	3.7%	1.7%	6.1%	1.7%	6.6%	1.8%	10.0%	0.0%

KTEB Baseline & Future No Action
Departure Runway Use Percentages

A/C Category		H		M		L		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	1	0.0%	0.0%	0.0%	0.0%	44.6%	50.1%	32.3%	29.0%	34.8%	28.9%
	6	0.0%	0.0%	0.0%	0.0%	9.6%	18.3%	15.5%	36.2%	29.0%	43.4%
	19	0.0%	0.0%	100.0%	0.0%	6.4%	15.7%	2.1%	16.3%	1.2%	12.2%
	24	0.0%	0.0%	0.0%	0.0%	39.4%	15.8%	50.0%	18.4%	35.0%	15.5%
2006	1	0.0%	0.0%	0.0%	0.0%	44.3%	51.3%	33.3%	30.4%	29.0%	32.7%
	6	0.0%	0.0%	0.0%	0.0%	9.5%	17.7%	16.2%	35.6%	22.6%	41.0%
	19	0.0%	0.0%	0.0%	0.0%	7.4%	15.9%	1.8%	14.5%	1.5%	11.2%
	24	0.0%	0.0%	0.0%	0.0%	38.8%	15.1%	48.6%	19.5%	46.9%	15.1%
2011	1	0.0%	0.0%	0.0%	0.0%	44.3%	51.5%	33.3%	30.4%	29.0%	32.7%
	6	0.0%	0.0%	0.0%	0.0%	9.5%	17.2%	16.2%	35.6%	22.6%	41.0%
	19	0.0%	0.0%	0.0%	0.0%	7.4%	16.0%	1.9%	14.5%	1.5%	11.2%
	24	0.0%	0.0%	0.0%	0.0%	38.9%	15.2%	48.6%	19.5%	46.9%	15.1%

KTEB Baseline & Future No Action
Arrival Runway Use Percentages

A/C Category		H		M		L		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	1	0.0%	0.0%	33.3%	0.0%	26.5%	40.6%	32.9%	41.8%	26.9%	43.2%
	6	0.0%	0.0%	33.4%	0.0%	26.1%	22.6%	37.3%	28.9%	48.6%	28.7%
	19	0.0%	0.0%	33.4%	0.0%	38.9%	31.1%	26.0%	22.3%	18.8%	23.8%
	24	0.0%	0.0%	0.0%	0.0%	8.5%	5.7%	3.8%	7.0%	5.7%	4.3%
2006	1	0.0%	0.0%	37.3%	0.0%	26.9%	43.1%	28.4%	56.4%	22.1%	43.1%
	6	0.0%	0.0%	21.6%	0.0%	26.1%	21.7%	41.1%	23.1%	47.9%	27.1%
	19	0.0%	0.0%	37.3%	0.0%	38.9%	30.2%	25.9%	12.4%	24.4%	26.0%
	24	0.0%	0.0%	3.9%	0.0%	8.1%	4.9%	4.6%	8.1%	5.7%	3.8%
2011	1	0.0%	0.0%	37.3%	0.0%	26.8%	42.8%	28.3%	56.4%	22.1%	42.9%
	6	0.0%	0.0%	21.6%	0.0%	26.2%	21.7%	41.1%	23.0%	47.9%	27.2%
	19	0.0%	0.0%	37.3%	0.0%	38.9%	30.5%	25.9%	12.5%	24.4%	26.0%
	24	0.0%	0.0%	3.9%	0.0%	8.1%	5.0%	4.6%	8.1%	5.7%	3.8%

KTTN Baseline & Future No Action
Departure Runway Use Percentages

	A/C Category	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	6	0.0%	0.0%	0.0%	0.0%	16.3%	13.0%	15.9%	18.3%	7.8%	0.0%
	16	0.0%	0.0%	0.0%	0.0%	8.3%	4.4%	27.9%	27.4%	10.9%	15.2%
	24	0.0%	0.0%	0.0%	100.0%	60.5%	57.8%	36.1%	45.3%	53.7%	69.7%
	34	0.0%	0.0%	100.0%	0.0%	14.8%	24.8%	20.1%	9.1%	27.6%	15.2%
2006	6	0.0%	0.0%	0.0%	0.0%	16.8%	0.0%	16.2%	0.0%	4.1%	0.0%
	16	0.0%	0.0%	0.0%	0.0%	8.2%	0.0%	27.8%	0.0%	12.2%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	55.2%	46.7%	36.3%	0.0%	54.1%	0.0%
	34	0.0%	0.0%	0.0%	0.0%	19.7%	53.3%	19.6%	0.0%	29.7%	0.0%
2011	6	0.0%	0.0%	0.0%	0.0%	16.5%	0.0%	16.2%	0.0%	4.1%	0.0%
	16	0.0%	0.0%	0.0%	0.0%	8.4%	0.0%	27.8%	0.0%	12.2%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	59.0%	46.7%	36.3%	0.0%	54.1%	0.0%
	34	0.0%	0.0%	0.0%	0.0%	16.1%	53.3%	19.6%	0.0%	29.7%	0.0%

KTTN Baseline & Future No Action
Arrival Runway Use Percentages

A/C Category		H		M		L		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	6	0.0%	0.0%	0.0%	100.0%	58.6%	73.3%	40.0%	55.9%	76.3%	100.0%
	16	0.0%	0.0%	0.0%	0.0%	7.8%	0.0%	16.4%	2.9%	9.5%	0.0%
	24	0.0%	0.0%	100.0%	0.0%	20.6%	17.9%	15.4%	17.6%	7.1%	0.0%
	34	0.0%	0.0%	0.0%	0.0%	13.0%	8.8%	28.2%	23.5%	7.1%	0.0%
2006	6	0.0%	0.0%	0.0%	0.0%	59.4%	0.0%	44.6%	0.0%	82.6%	0.0%
	16	0.0%	0.0%	0.0%	0.0%	7.9%	0.0%	15.2%	0.0%	6.1%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	21.8%	0.0%	14.1%	0.0%	5.8%	0.0%
	34	0.0%	0.0%	0.0%	0.0%	10.9%	0.0%	26.0%	0.0%	5.5%	0.0%
2011	6	0.0%	0.0%	0.0%	0.0%	58.6%	0.0%	48.2%	0.0%	82.6%	0.0%
	16	0.0%	0.0%	0.0%	0.0%	8.6%	0.0%	14.2%	0.0%	6.1%	0.0%
	24	0.0%	0.0%	0.0%	0.0%	21.3%	0.0%	13.2%	0.0%	5.8%	0.0%
	34	0.0%	0.0%	0.0%	0.0%	11.5%	0.0%	24.4%	0.0%	5.5%	0.0%

KWRI Baseline & Future No Action Departure Runway Use Percentages											
	A/C Category	**H**		**M**		**L**		**T**		**P**	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	6	43.3%	65.0%	36.9%	0.0%	45.5%	25.0%	40.4%	100.0%	25.0%	0.0%
	18	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	24	55.6%	35.0%	63.1%	0.0%	54.5%	75.0%	58.8%	0.0%	62.5%	0.0%
	36	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%	0.0%	12.5%	0.0%
2006	6	37.5%	0.0%	40.6%	0.0%	0.0%	0.0%	40.0%	100.0%	0.0%	0.0%
	18	0.4%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	24	61.2%	0.0%	58.5%	0.0%	0.0%	0.0%	59.1%	0.0%	0.0%	0.0%
	36	0.9%	0.0%	0.6%	0.0%	0.0%	0.0%	0.9%	0.0%	0.0%	0.0%
2011	6	37.5%	0.0%	40.6%	0.0%	0.0%	0.0%	40.0%	100.0%	0.0%	0.0%
	18	0.4%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	24	61.2%	0.0%	58.5%	0.0%	0.0%	0.0%	59.1%	0.0%	0.0%	0.0%
	36	0.9%	0.0%	0.6%	0.0%	0.0%	0.0%	0.9%	0.0%	0.0%	0.0%

KWRI Baseline & Future No Action
Arrival Runway Use Percentages

	A/C Category	H		M		L		T		P	
Year	Runway	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2000	6	37.2%	59.3%	13.9%	0.0%	0.0%	0.0%	14.7%	0.0%	0.0%	0.0%
	18	7.3%	0.0%	22.4%	0.0%	24.6%	0.0%	11.5%	0.0%	20.1%	0.0%
	24	51.4%	40.7%	61.8%	0.0%	75.4%	0.0%	62.2%	0.0%	59.8%	0.0%
	36	4.1%	0.0%	1.9%	0.0%	0.0%	0.0%	11.5%	0.0%	20.1%	0.0%
2006	6	49.5%	58.6%	31.1%	58.6%	0.0%	0.0%	13.3%	0.0%	0.0%	0.0%
	18	6.8%	0.0%	7.6%	0.0%	0.0%	0.0%	12.0%	0.0%	0.0%	0.0%
	24	42.7%	41.4%	55.8%	41.4%	0.0%	0.0%	62.7%	0.0%	0.0%	0.0%
	36	0.9%	0.0%	5.6%	0.0%	0.0%	0.0%	12.0%	0.0%	0.0%	0.0%
2011	6	49.5%	58.6%	31.1%	58.6%	0.0%	0.0%	13.3%	0.0%	0.0%	0.0%
	18	6.8%	0.0%	7.6%	0.0%	0.0%	0.0%	12.0%	0.0%	0.0%	0.0%
	24	42.7%	41.4%	55.8%	41.4%	0.0%	0.0%	62.7%	0.0%	0.0%	0.0%
	36	0.9%	0.0%	5.6%	0.0%	0.0%	0.0%	12.0%	0.0%	0.0%	0.0%

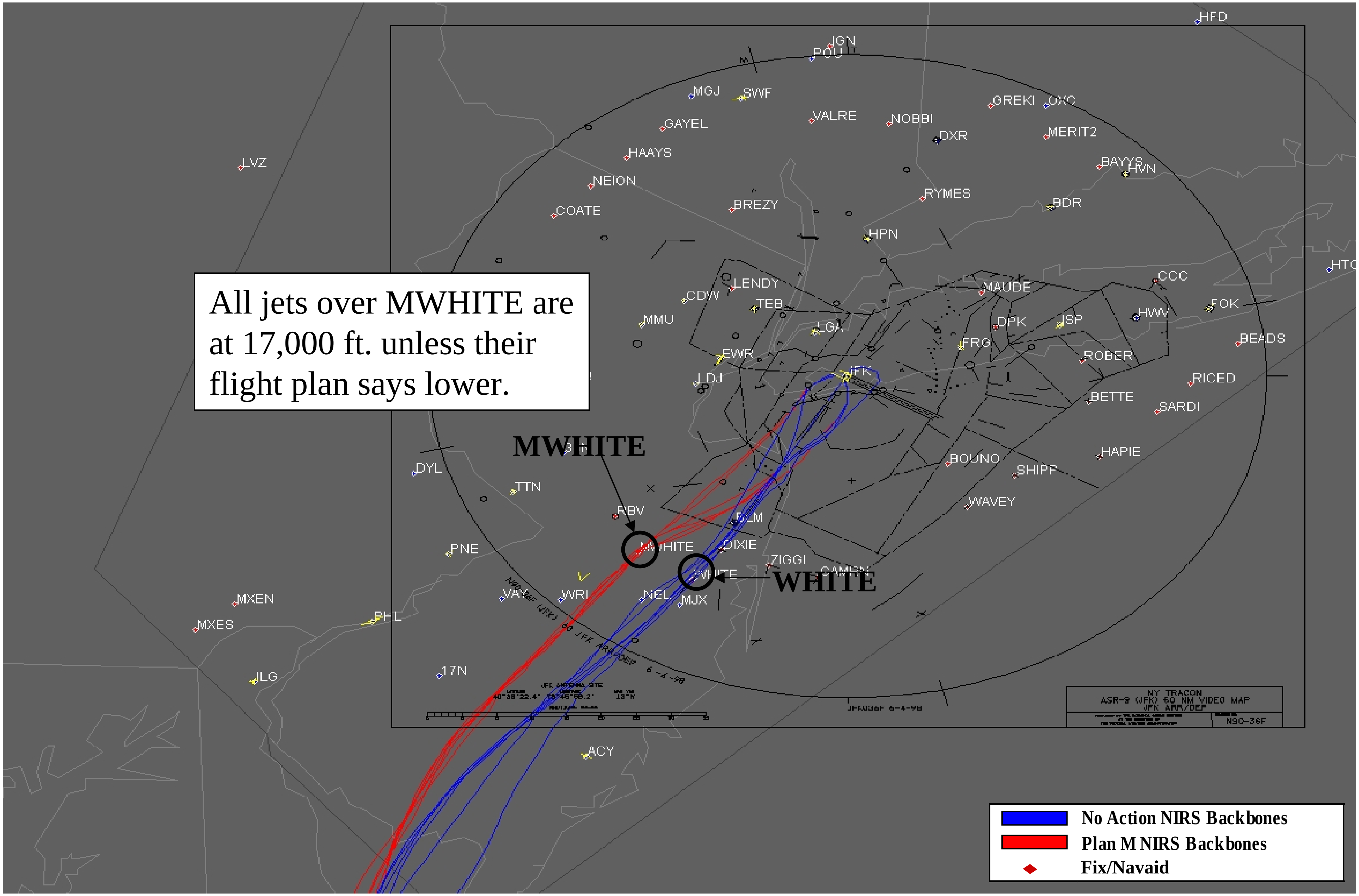
Attachment C

ALTERNATIVE FLIGHT TRACK CHANGE ILLUSTRATIONS

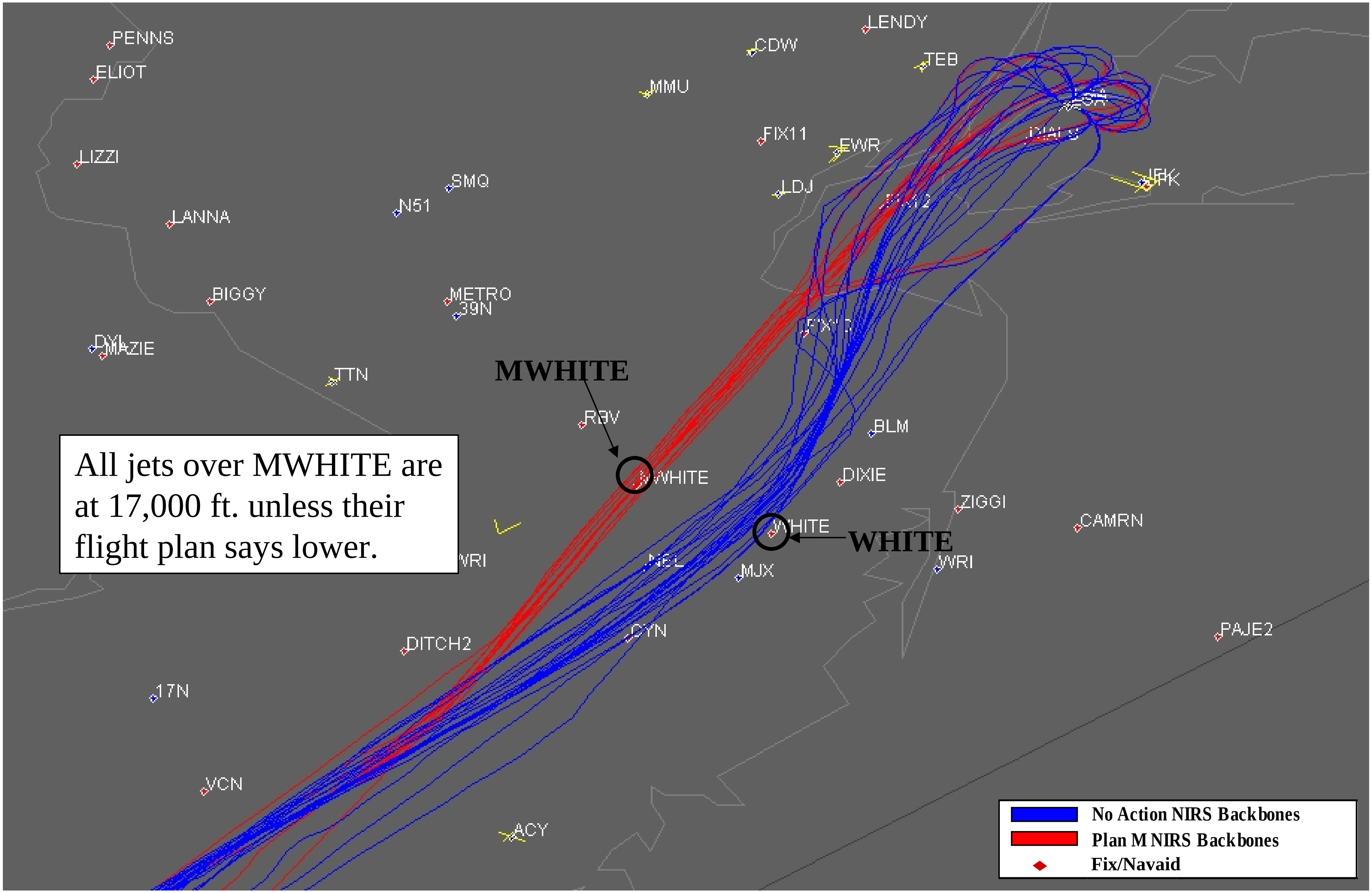
Section 1

Modifications to Existing Airspace (Plan M)
Flight Track Changes

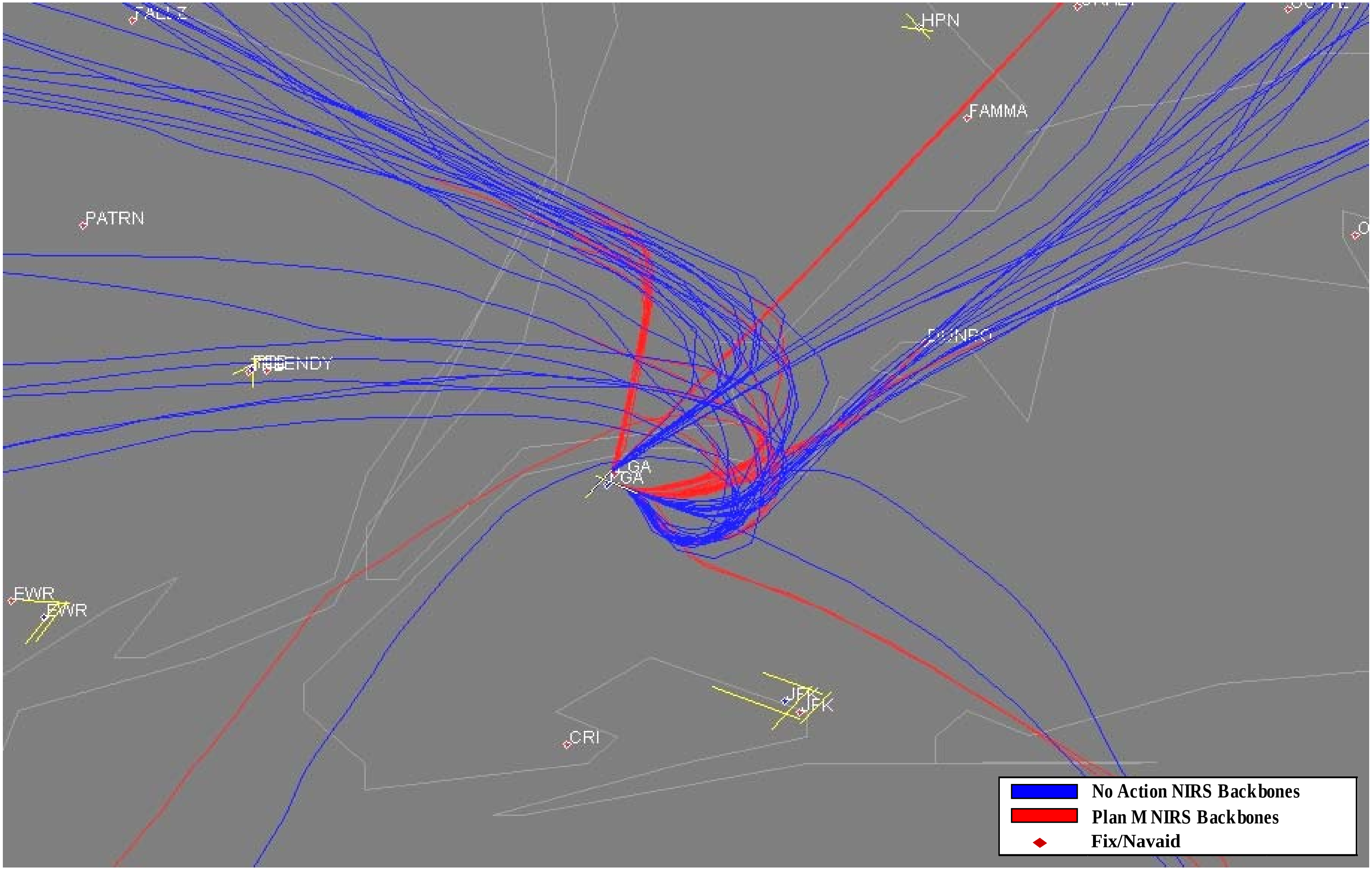
JFK Departures – Plan M MWHITE vs. No Action WHITE



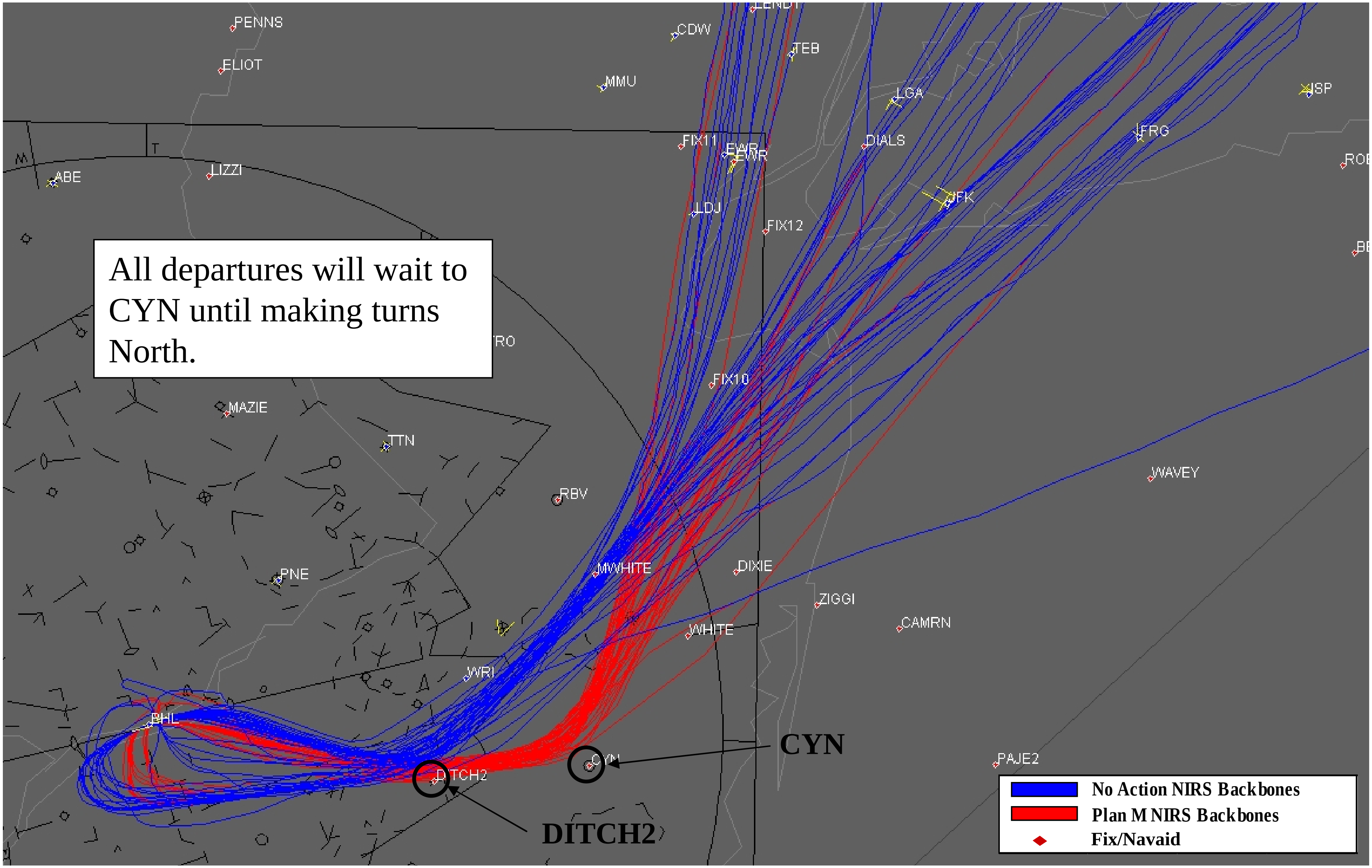
LGA Departures – Plan M MWHITE vs. No Action WHITE



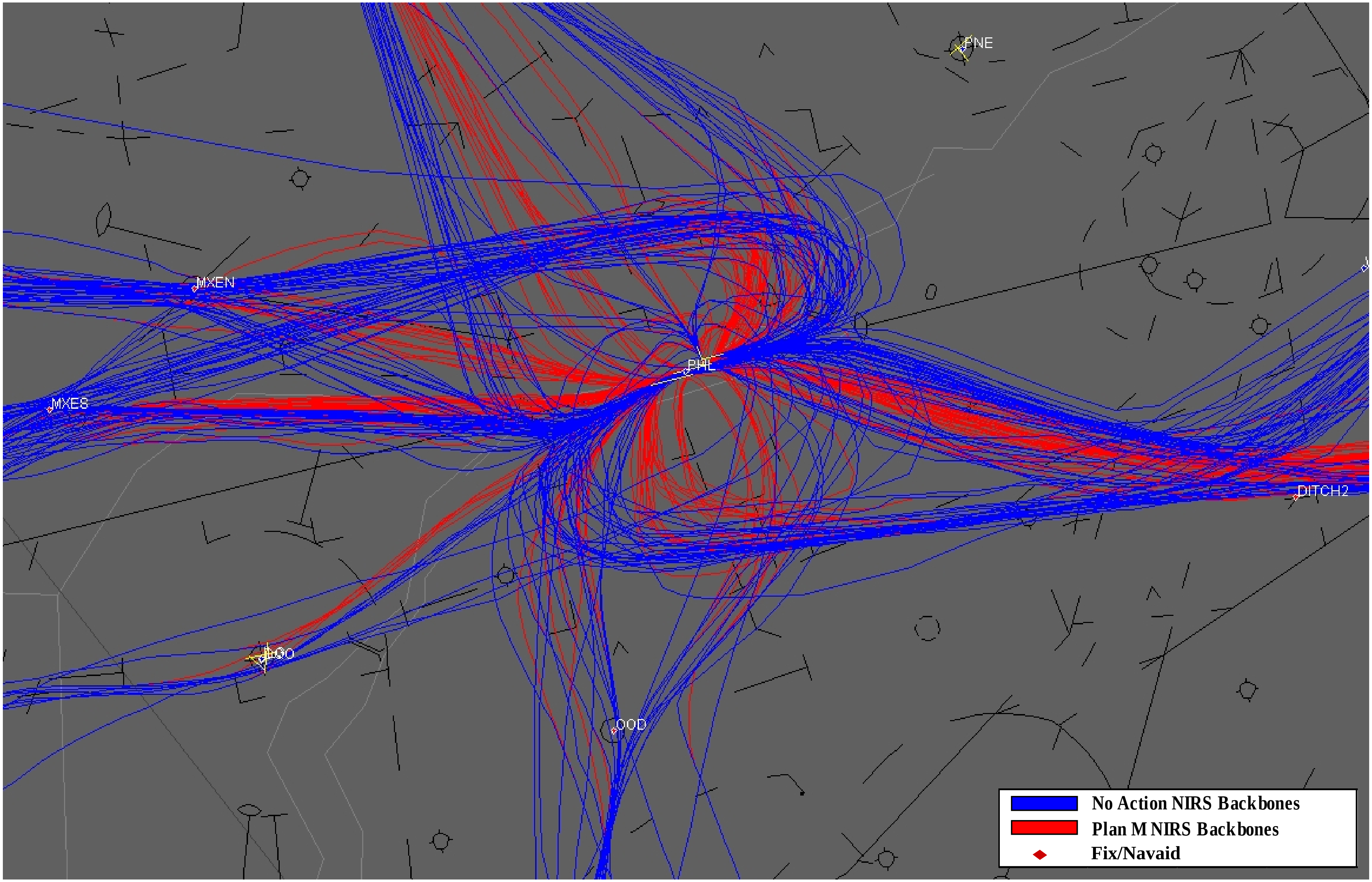
LGA Departures – Plan M vs. No Action (Heading Changes)



PHL Departures – Plan M CYN vs. No Action DITCH2



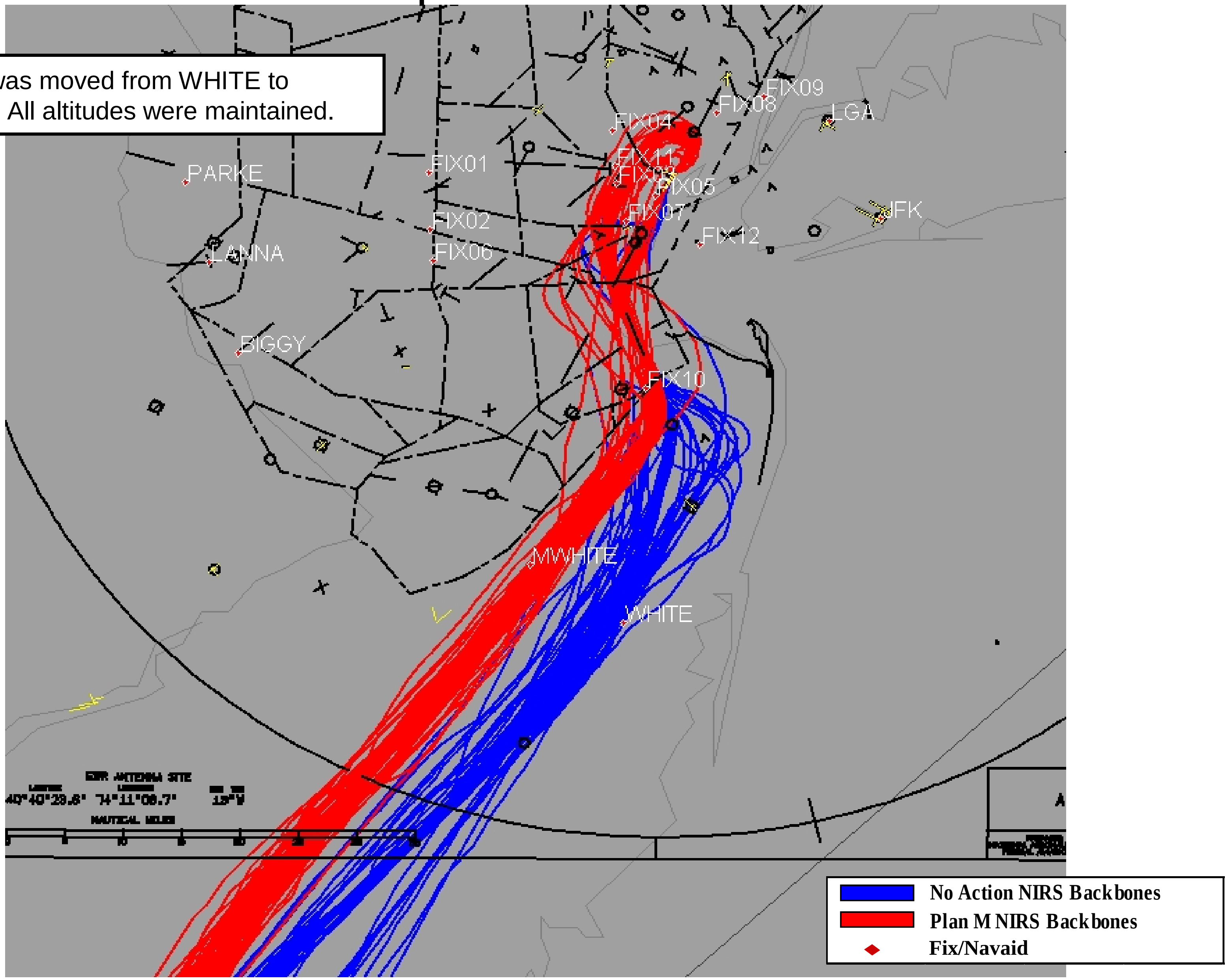
PHL Departures – Plan M vs. No Action (Heading Changes)



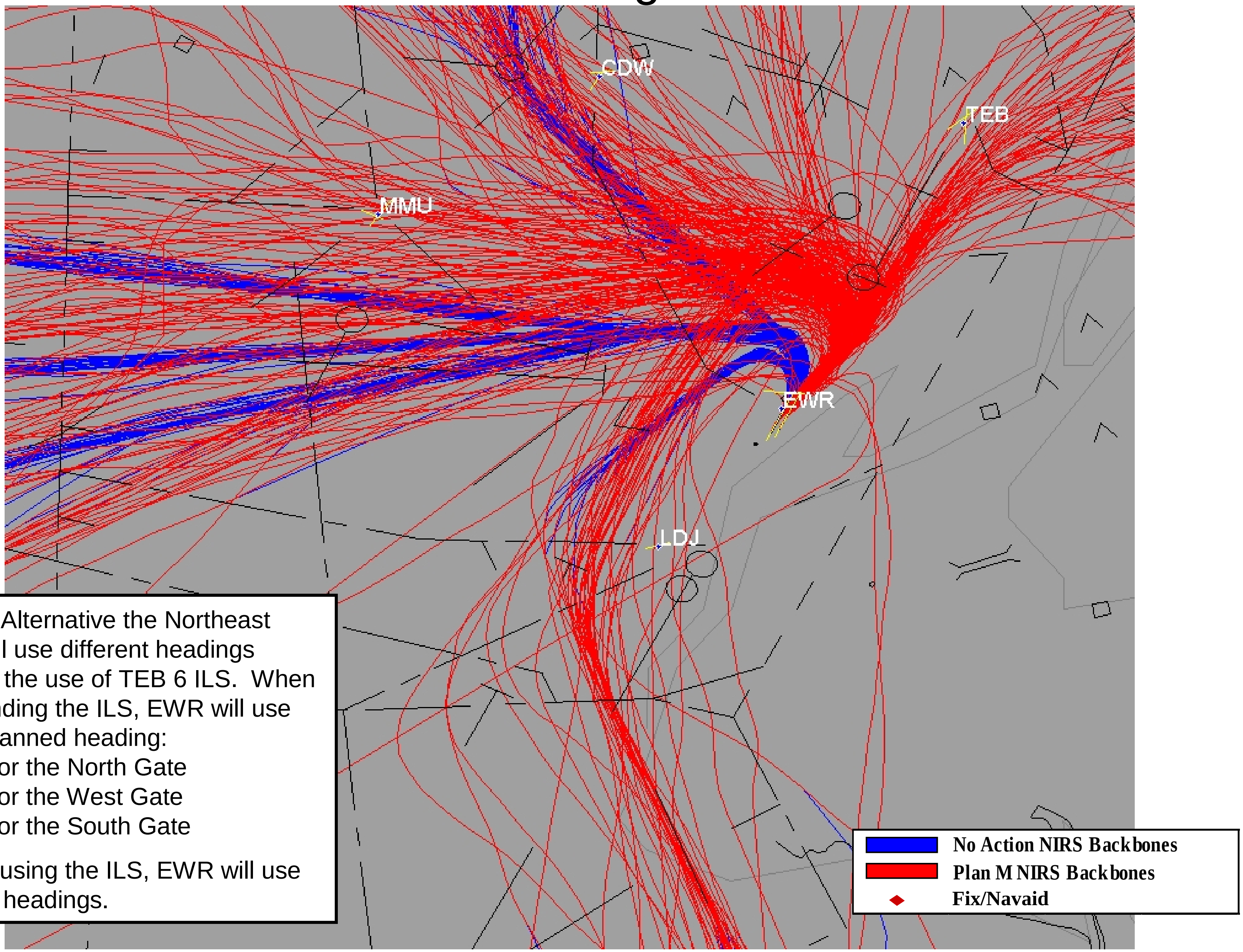
Appendix E
Attachment C-8

EWR – MWHITE Departures – Plan M vs No Action

All traffic was moved from WHITE to MWHITE. All altitudes were maintained.



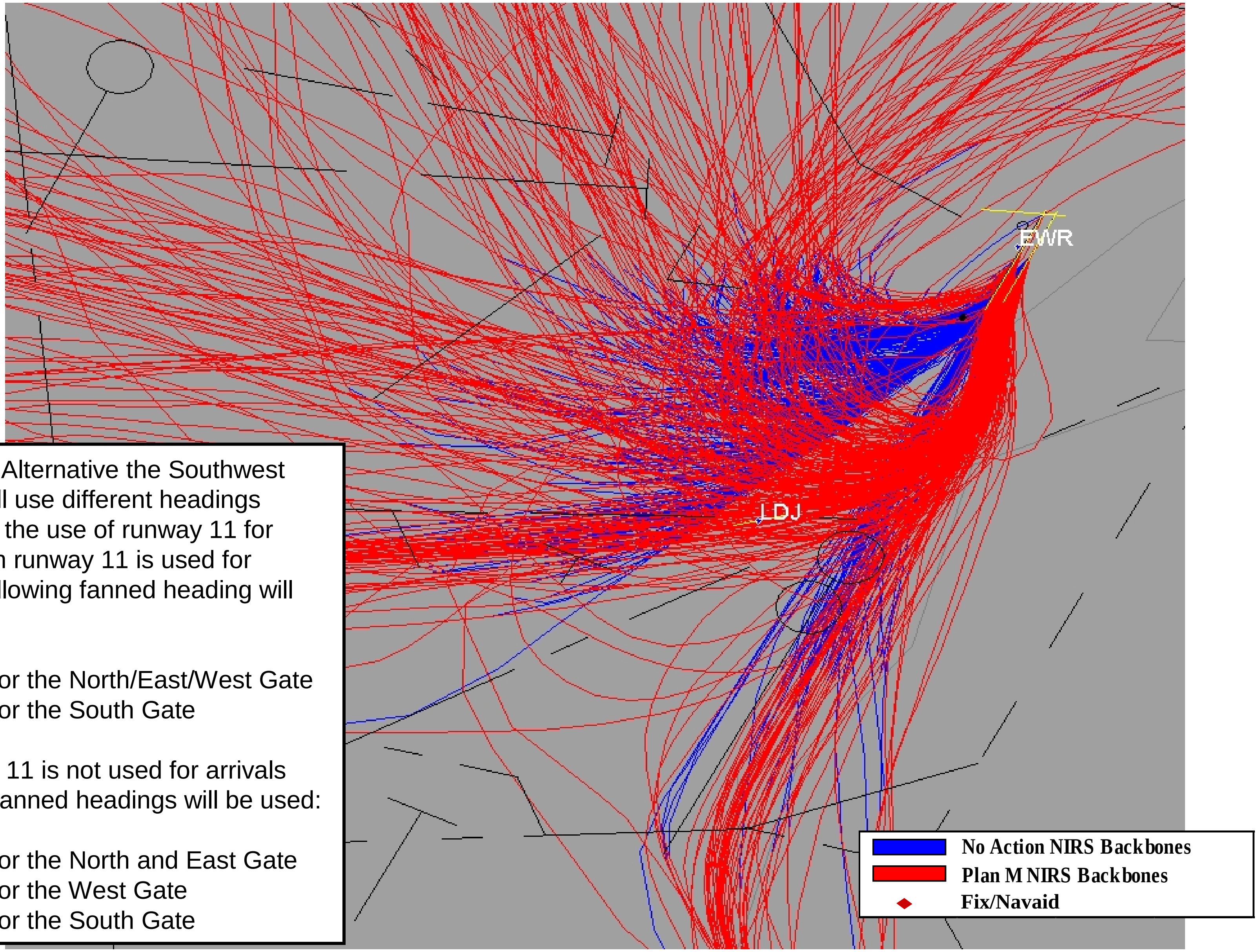
EWR Northeast Fanned Headings – Plan M vs. No Action



In the Plan M Alternative the Northeast departures will use different headings depending on the use of TEB 6 ILS. When TEB is not landing the ILS, EWR will use the following fanned heading:
330 heading for the North Gate
280 heading for the West Gate
240 heading for the South Gate

When TEB is using the ILS, EWR will use the No Action headings.

EWR Southwest Fanned Headings – Plan M vs. No Action



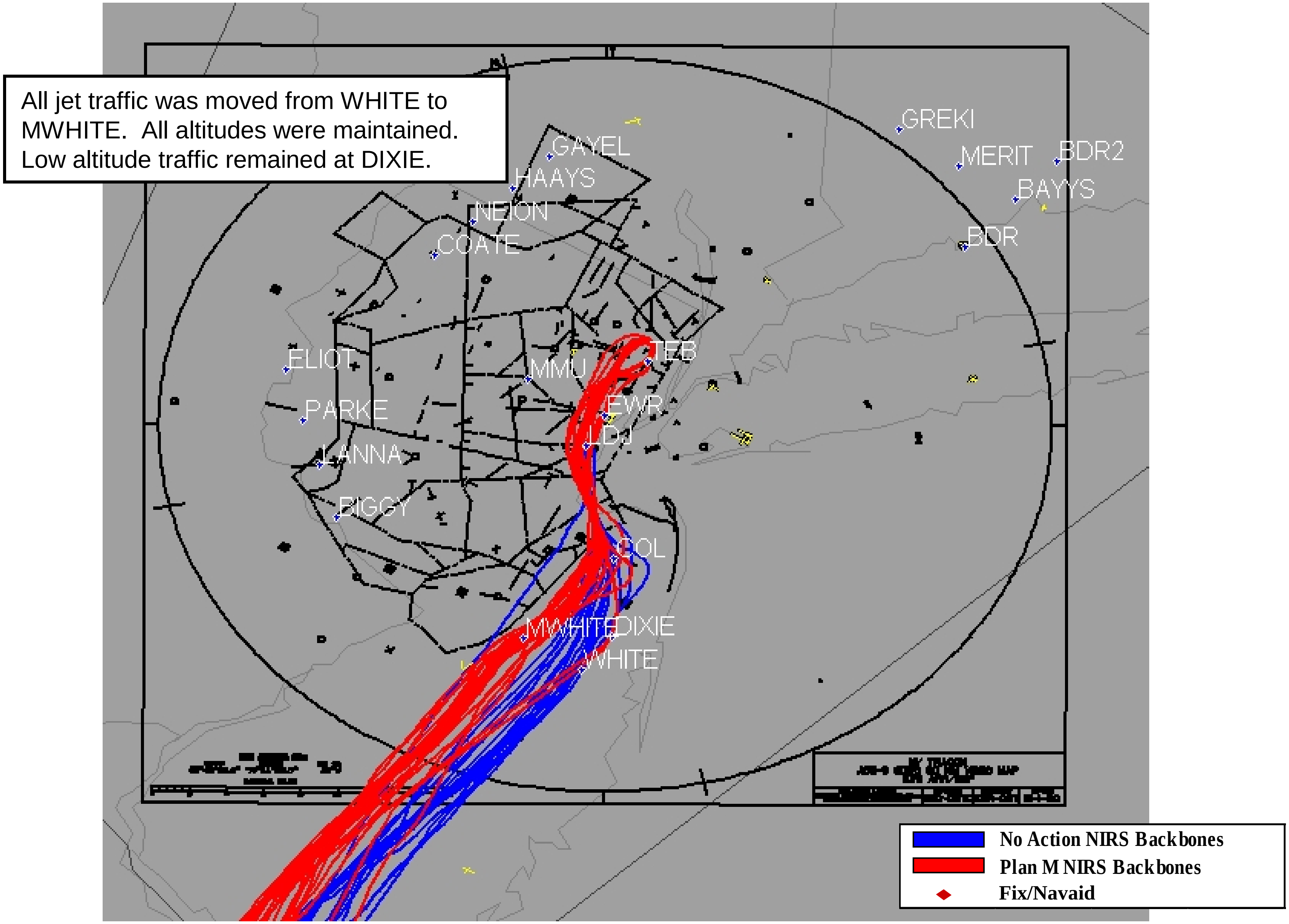
In the Plan M Alternative the Southwest departures will use different headings depending on the use of runway 11 for arrivals. When runway 11 is used for arrivals the following fanned heading will be used:

240 heading for the North/East/West Gate
220 heading for the South Gate

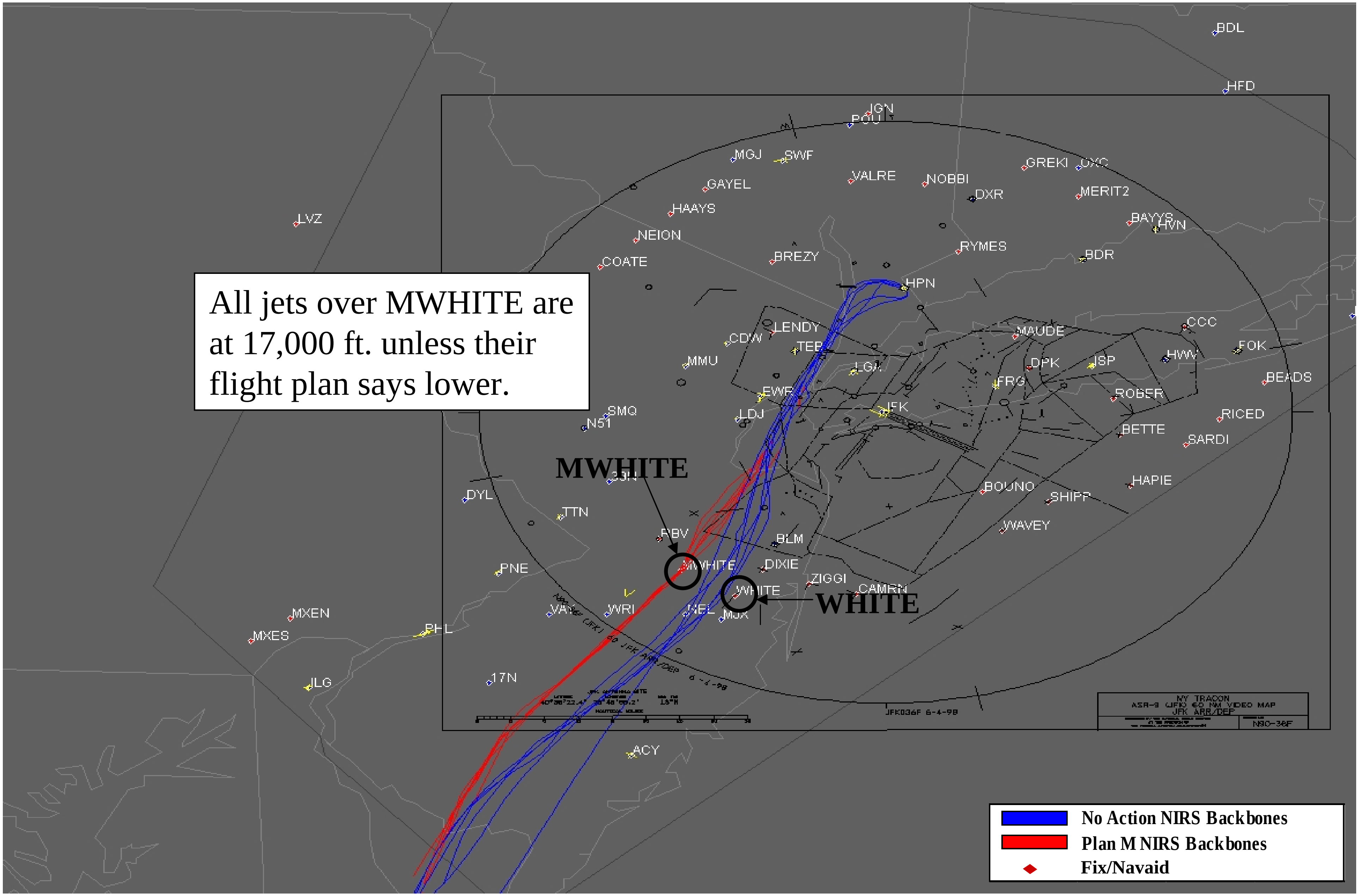
When runway 11 is not used for arrivals the following fanned headings will be used:

260 heading for the North and East Gate
240 heading for the West Gate
220 heading for the South Gate

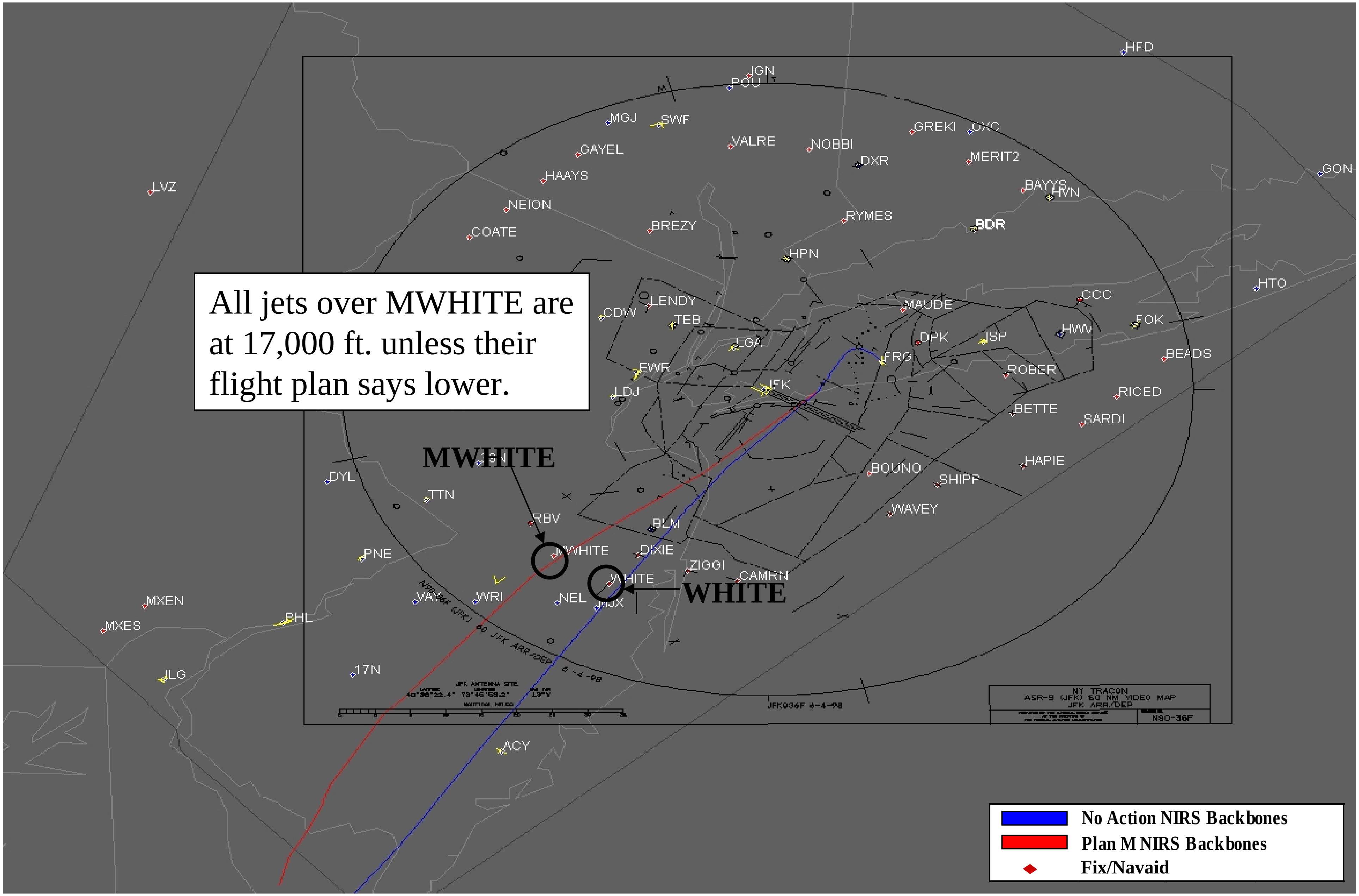
TEB – MWHITE Departures – Plan M vs. No Action



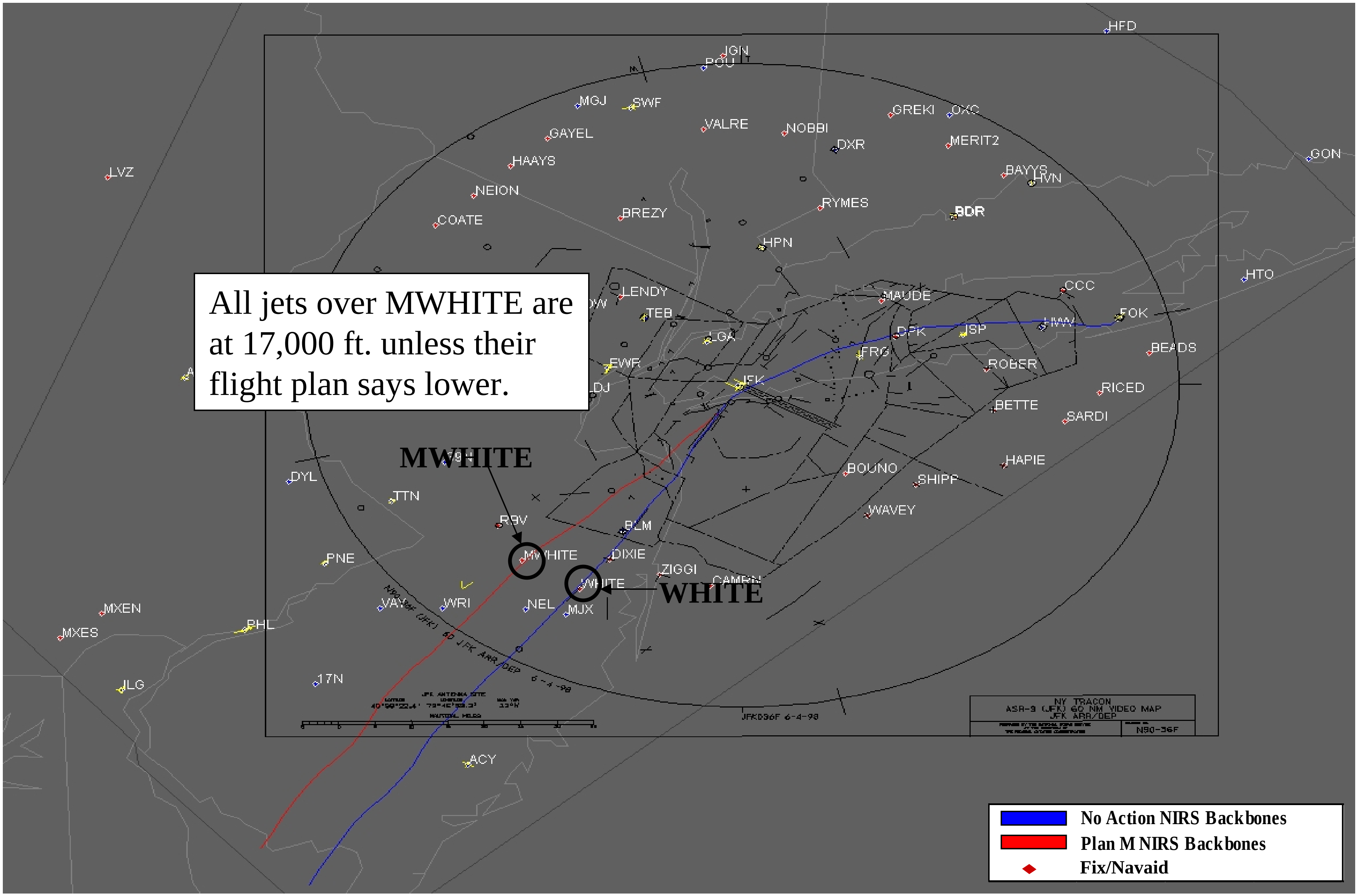
HPN Departures – Plan M MWHITE vs. No Action WHITE



FRG Departures – Plan M MWHITE vs. No Action WHITE

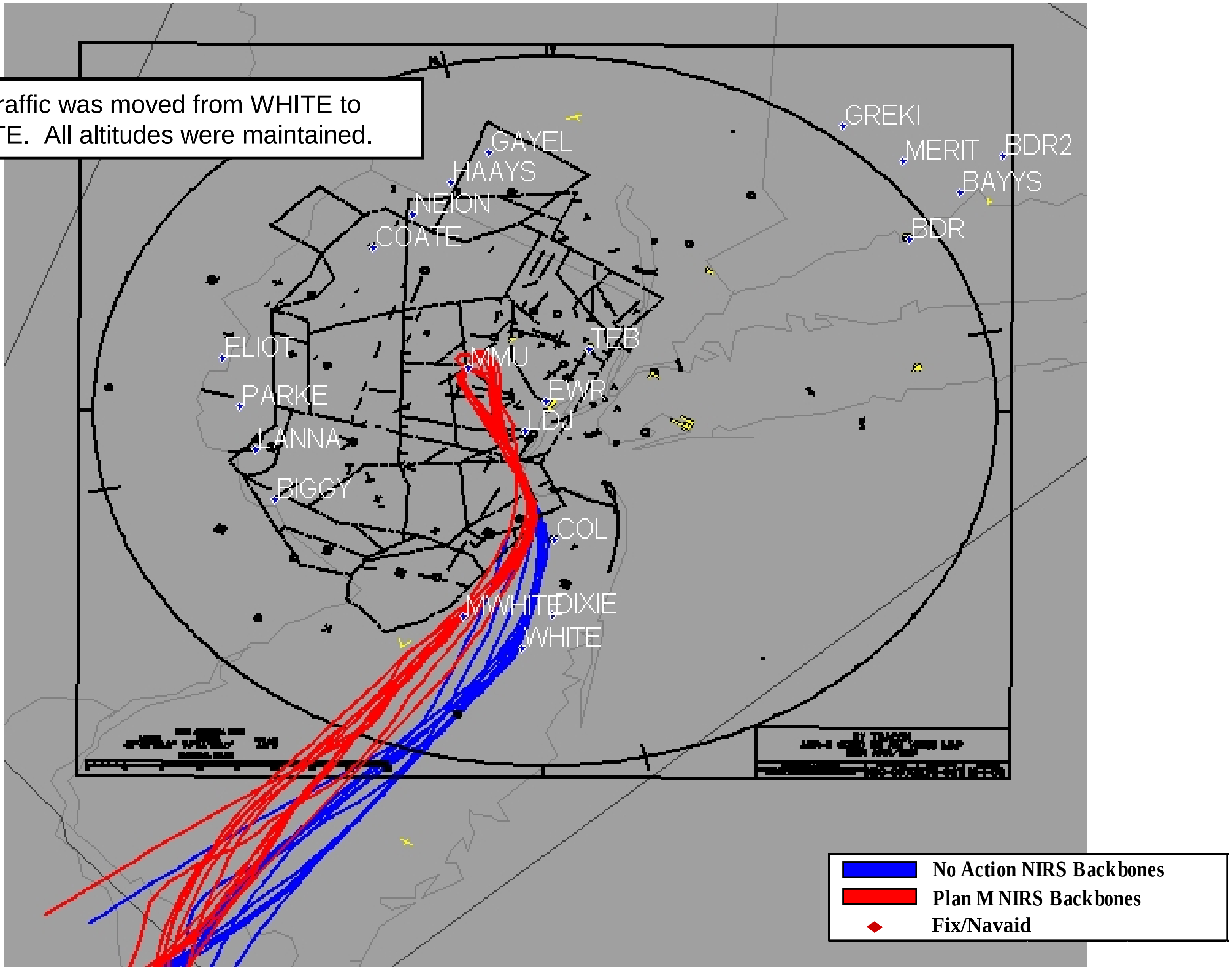


FOK Departures – Plan M MWHITE vs. No Action WHITE

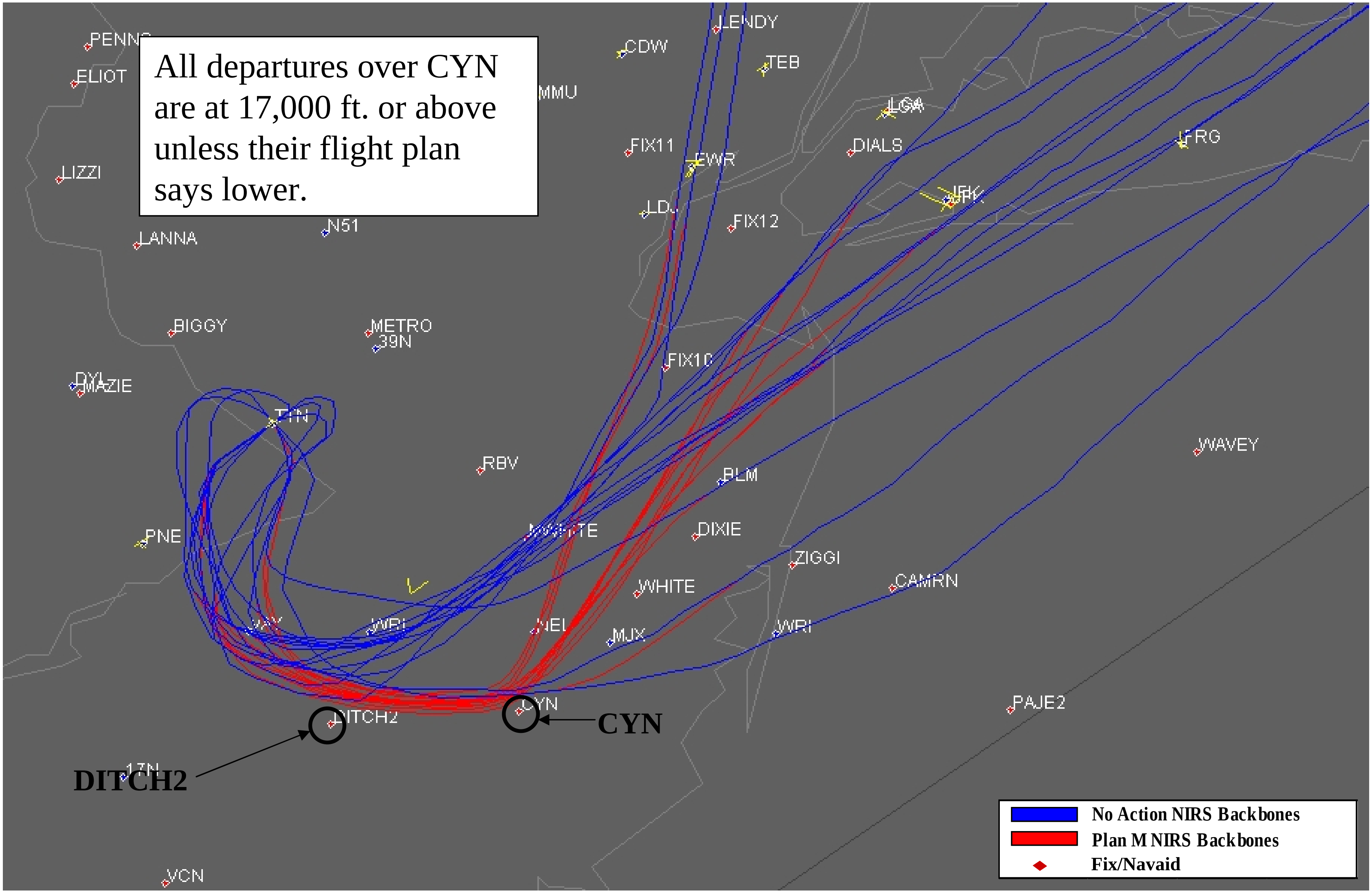


MMU- MWHITE Departures – Plan M vs. No Action

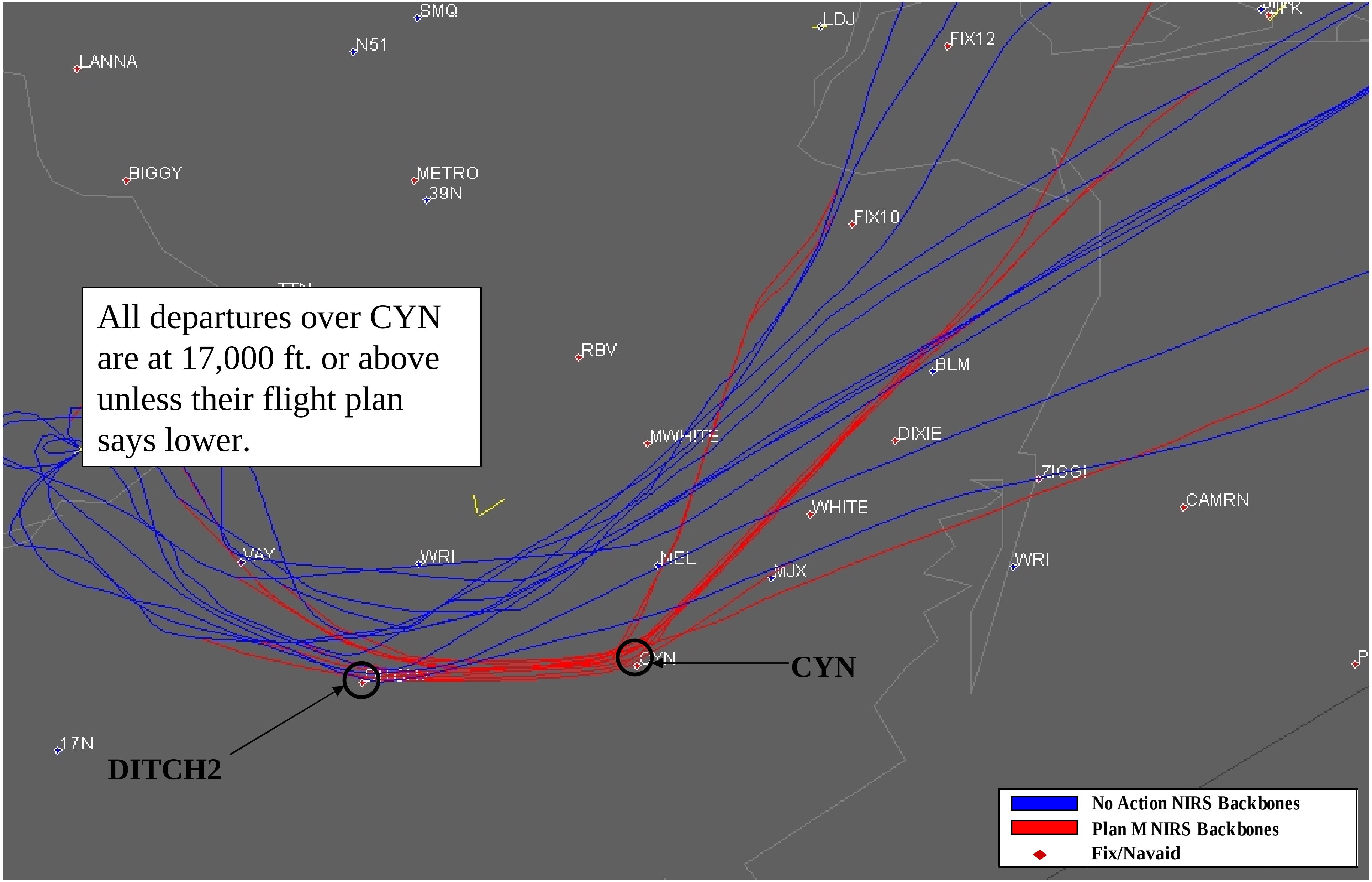
All jet traffic was moved from WHITE to MWHITE. All altitudes were maintained.



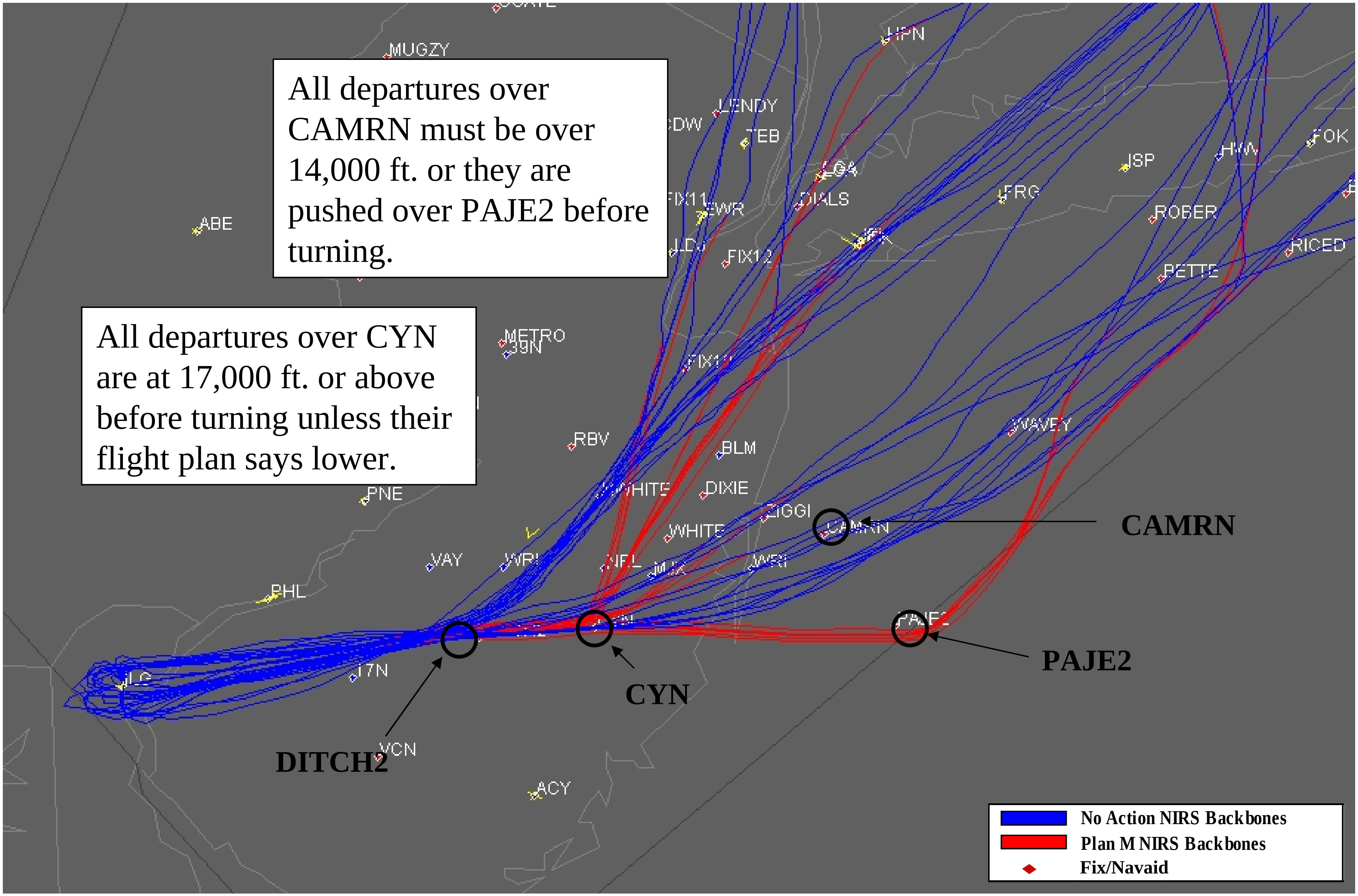
TTN Departures – Plan CYN vs. No Action DITCH2



PNE Departures – Plan CYN vs. No Action DITCH2



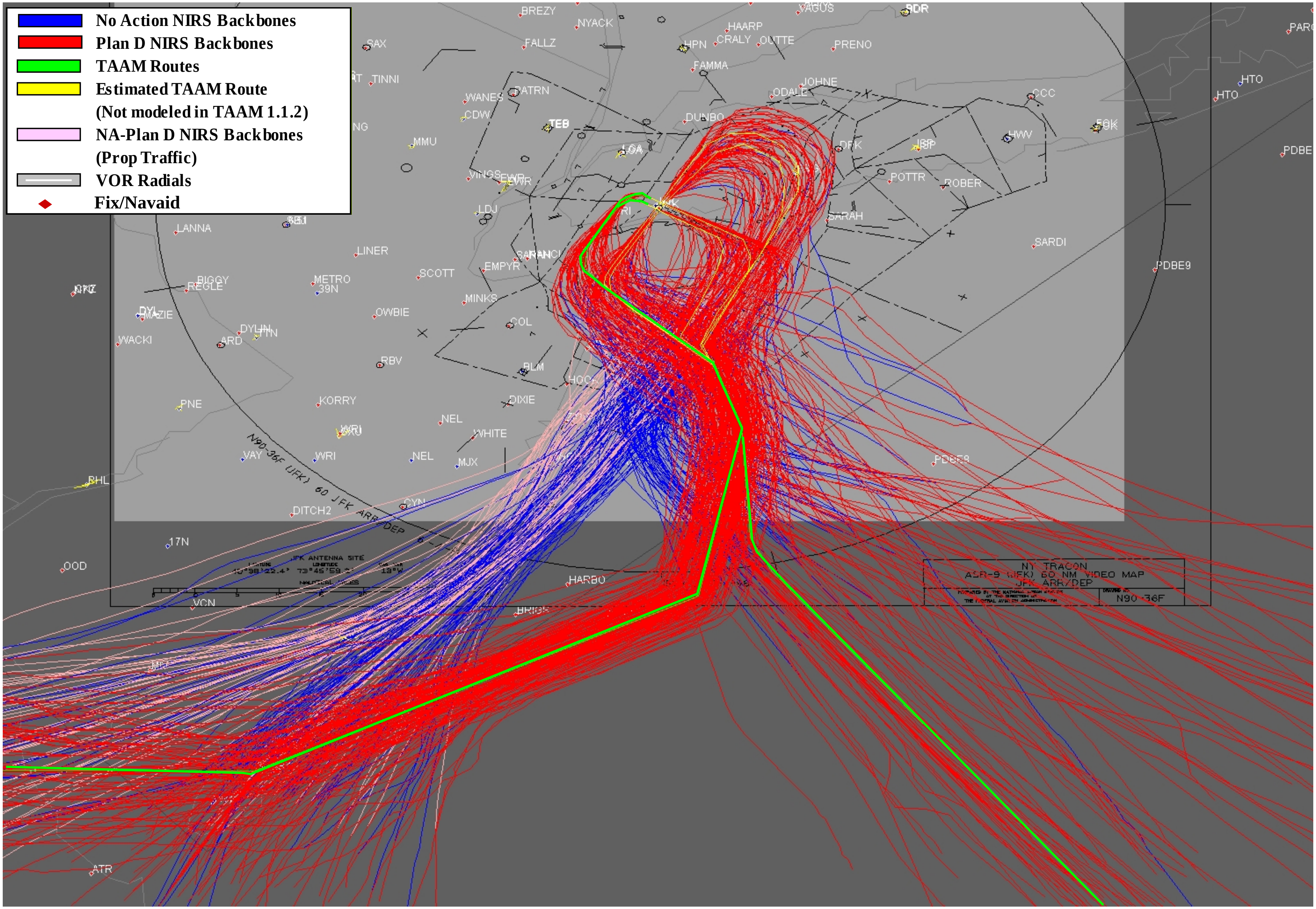
ILG Departures – Plan CYN vs. No Action DITCH2



Section 2

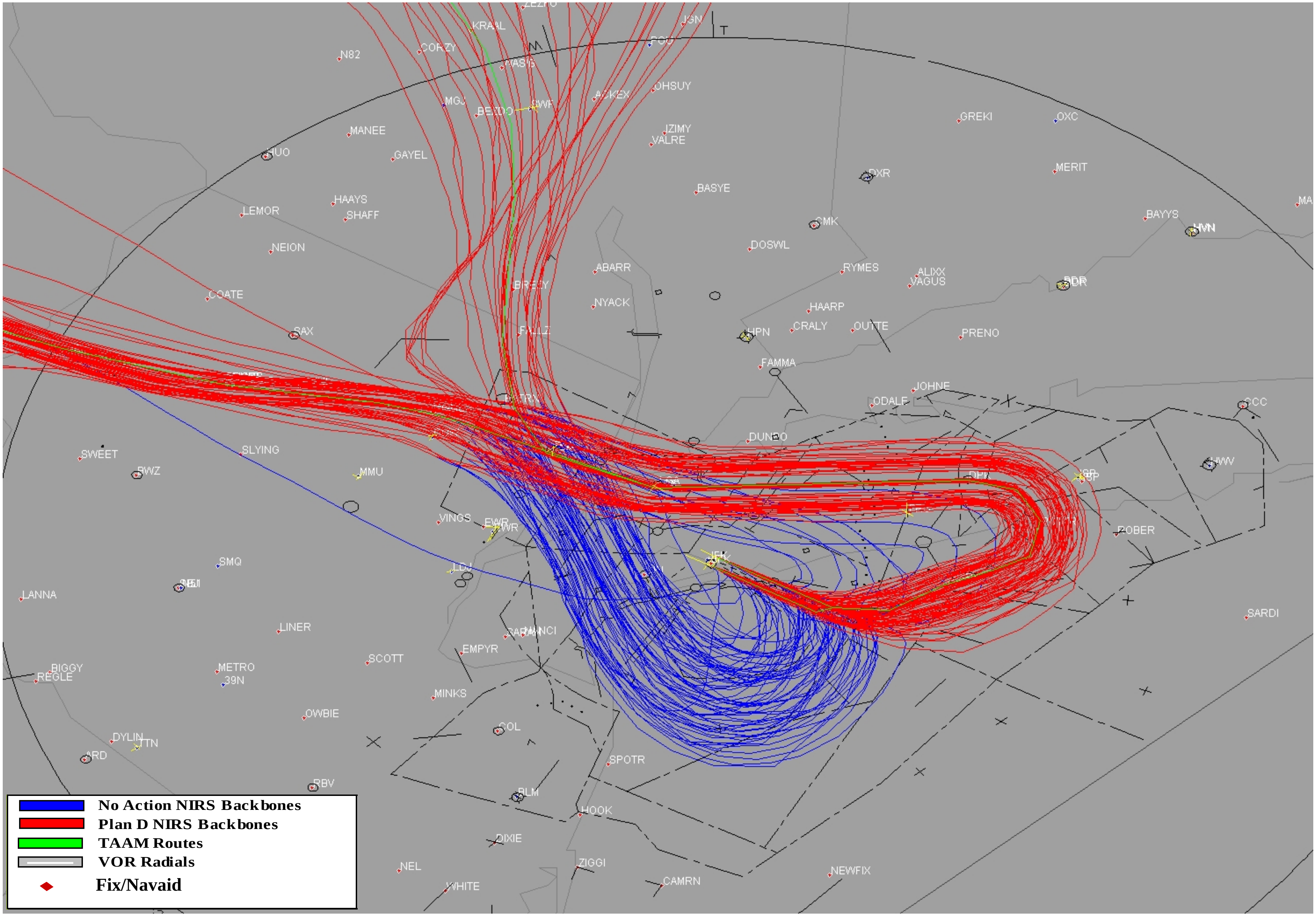
Ocean Routing Alternative (Plan D)
Flight Track Changes

JFK South CAMRN Arrivals

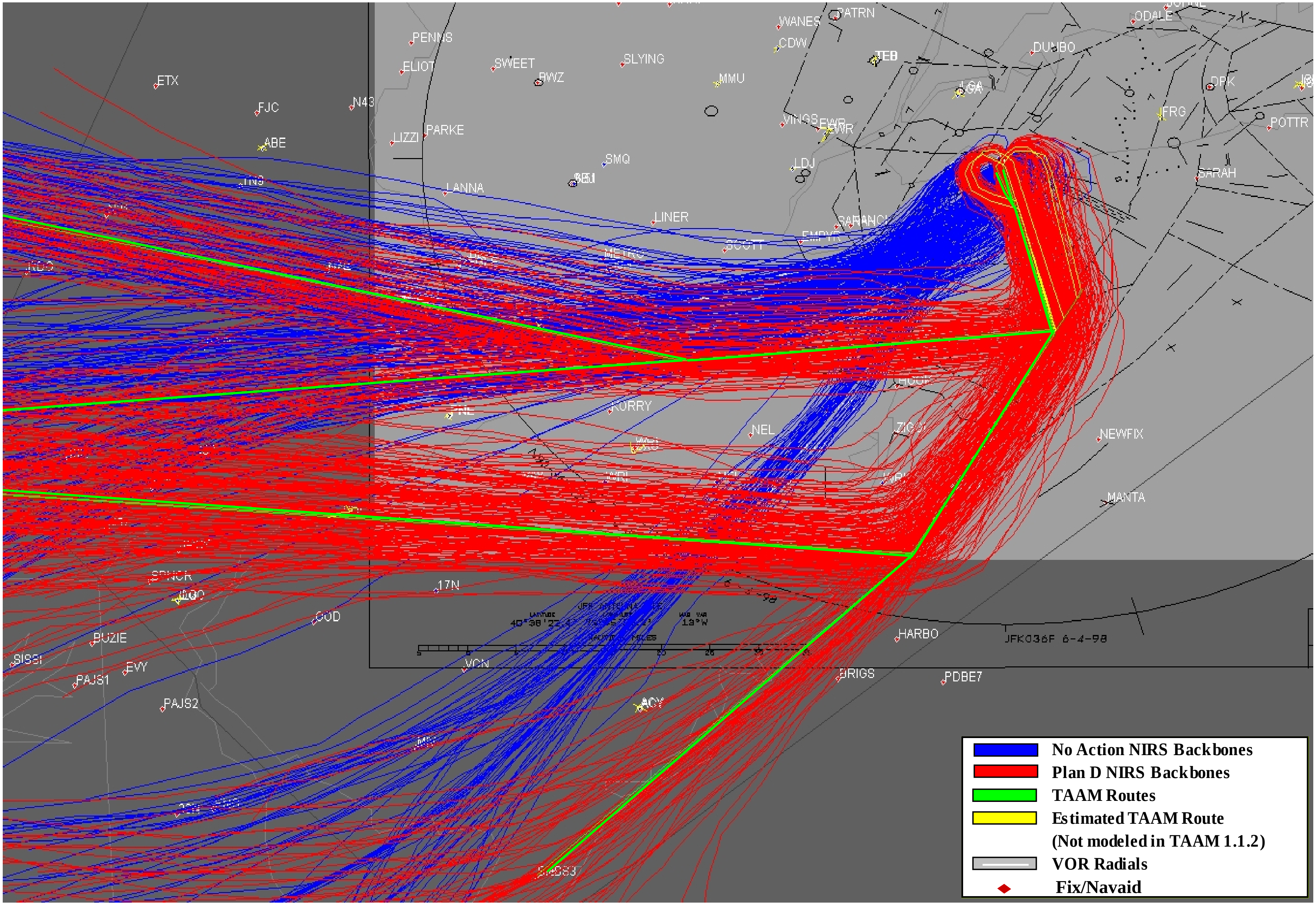


Appendix E
Attachment C-21

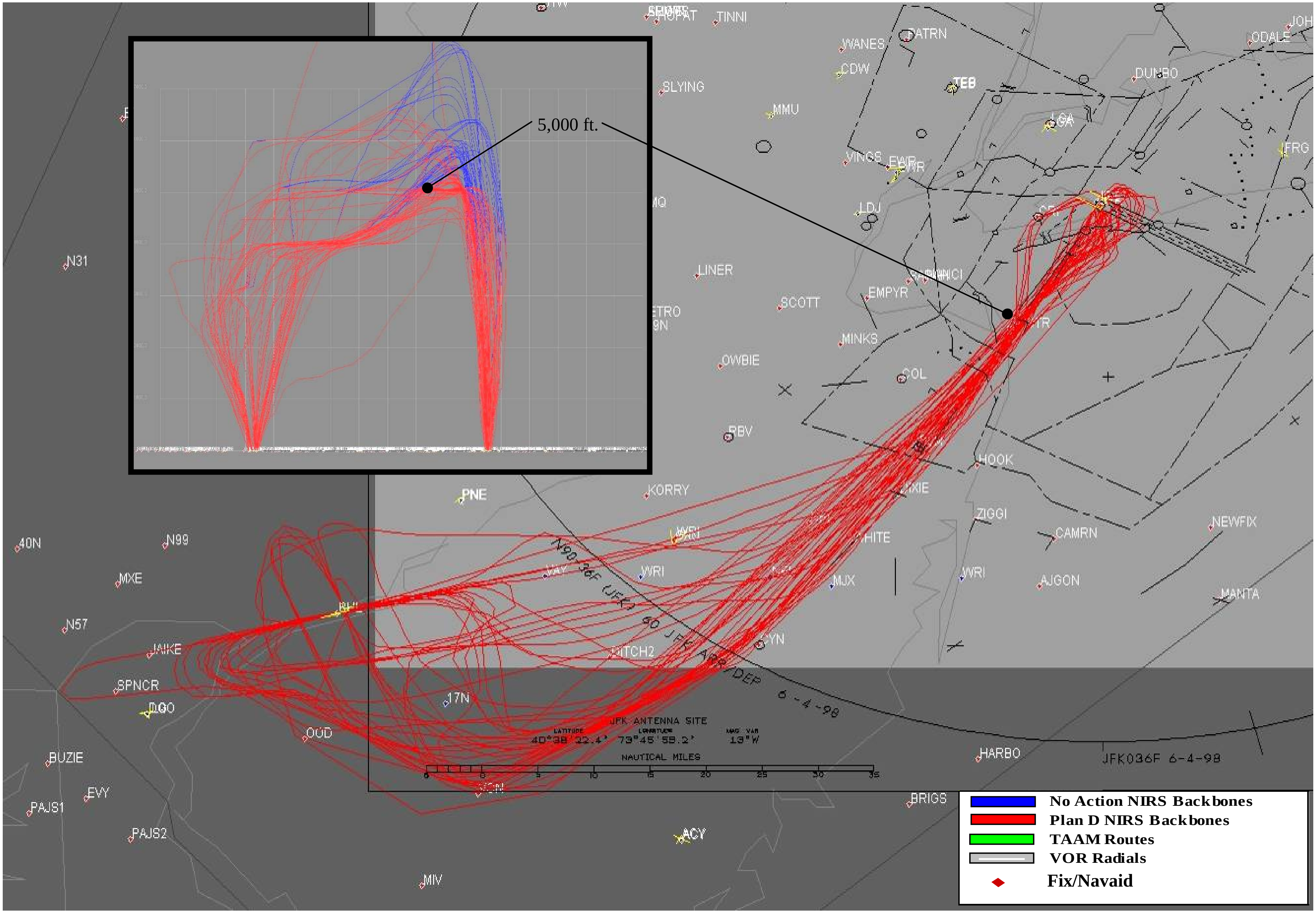
JFK 31L/31R North & West Arrivals



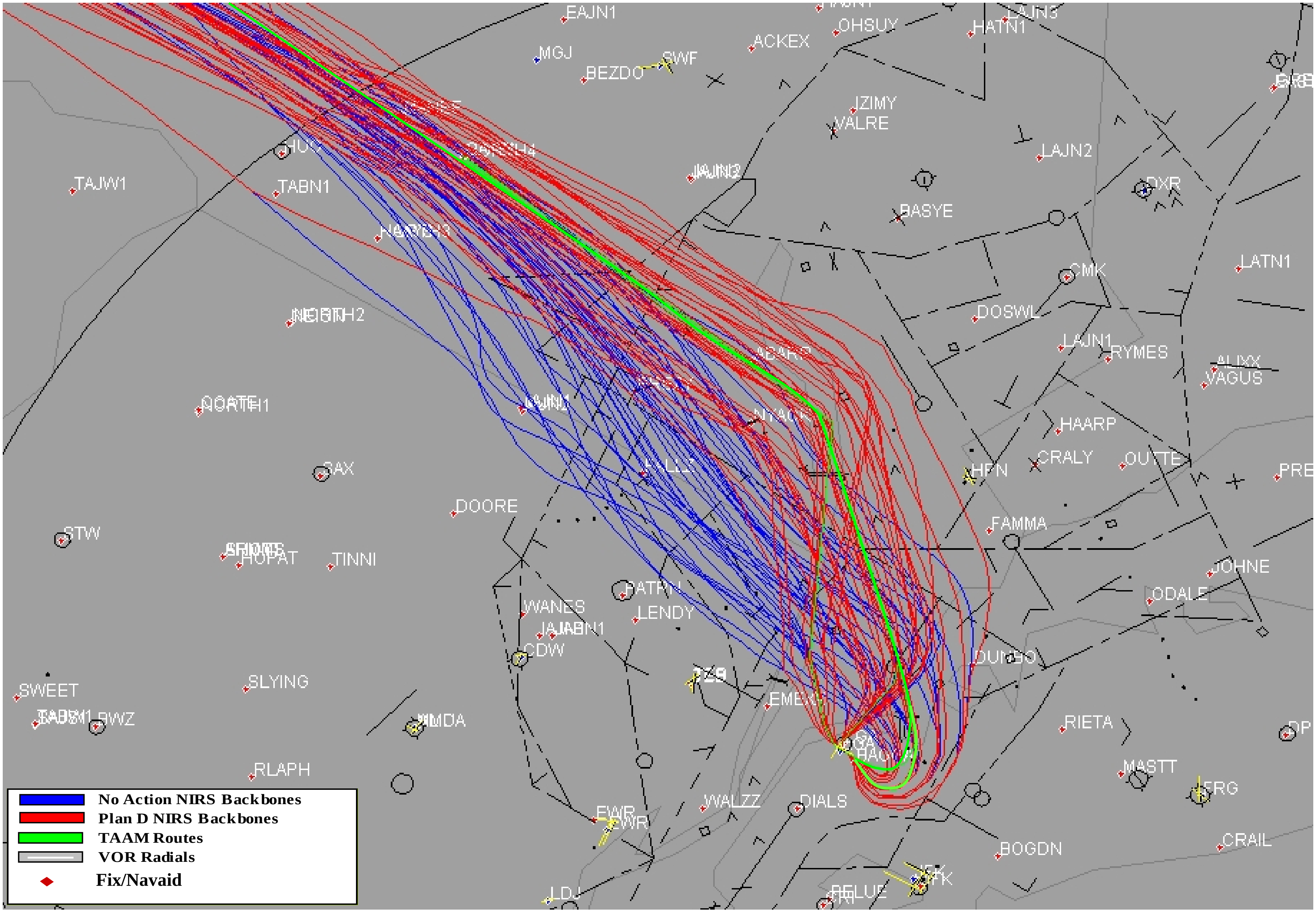
JFK West & North Departures



JFK-PHL Traffic

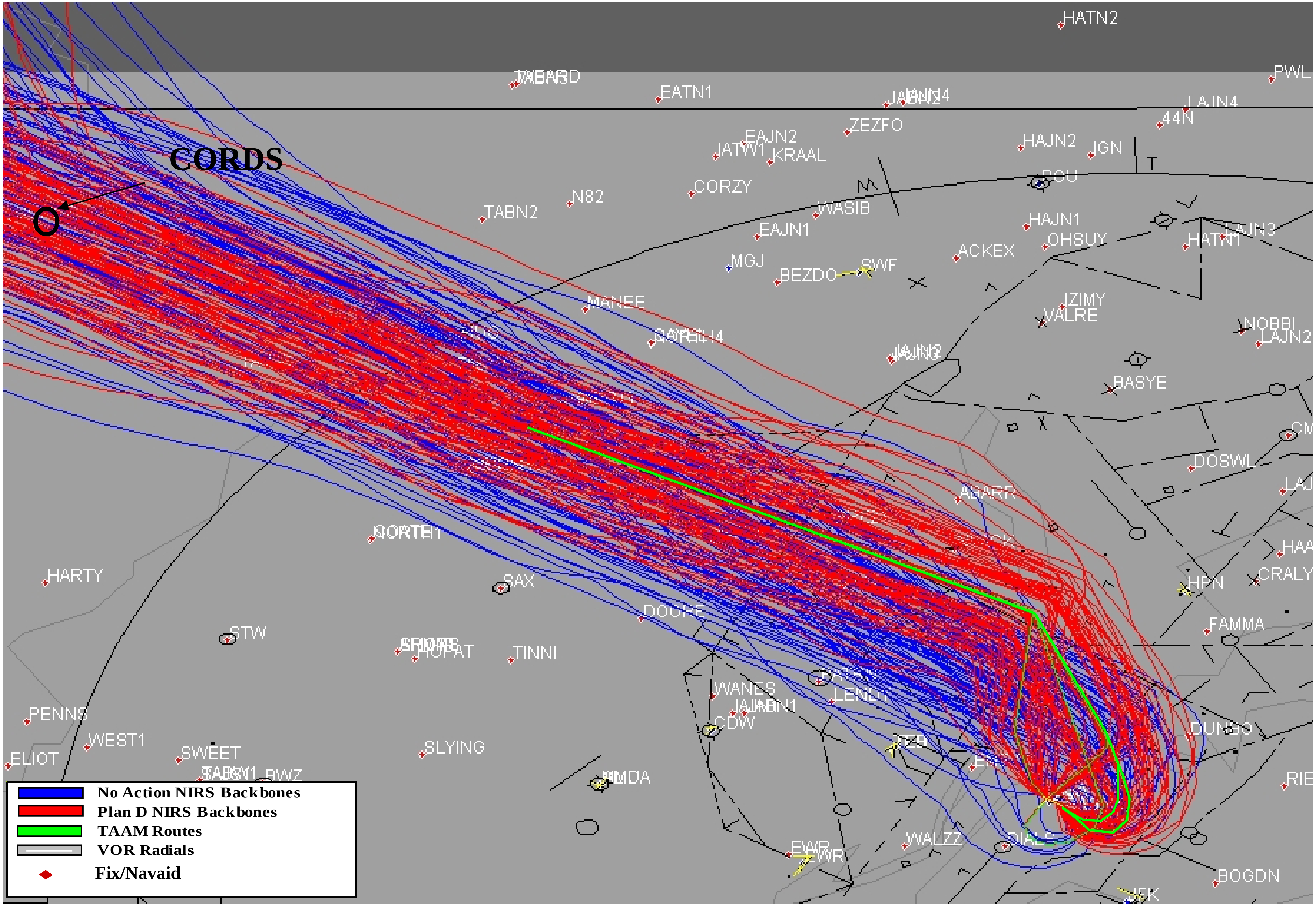


LGA North Gate GAYEL Departures



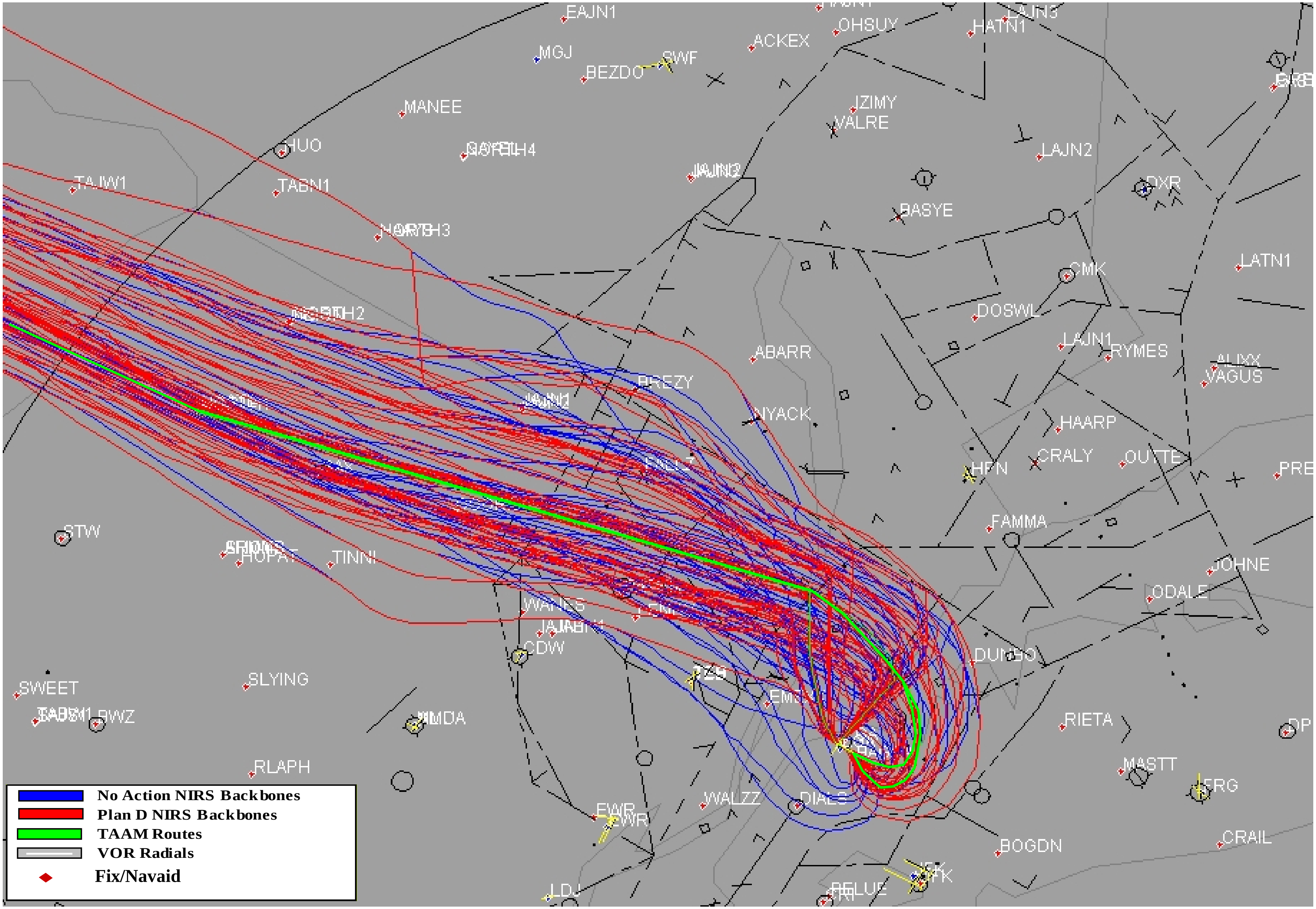
Appendix E
Attachment C-25

LGA North Gate NEION/HAAYS Departures

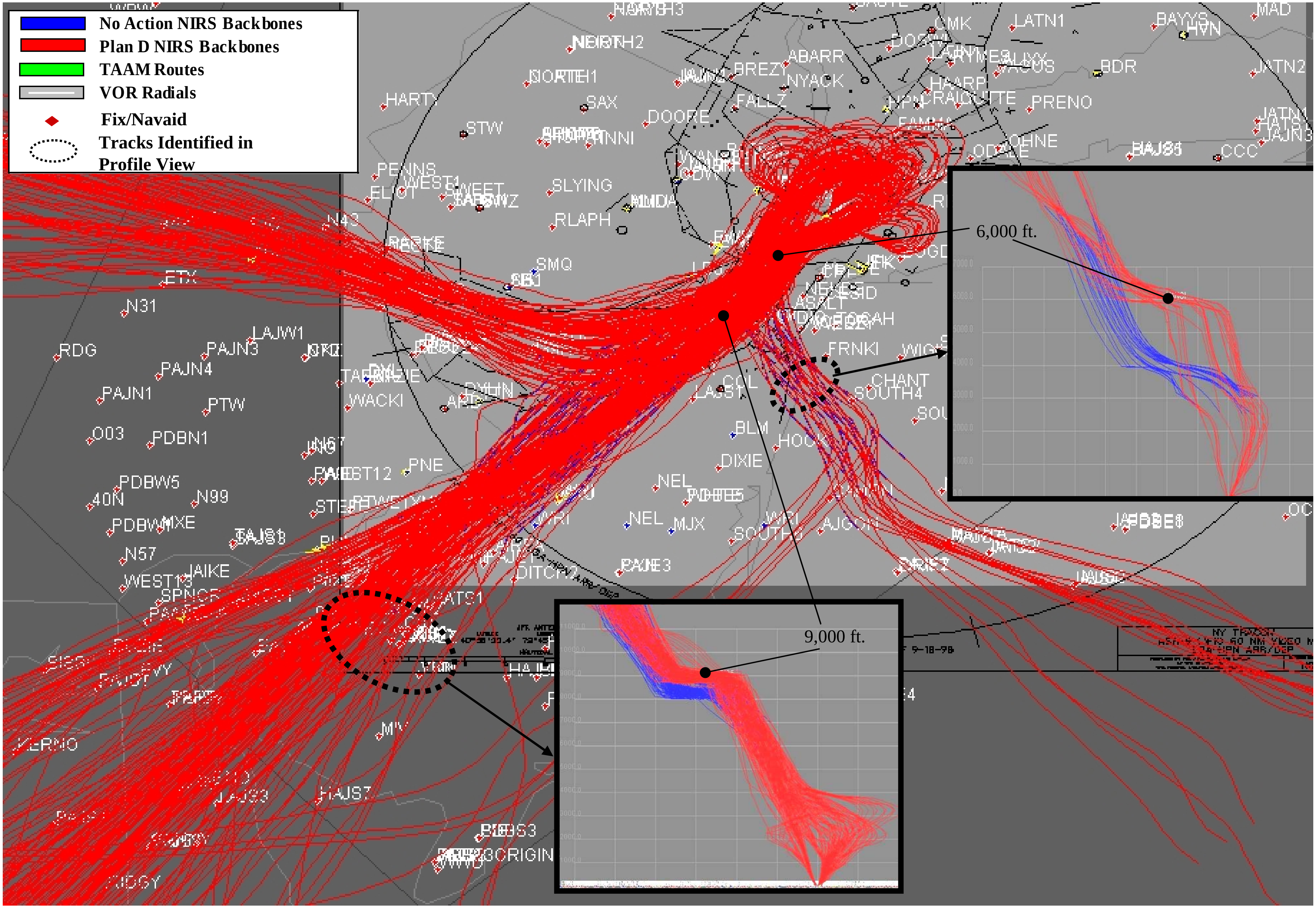


Appendix E
Attachment C-26

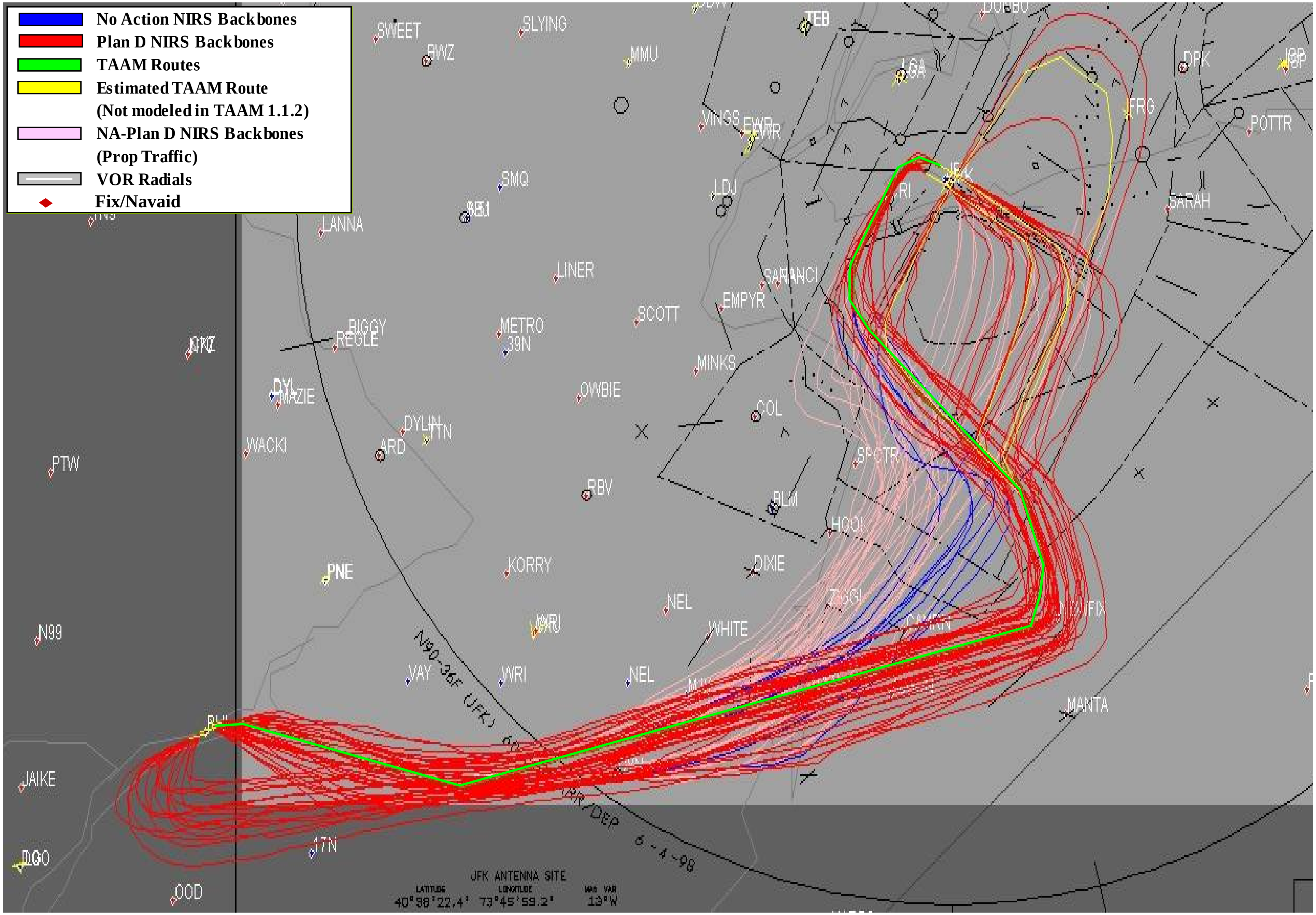
LGA North Gate COATE Departures



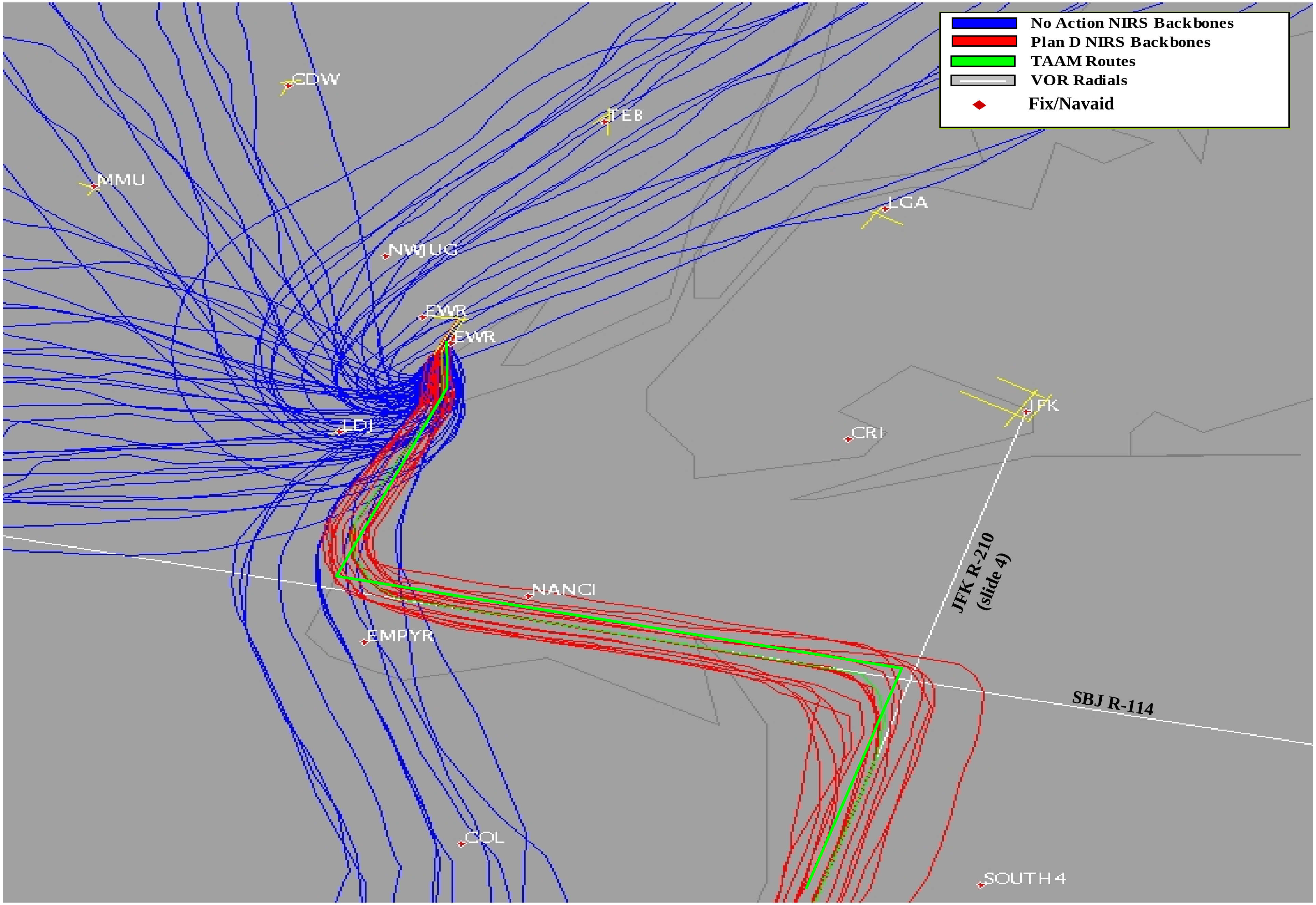
LGA Arrival Procedures



PHL-JFK Traffic

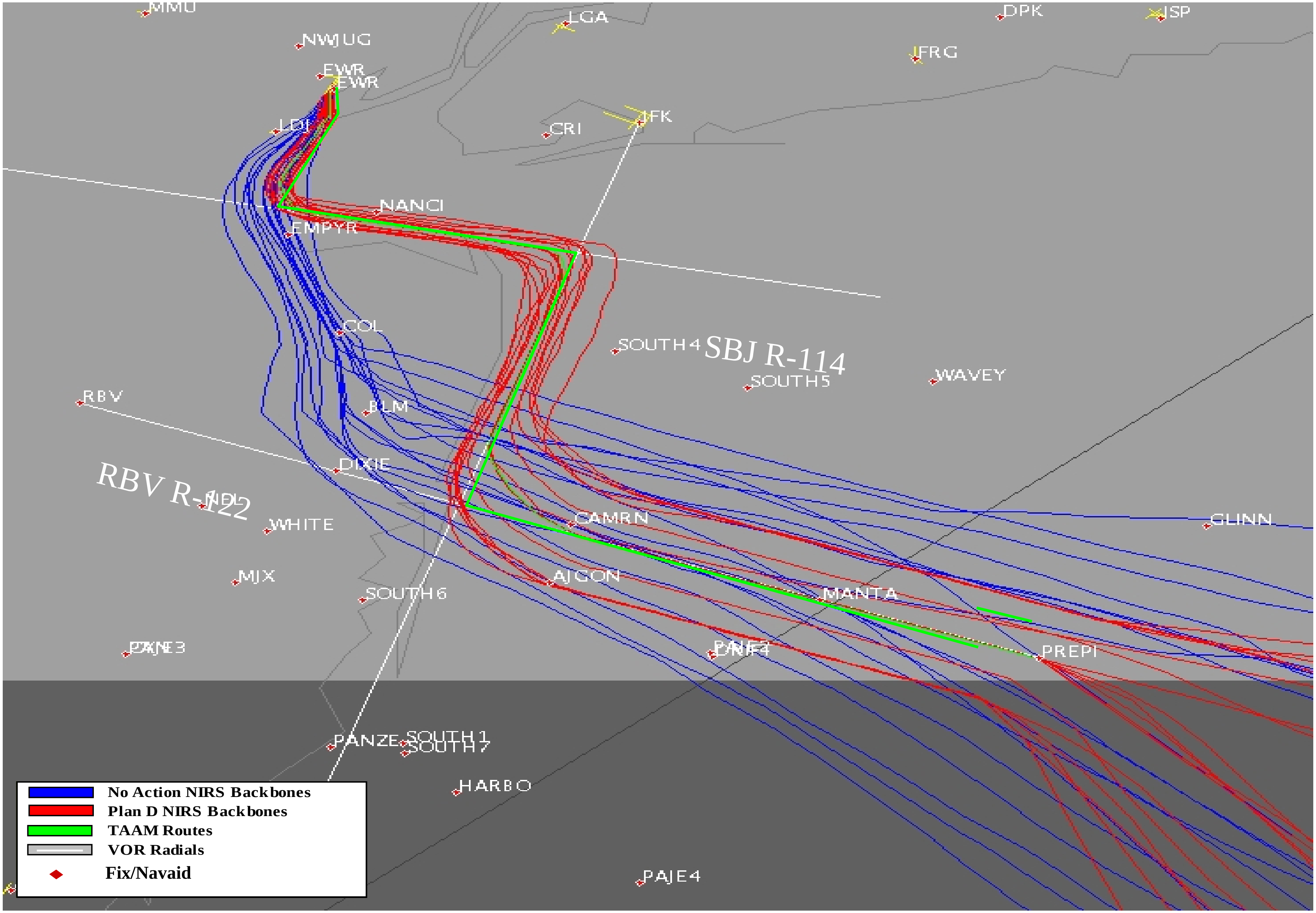


EWR Runway 22L/R Departures

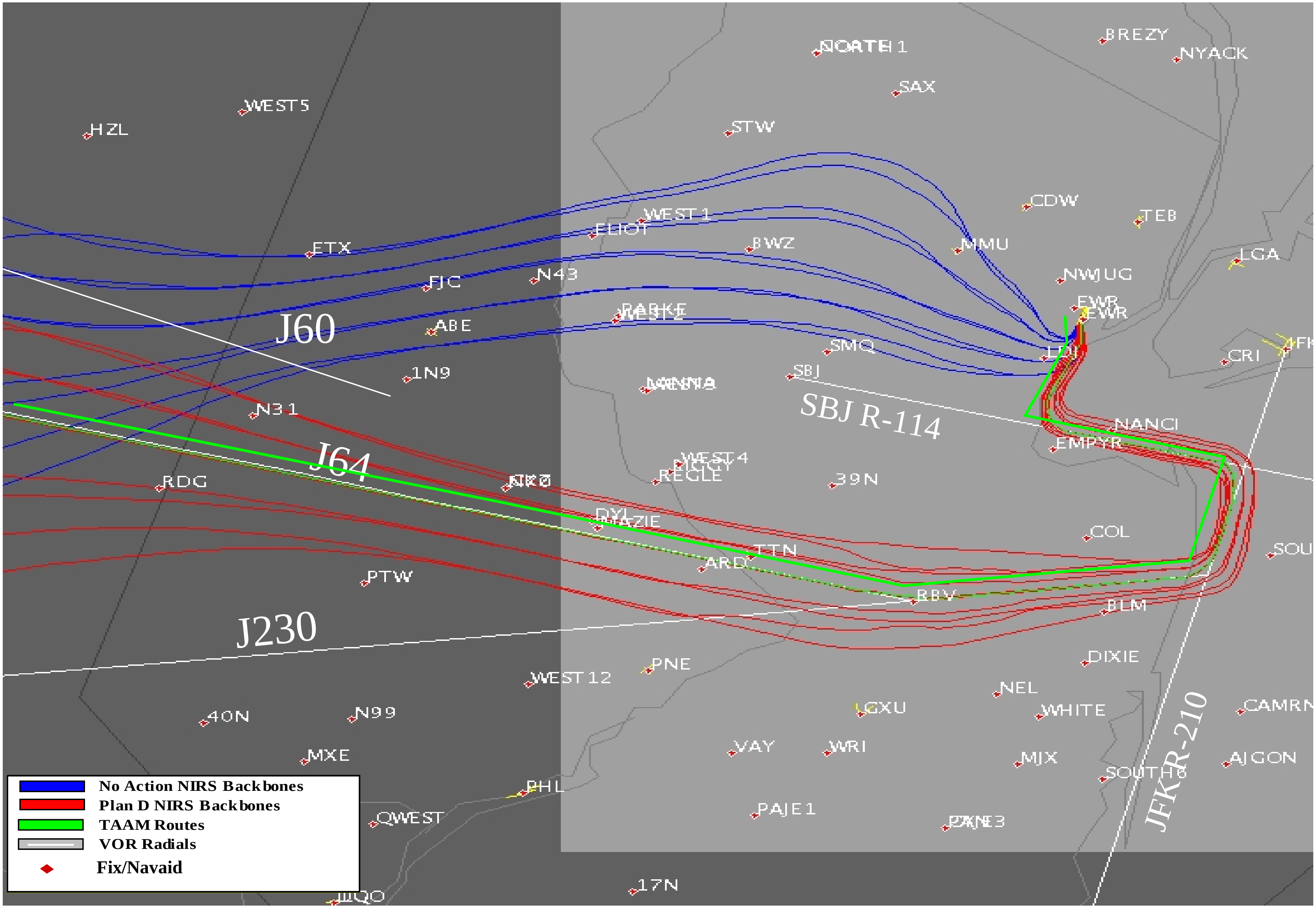


Appendix E
Attachment C-30

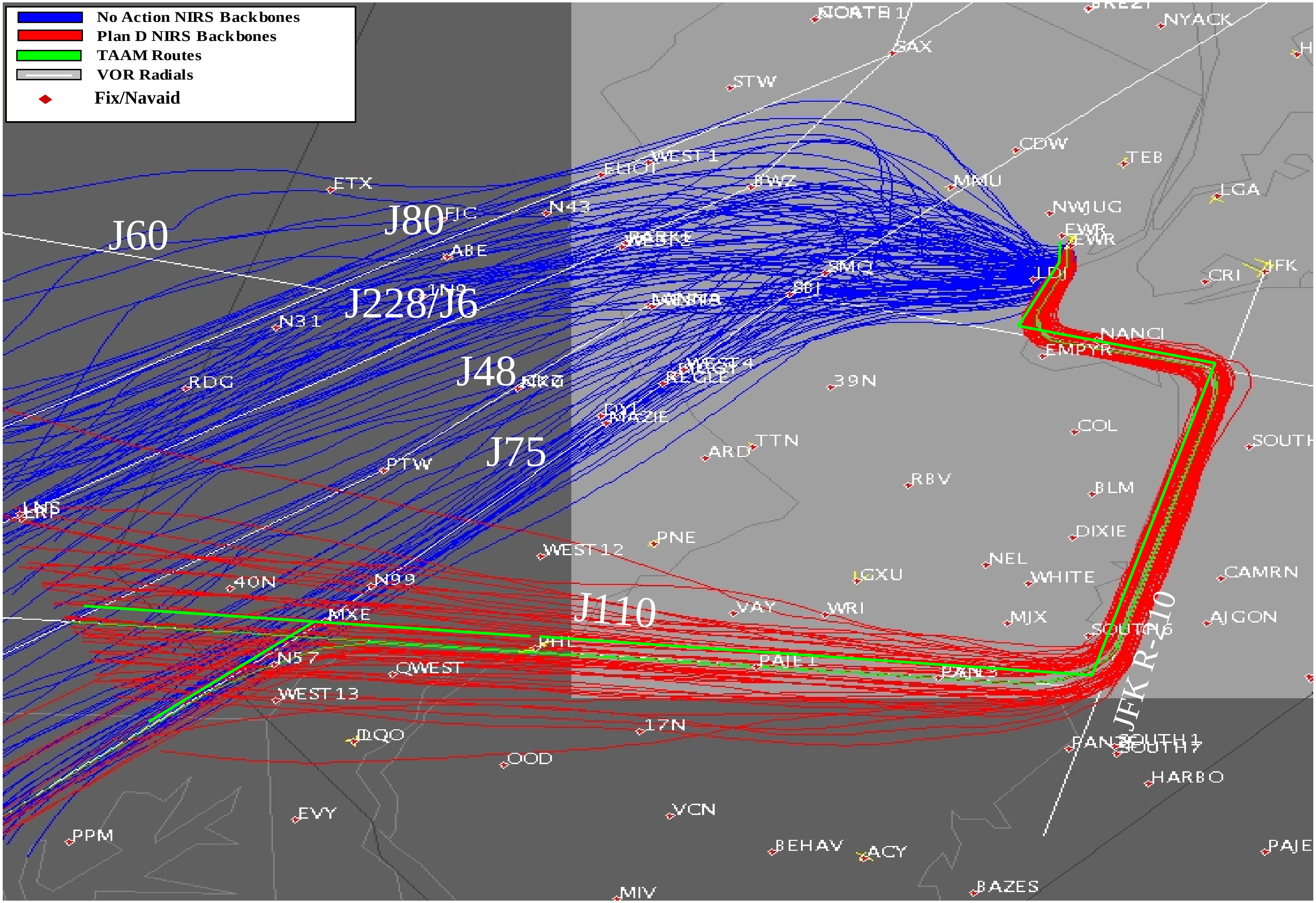
EWR Runway 22L/R East-Ocean Departures



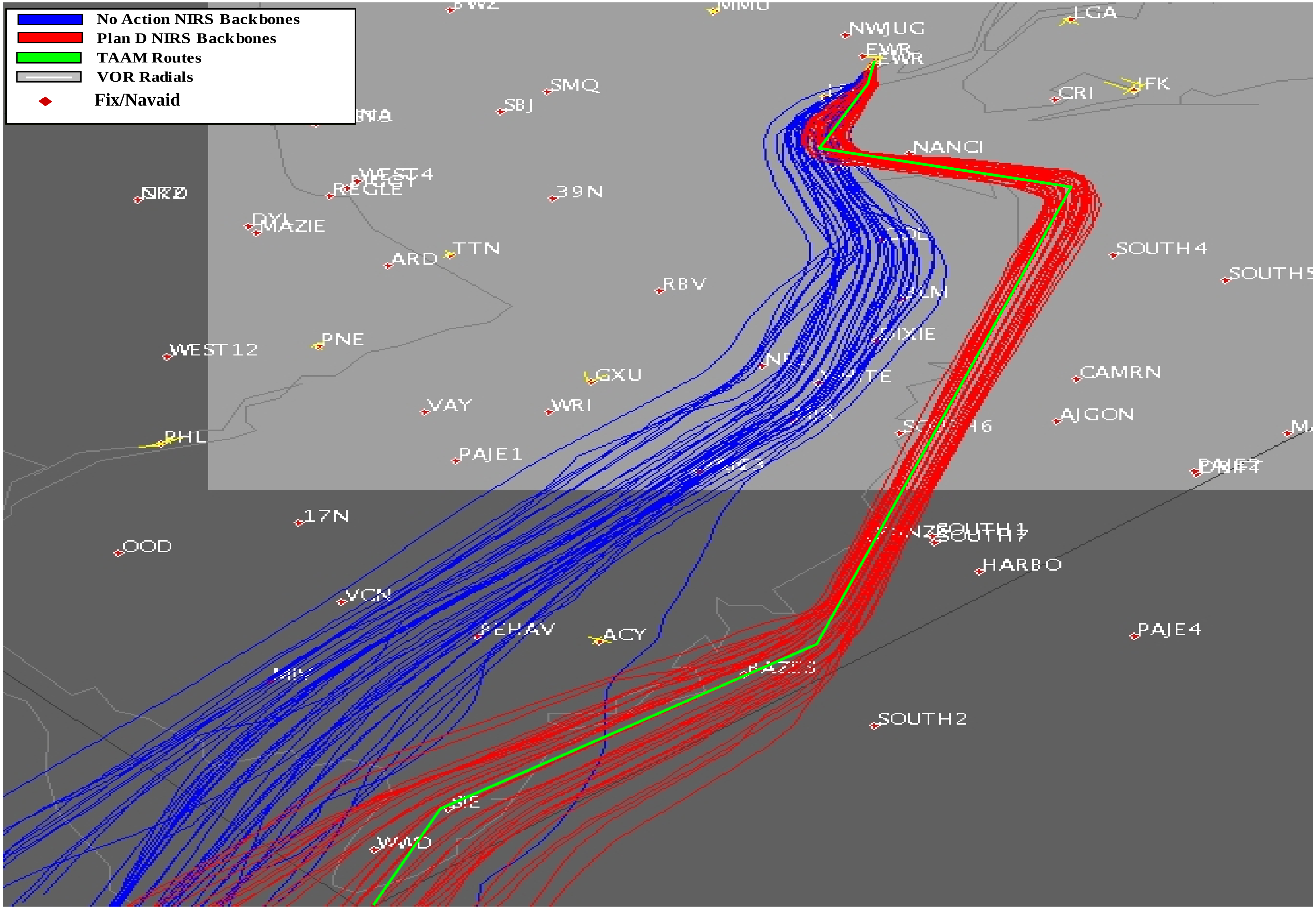
EWR Runway 22L/R J60 Departures



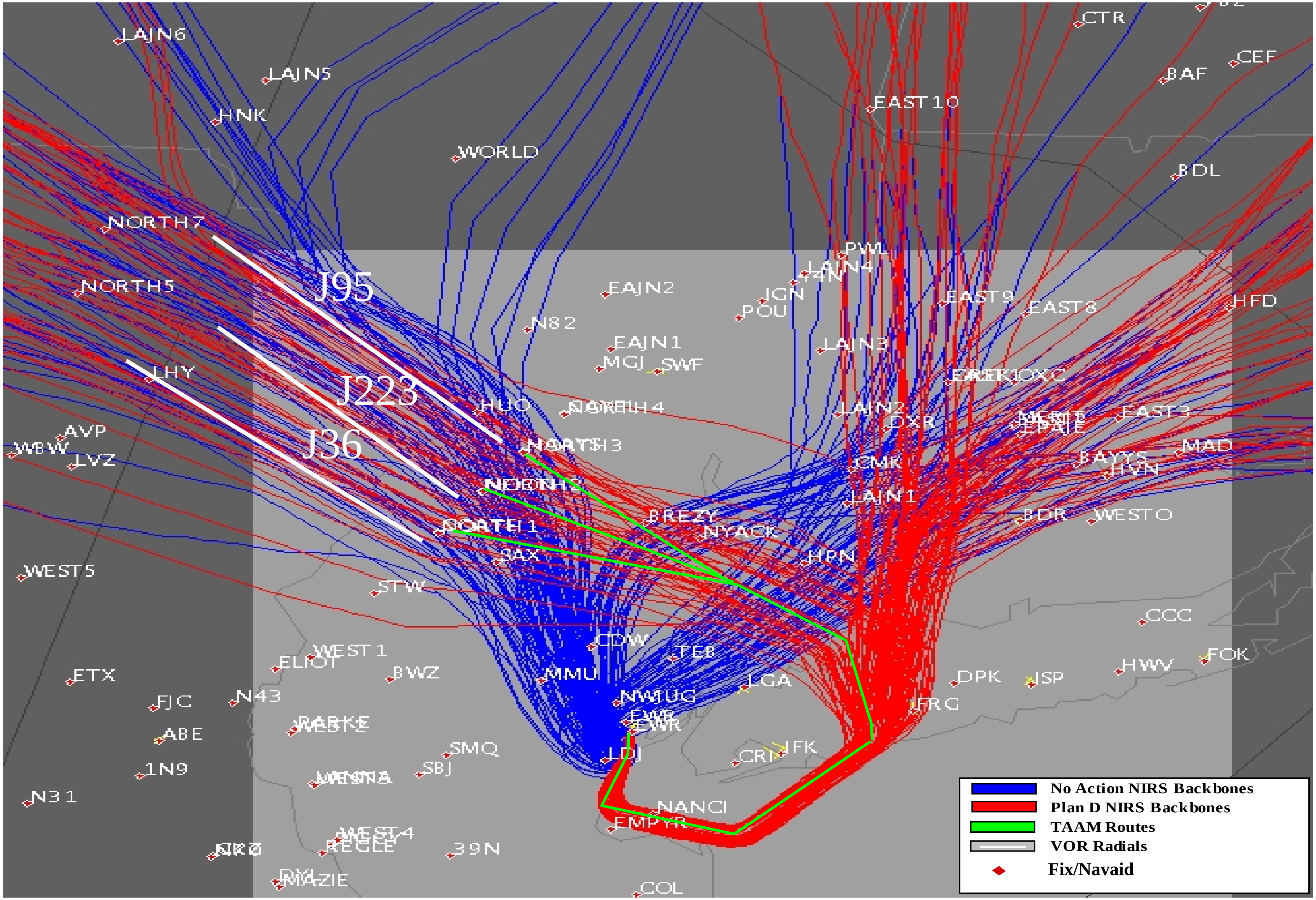
EWR Runway 22L/R West Gate Departures



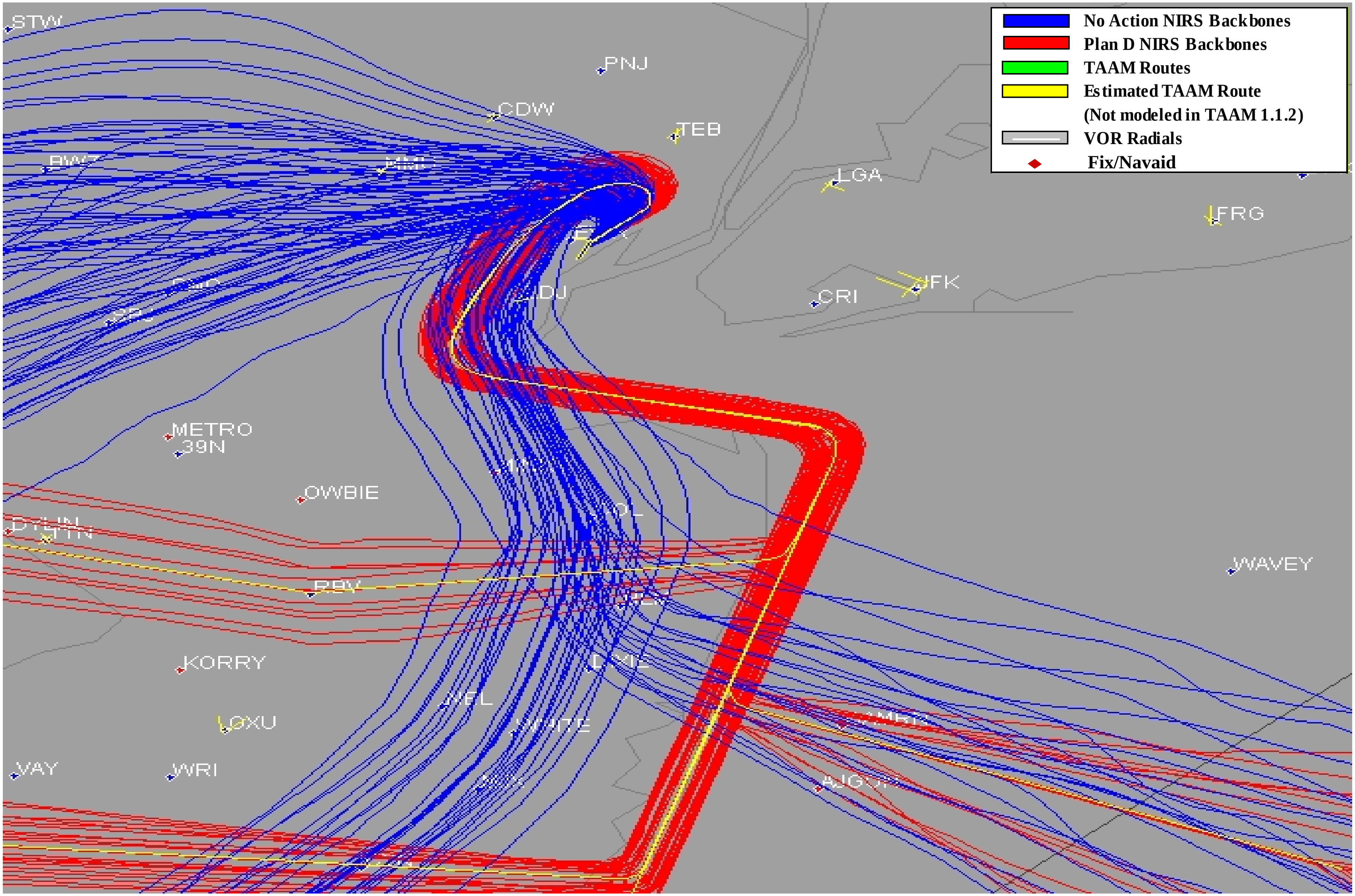
EWR Runway 22L/R South Departures



EWR Runway 22L and Runway 22R Departures

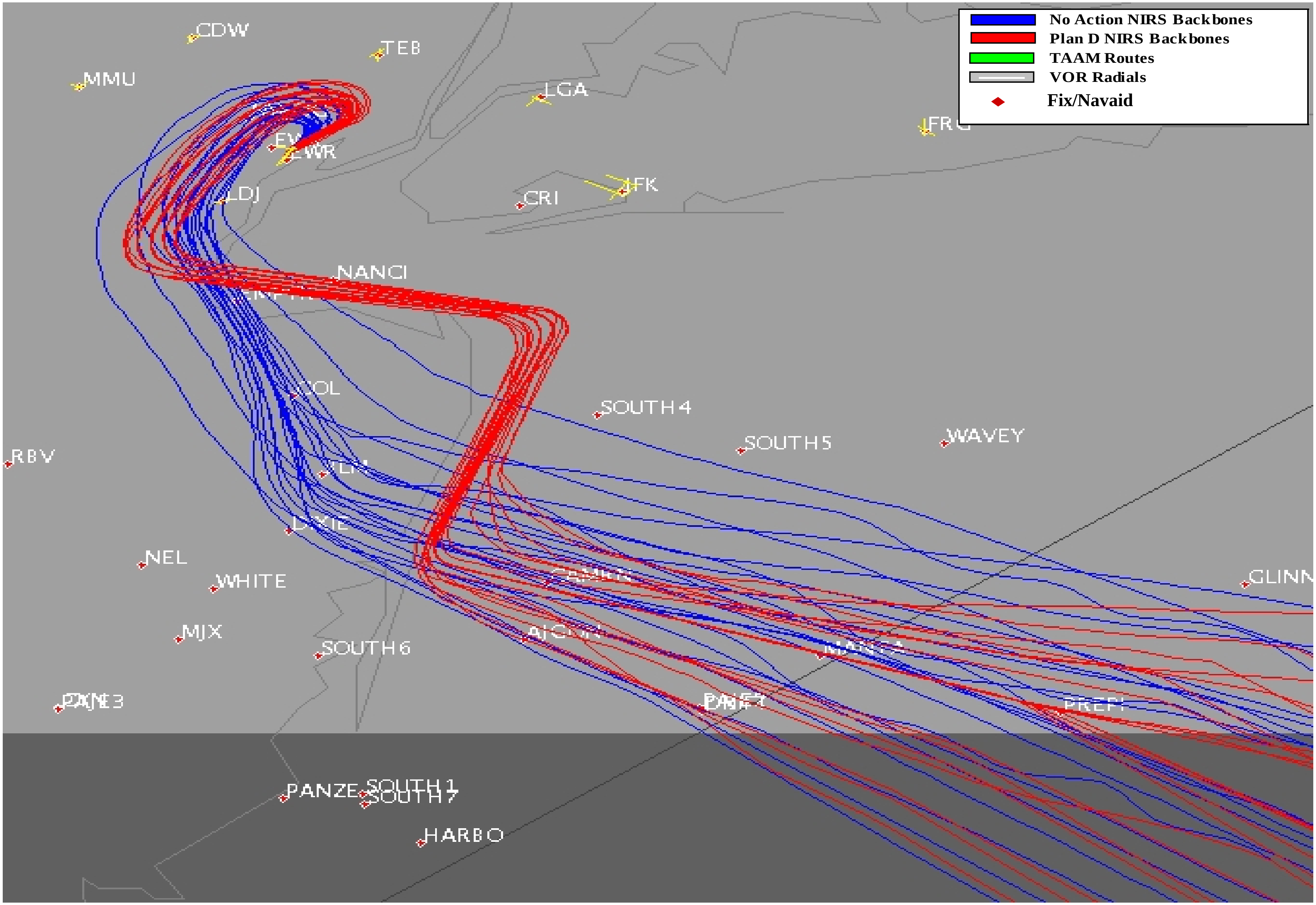


EWR Runways 4L/R West, Southwest and South-bound Departures



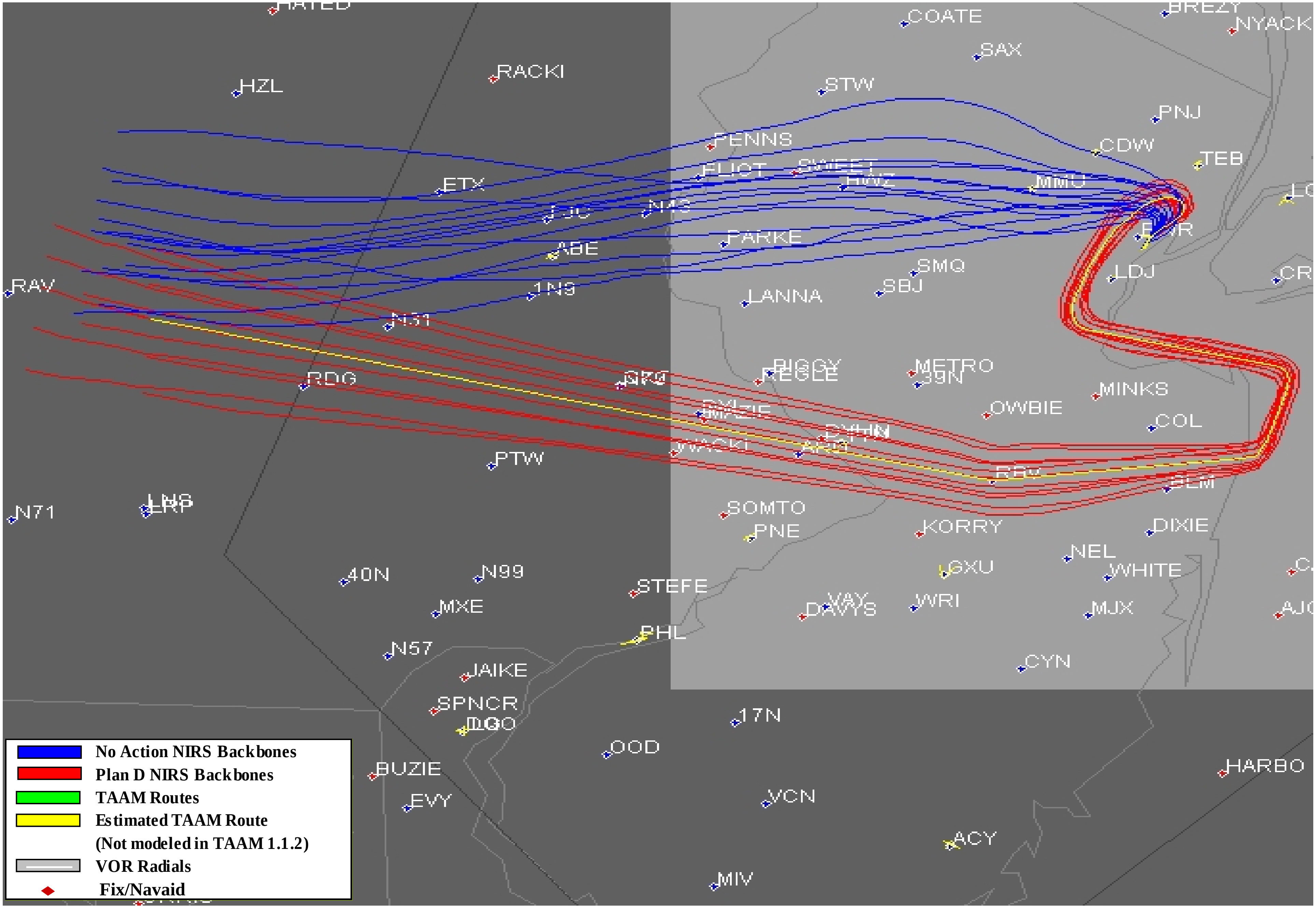
Appendix E
Attachment C-36

EWR Runways 4L/R East-Ocean Departures



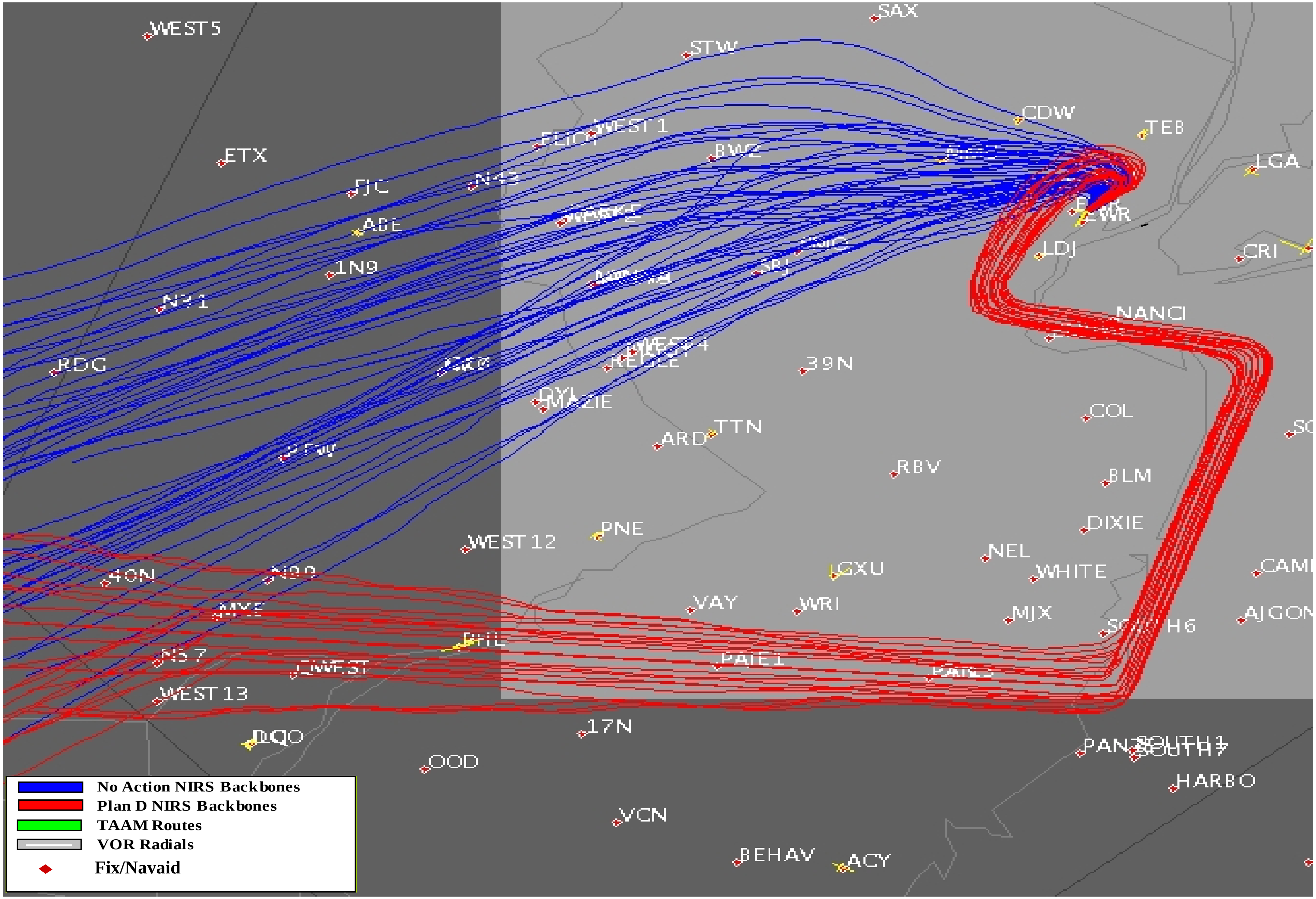
Appendix E
Attachment C-37

EWR Runways 4L/R West-J60 Departures



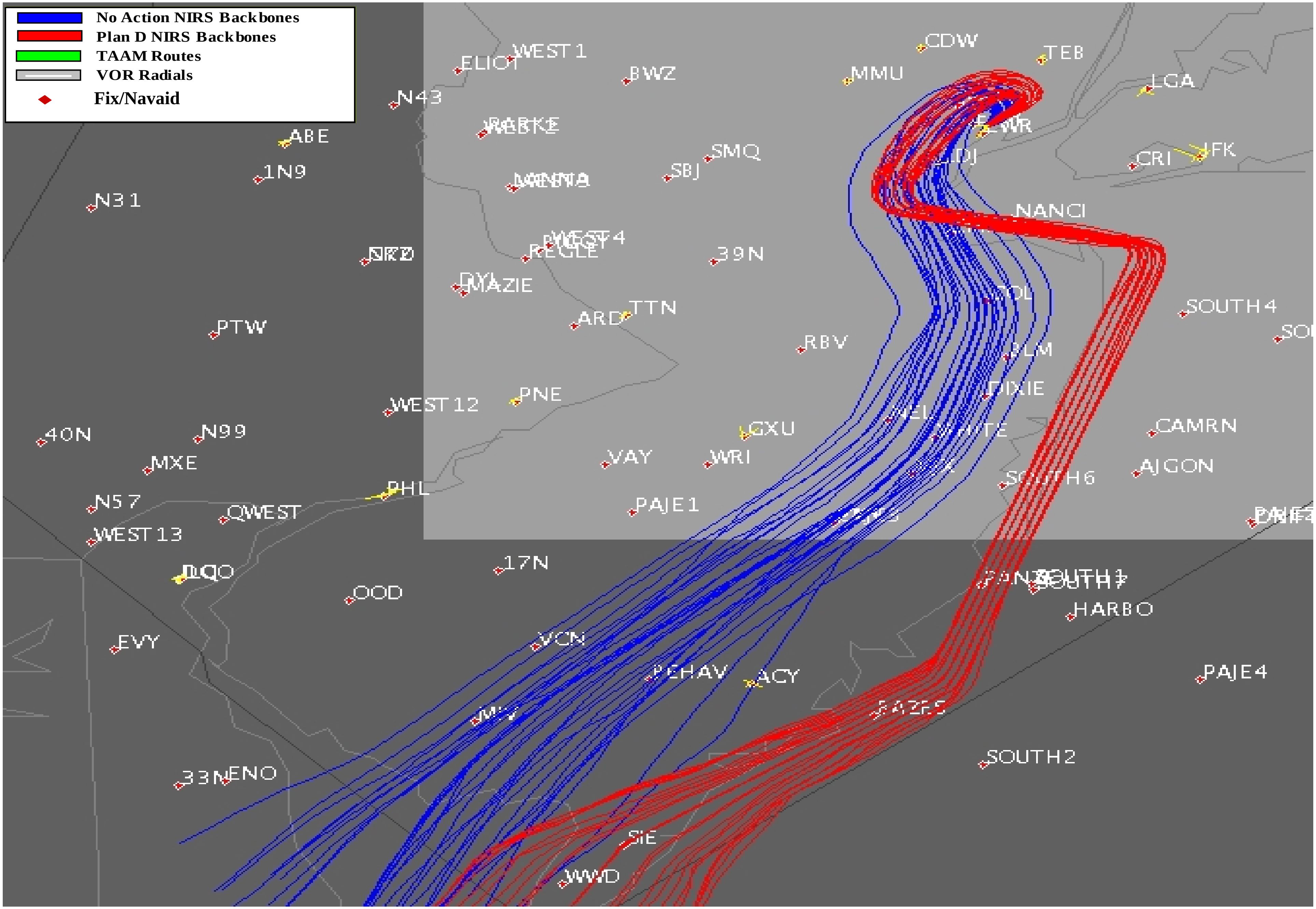
Appendix E
Attachment C-38

EWR Runways 4L/R West Gate Departures



Appendix E
Attachment C-39

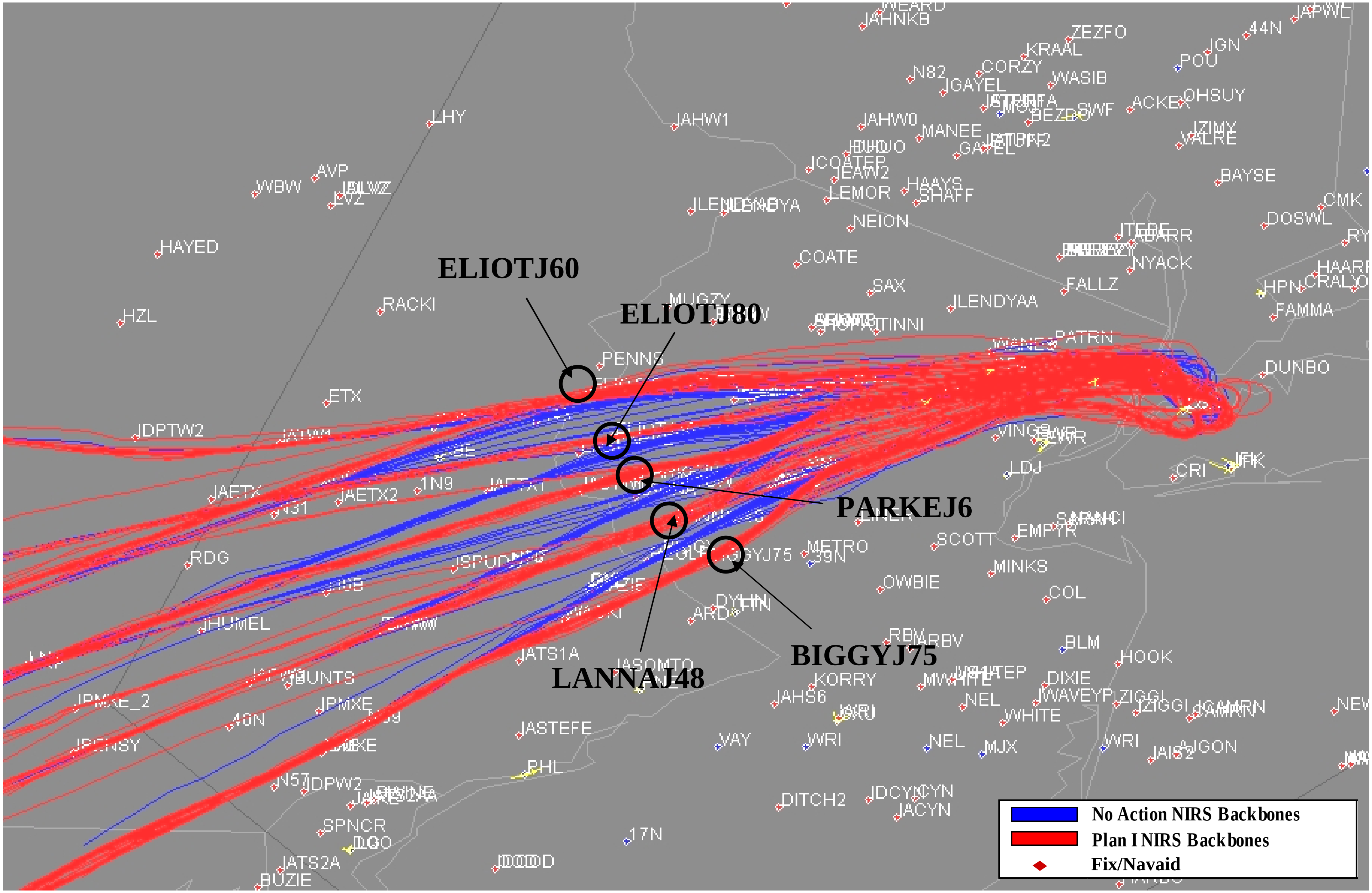
EWR Runways 4L/R South Departures



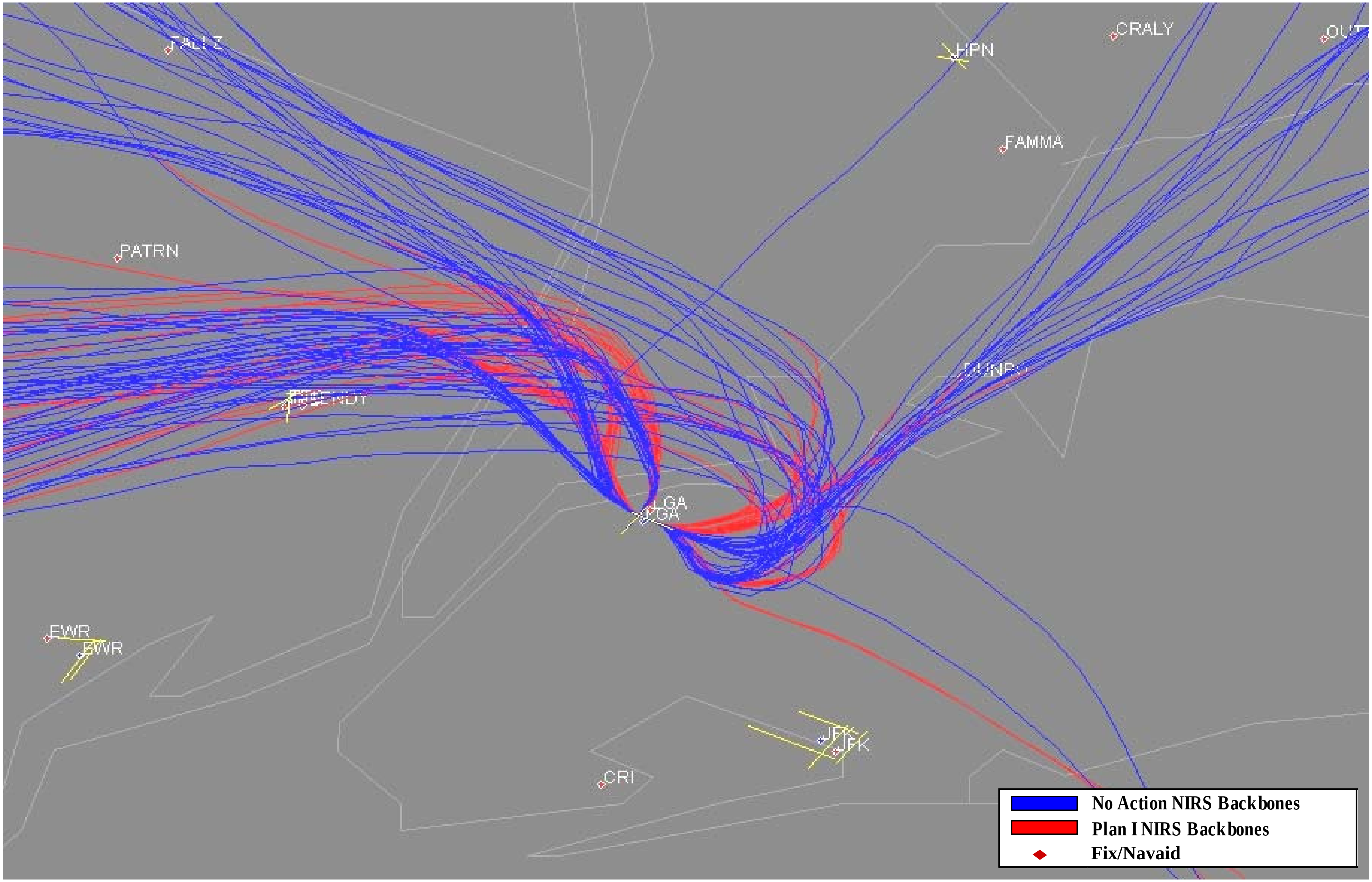
Section 3

Integrated Airspace Without ICC (Plan I)
Flight Track Changes

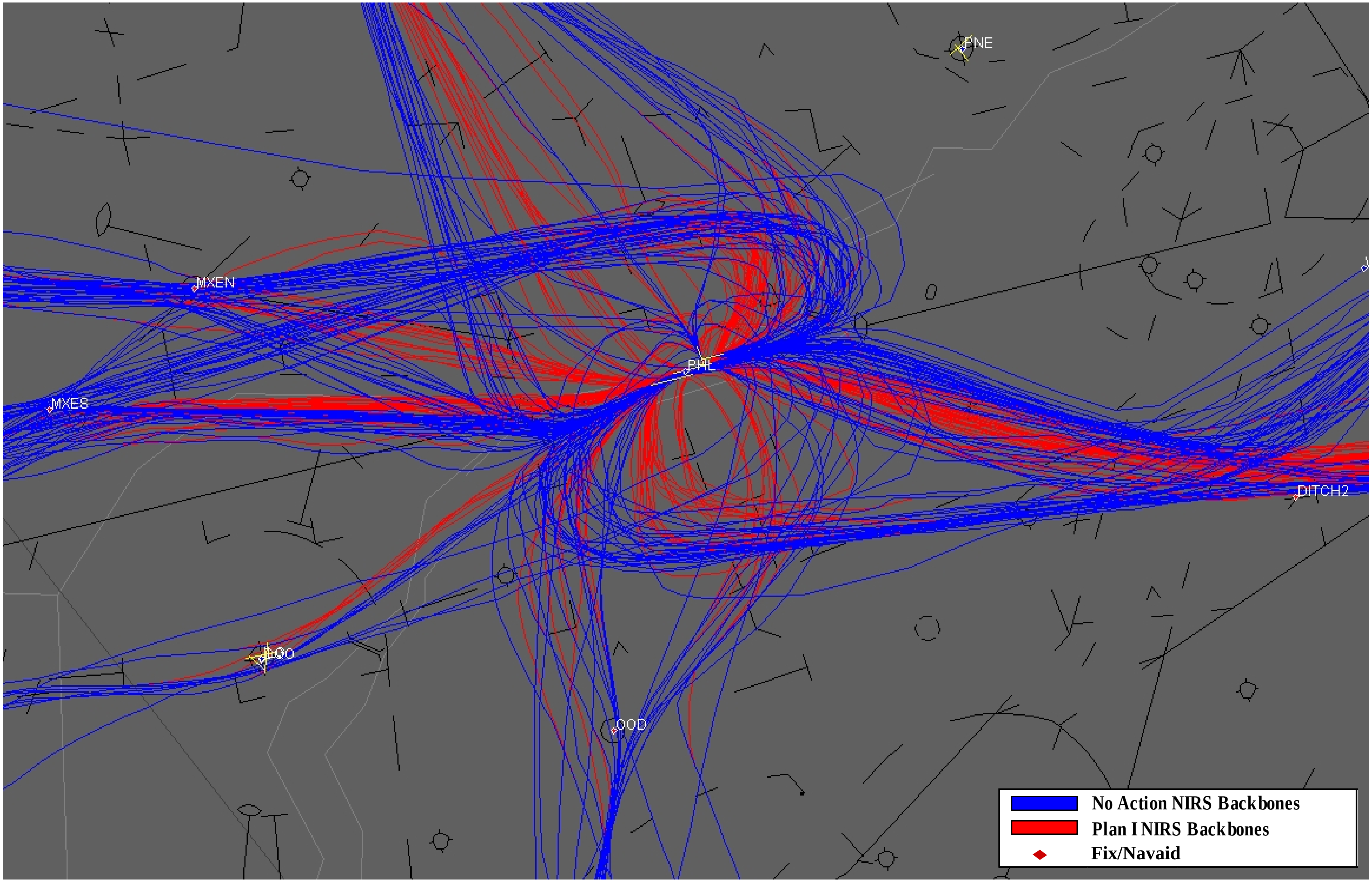
LGA Departures – Plan I no Building vs. No Action



LGA Departures – Plan I no Building vs. No Action (Heading Changes)

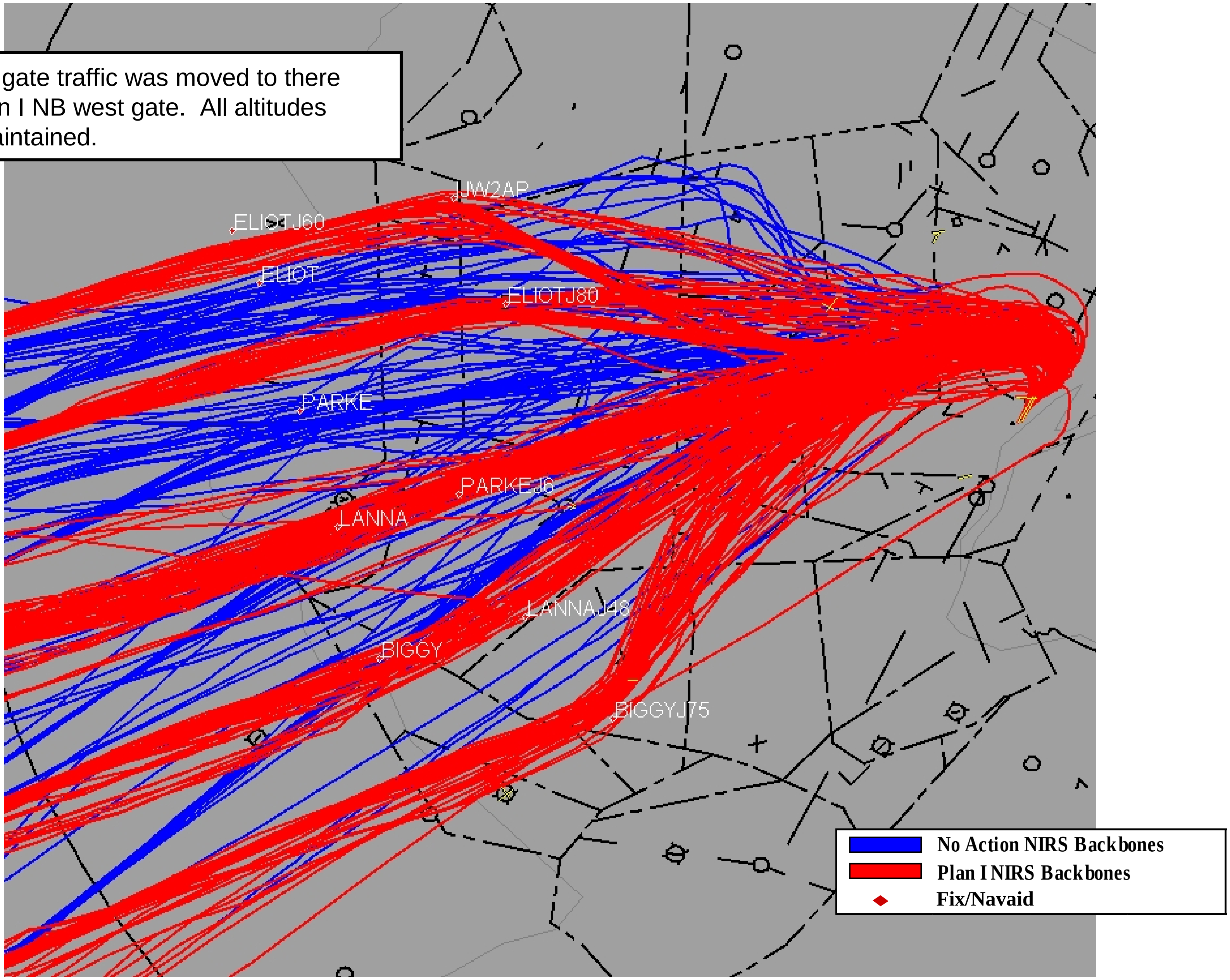


PHL Departures – Plan I no Building vs. No Action (Heading Changes)



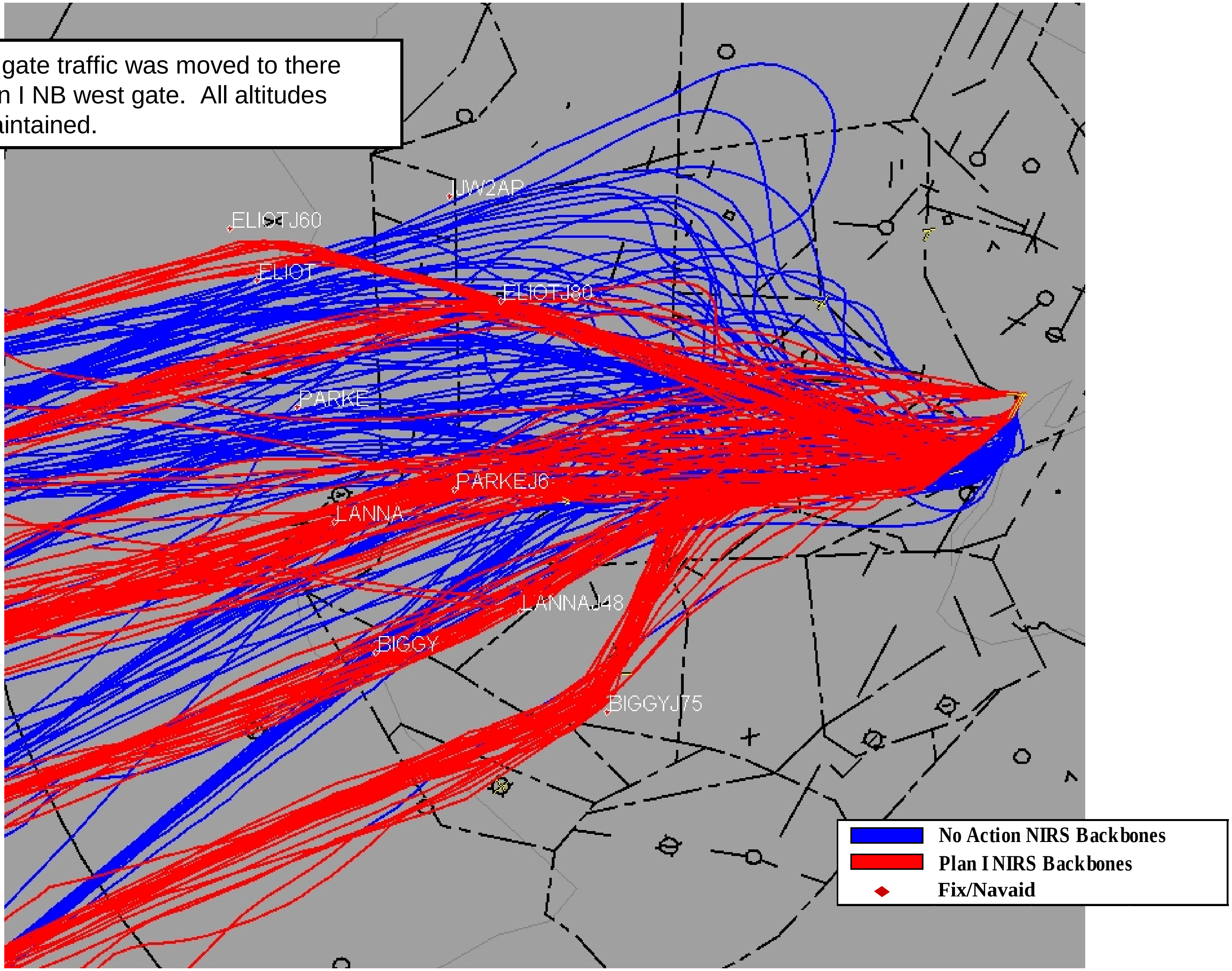
EWR – NE West Gate Departures – Plan I NB vs No Action

All west gate traffic was moved to there new Plan I NB west gate. All altitudes were maintained.

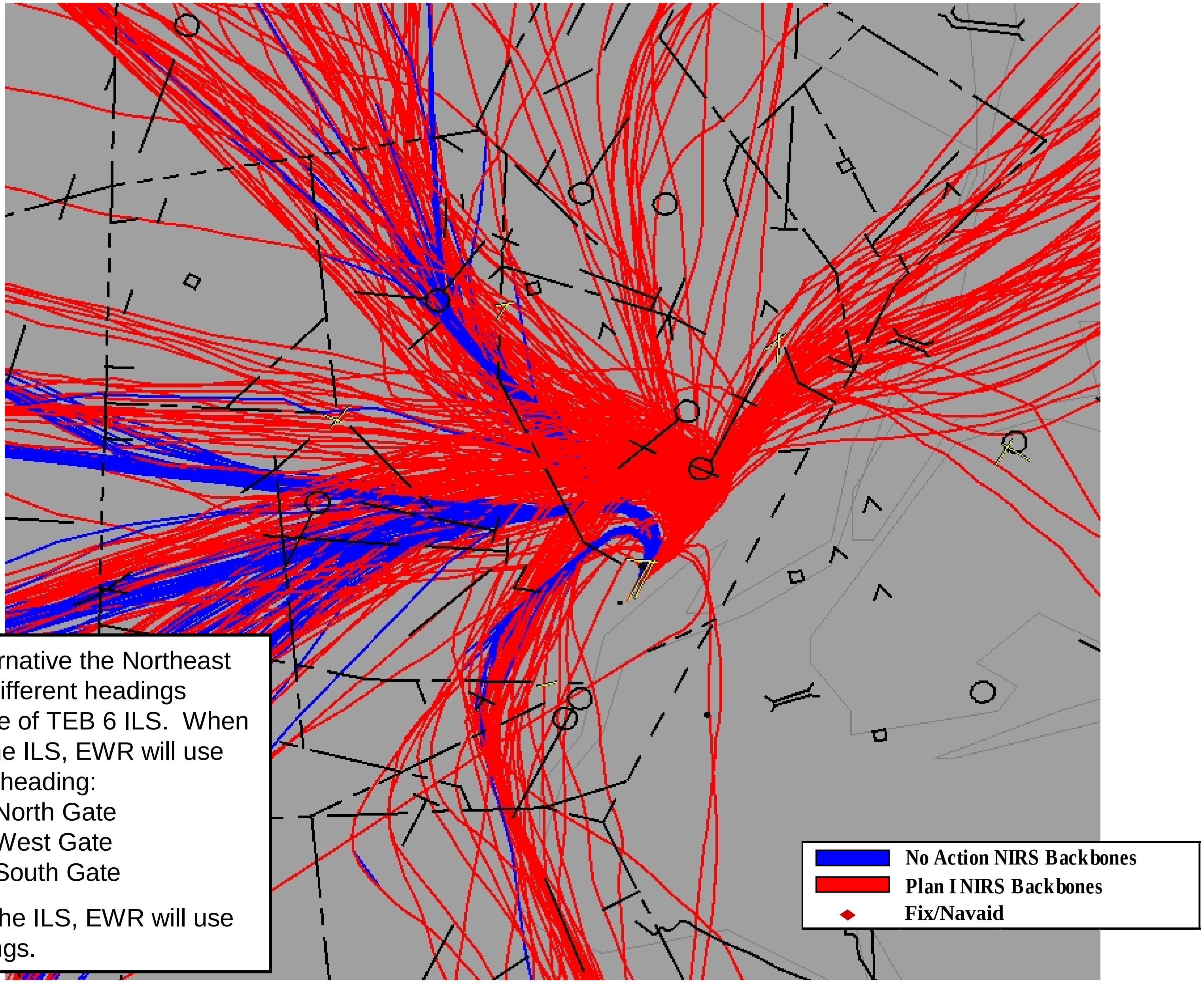


EWR – SW West Gate Departures – Plan I NB vs No Action

All west gate traffic was moved to there new Plan I NB west gate. All altitudes were maintained.



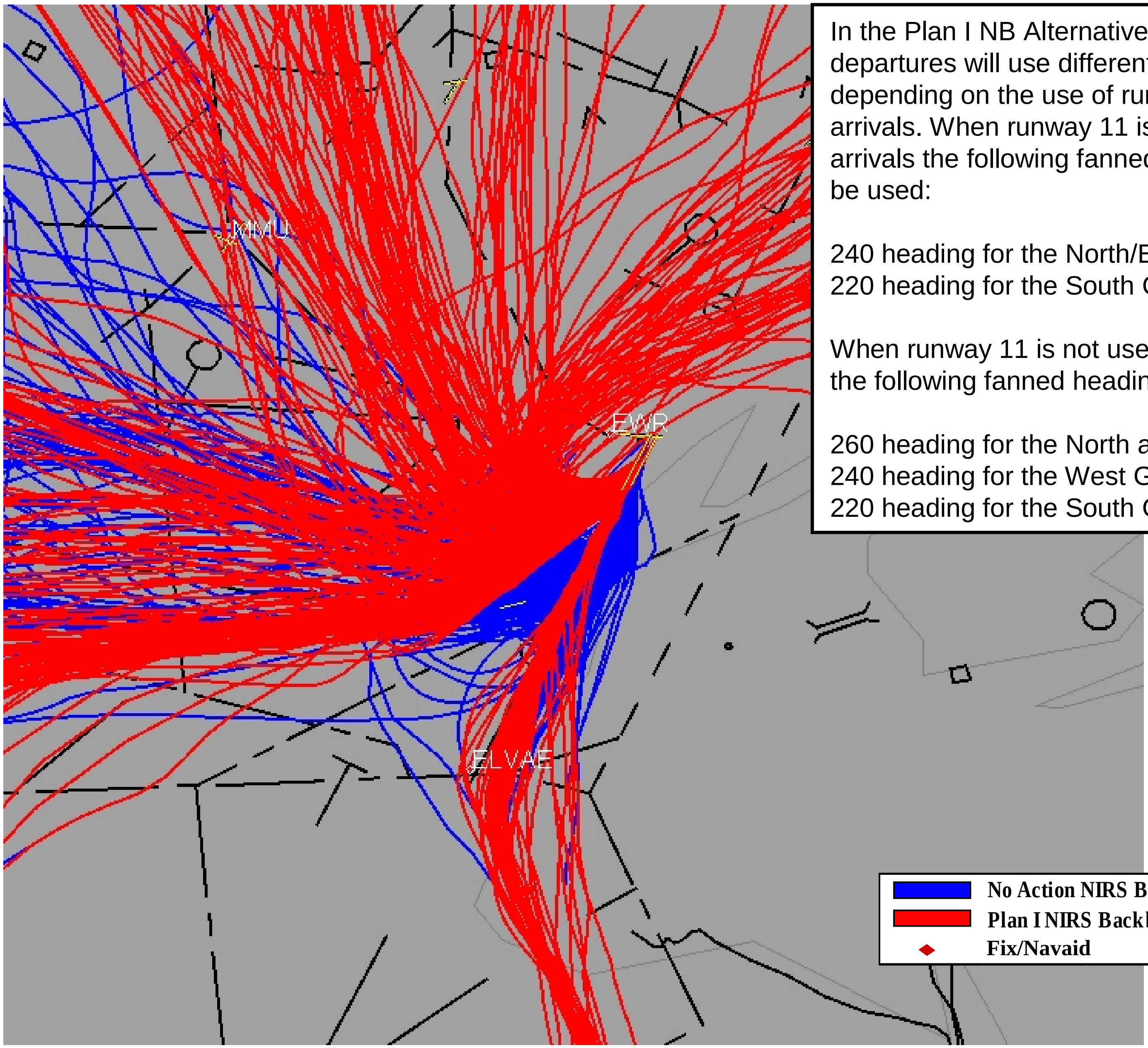
EWR Northeast Fanned Headings – Plan I NB vs. No Action



In the Plan I NB Alternative the Northeast departures will use different headings depending on the use of TEB 6 ILS. When TEB is not landing the ILS, EWR will use the following fanned heading:
330 heading for the North Gate
280 heading for the West Gate
240 heading for the South Gate

When TEB is using the ILS, EWR will use the No Action headings.

EWR Southwest Fanned Headings – Plan I NB vs. No Action



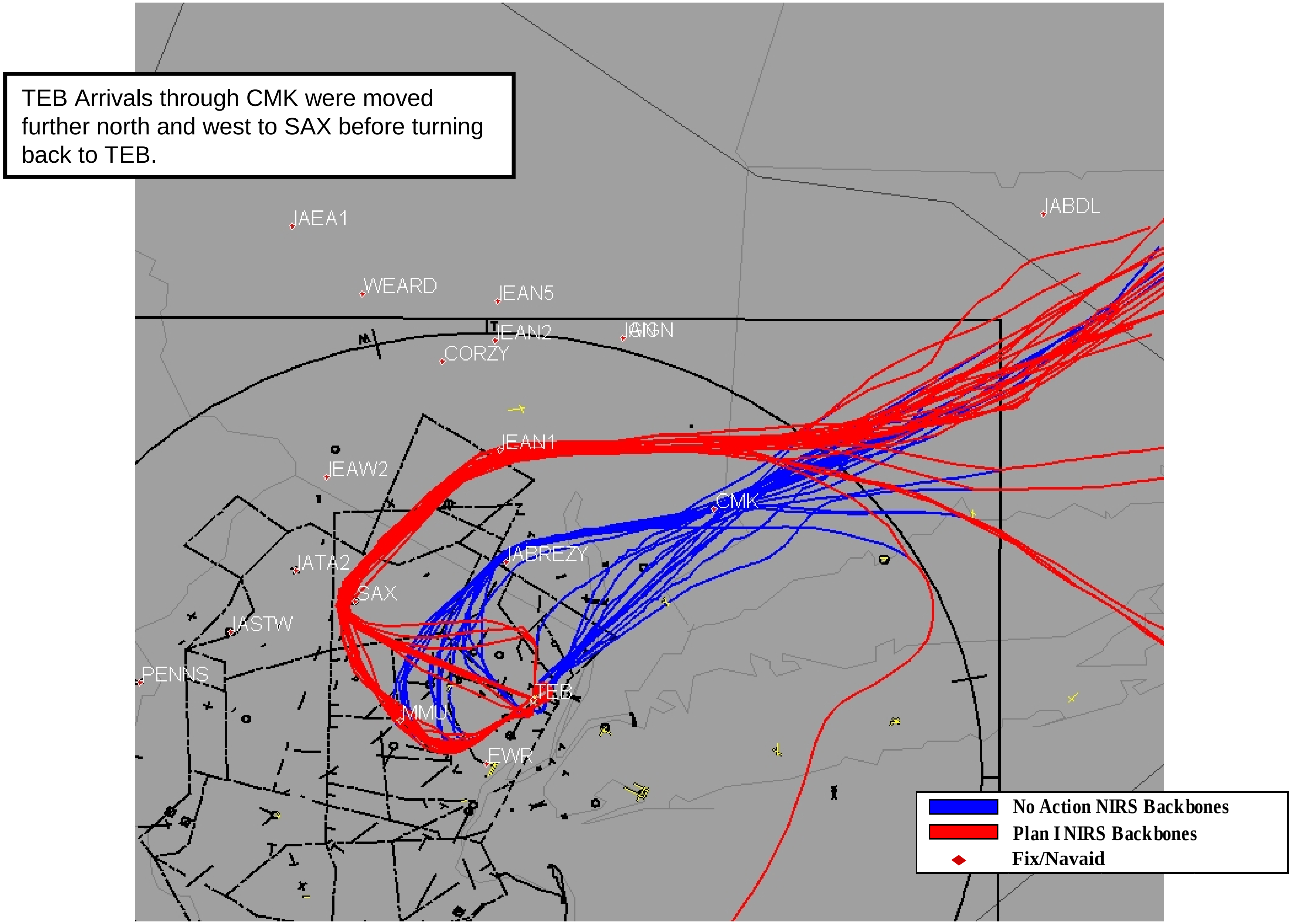
In the Plan I NB Alternative the Southwest departures will use different headings depending on the use of runway 11 for arrivals. When runway 11 is used for arrivals the following fanned heading will be used:

240 heading for the North/East/West Gate
220 heading for the South Gate

When runway 11 is not used for arrivals the following fanned headings will be used:

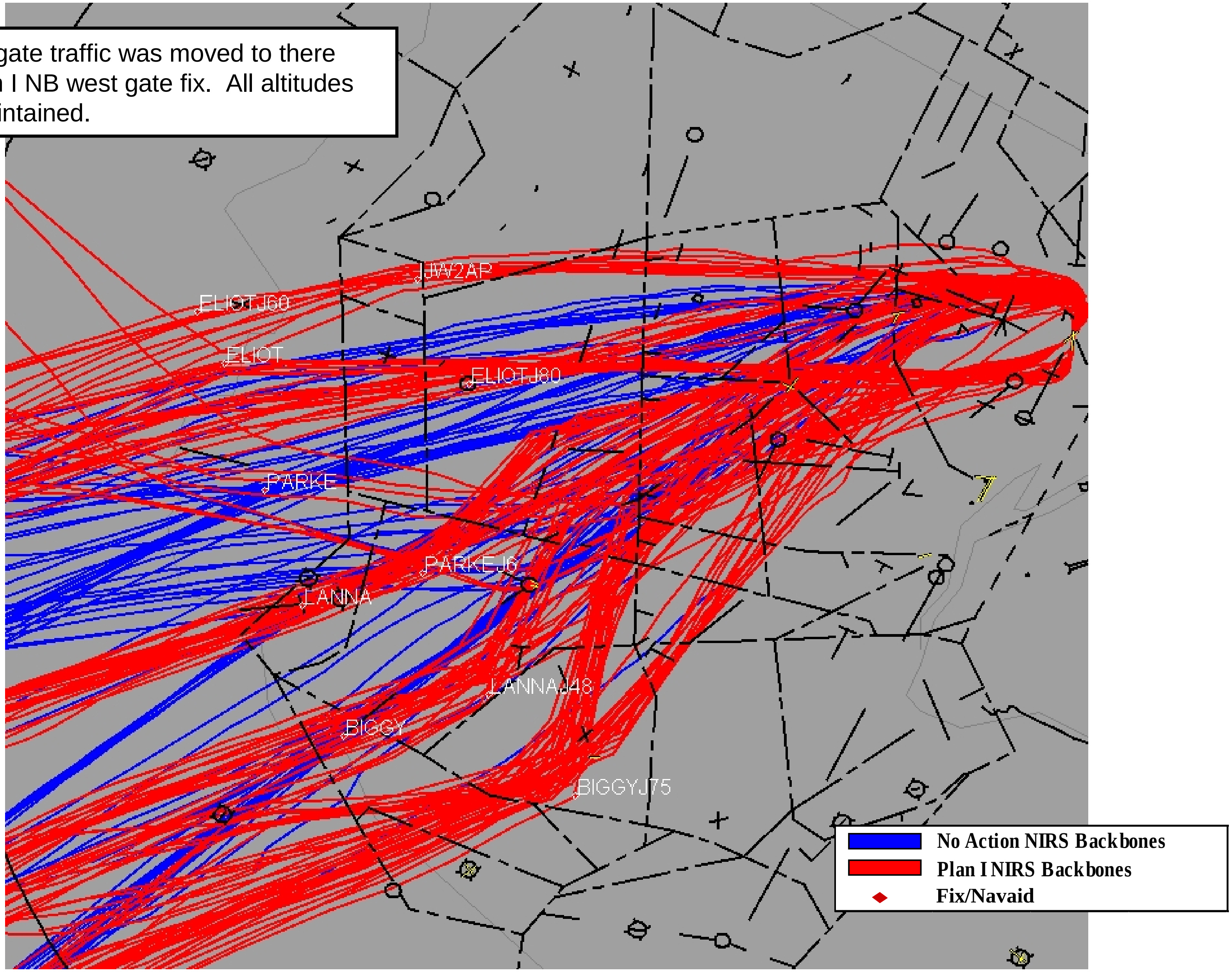
260 heading for the North and East Gate
240 heading for the West Gate
220 heading for the South Gate

TEB- Arrivals – Plan I NB vs. No Action

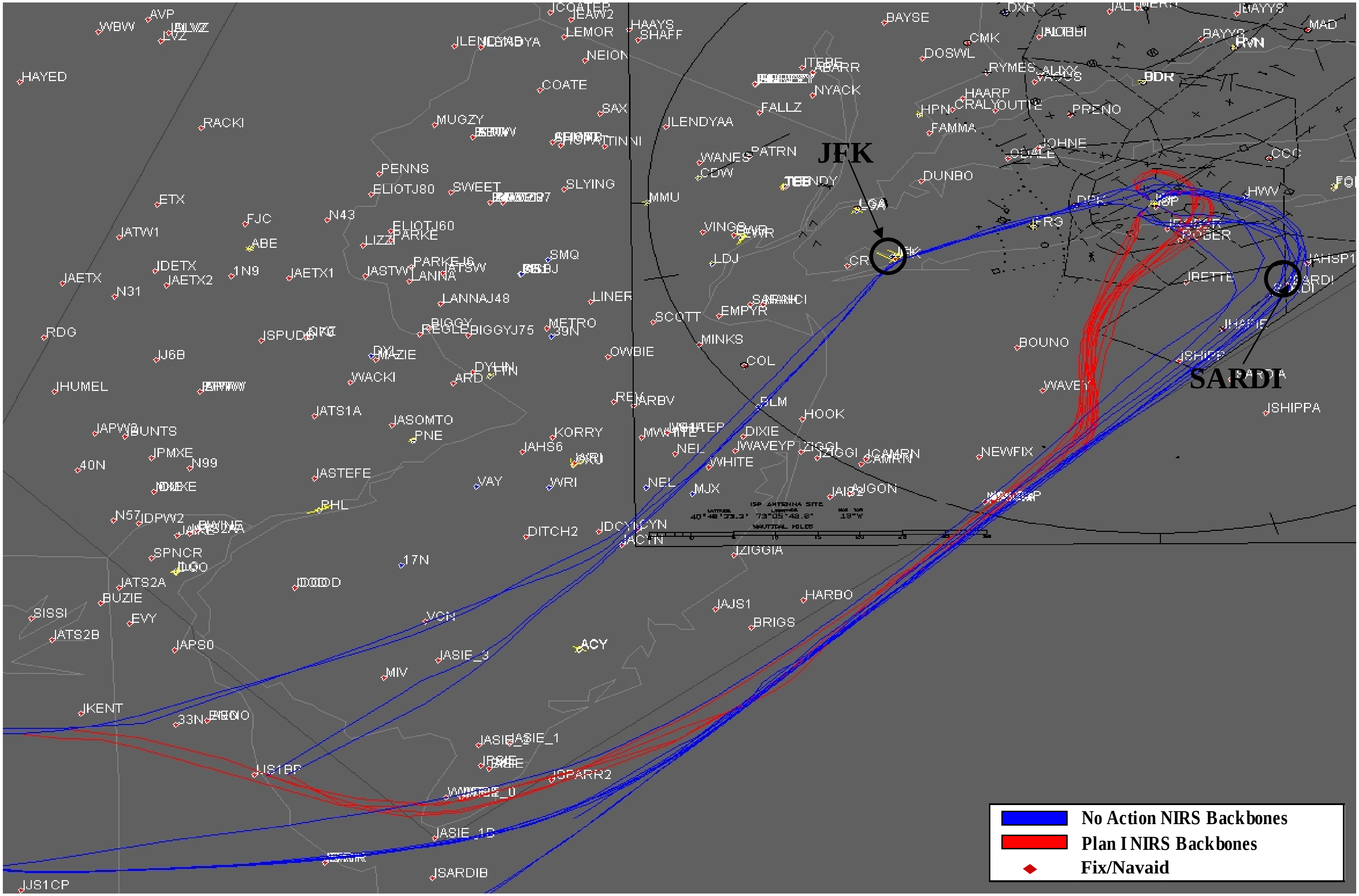


TEB- West Gate Departures – Plan I NB vs. No Action

All west gate traffic was moved to there new Plan I NB west gate fix. All altitudes were maintained.

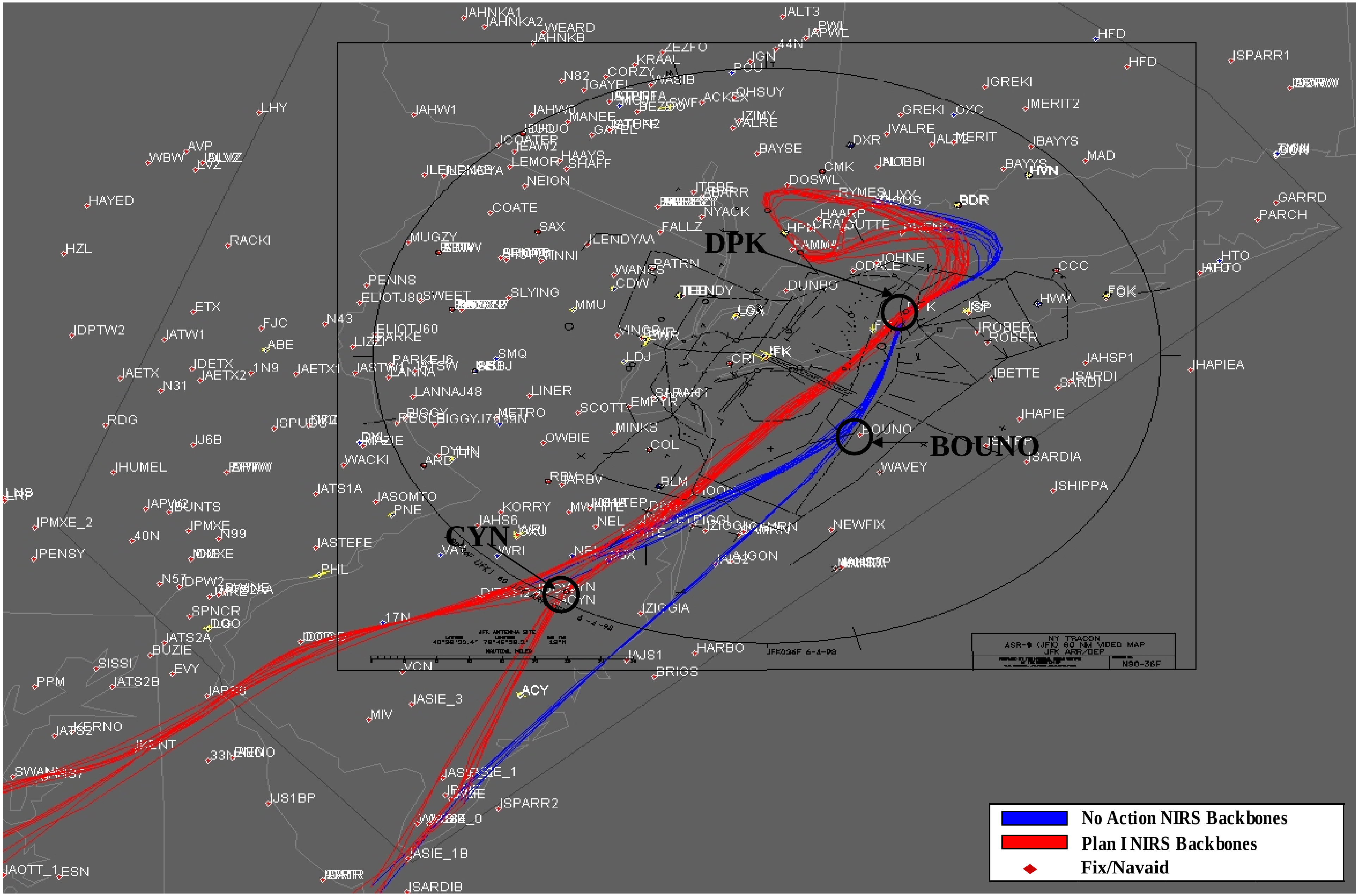


ISP Departures – Plan I no Building vs. No Action

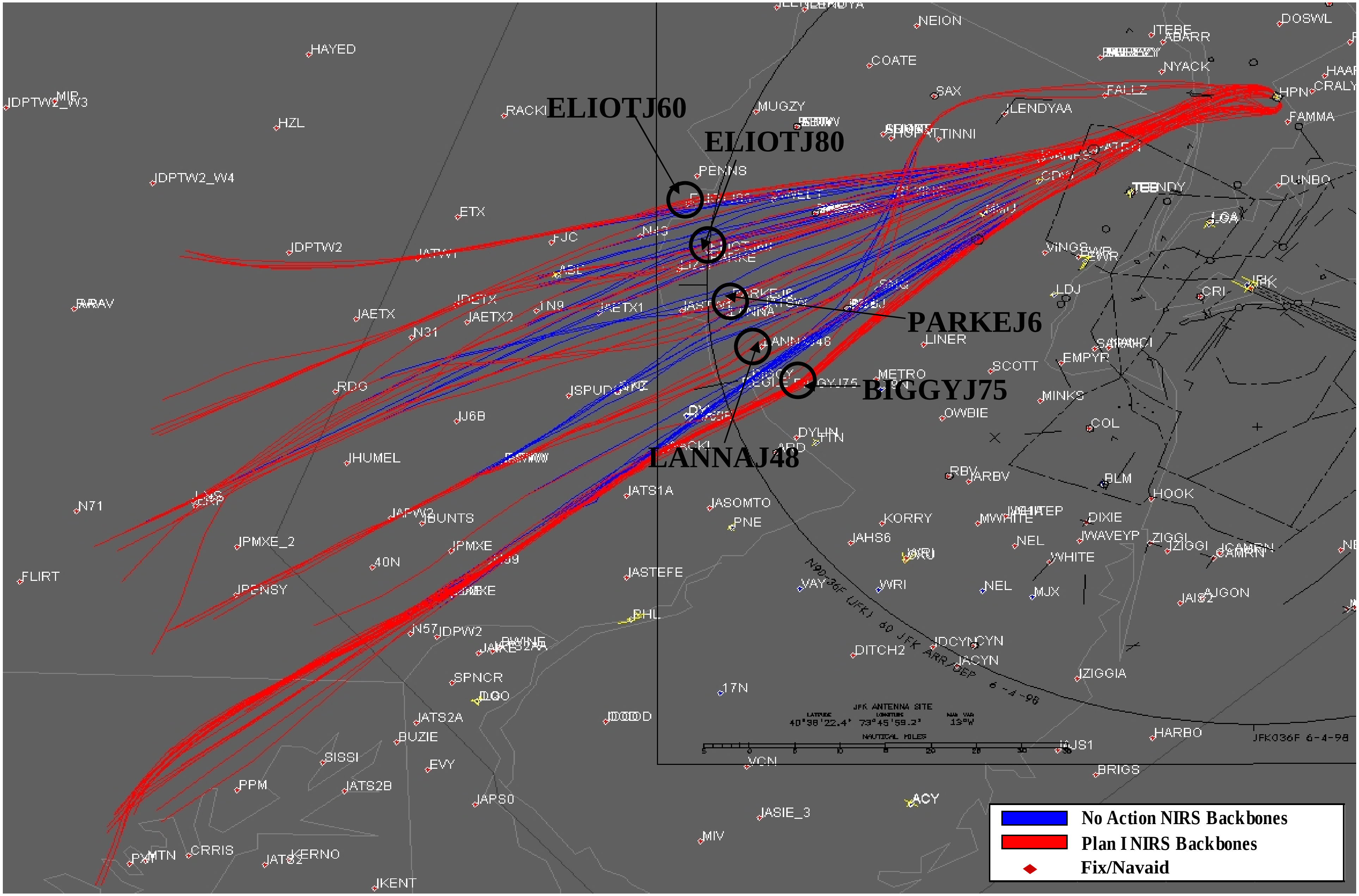


Appendix E
Attachment C-51

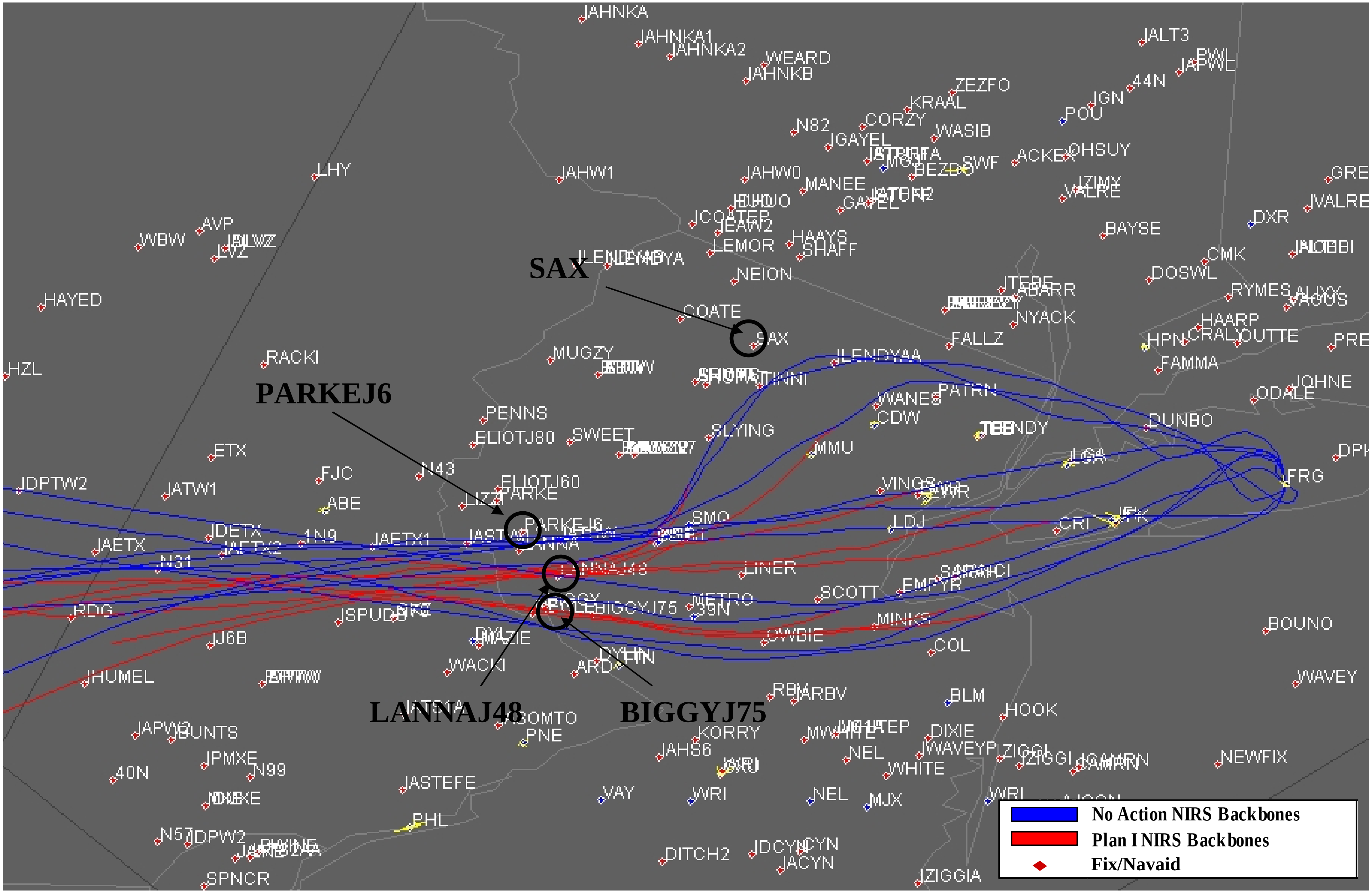
HPN Arrivals – Plan I no Building vs. No Action



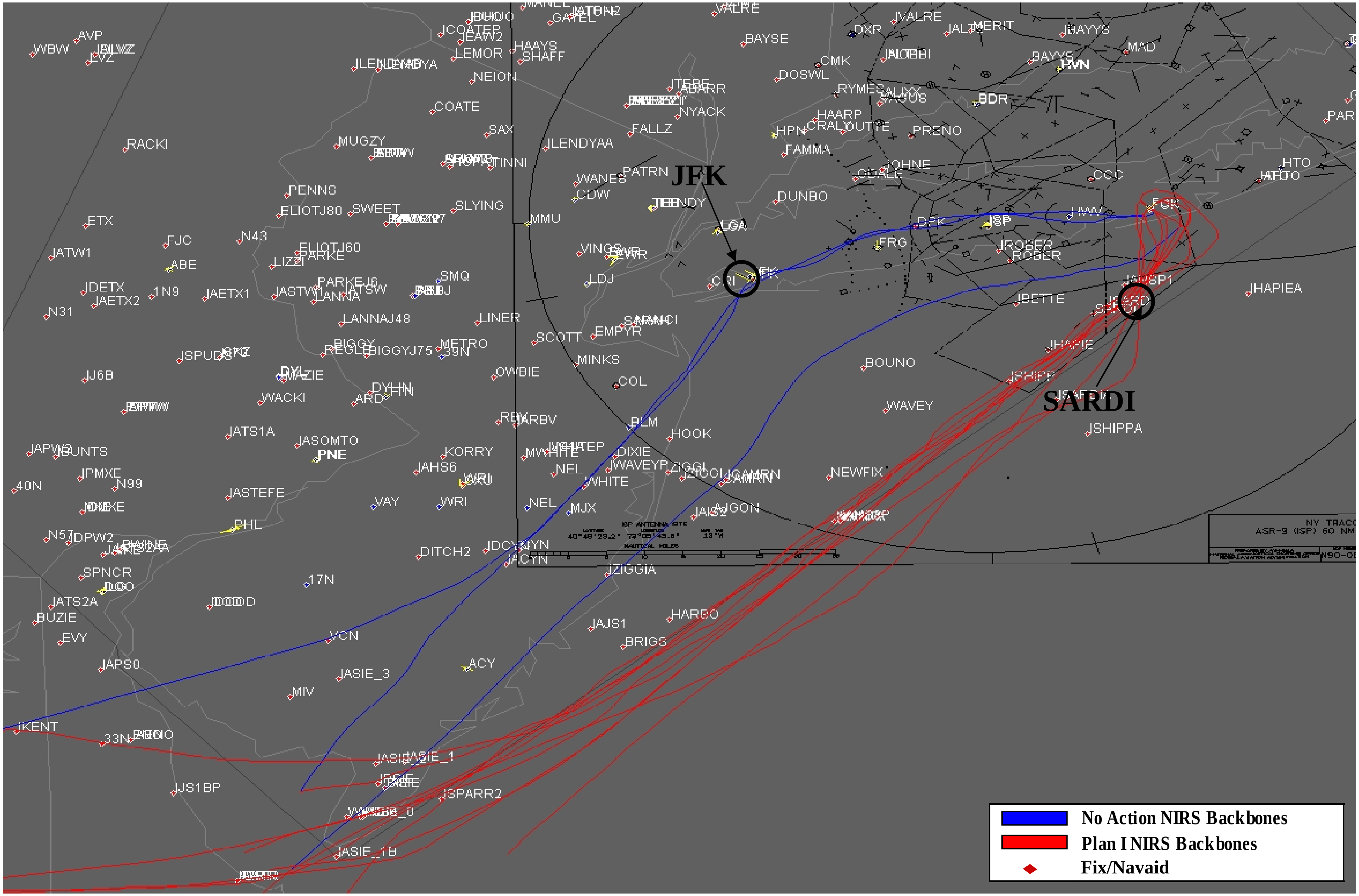
HPN Departures – Plan I no Building vs. No Action



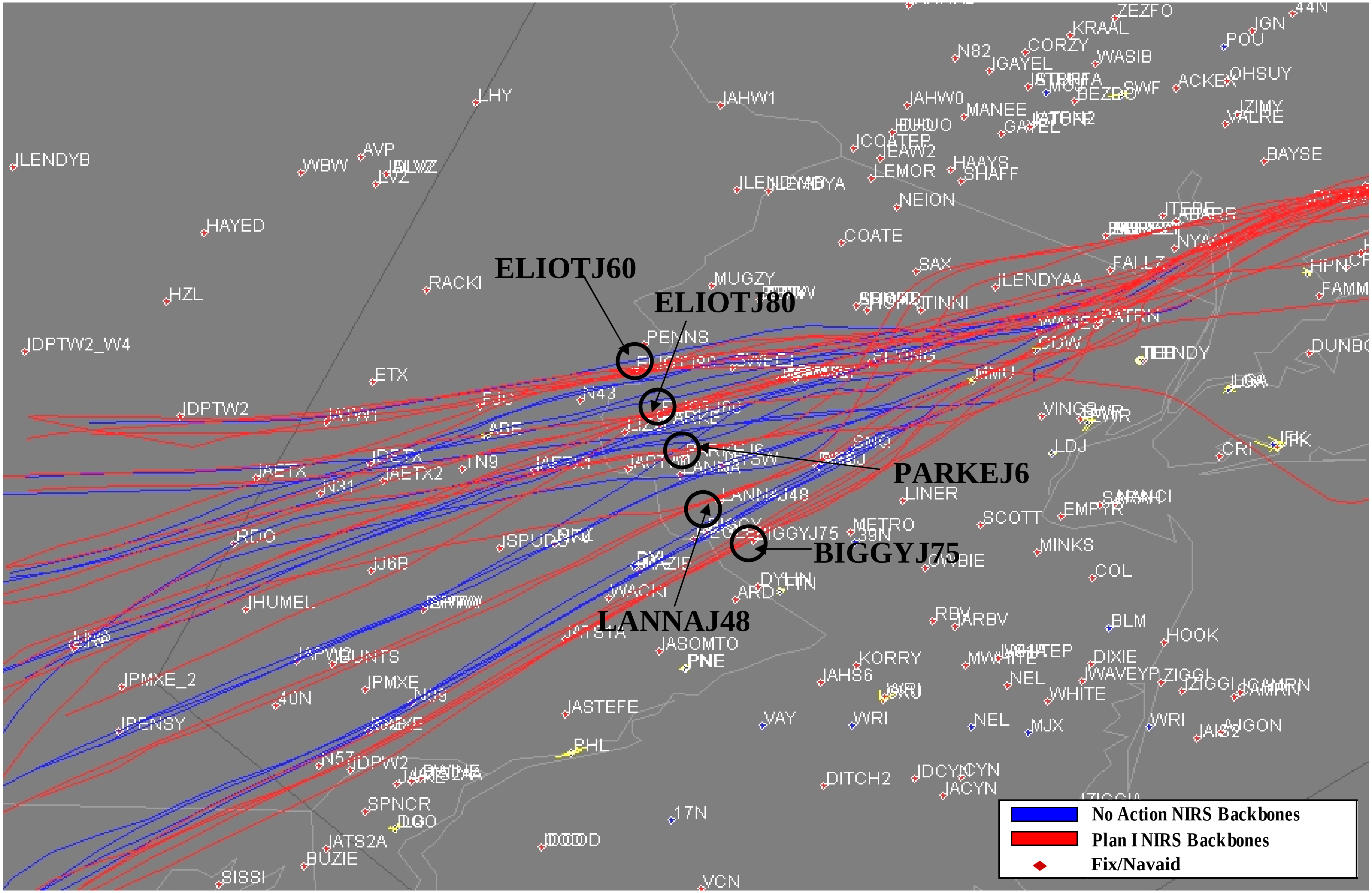
FRG Departures – Plan I no Building vs. No Action



FOK Departures – Plan I no Building vs. No Action



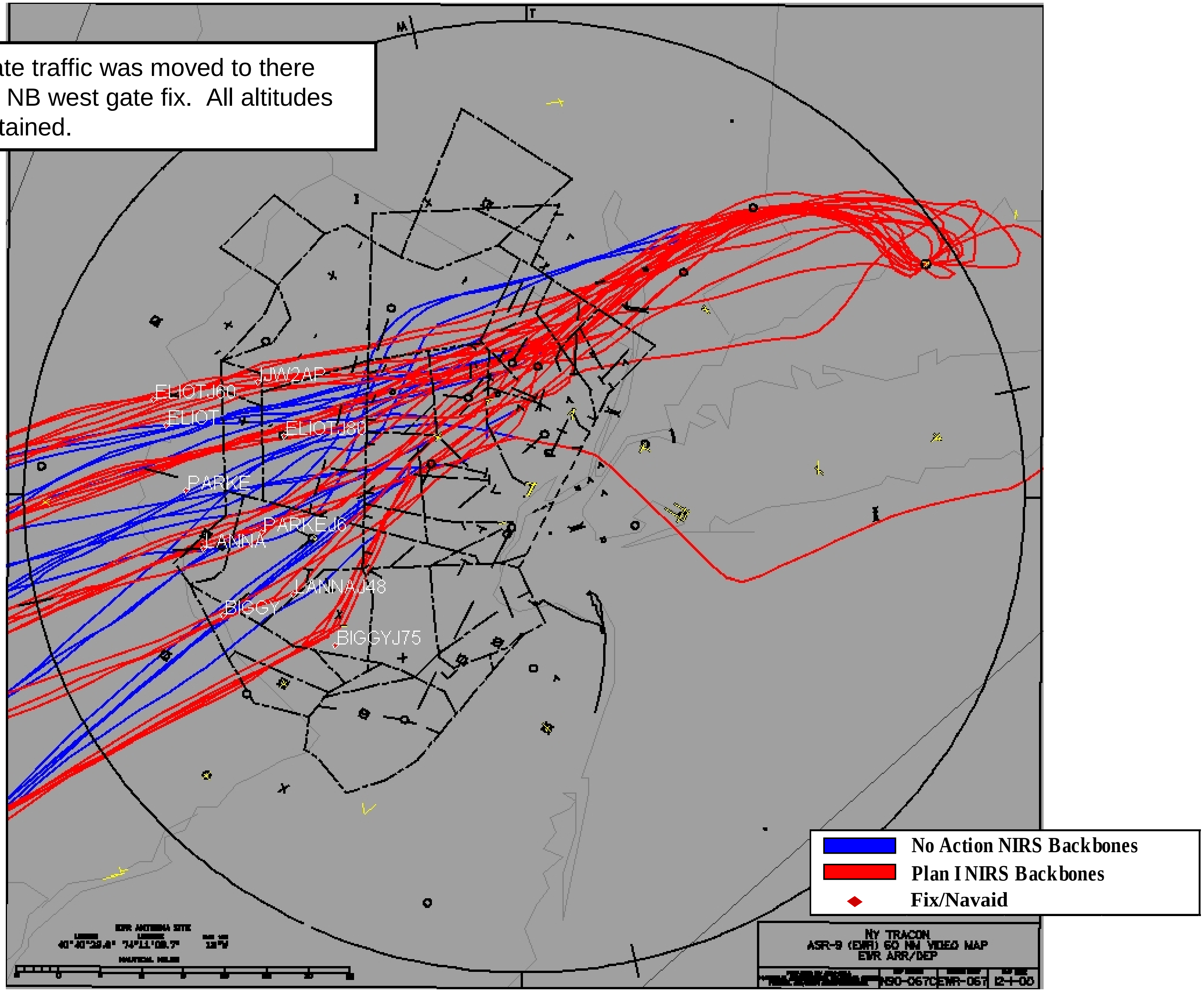
BDR Departures – Plan I no Building vs. No Action



Appendix E
Attachment C-56

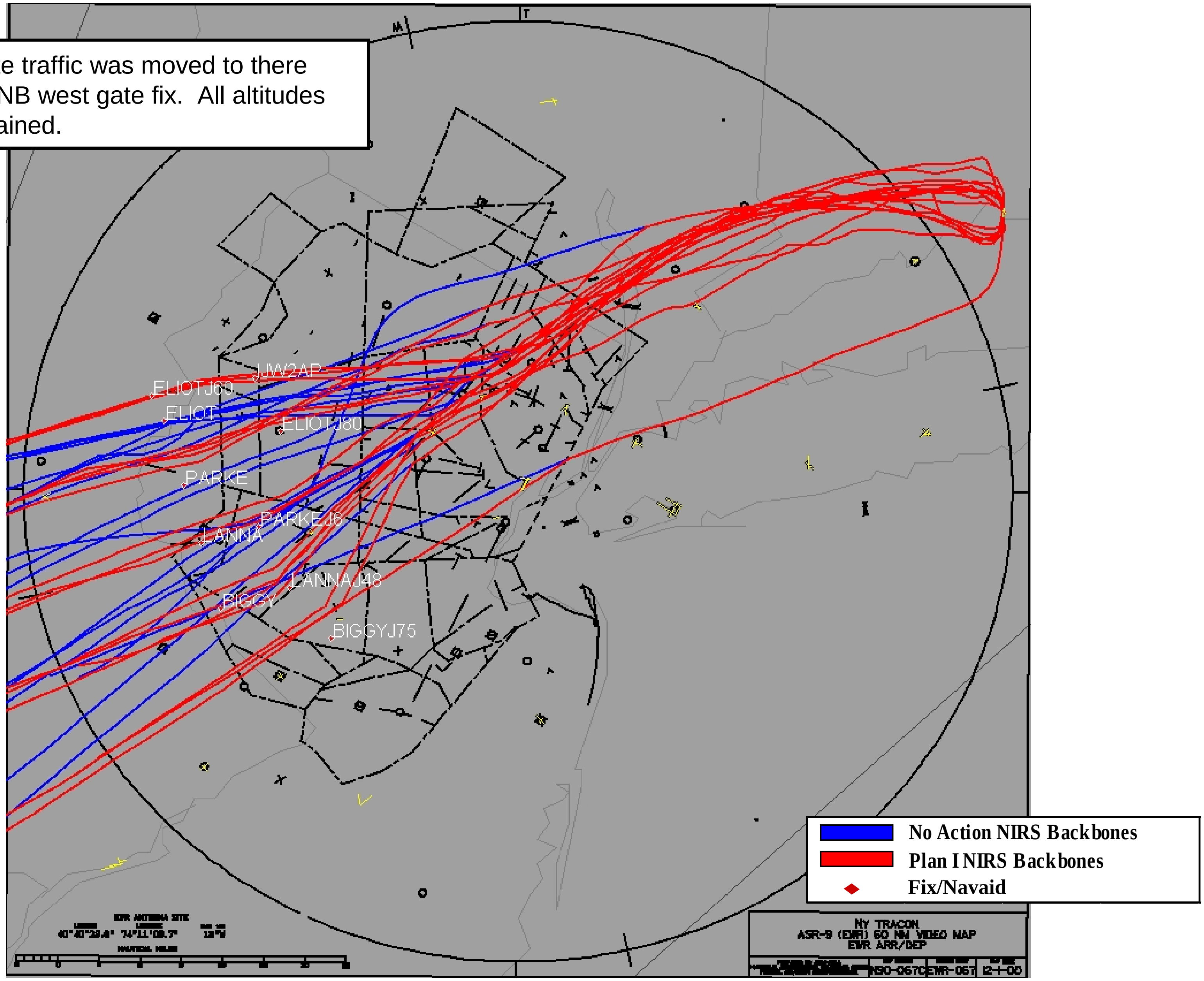
BDR- Departures – Plan I NB vs. No Action

All west gate traffic was moved to there new Plan I NB west gate fix. All altitudes were maintained.



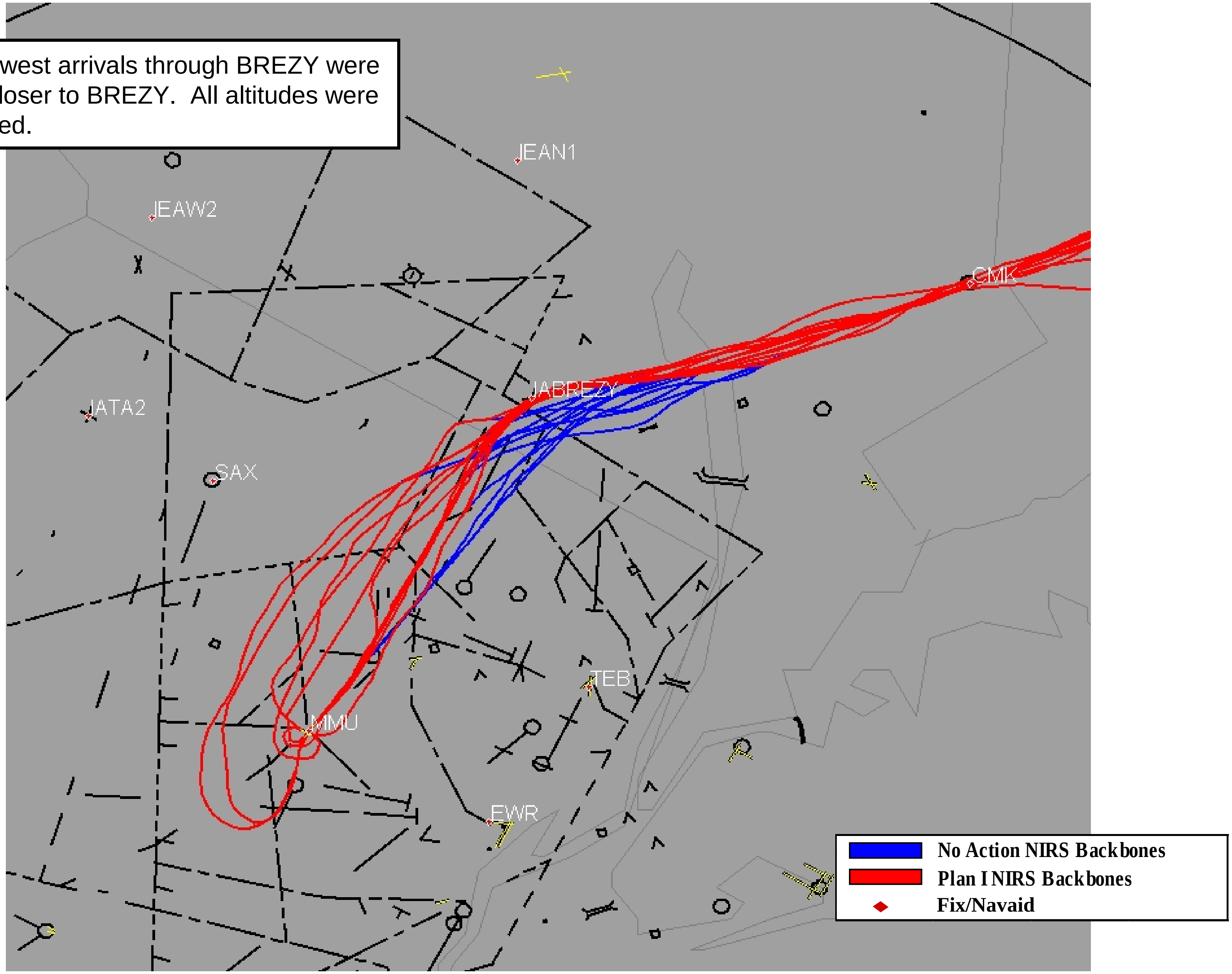
HVN- Departures – Plan I NB vs. No Action

All west gate traffic was moved to there new Plan I NB west gate fix. All altitudes were maintained.



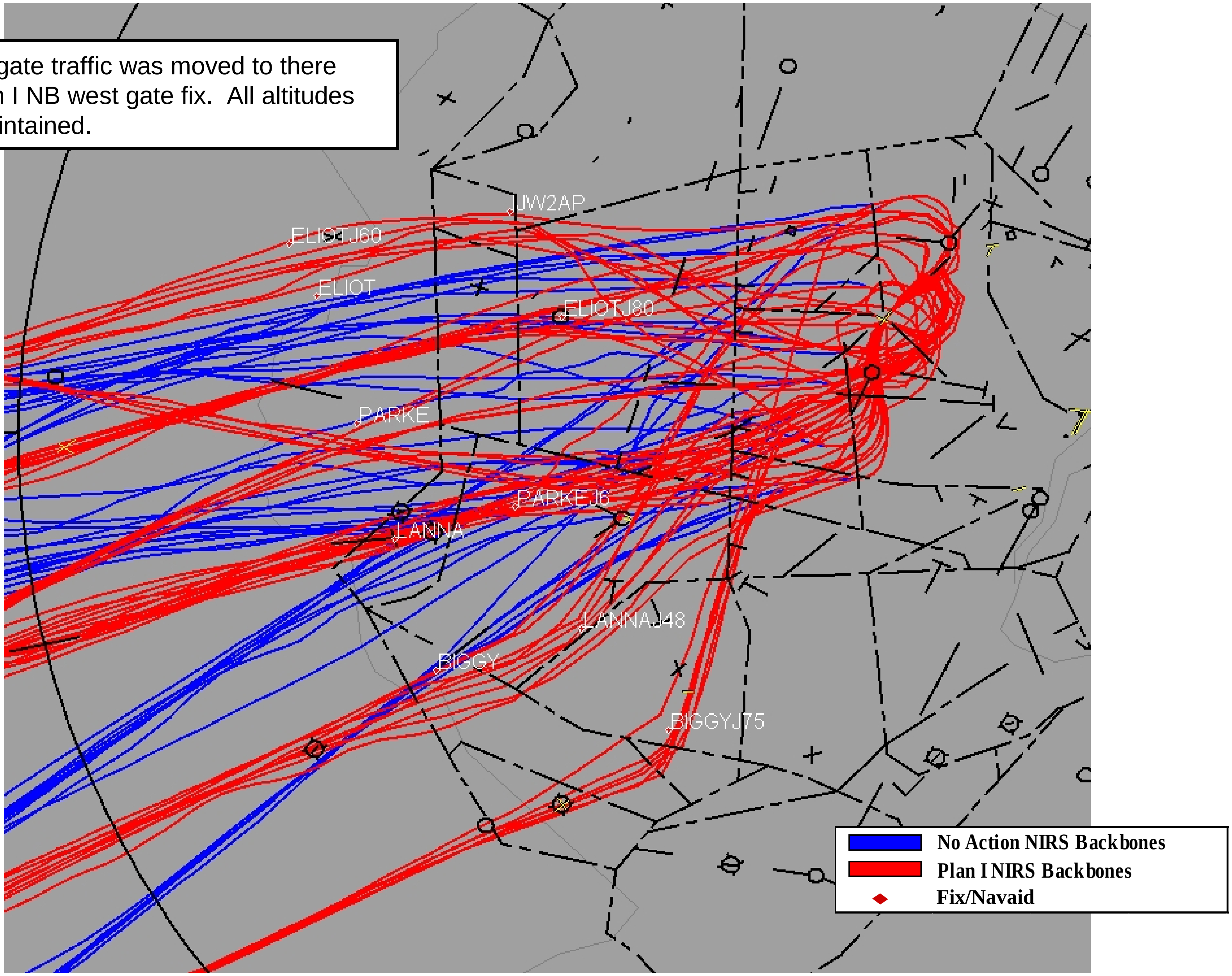
MMU- BREZY Arrivals – Plan I NB vs. No Action

All southwest arrivals through BREZY were moved closer to BREZY. All altitudes were maintained.



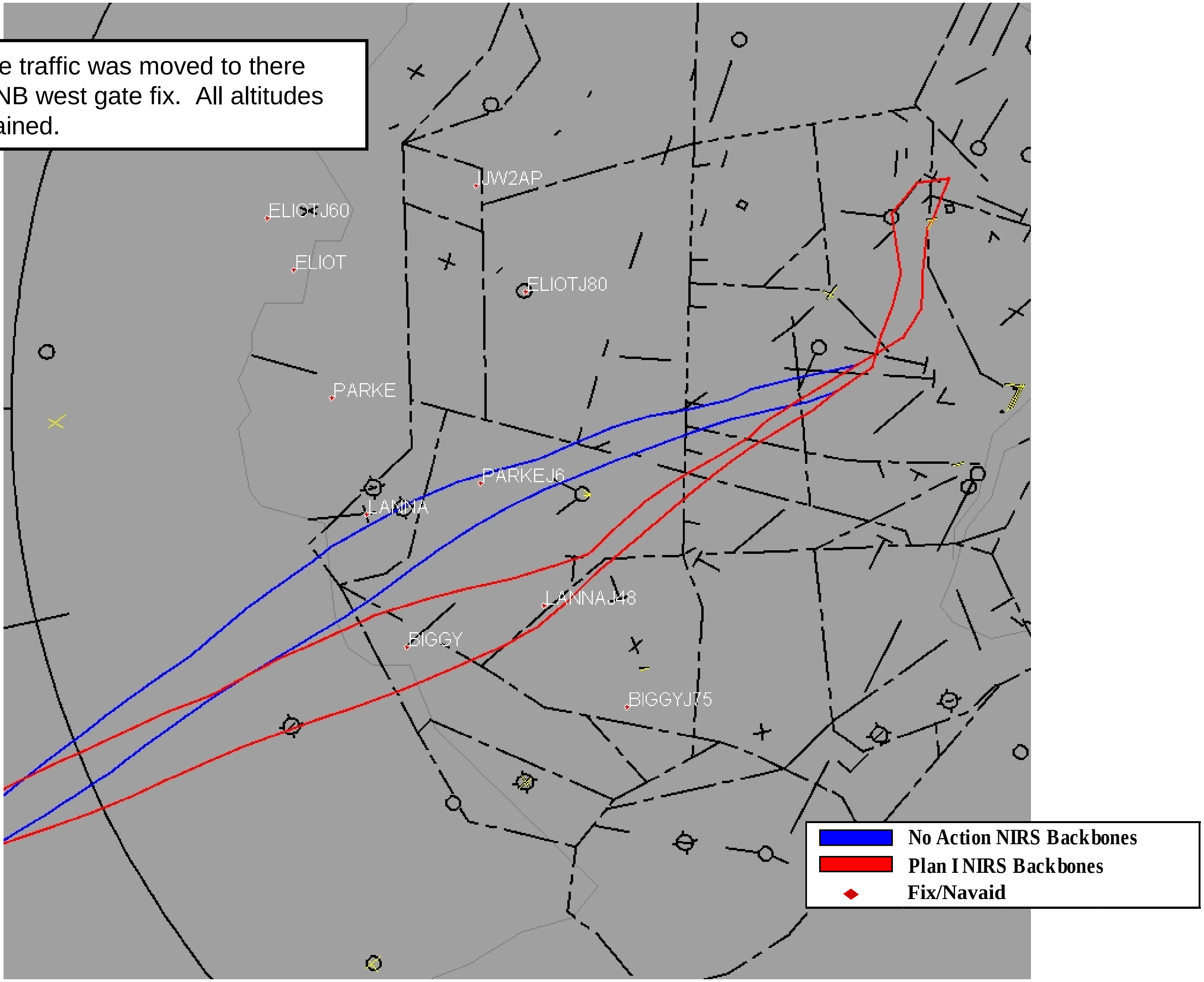
MMU- West Gate Departures – Plan I NB vs. No Action

All west gate traffic was moved to there new Plan I NB west gate fix. All altitudes were maintained.



CDW- Departures – Plan I NB vs. No Action

All west gate traffic was moved to there new Plan I NB west gate fix. All altitudes were maintained.

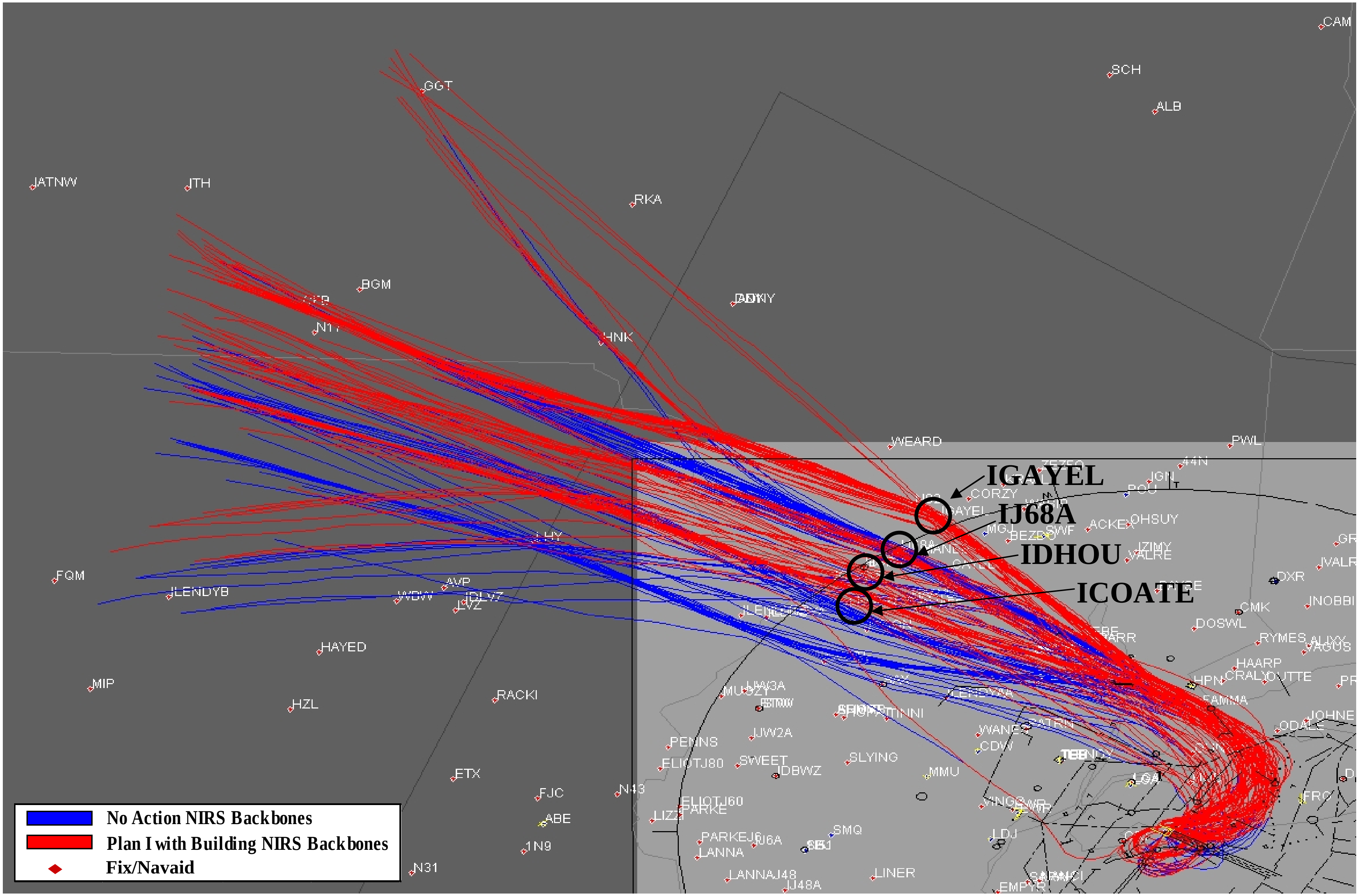


Section 4

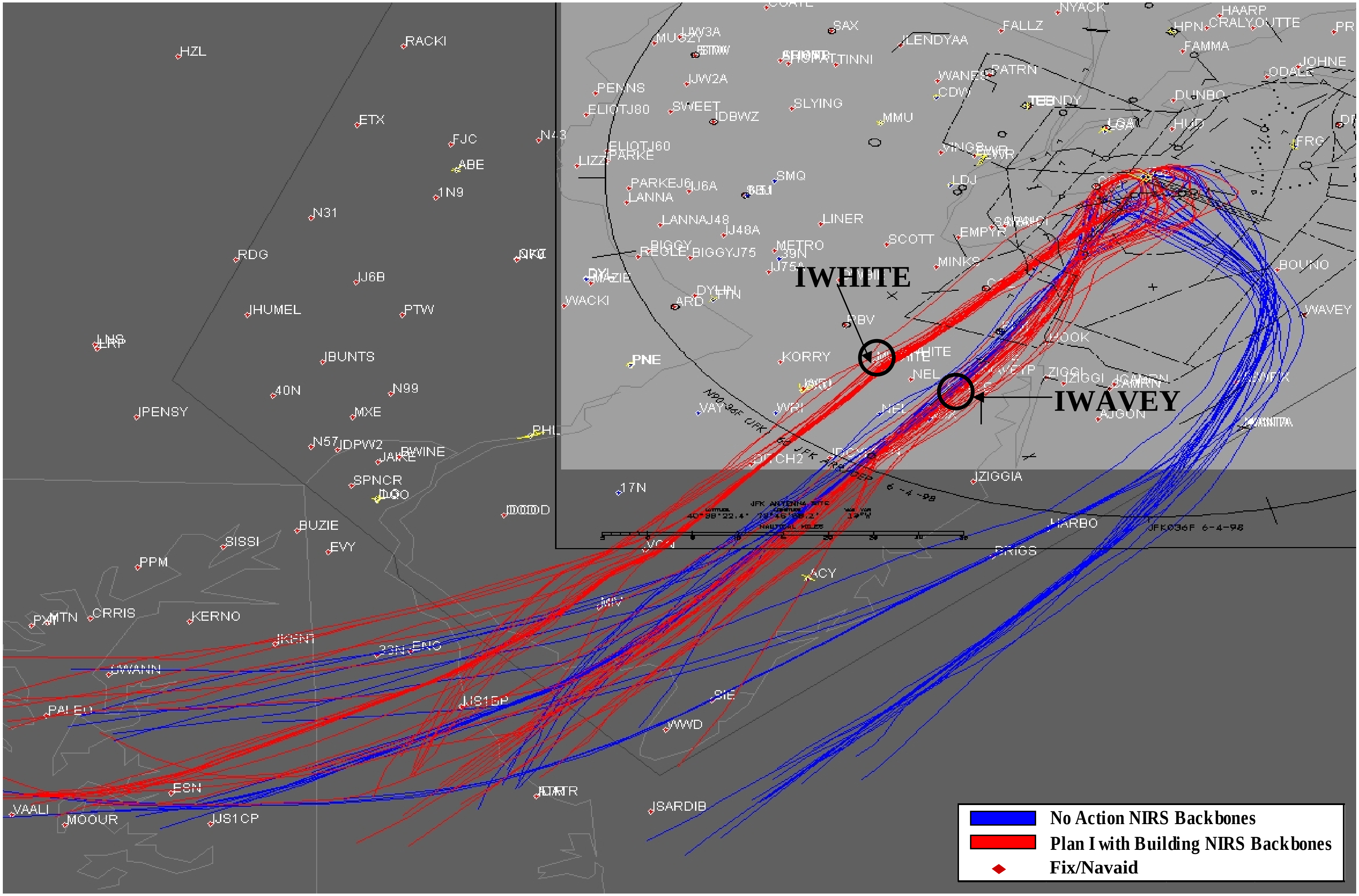
Integrated Airspace With ICC (Plan I)
Flight Track Changes

Appendix E
Attachment C-62

JFK Northwest Departure Routes – Plan I with Building vs. No Action

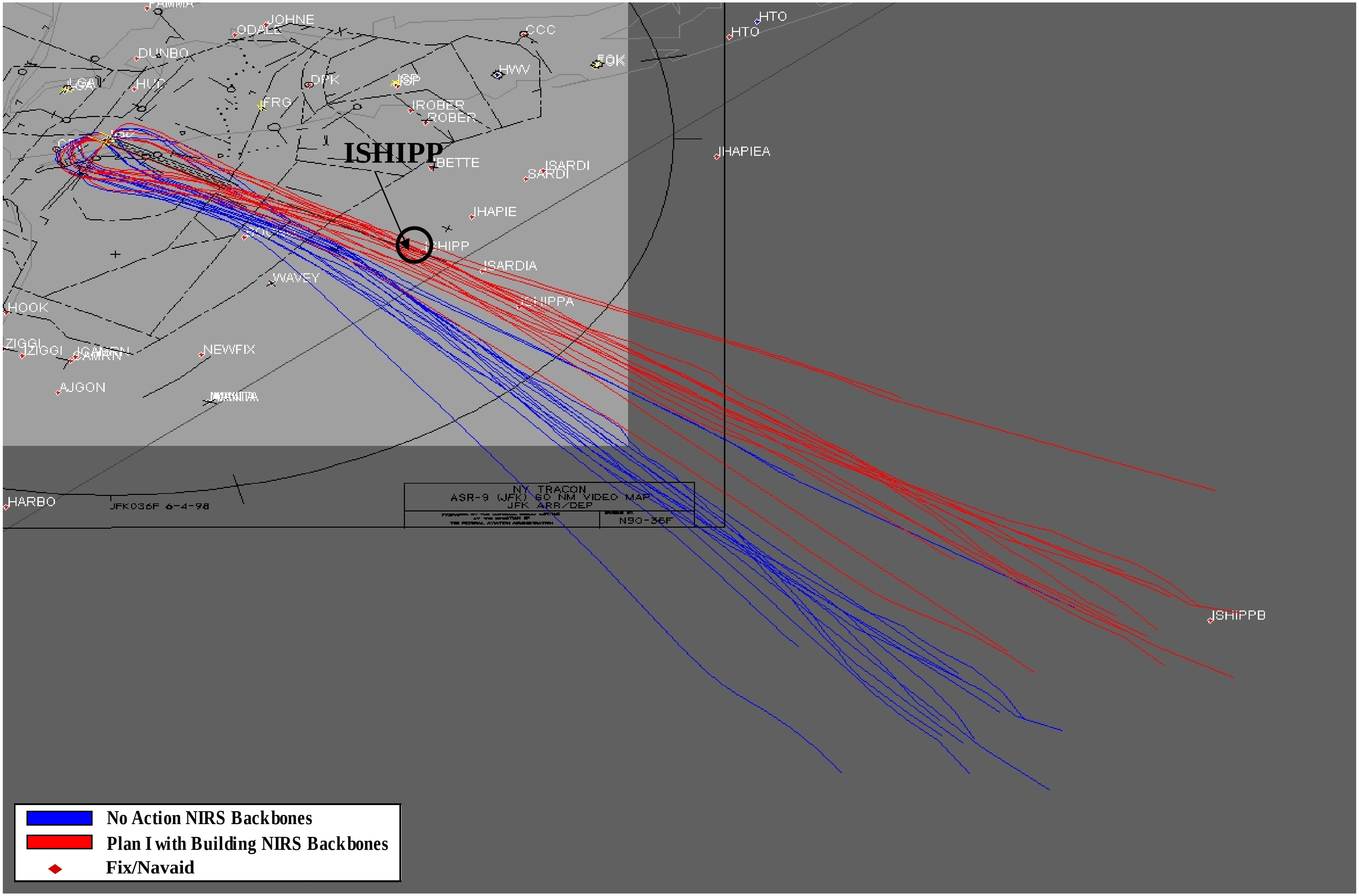


JFK South Departure Routes – Plan I with Building vs. No Action

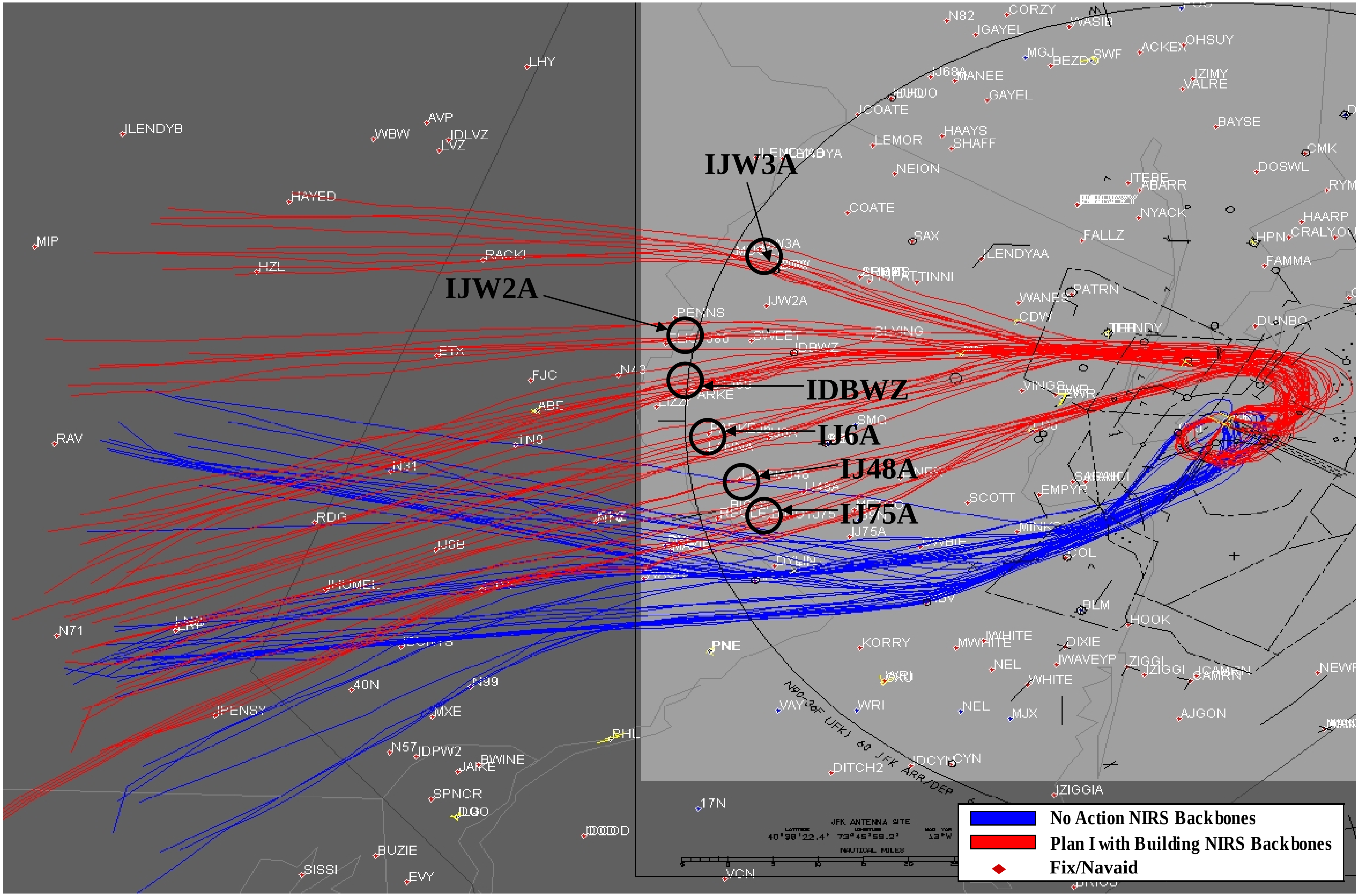


Appendix E
Attachment C-64

JFK Waters Departure Routes – Plan I with Building vs. No Action



JFK West Departure Routes – Plan I with Building vs. No Action



JFK Departure Headings – Plan I with Building vs. No Action

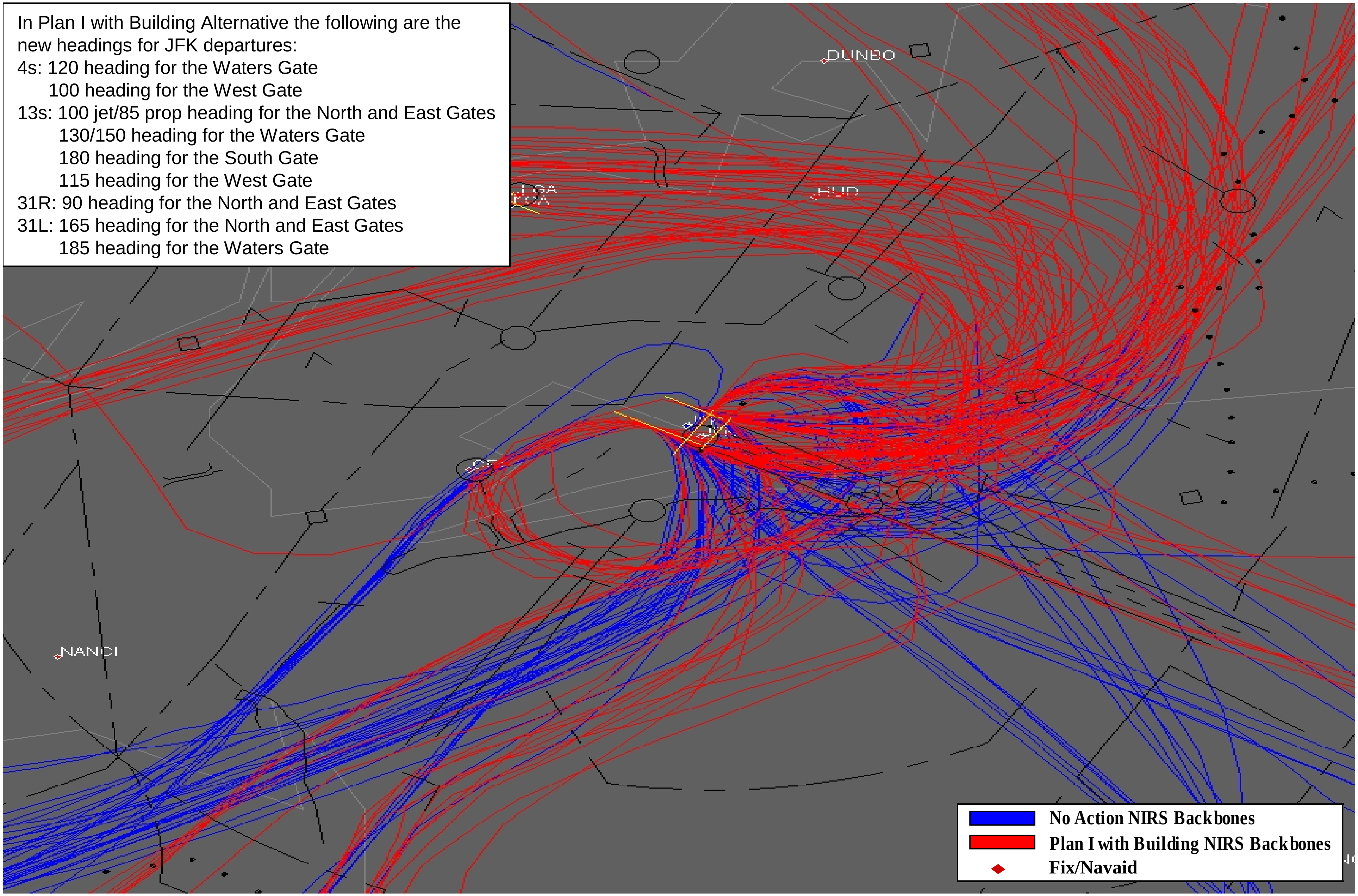
In Plan I with Building Alternative the following are the new headings for JFK departures:

4s: 120 heading for the Waters Gate
 100 heading for the West Gate

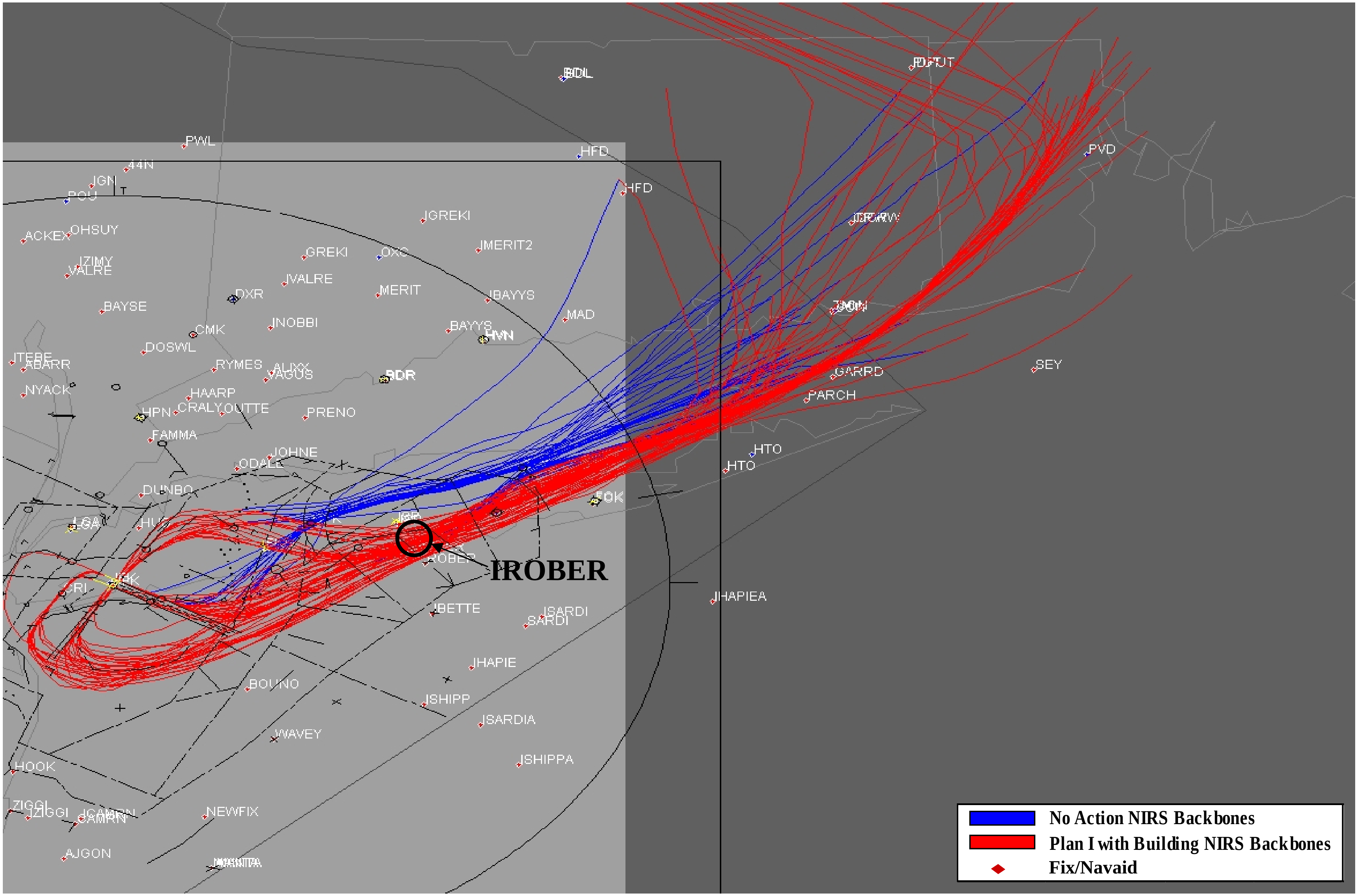
13s: 100 jet/85 prop heading for the North and East Gates
 130/150 heading for the Waters Gate
 180 heading for the South Gate
 115 heading for the West Gate

31R: 90 heading for the North and East Gates

31L: 165 heading for the North and East Gates
 185 heading for the Waters Gate

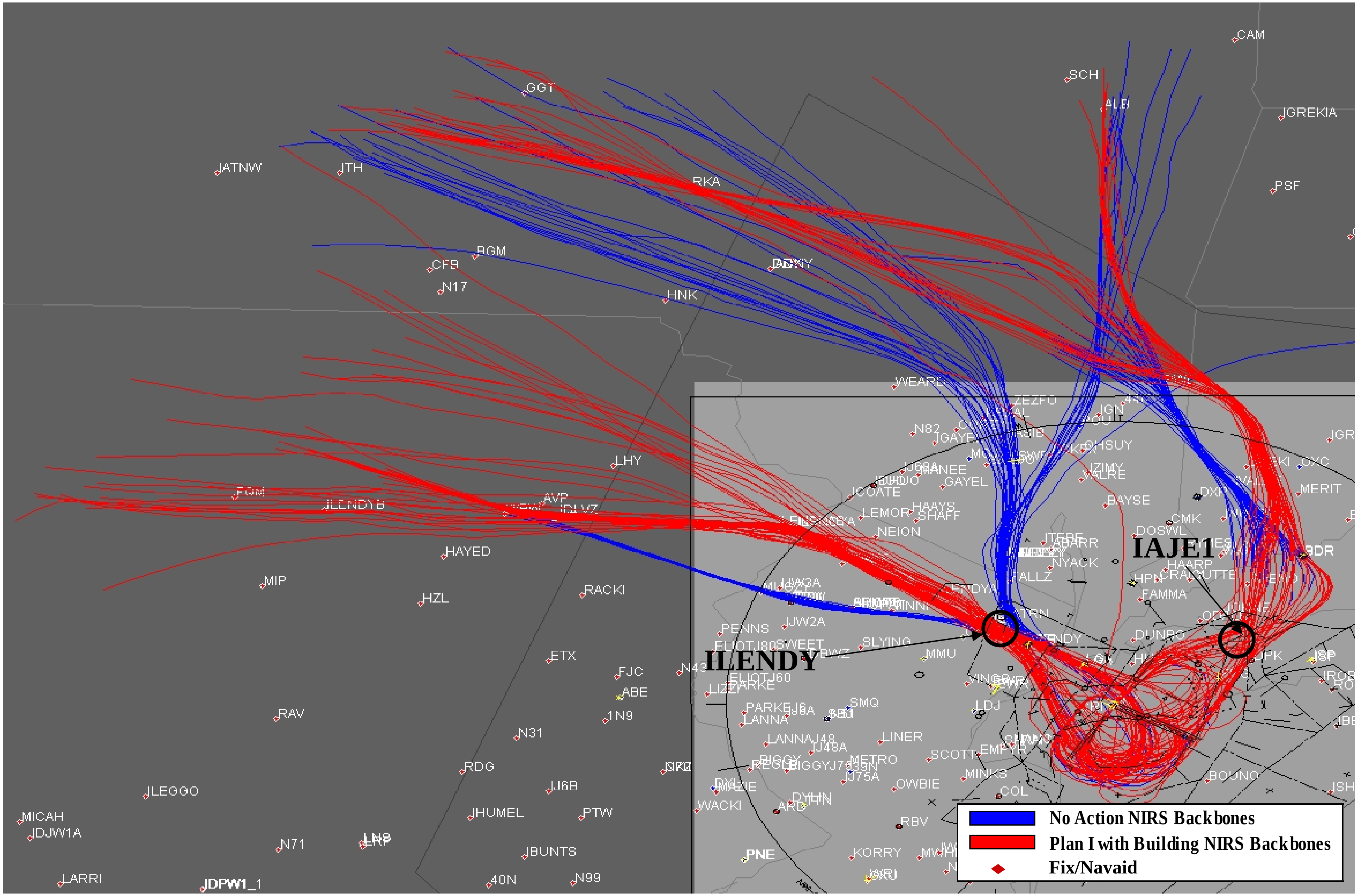


JFK East Arrival Routes – Plan I with Building vs. No Action

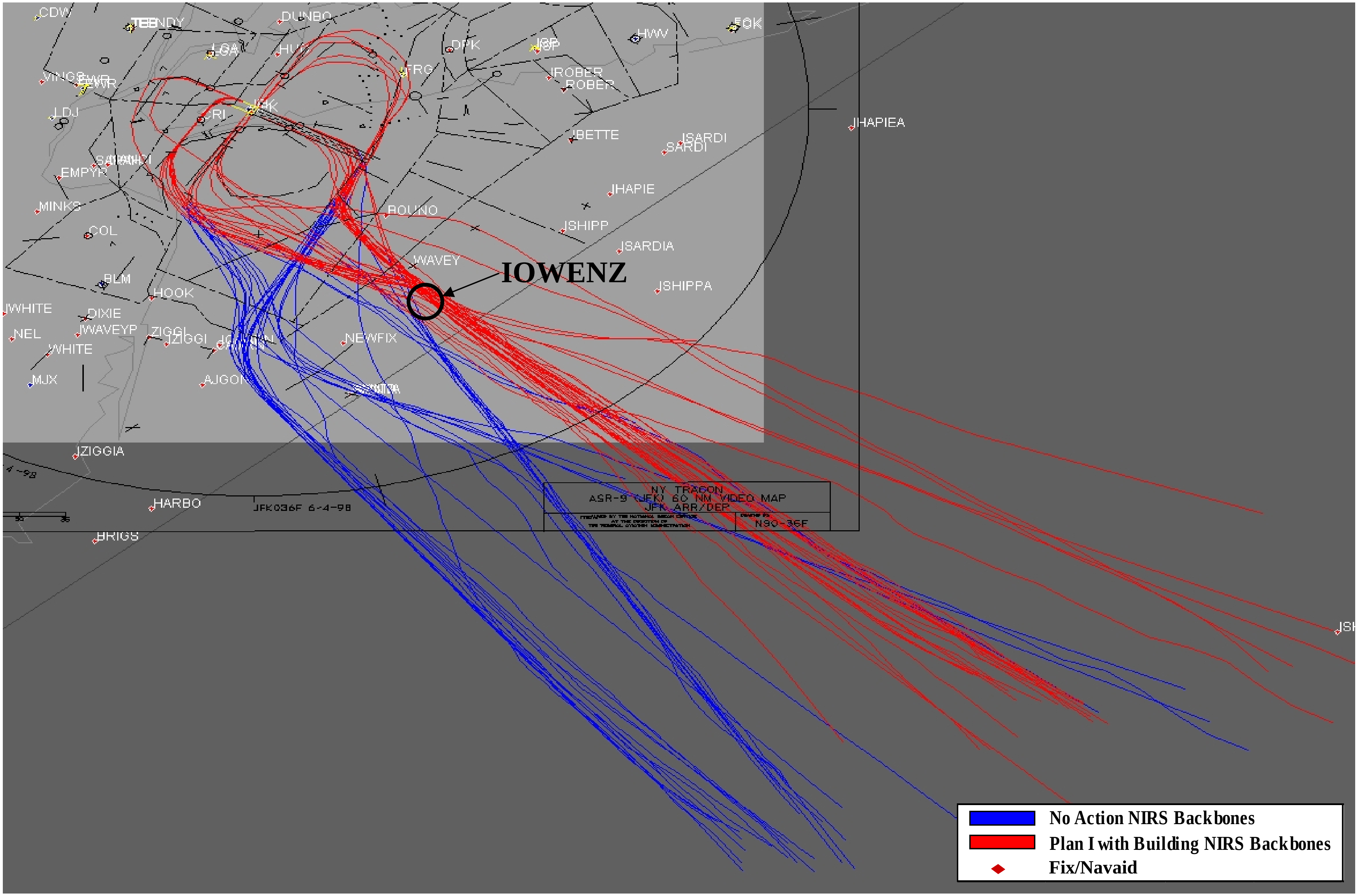


Appendix E
Attachment C-68

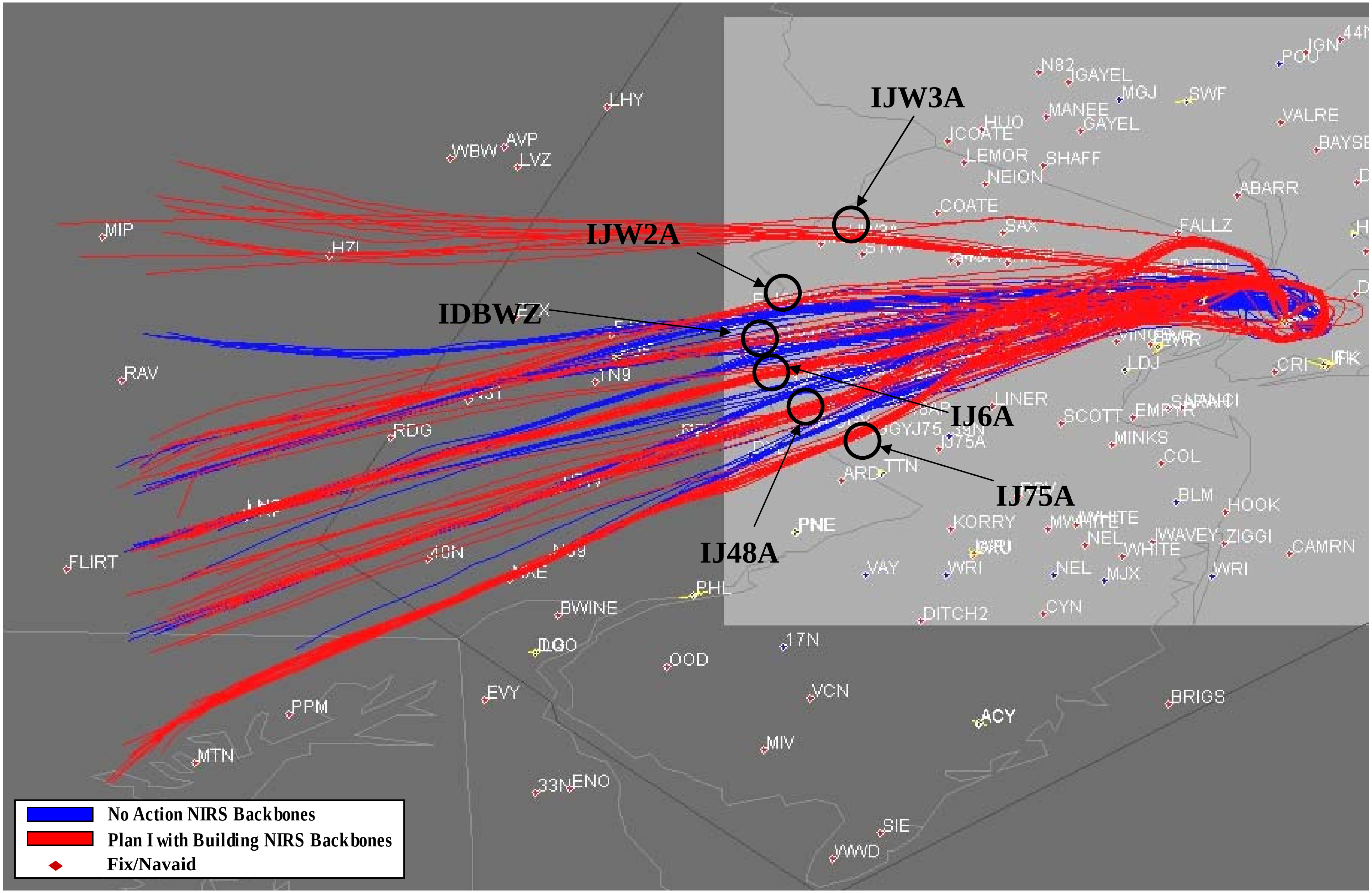
JFK North Arrival Routes – Plan I with Building vs. No Action



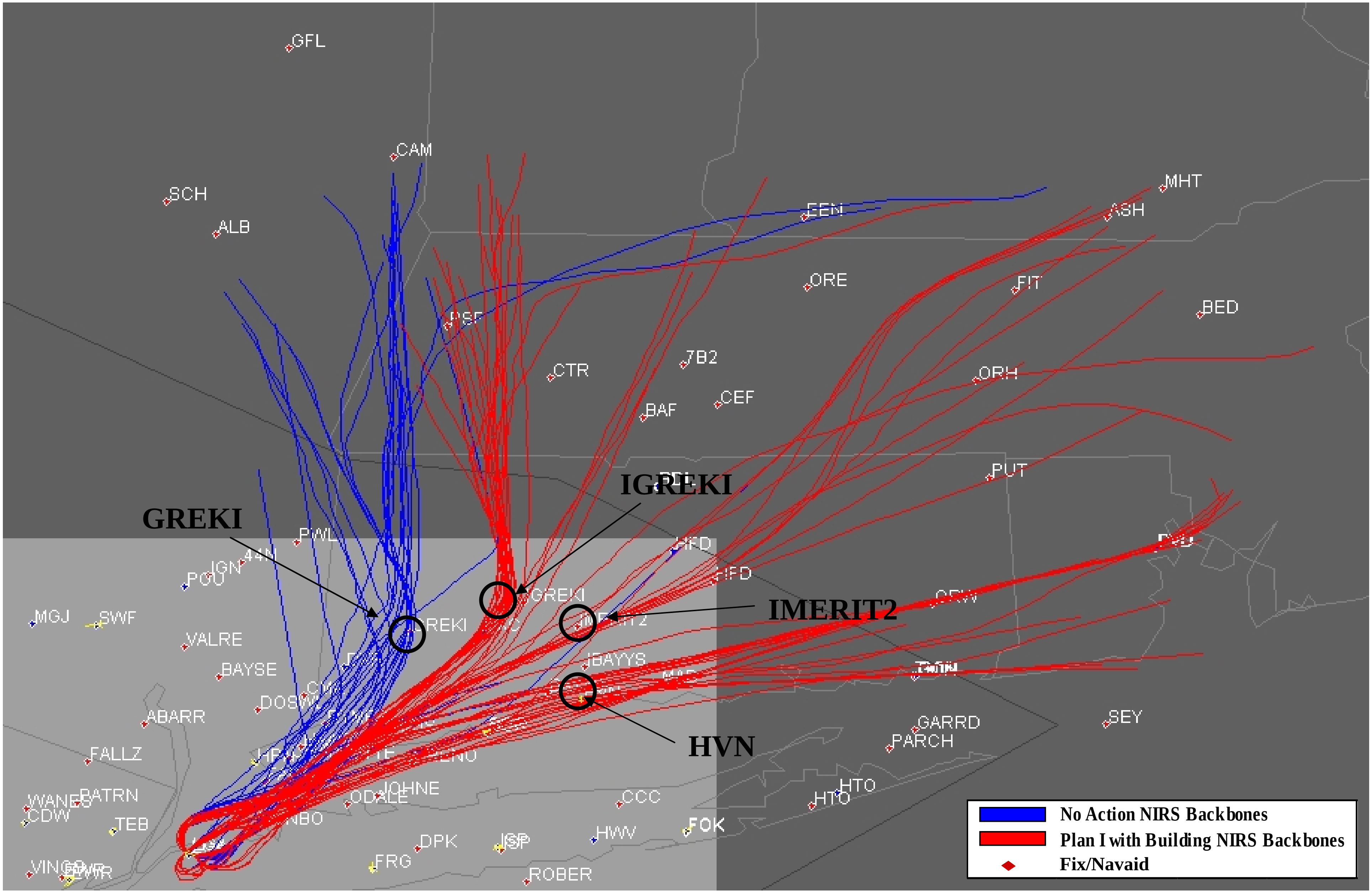
JFK Waters Arrival Routes – Plan I with Building vs. No Action



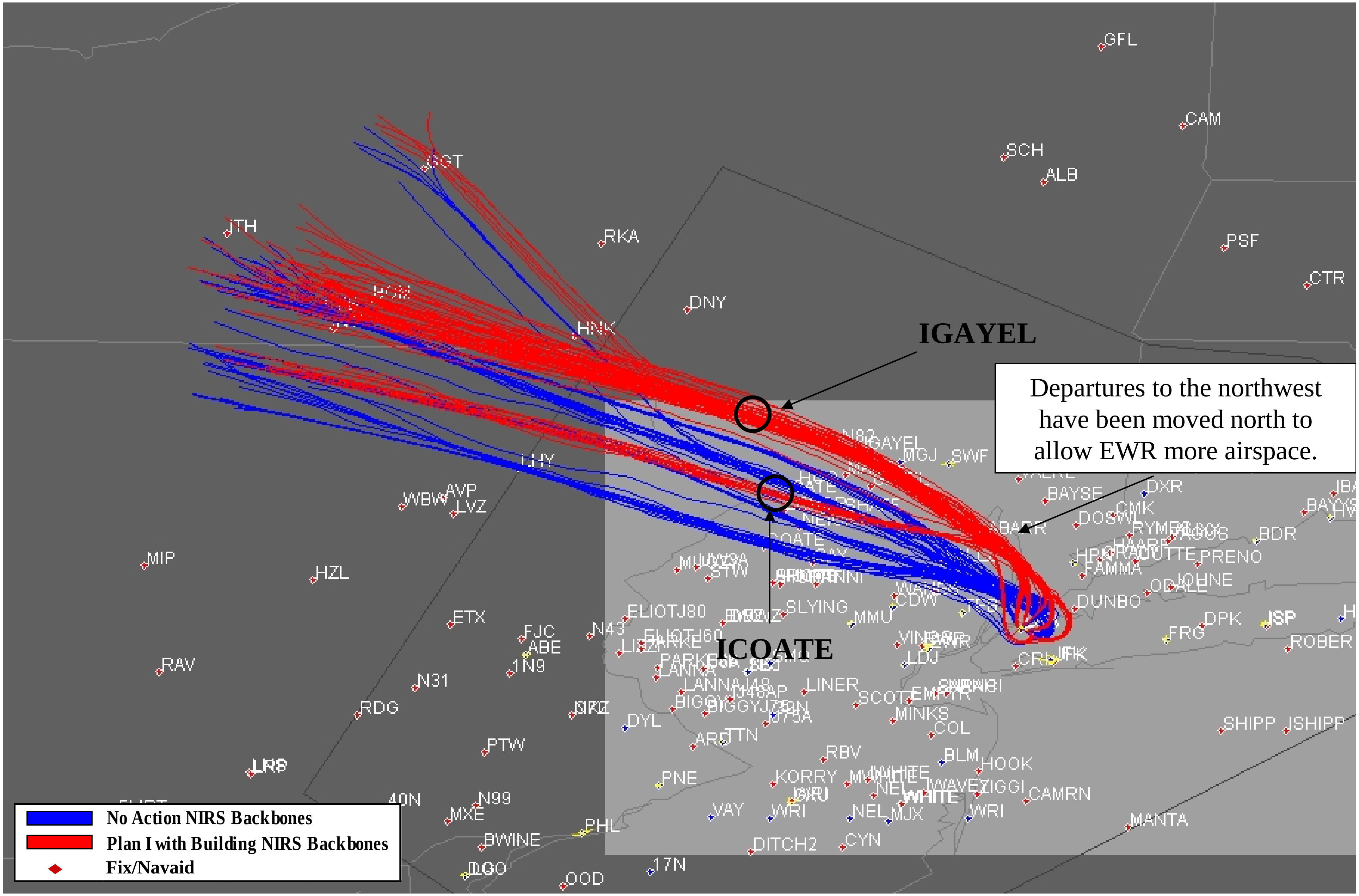
LGA West Departure Routes – Plan I with Building vs. No Action



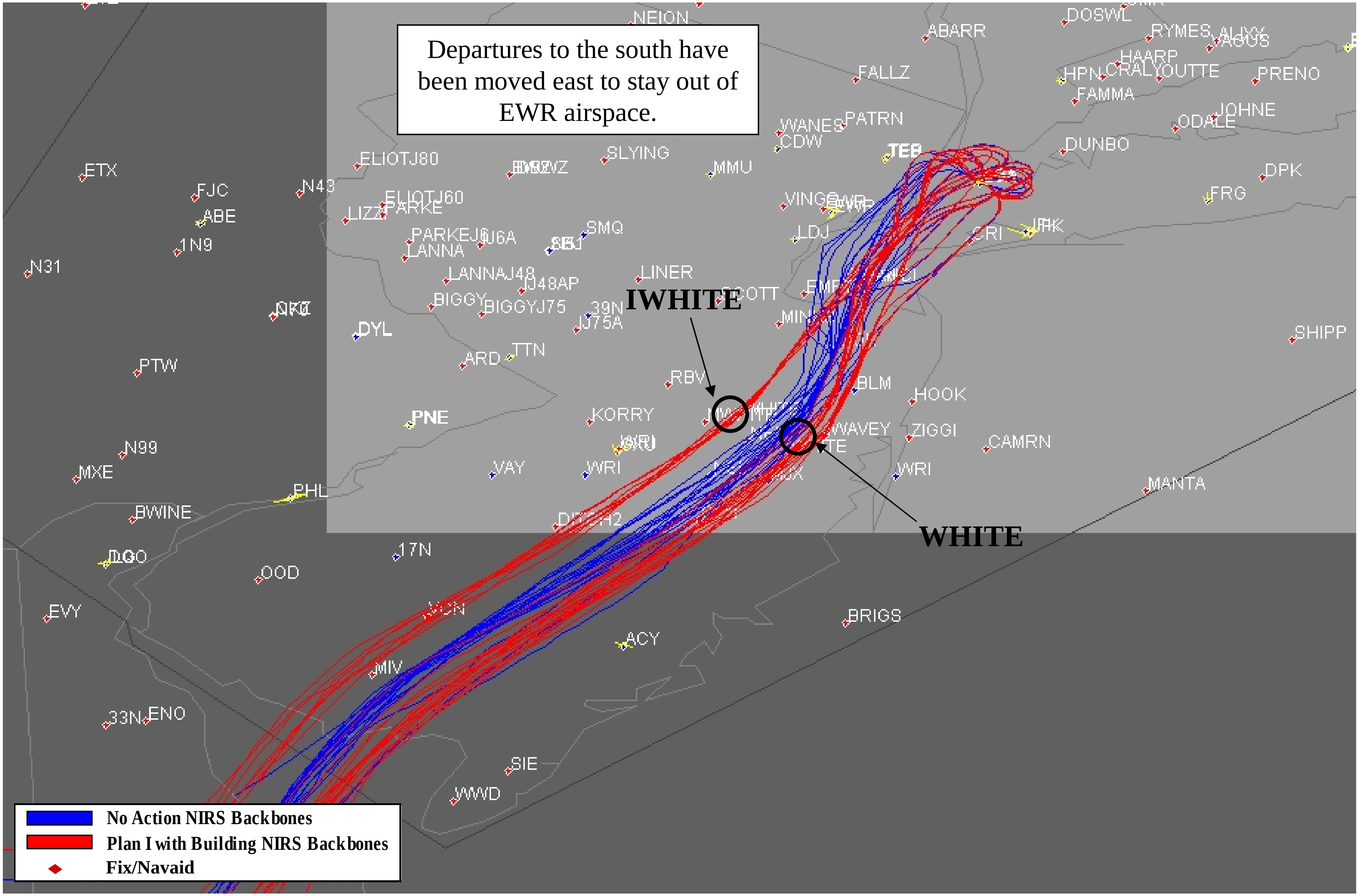
LGA East Departure Routes – Plan I with Building vs. No Action



LGA Northwest Departure Routes – Plan I with Building vs. No Action

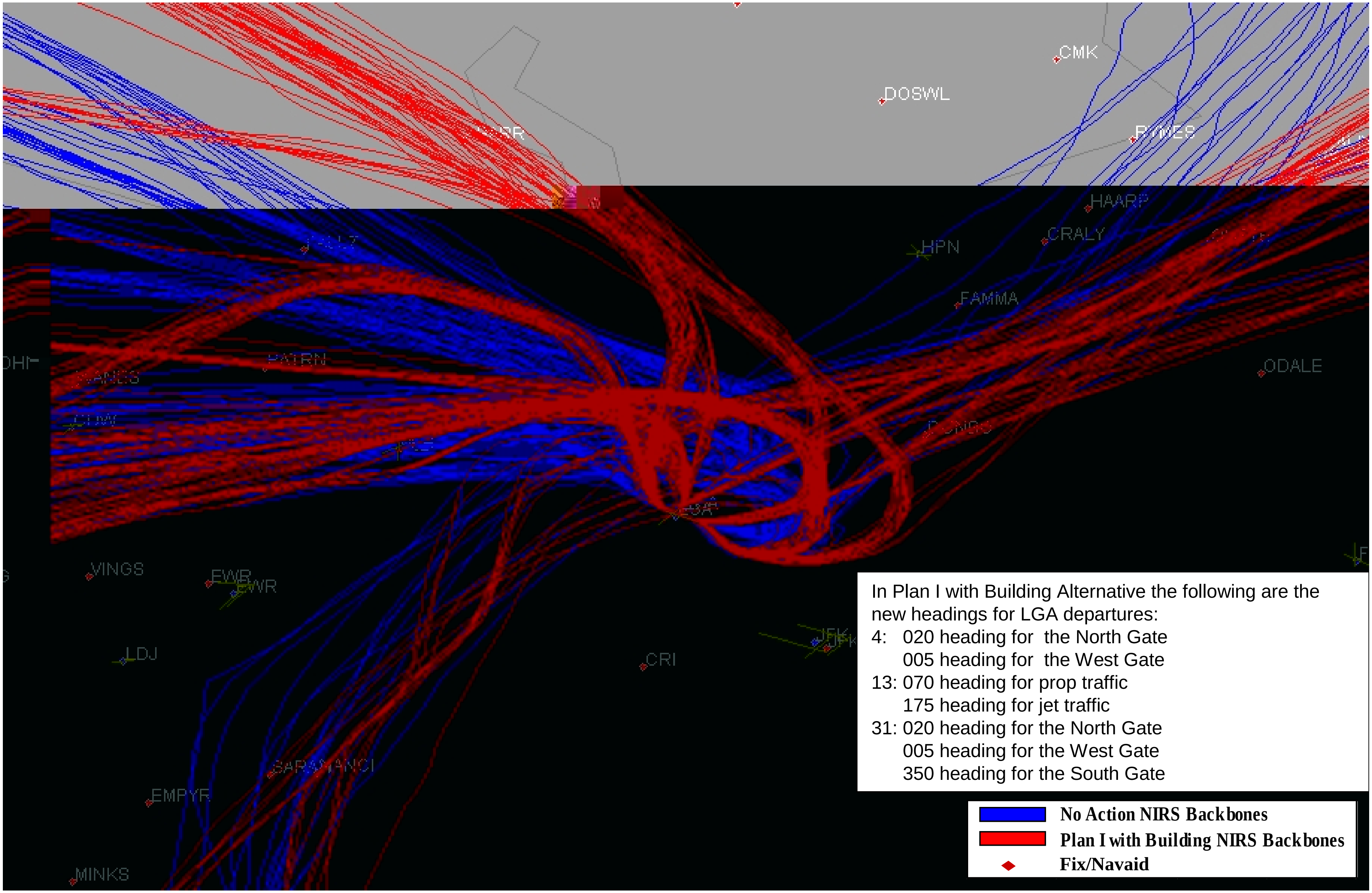


LGA South Departure Routes – Plan I with Building vs. No Action

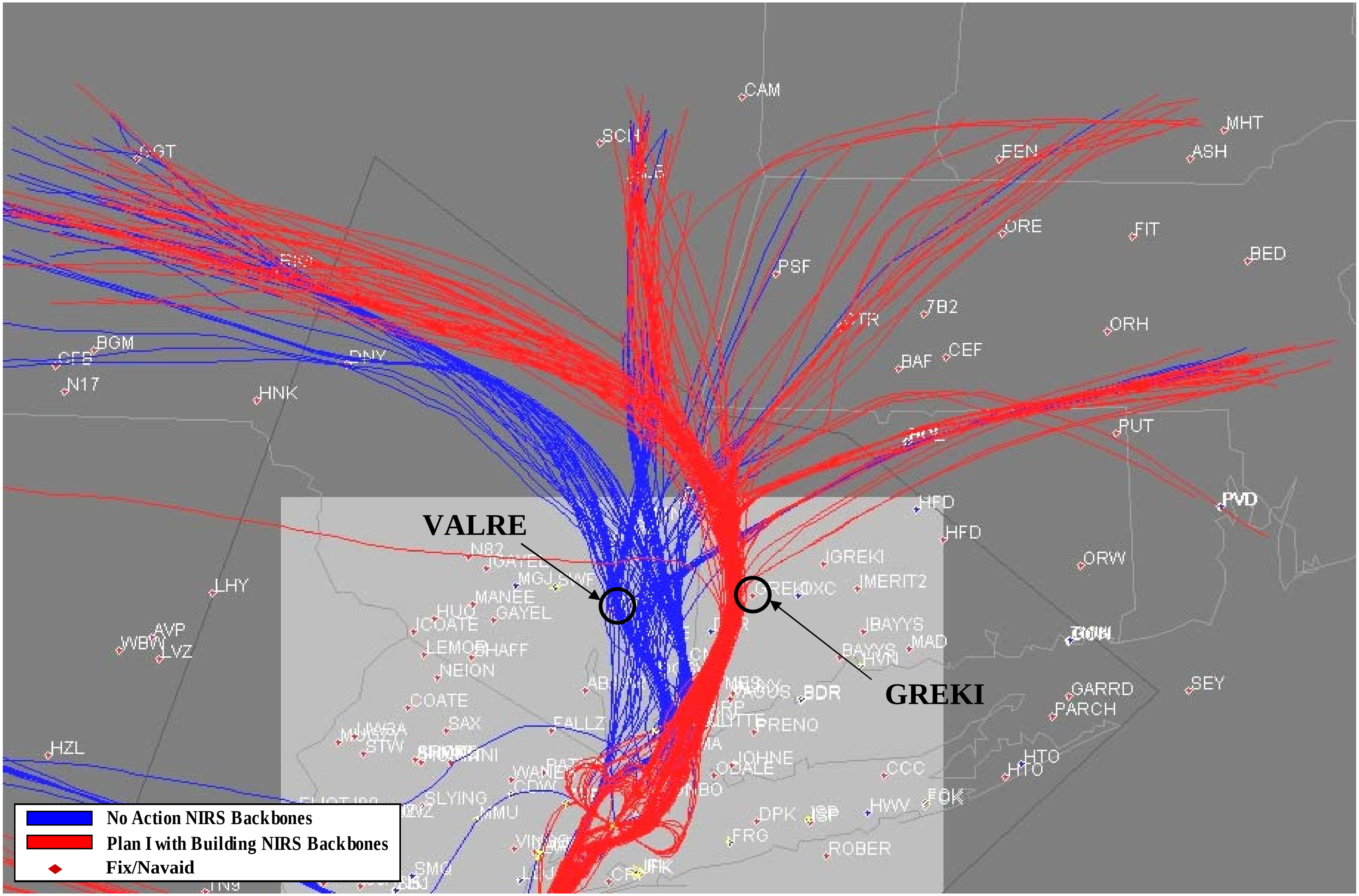


Appendix E
Attachment C-74

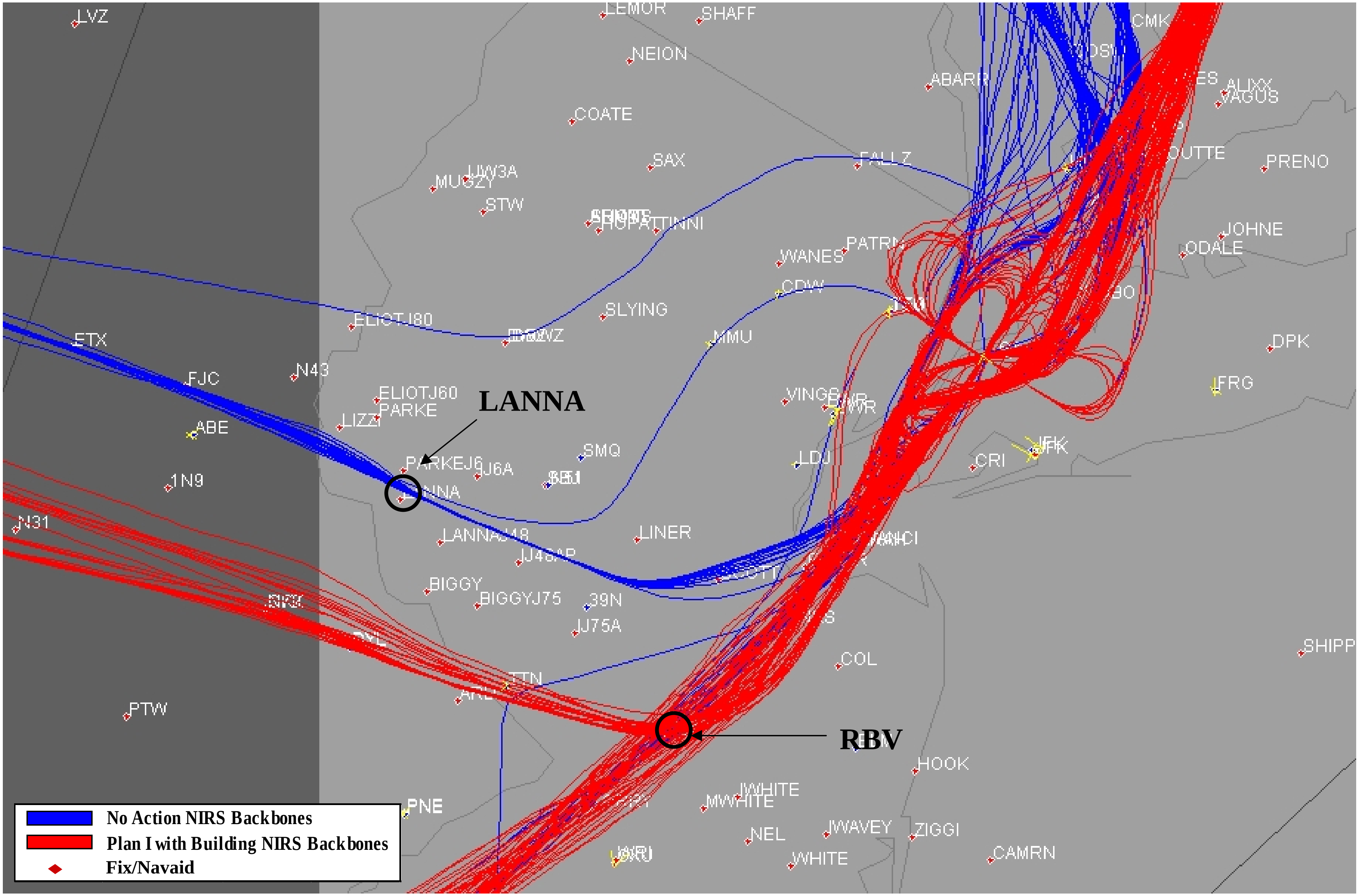
LGA Departure Headings – Plan I with Building vs. No Action



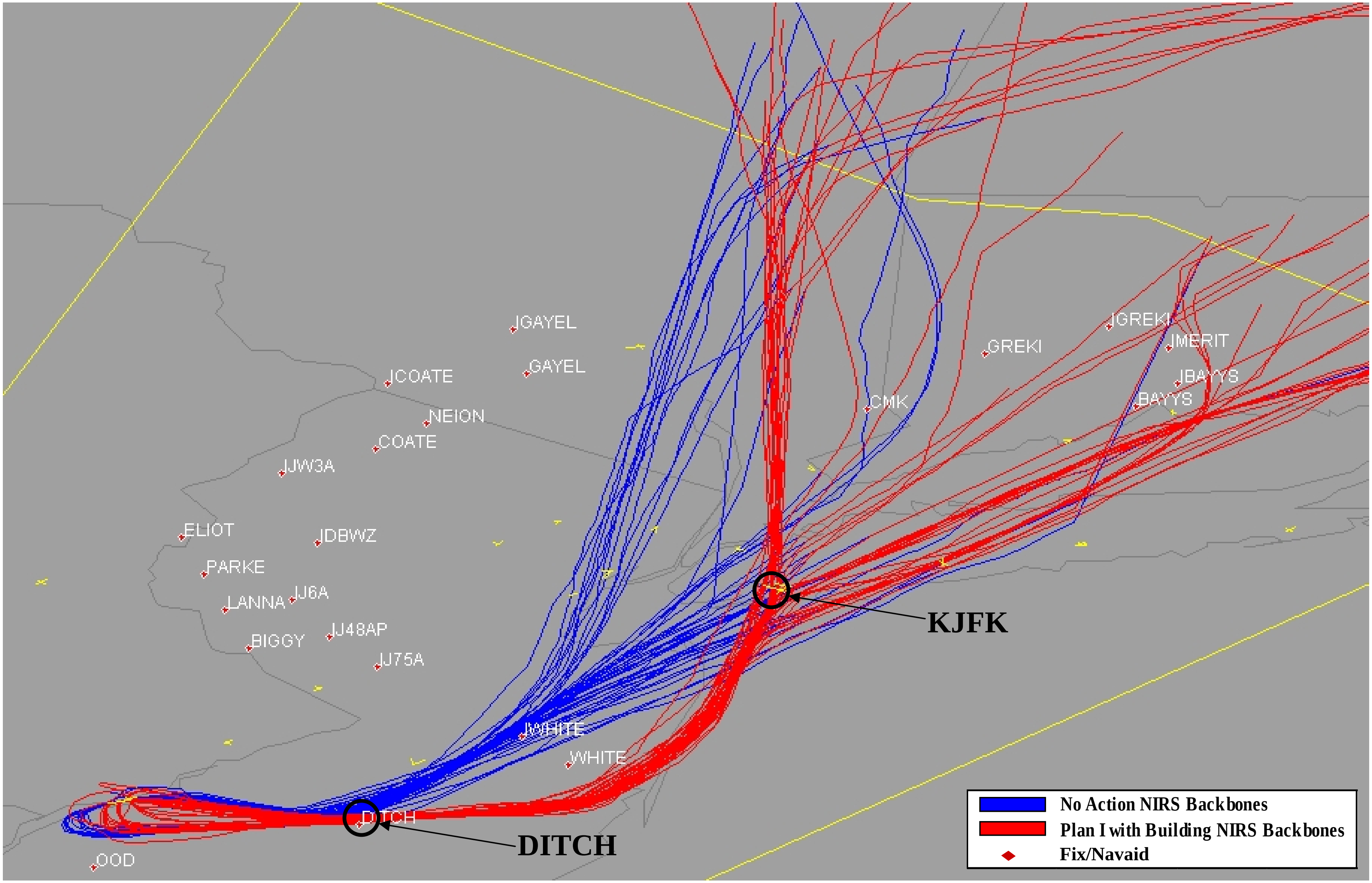
LGA North Arrivals Routes – Plan I with Building vs. No Action



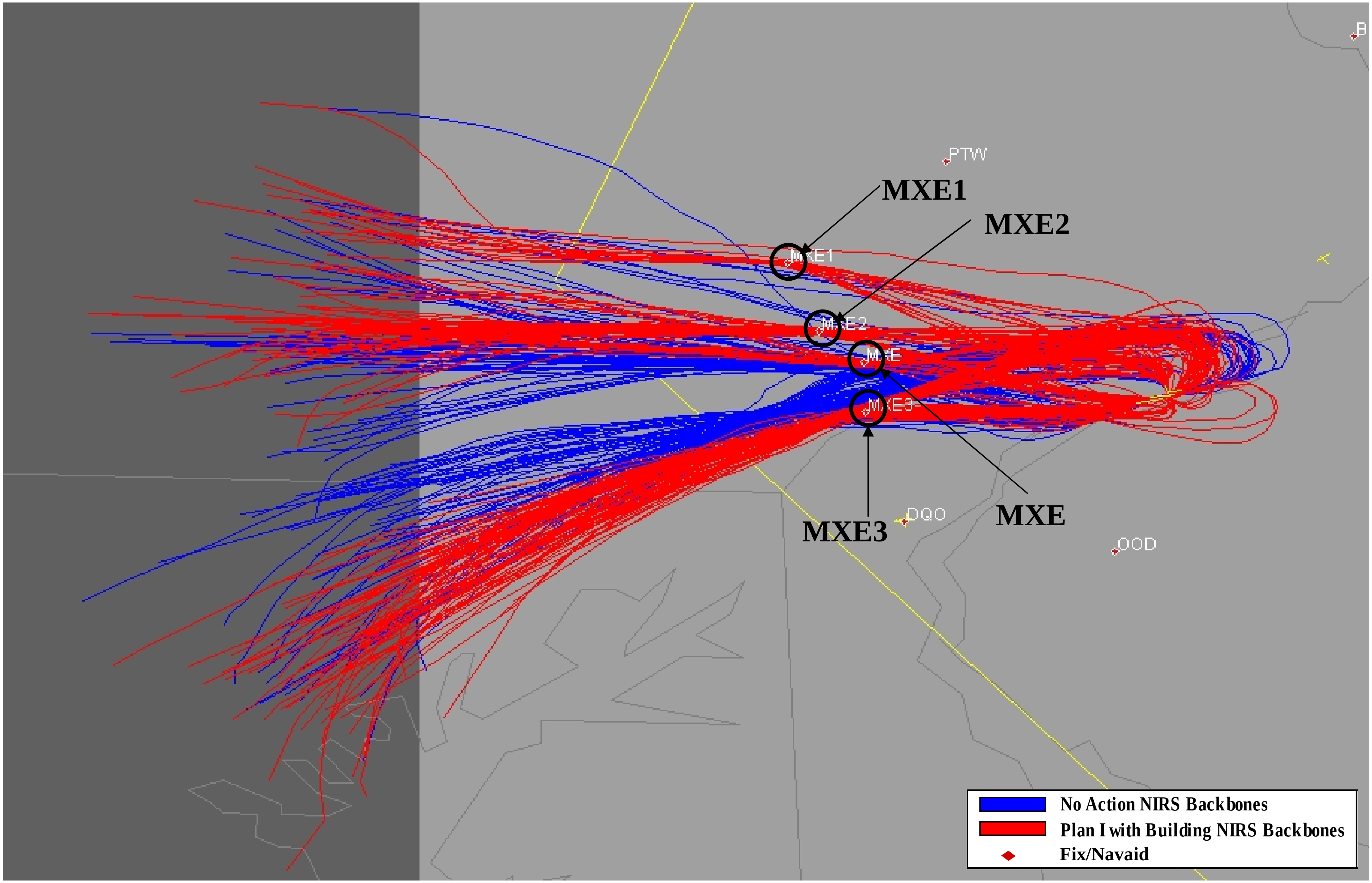
LGA South Arrivals Routes – Plan I with Building vs. No Action



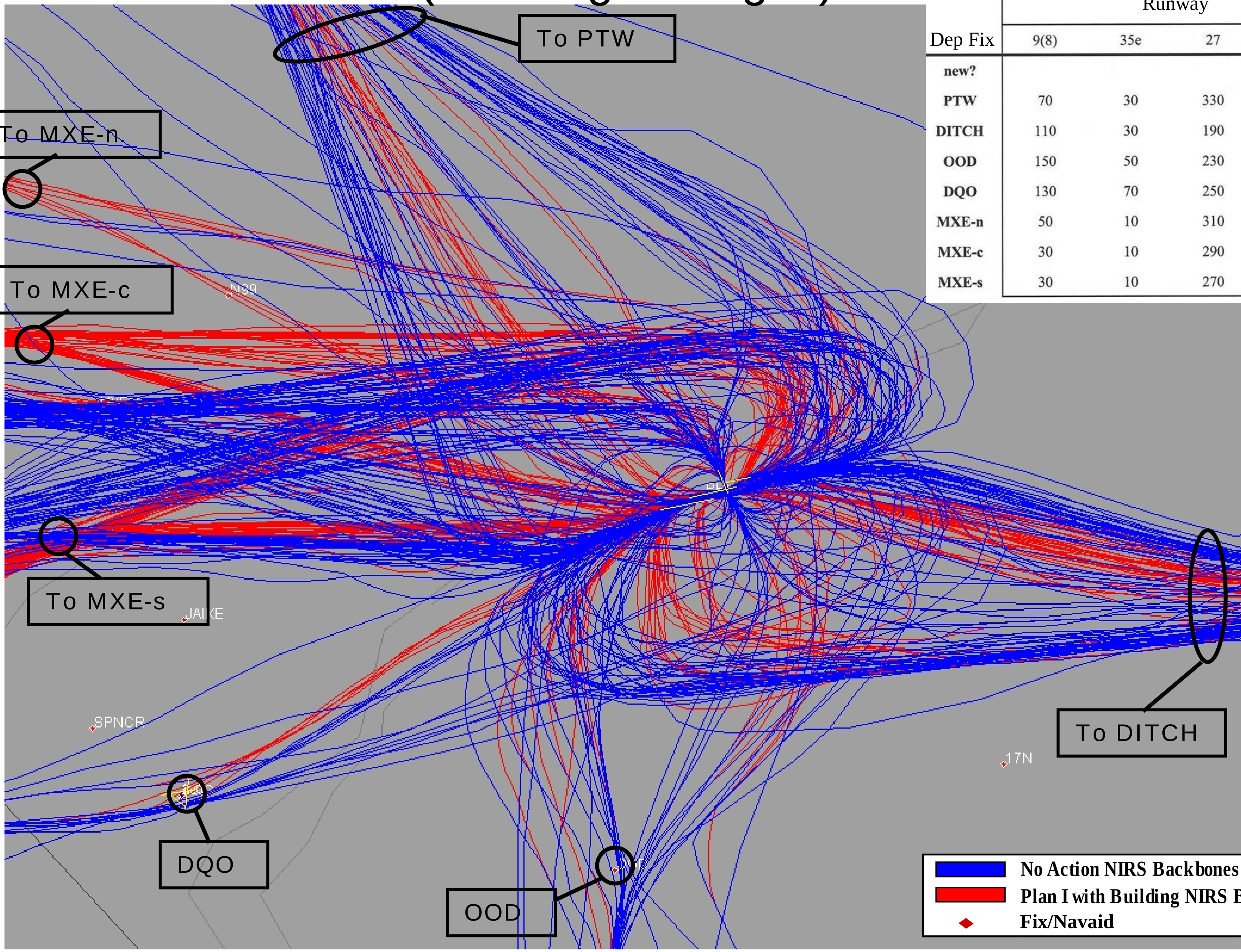
PHL East Departure Routes – Plan I with Building vs. No Action



PHL West Departure Routes – Plan I with Building vs. No Action



PHL Departures – Plan I With Building vs. No Action (Heading Changes)

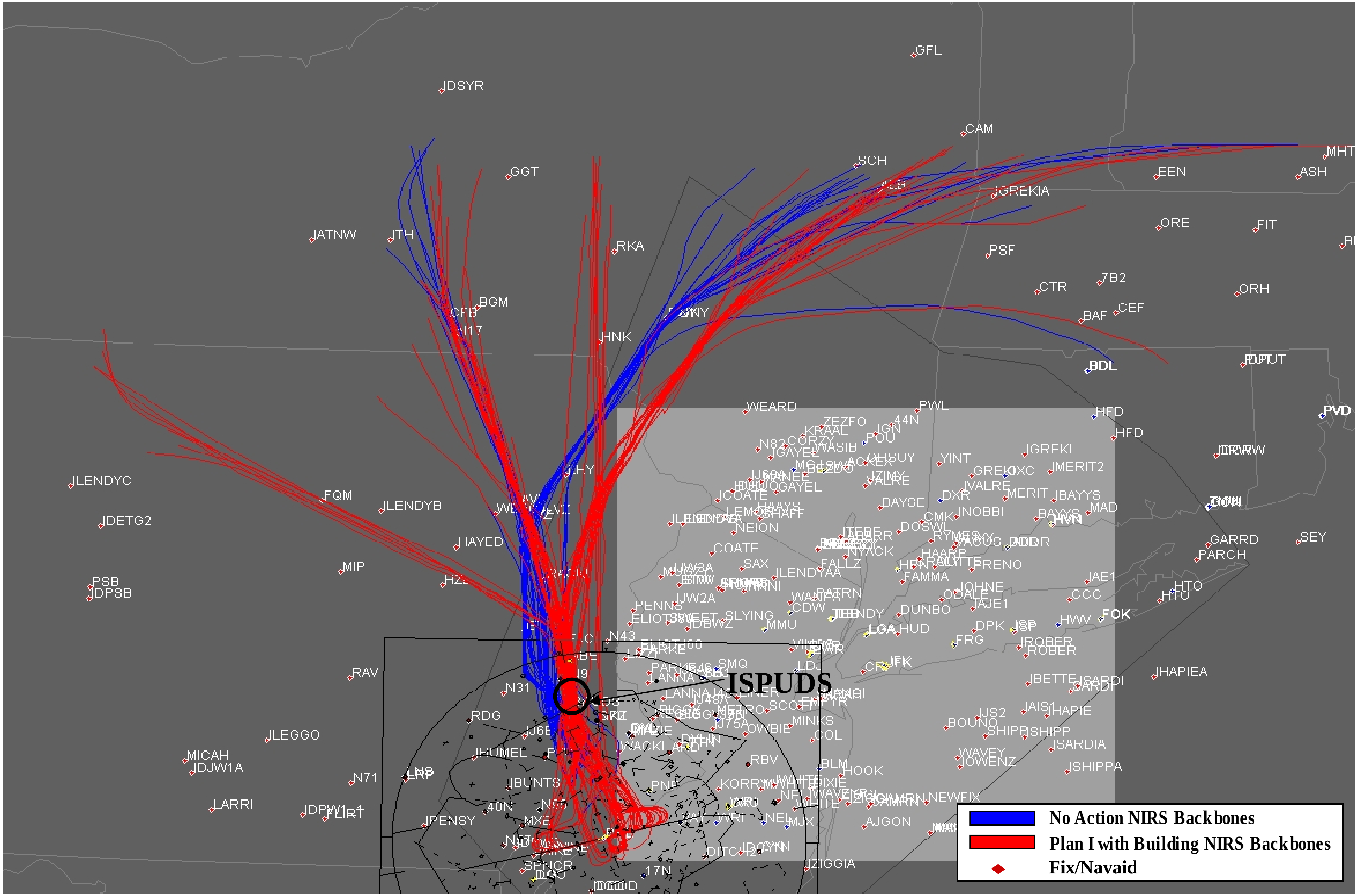


PHL Plan I w/Bldg Headings

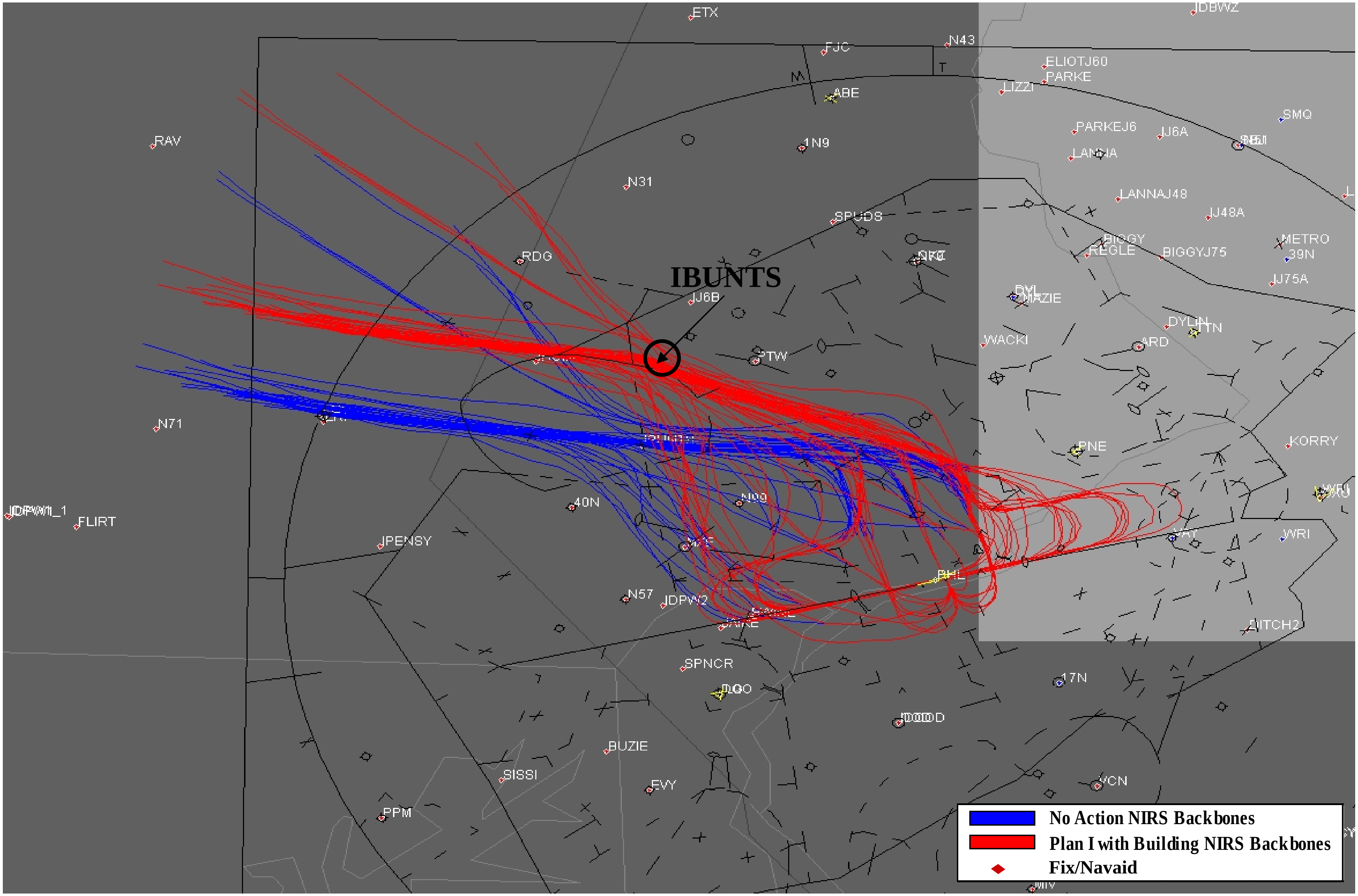
	Runway			
Dep Fix	9(8)	35e	27	35w
new?				
PTW	70	30	330	310
DITCH	110	30	190	290
OOD	150	50	230	290
DQO	130	70	250	290
MXE-n	50	10	310	330
MXE-c	30	10	290	330
MXE-s	30	10	270	330

Appendix E
Attachment C-80

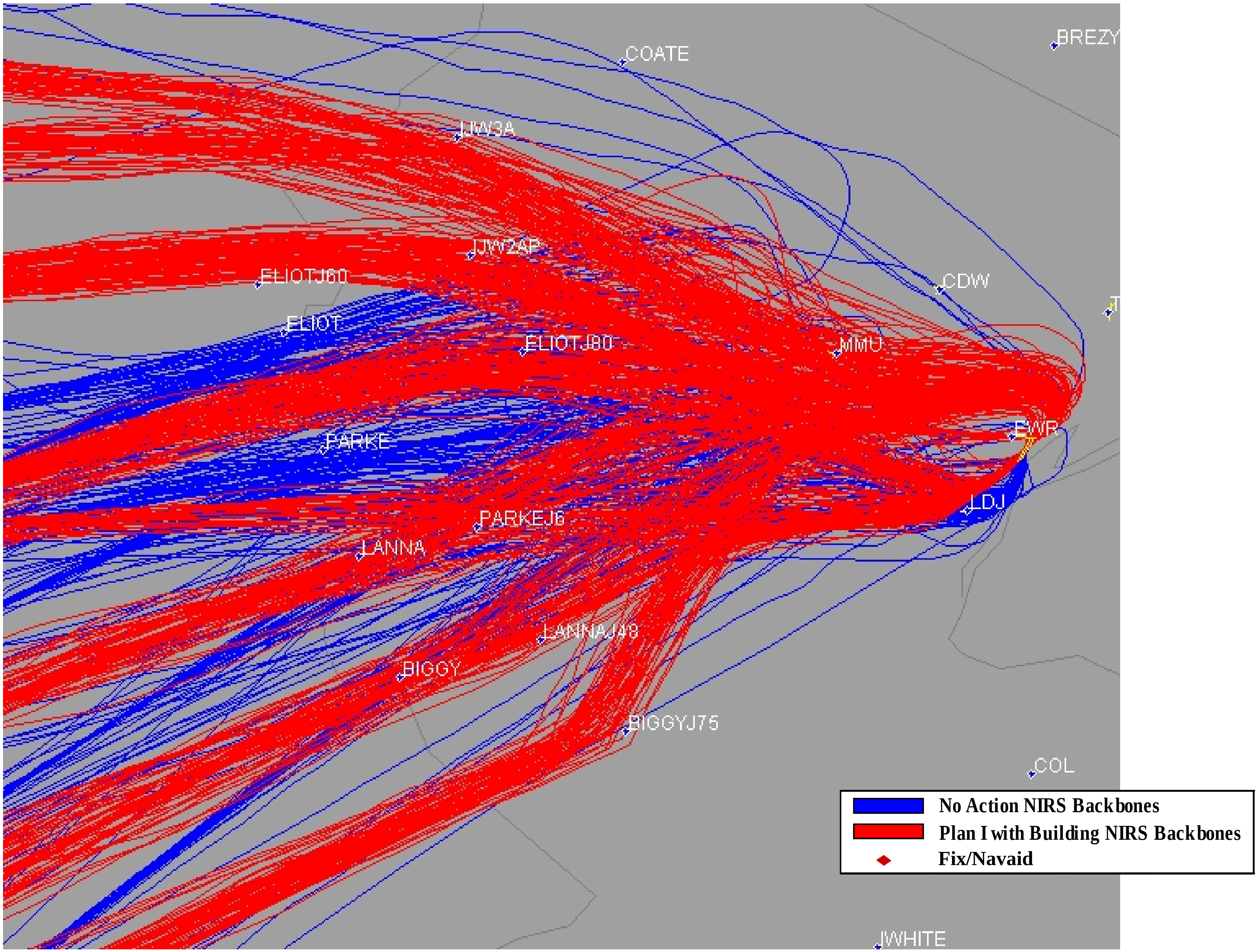
PHL North Arrival Routes – Plan I with Building vs. No Action



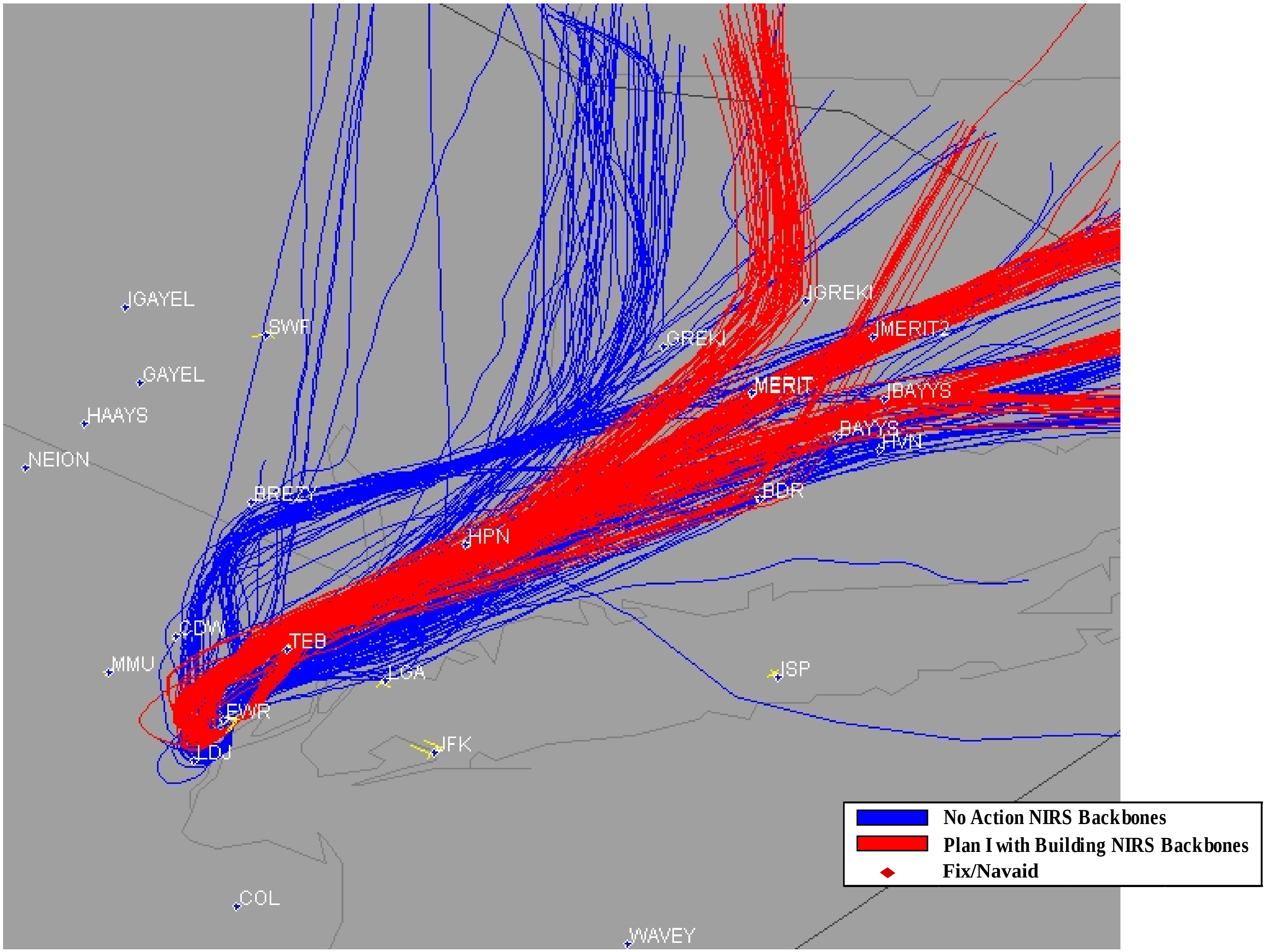
PHL West Arrival Routes – Plan I with Building vs. No Action



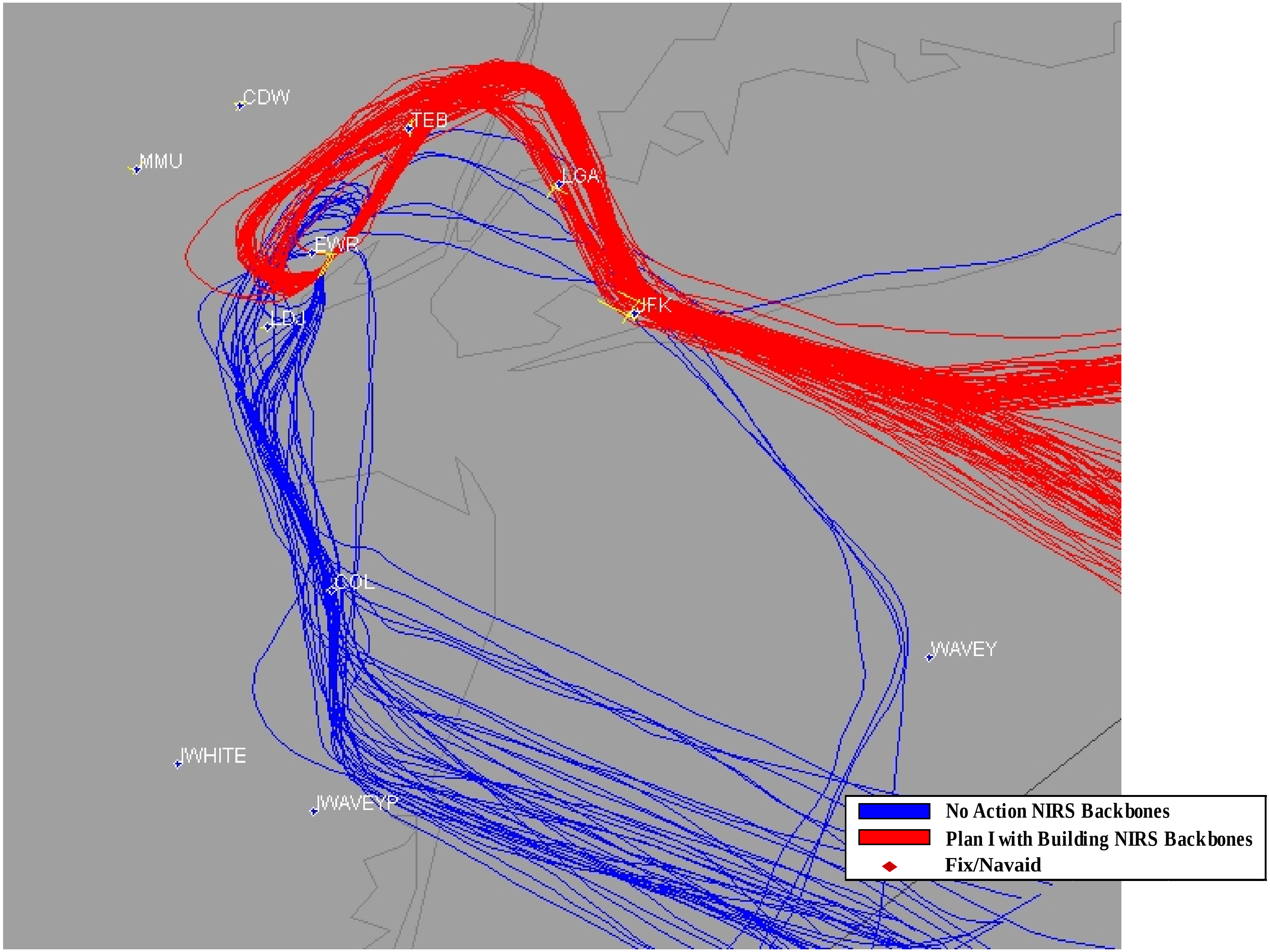
EWR – West Gate Departures – Plan I WB vs No Action



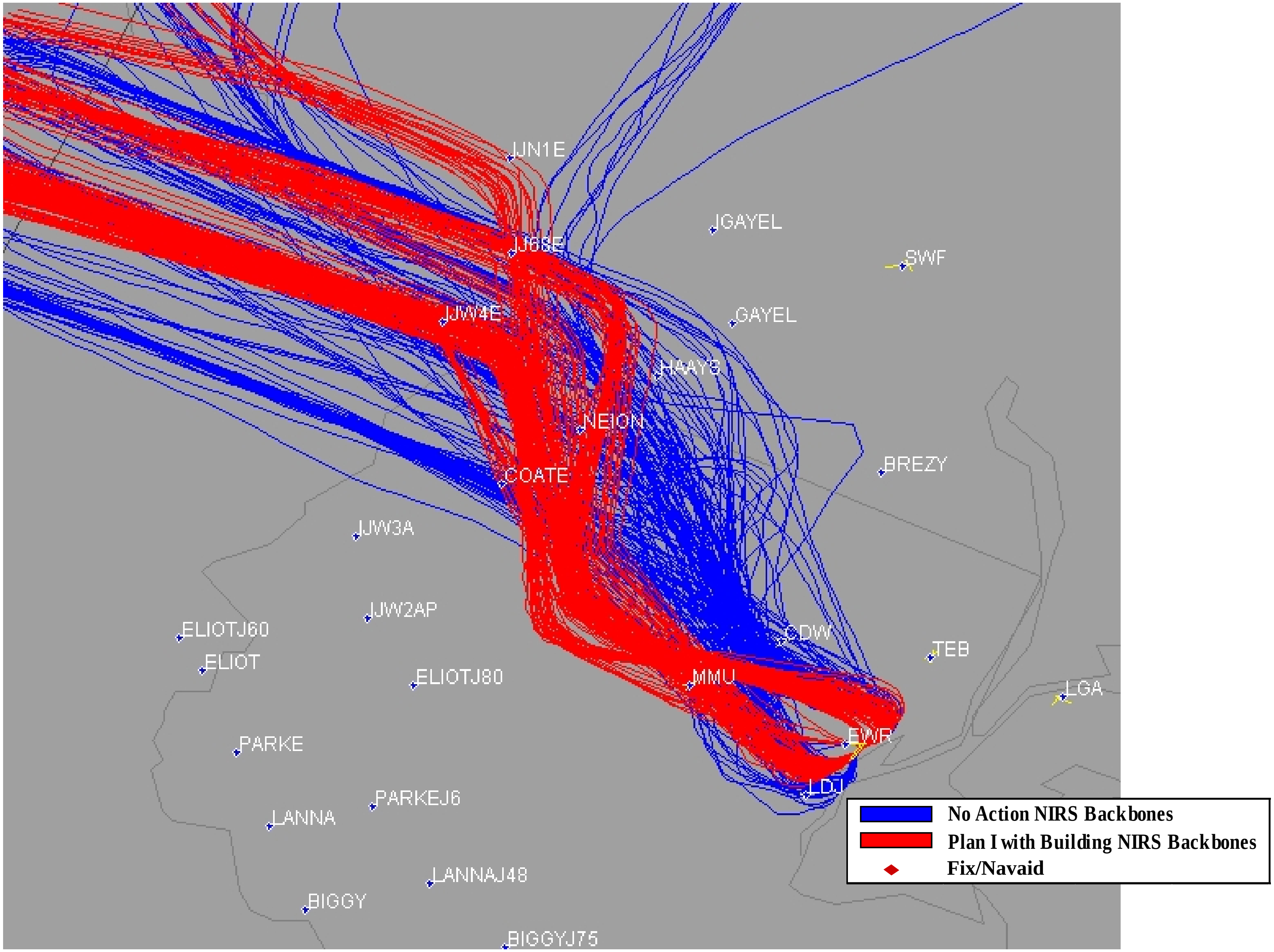
EWR – North East Gate Departures – Plan I WB vs No Action



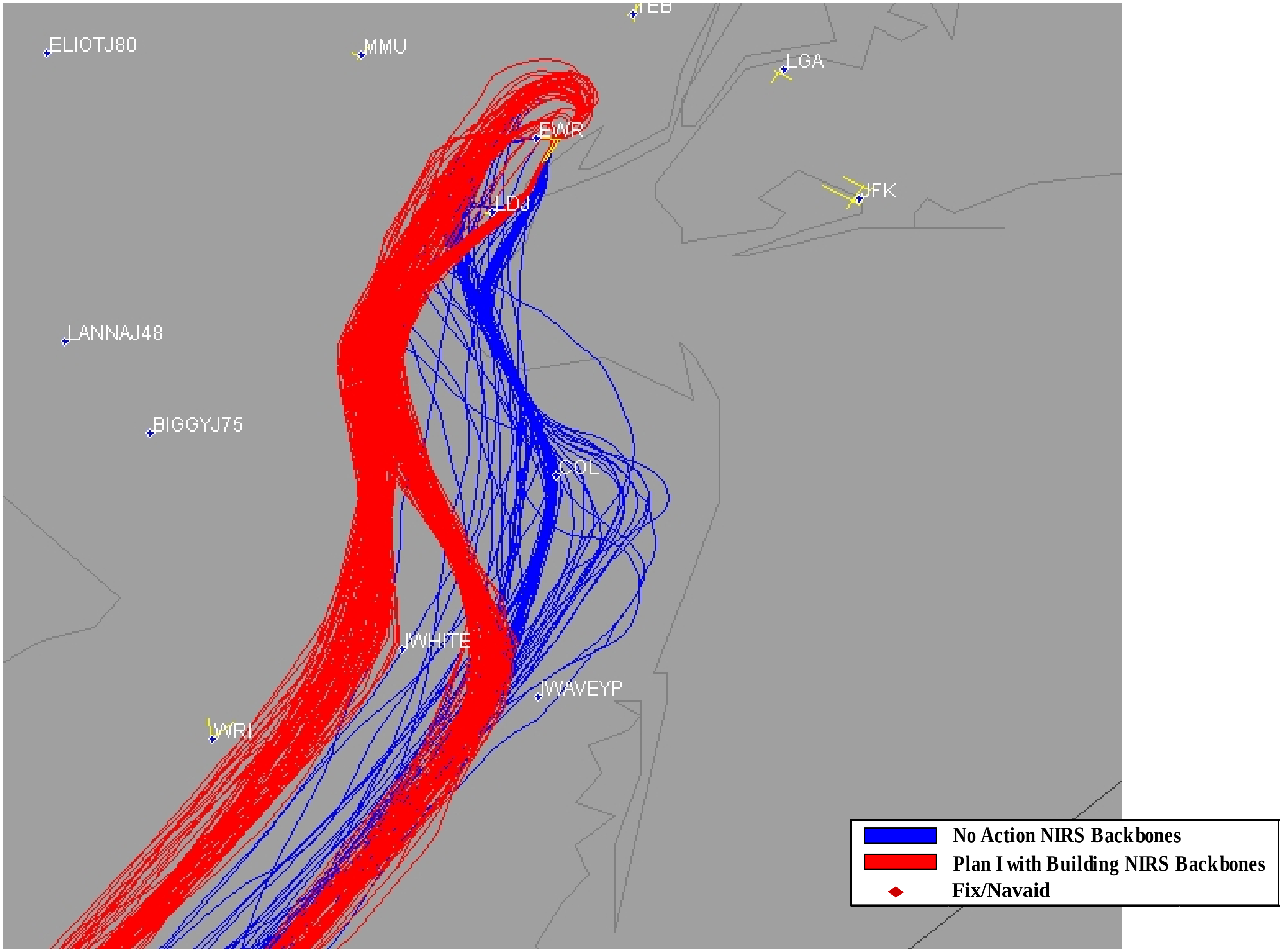
EWR – East Gate Departures – Plan I WB vs No Action



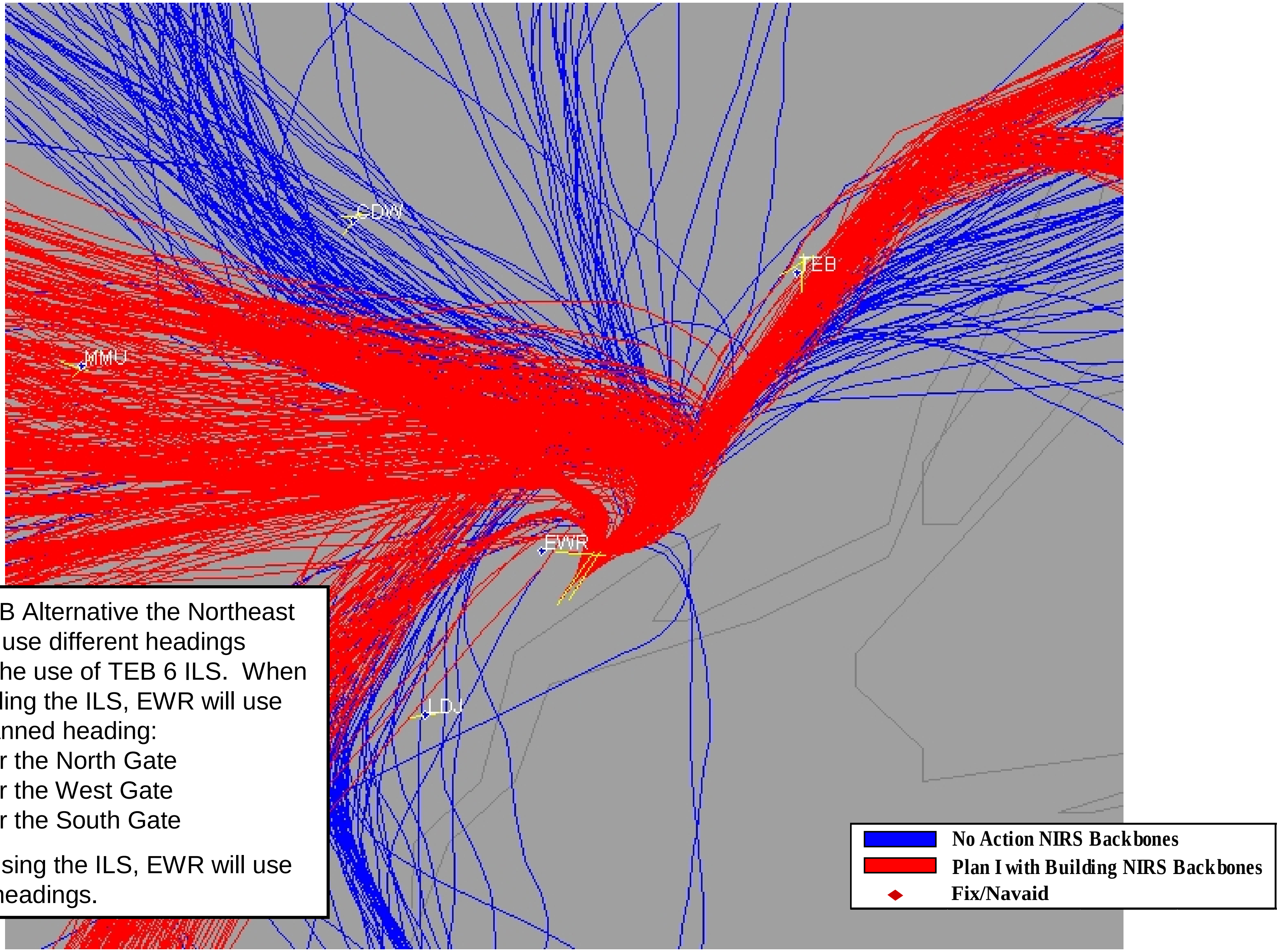
EWR – North West Gate Departures – Plan I WB vs No Action



EWR – South Gate Departures – Plan I WB vs No Action



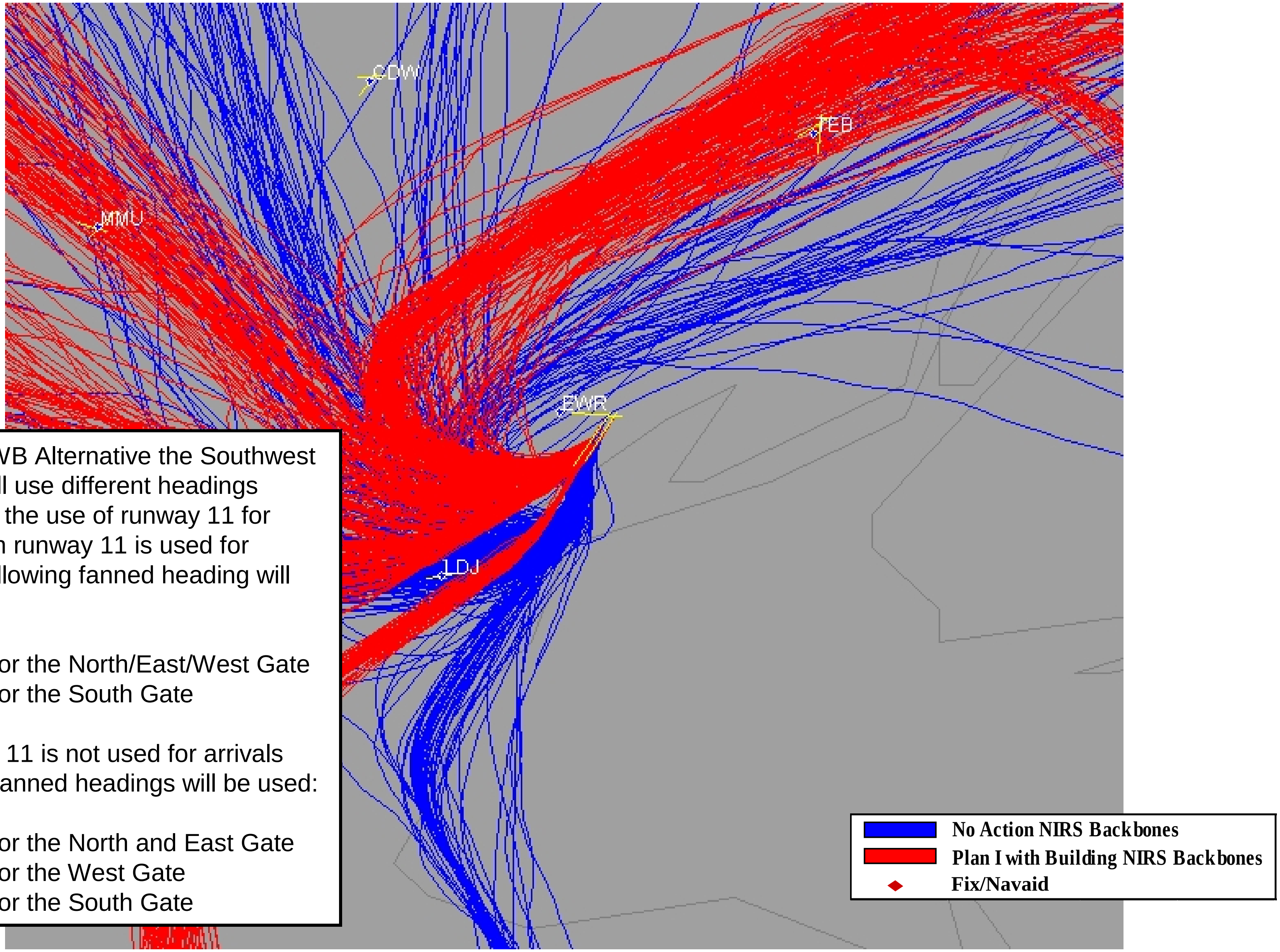
EWR Northeast Fanned Headings – Plan I WB vs. No Action



In the Plan I WB Alternative the Northeast departures will use different headings depending on the use of TEB 6 ILS. When TEB is not landing the ILS, EWR will use the following fanned heading:
330 heading for the North Gate
280 heading for the West Gate
240 heading for the South Gate

When TEB is using the ILS, EWR will use the No Action headings.

EWR Southwest Fanned Headings – Plan I WB vs. No Action



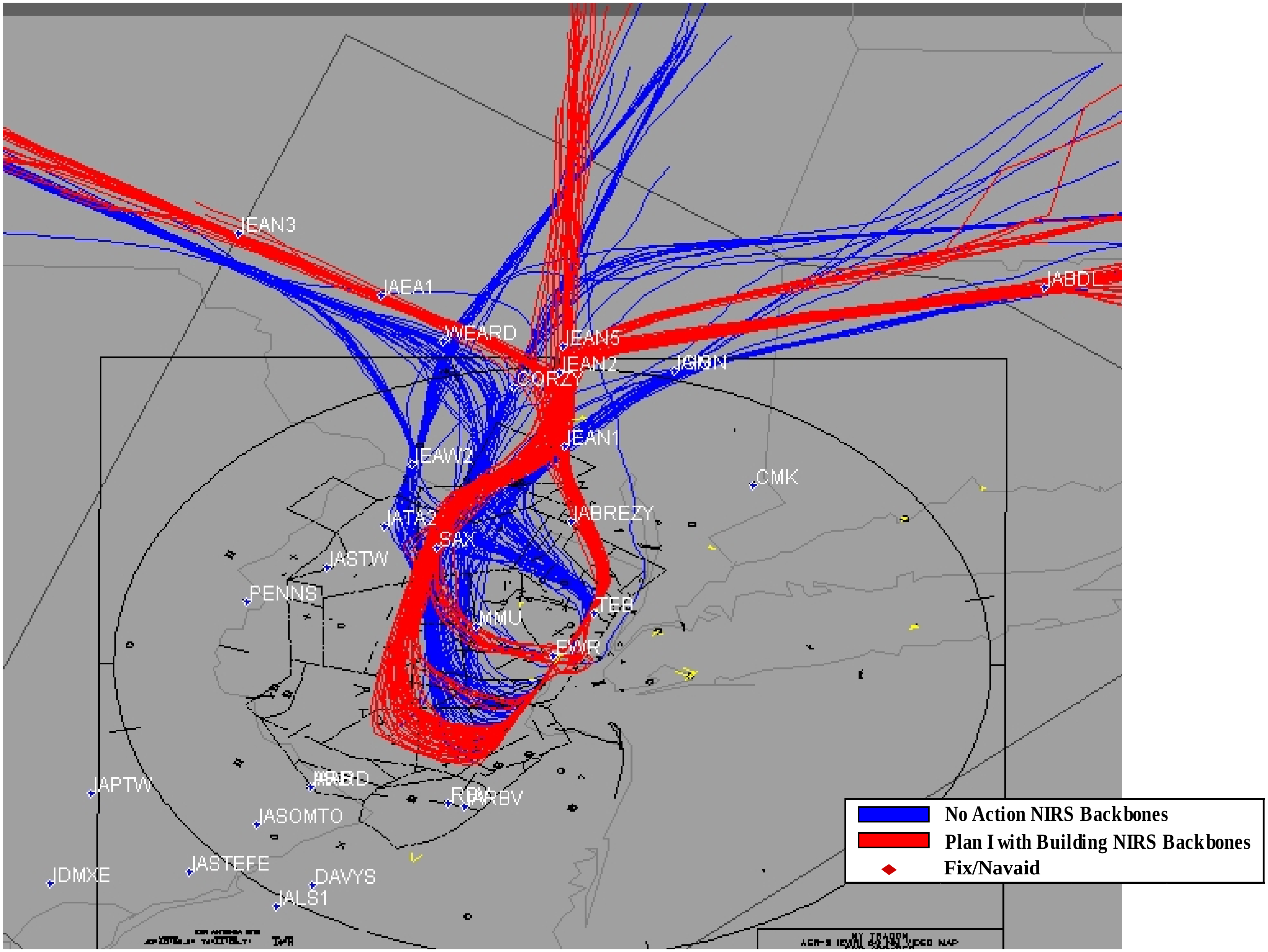
In the Plan I WB Alternative the Southwest departures will use different headings depending on the use of runway 11 for arrivals. When runway 11 is used for arrivals the following fanned heading will be used:

240 heading for the North/East/West Gate
220 heading for the South Gate

When runway 11 is not used for arrivals the following fanned headings will be used:

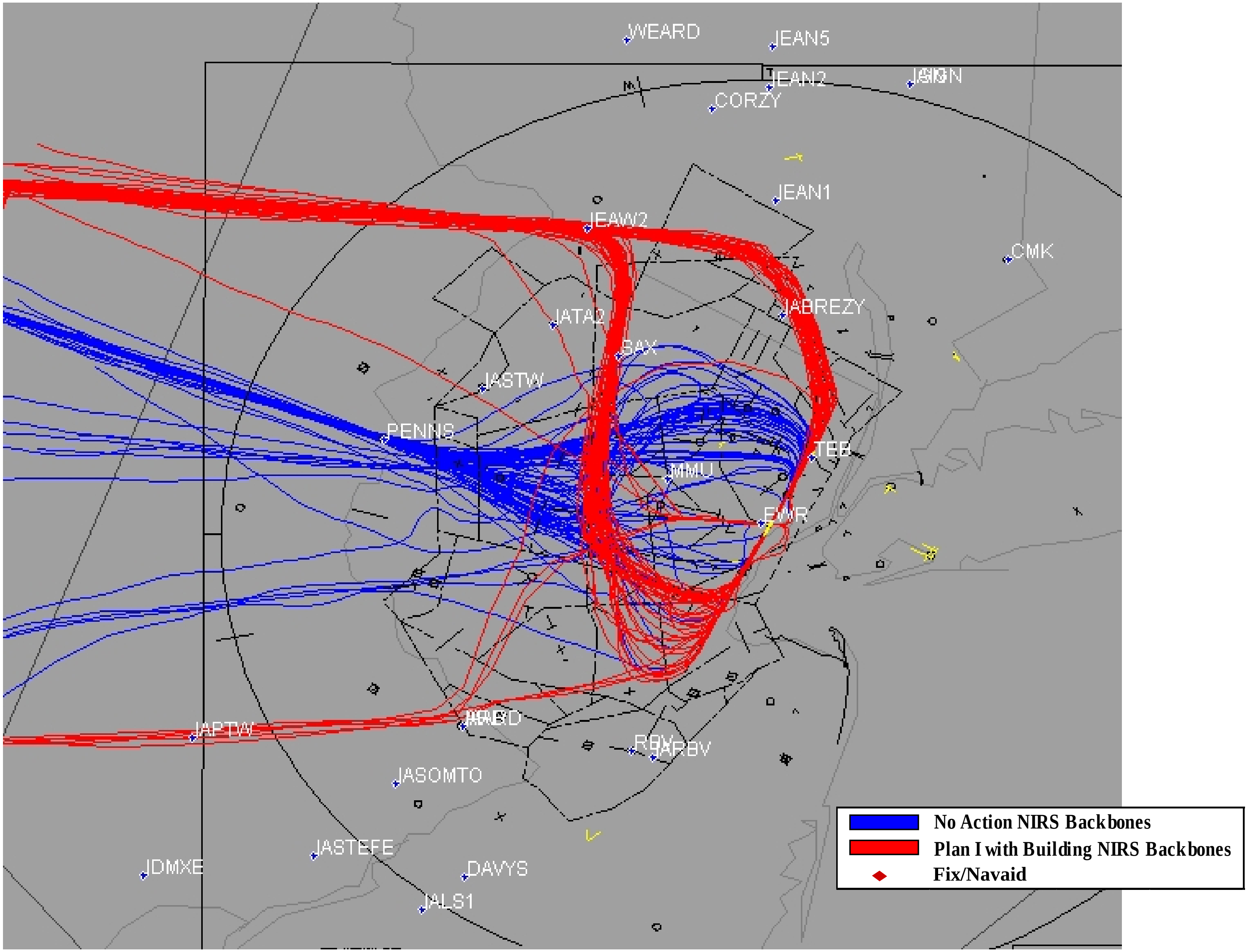
260 heading for the North and East Gate
240 heading for the West Gate
220 heading for the South Gate

EWR – North Gate Arrivals – Plan I WB vs No Action

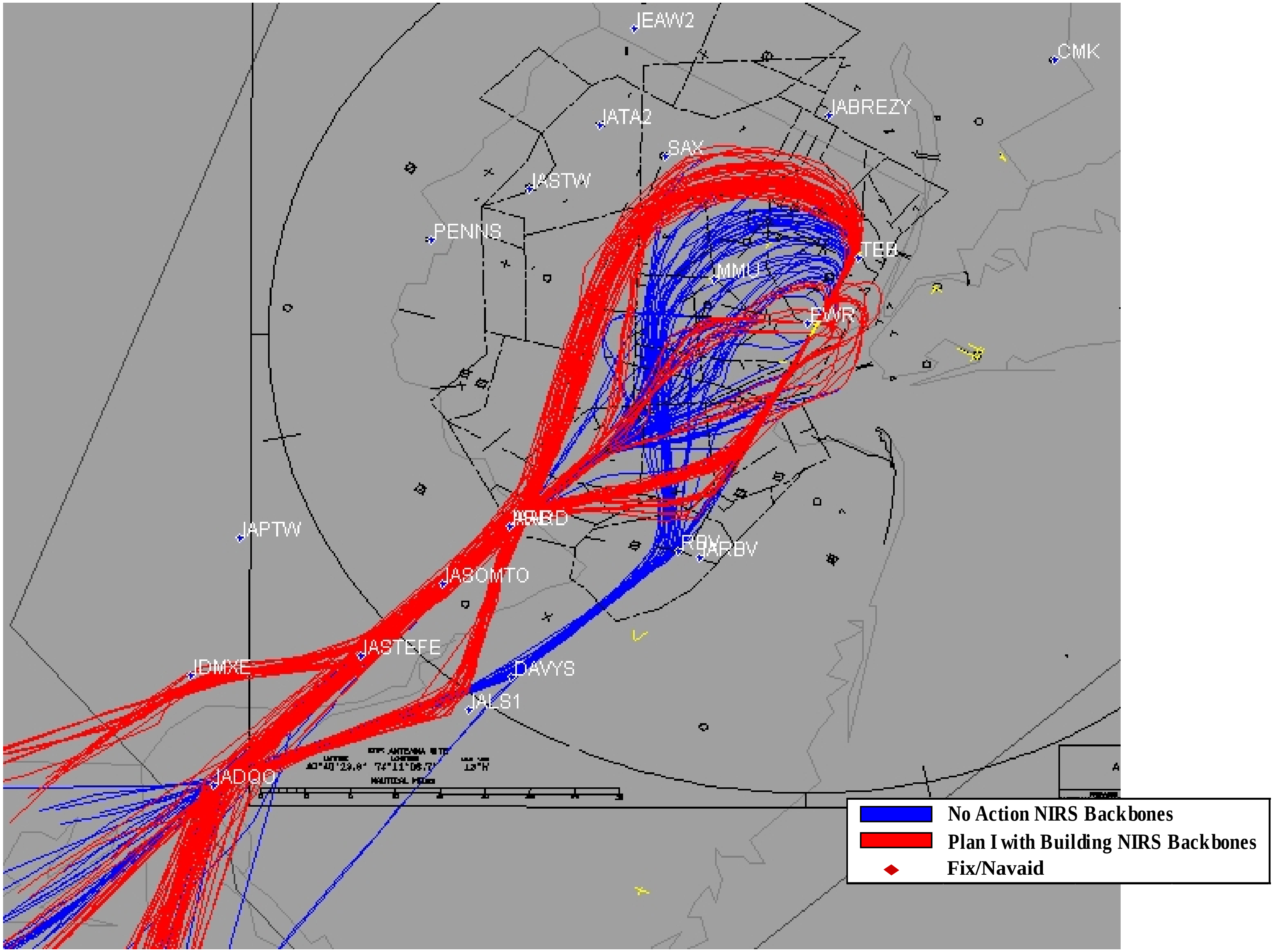


Appendix E
Attachment C-90

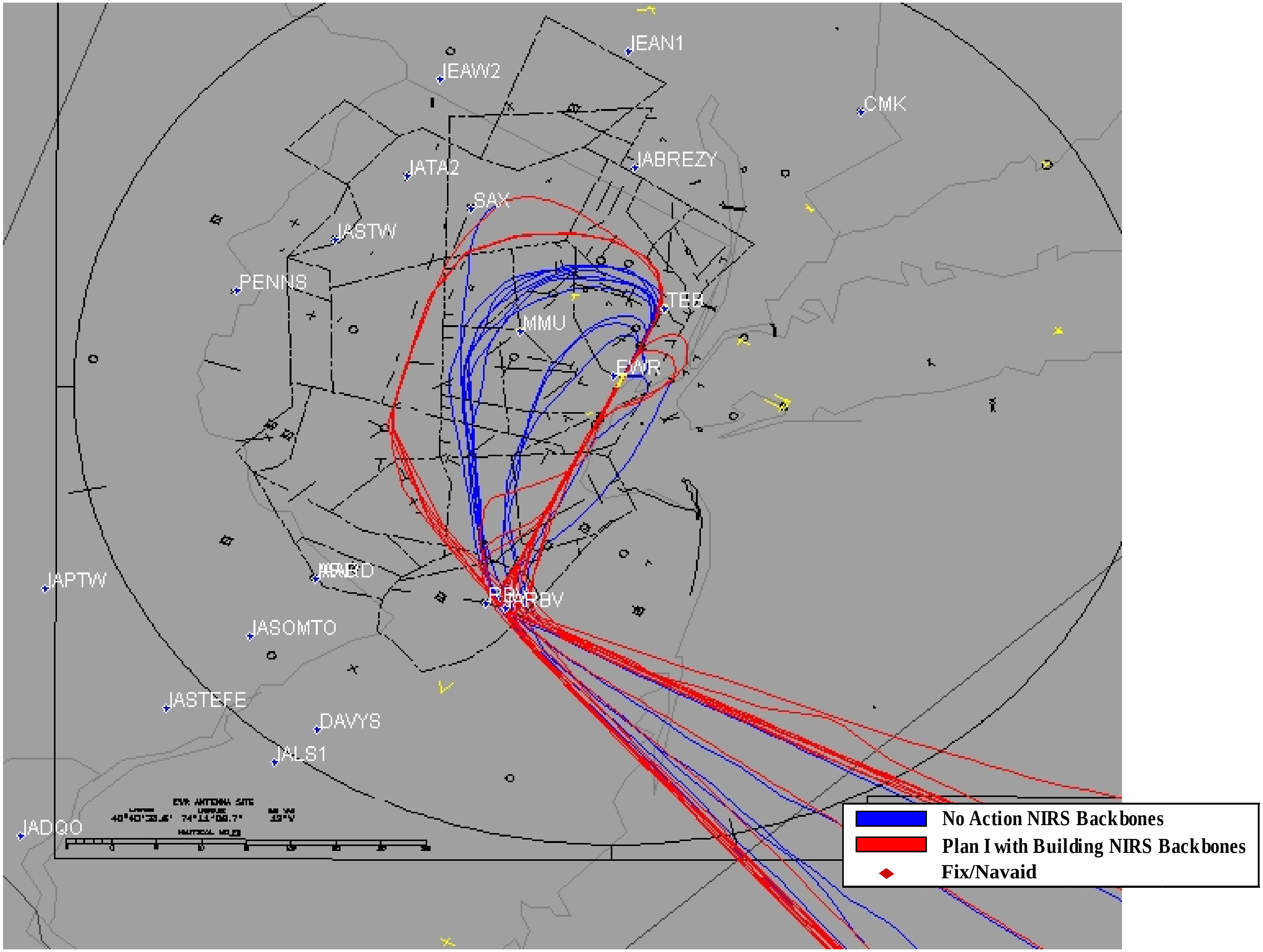
EWR – West Gate Arrivals – Plan I WB vs No Action



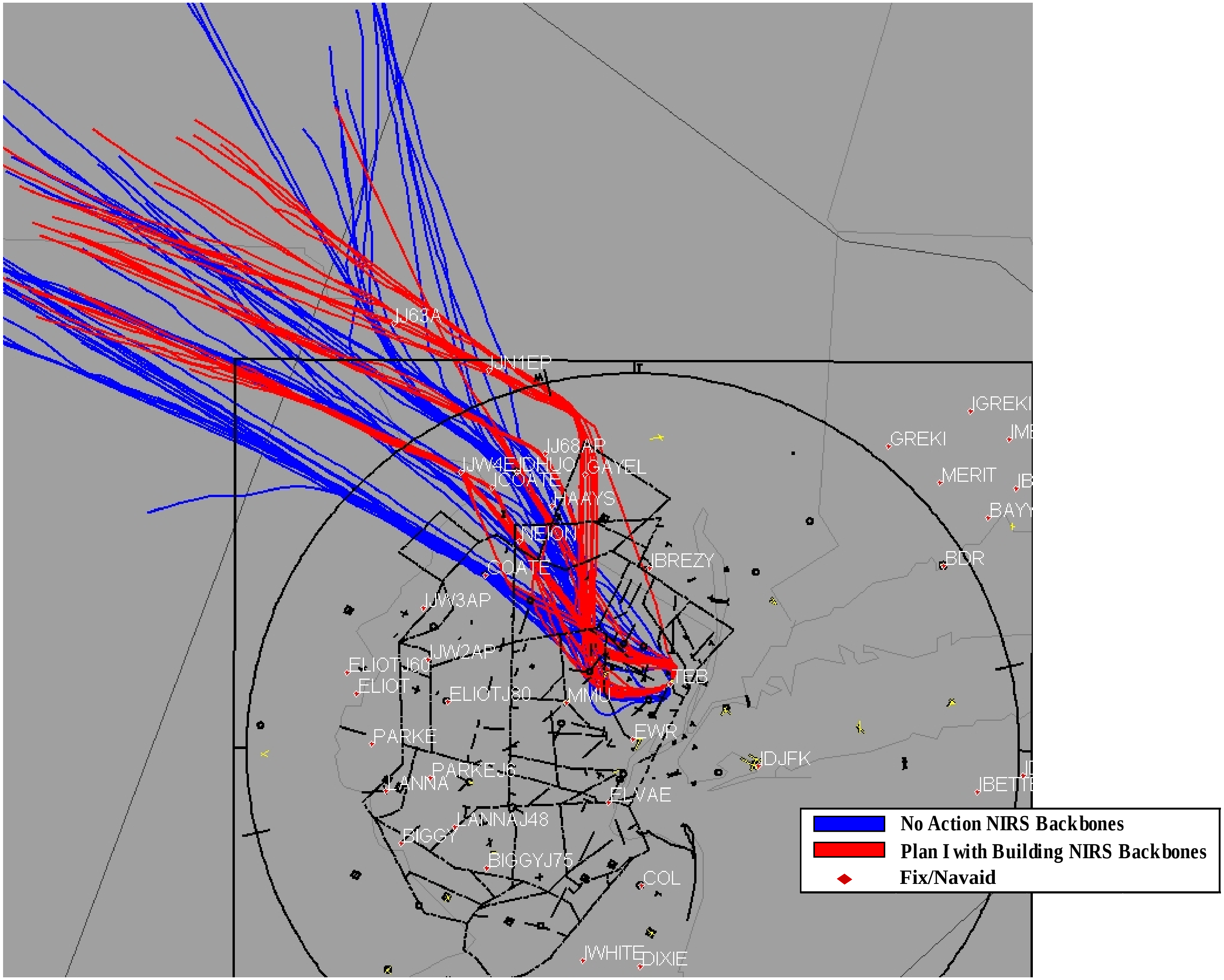
EWR – SW Gate Arrivals – Plan I WB vs No Action



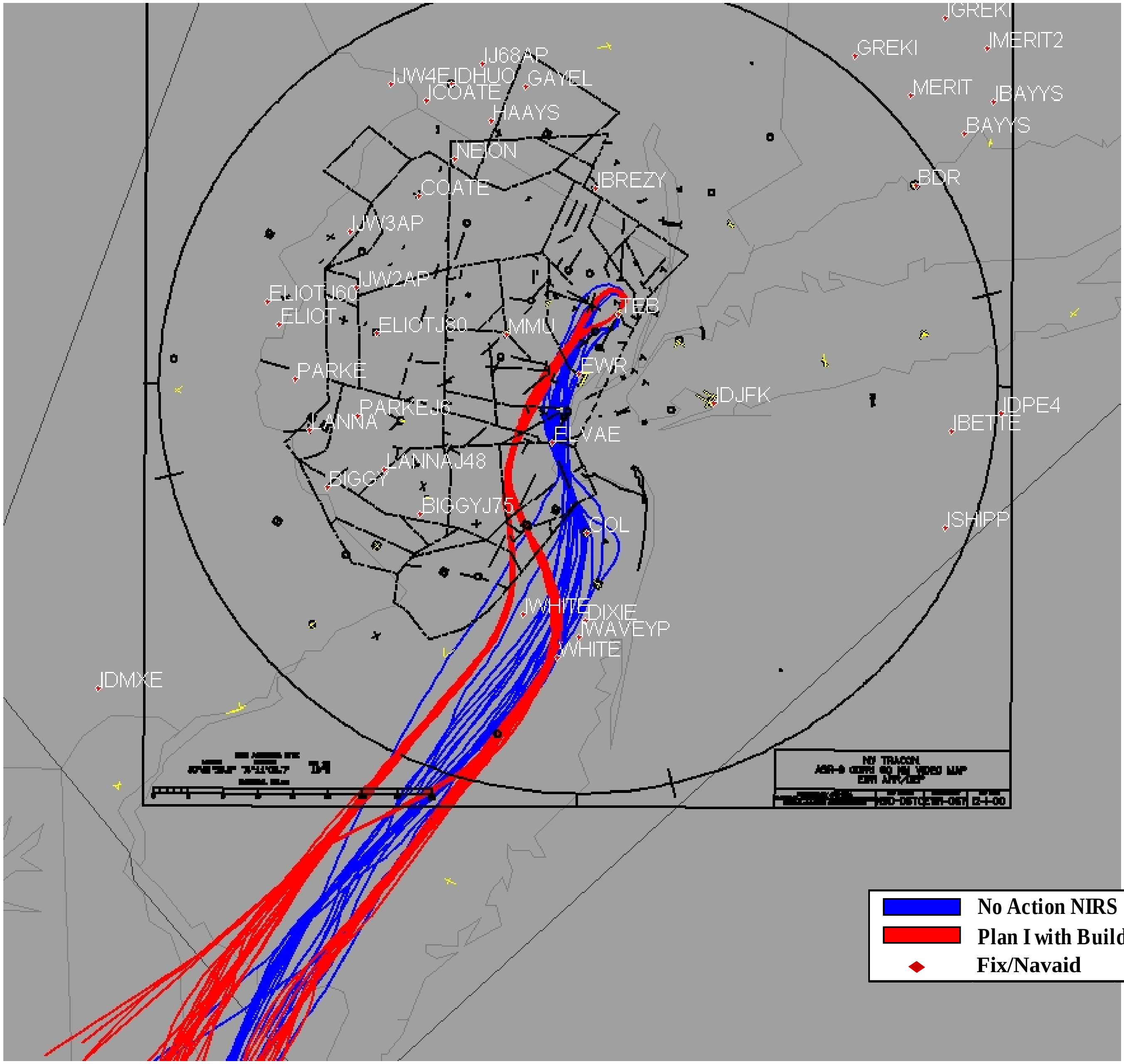
EWR – SW Gate Arrivals – Plan I WB vs No Action



TEB – North Gate Departures – Plan I WB vs No Action

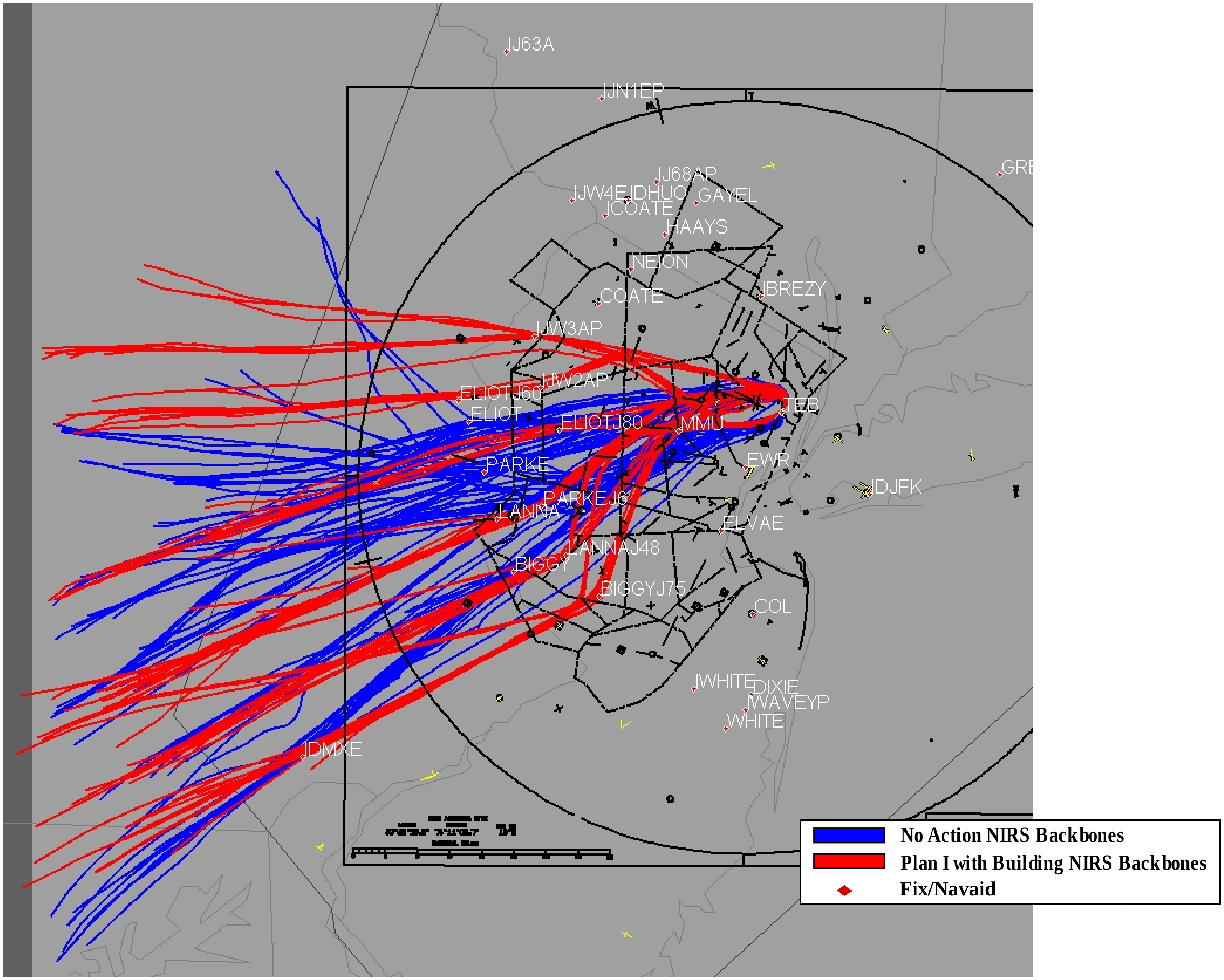


TEB – South Gate Departures – Plan I WB vs No Action

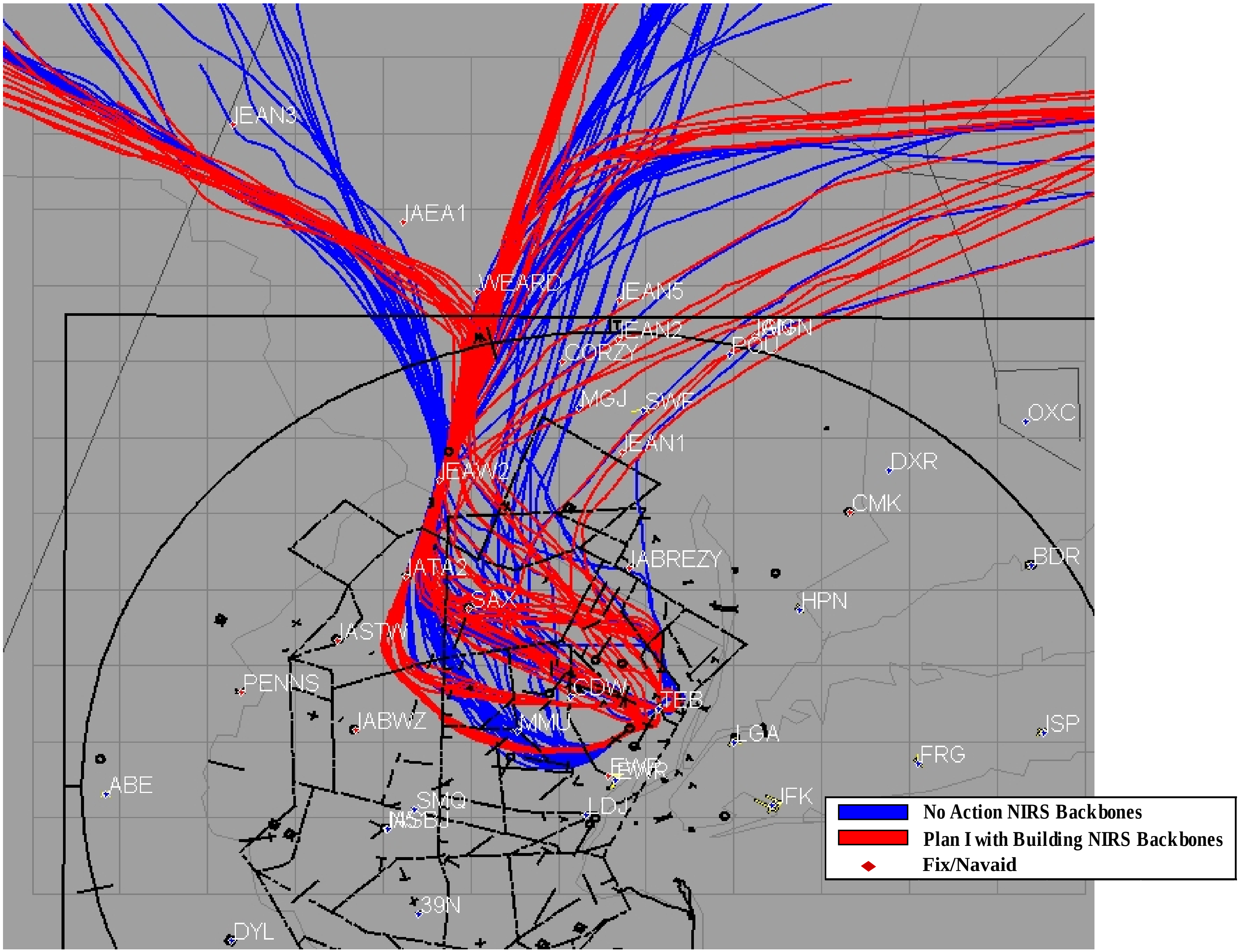


(blue)	No Action NIRS Backbones
(red)	Plan I with Building NIRS Backbones
◆	Fix/Navaid

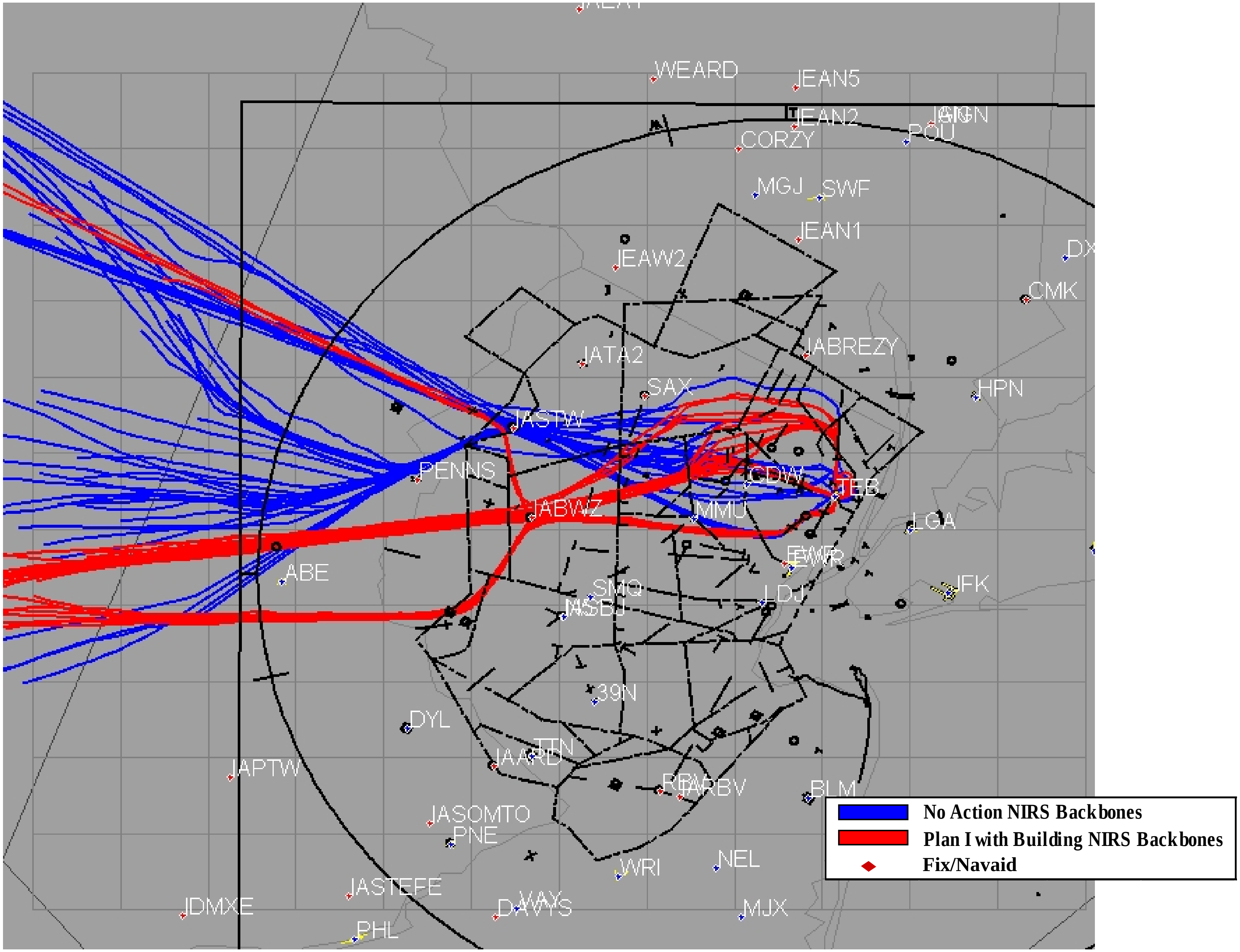
TEB – West Gate Departures – Plan I WB vs No Action



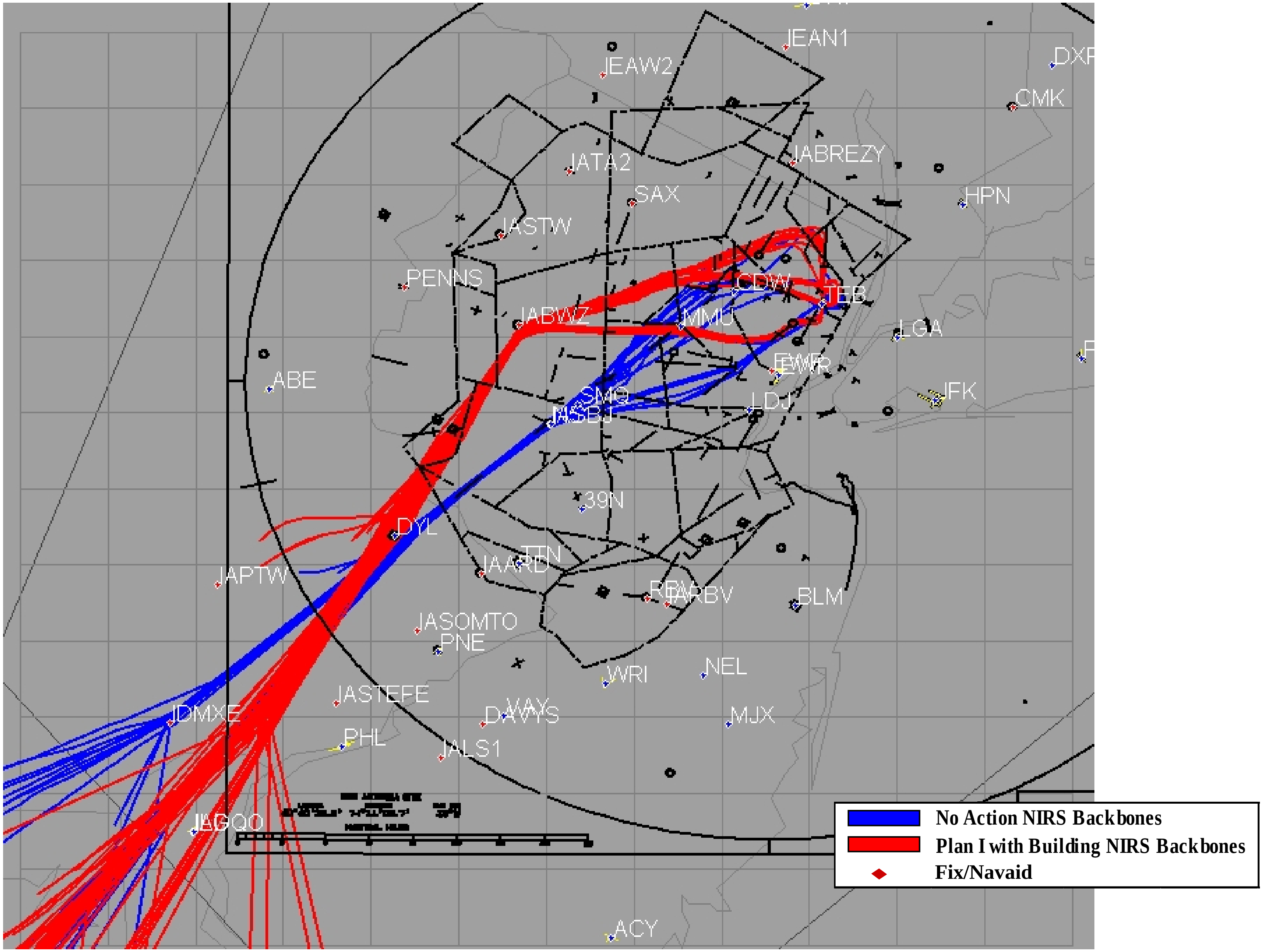
TEB – North Arrivals – Plan I WB vs No Action



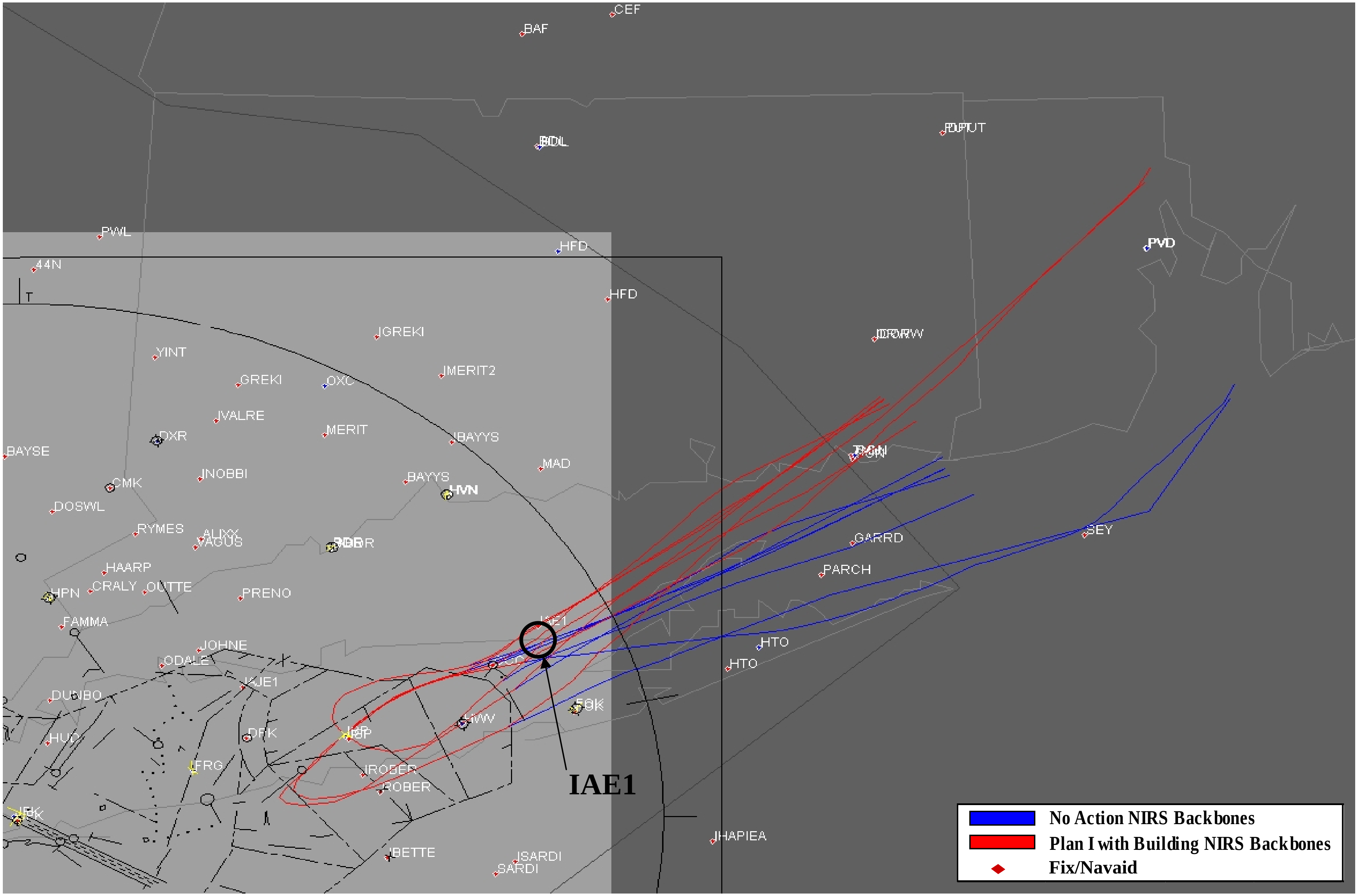
TEB – West Arrivals – Plan I WB vs No Action



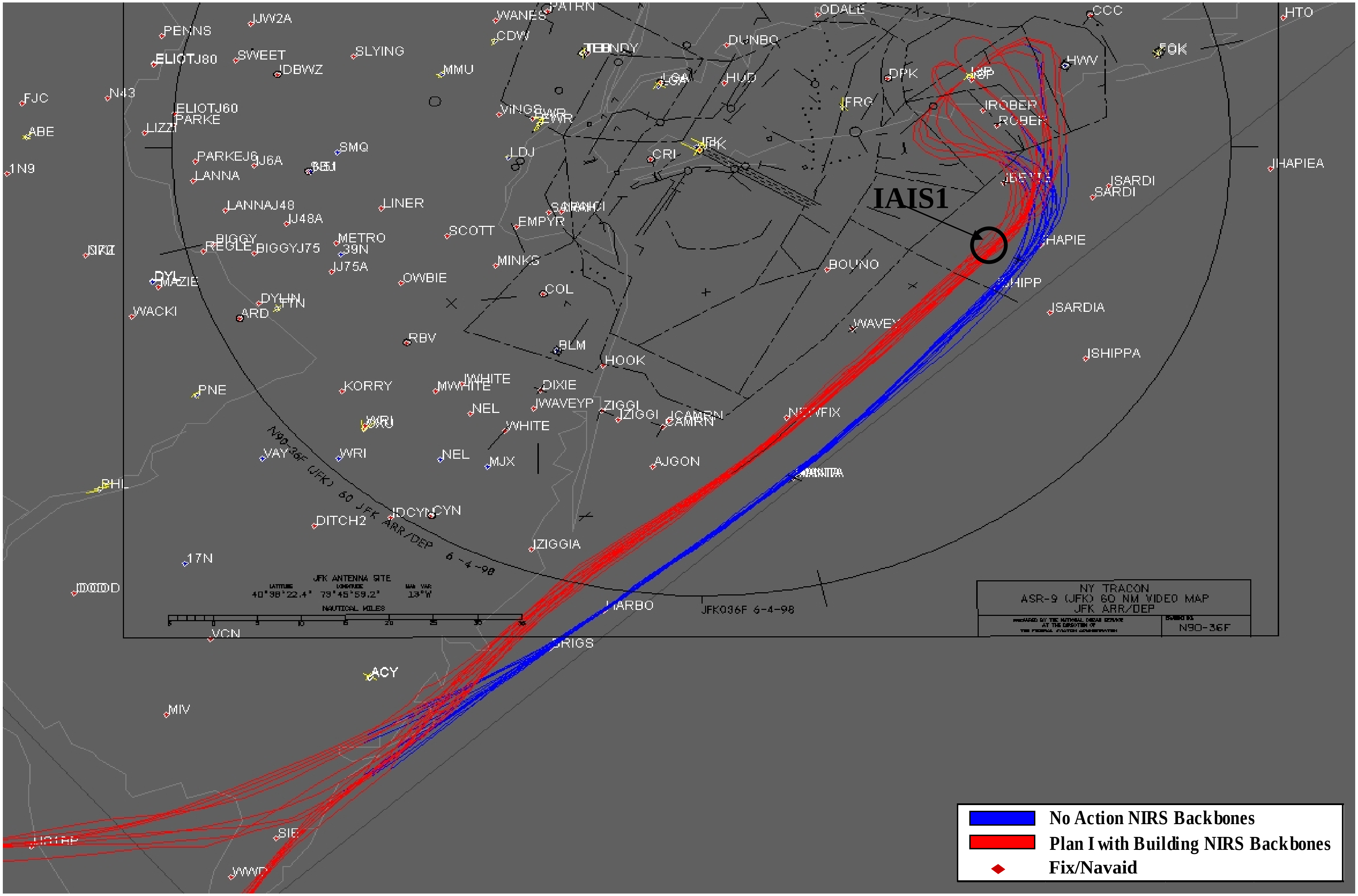
TEB – SouthWest
Arrivals – Plan I WB vs No Action



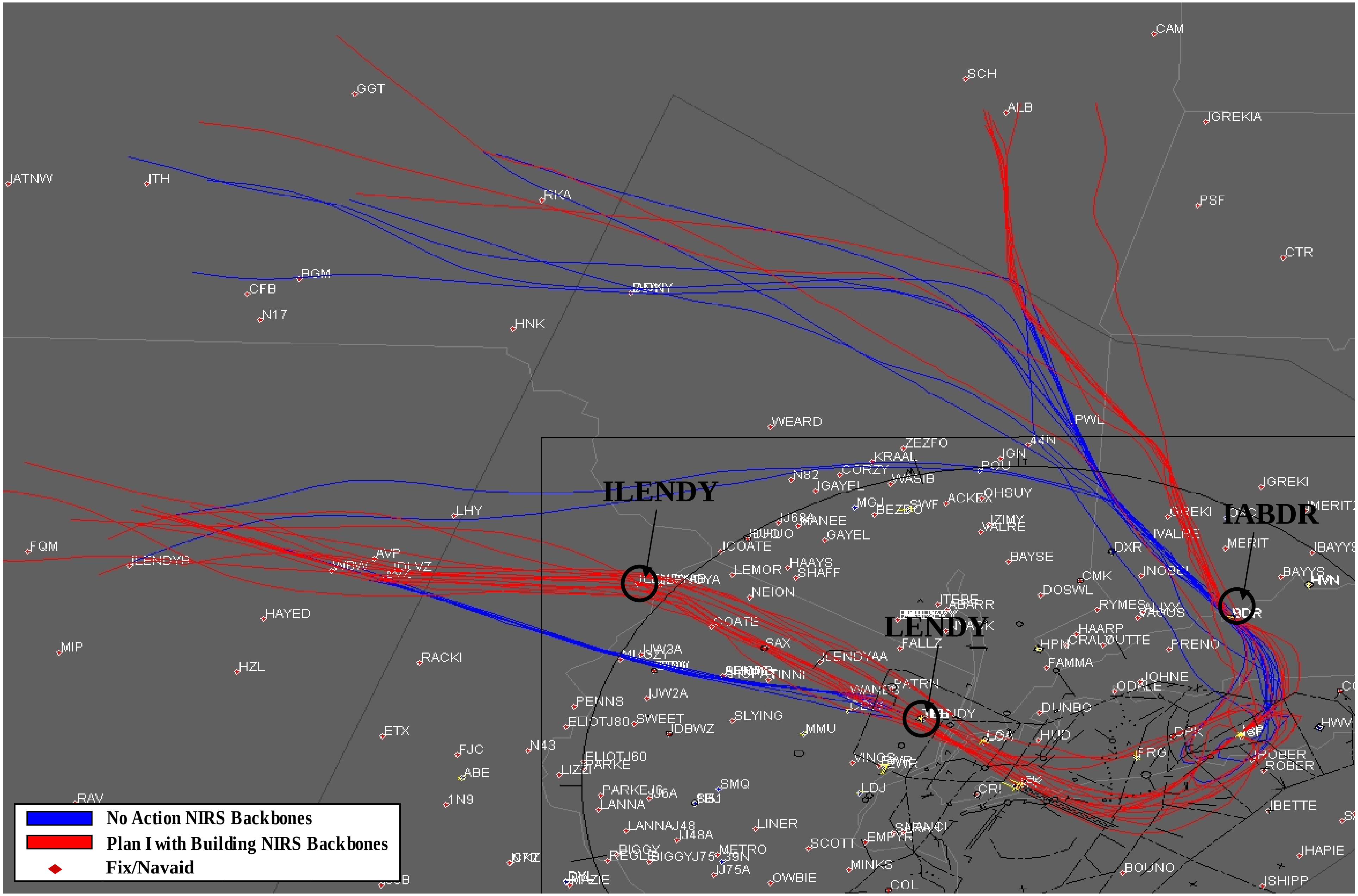
ISP North Arrival Routes – Plan I with Building vs. No Action



ISP South Arrival Routes – Plan I with Building vs. No Action

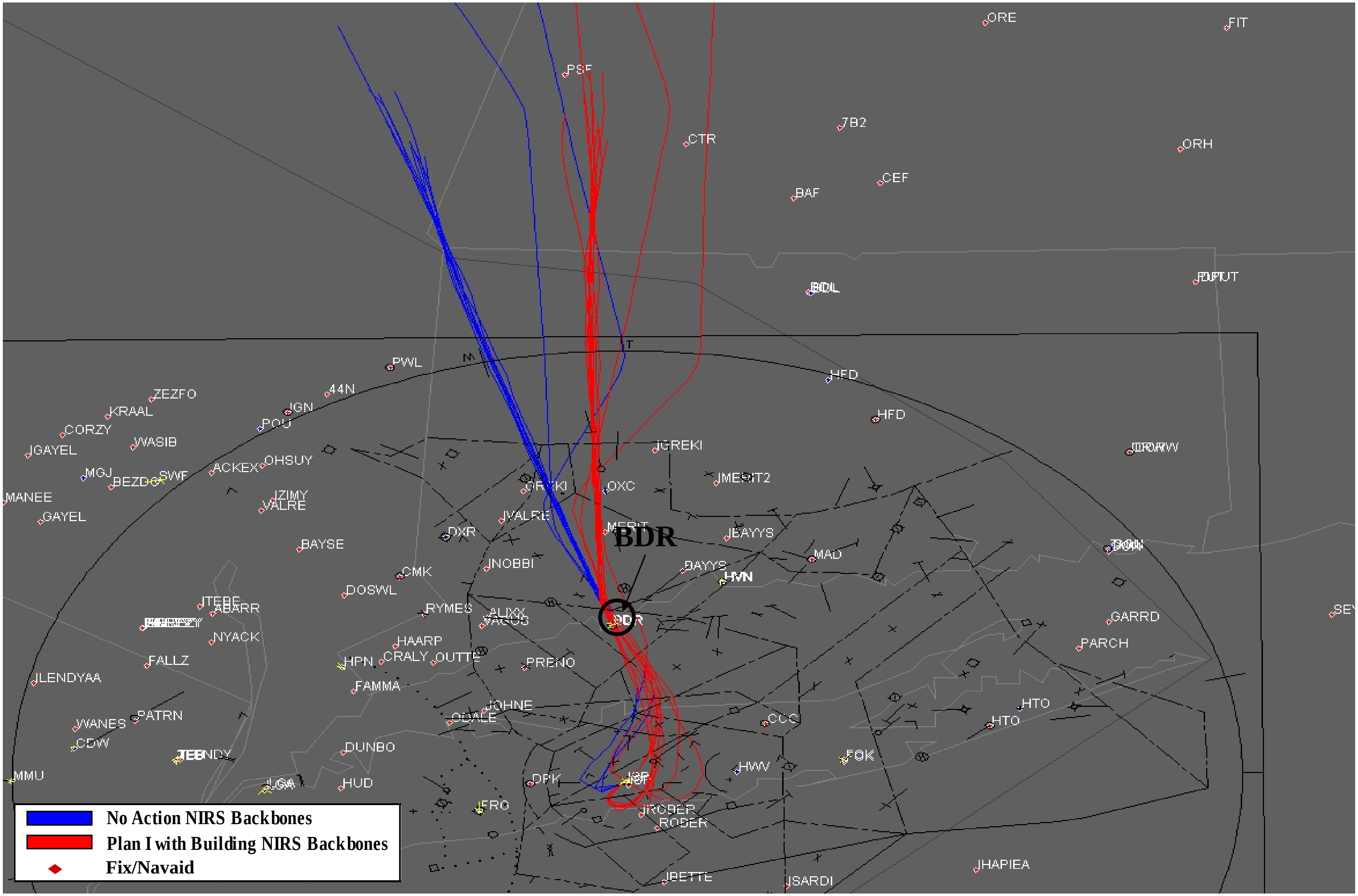


ISP North Arrival Routes – Plan I with Building vs. No Action

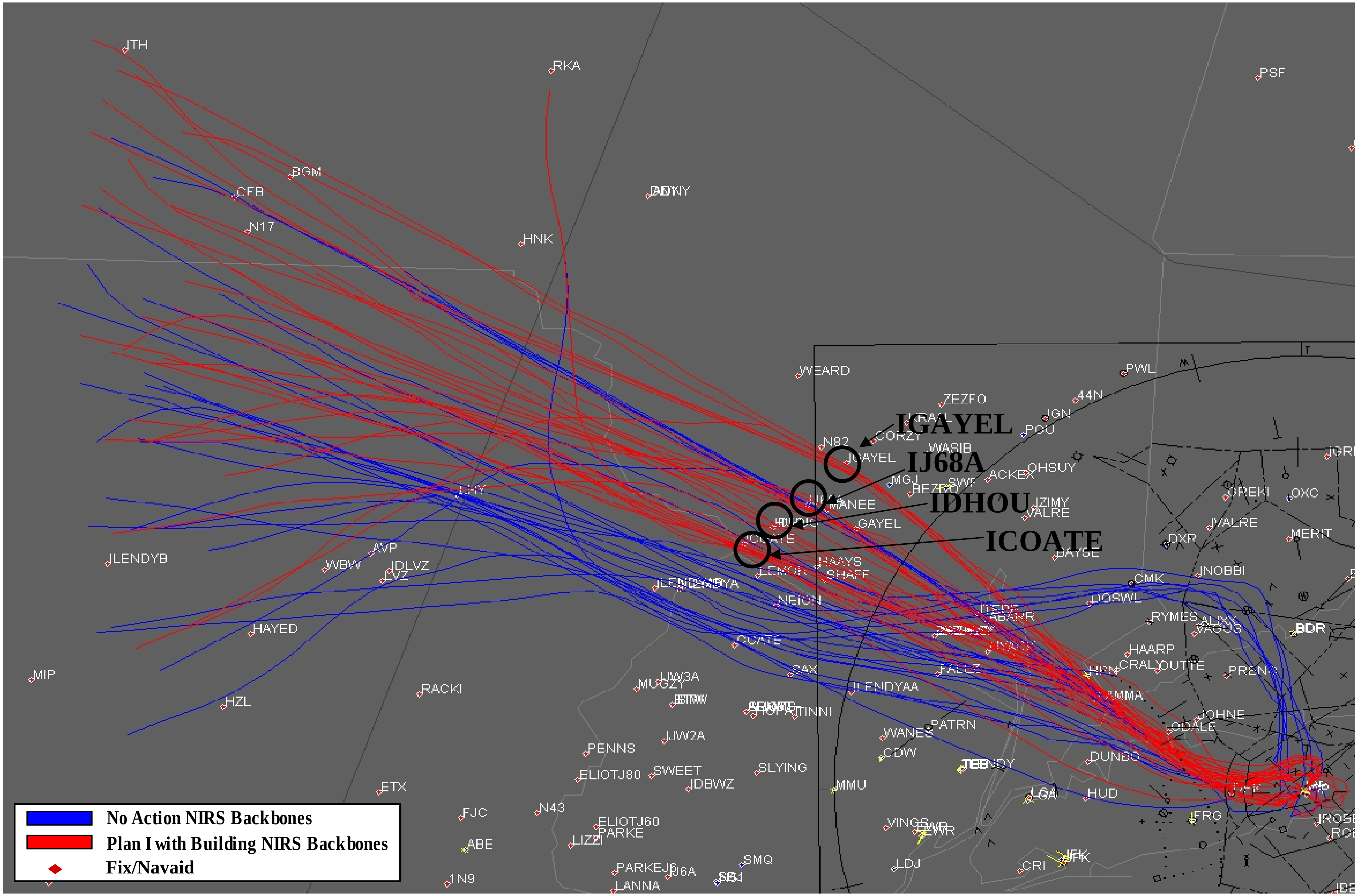


Appendix E
Attachment C-102

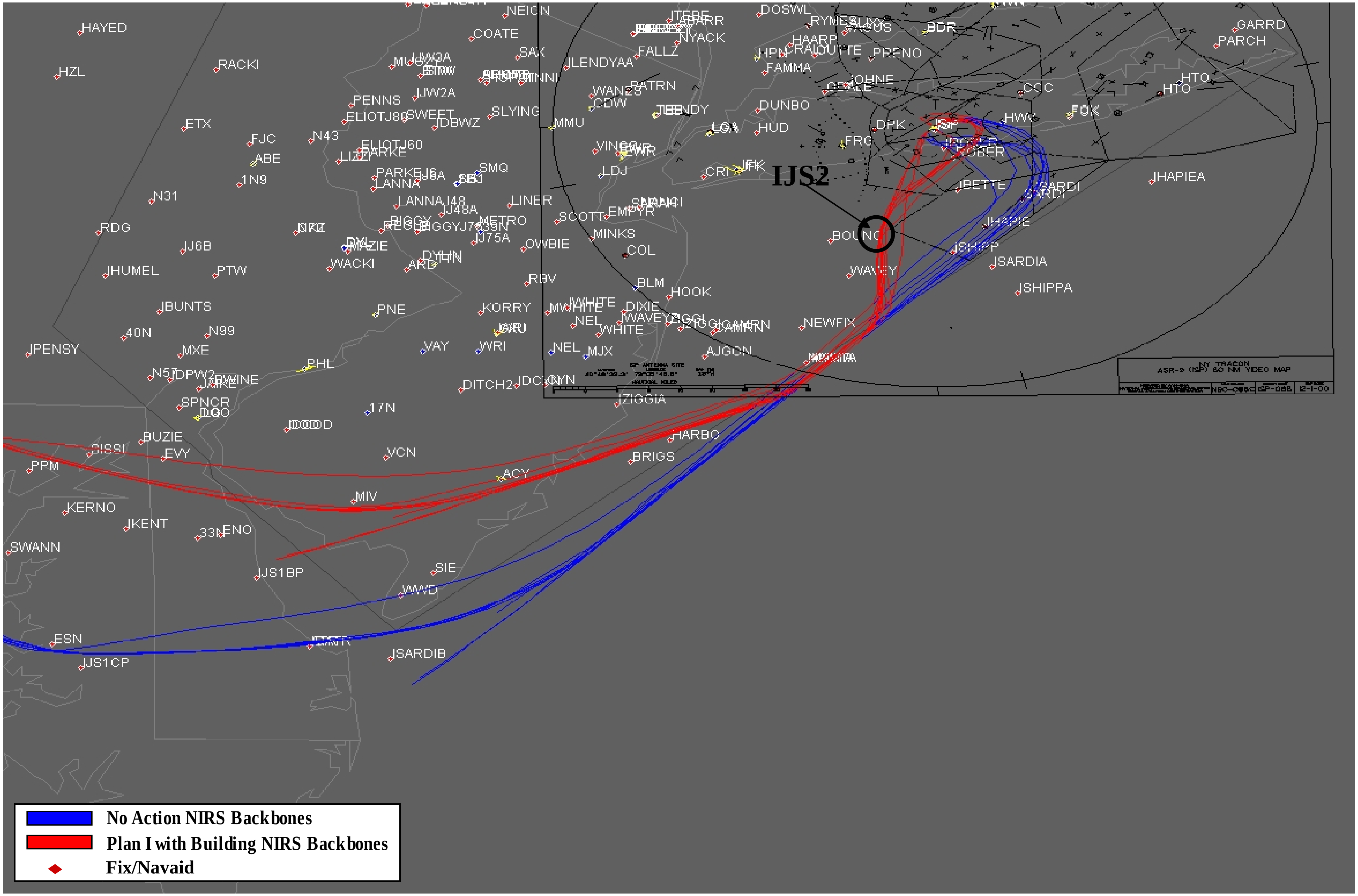
ISP North Departure Routes – Plan I with Building vs. No Action



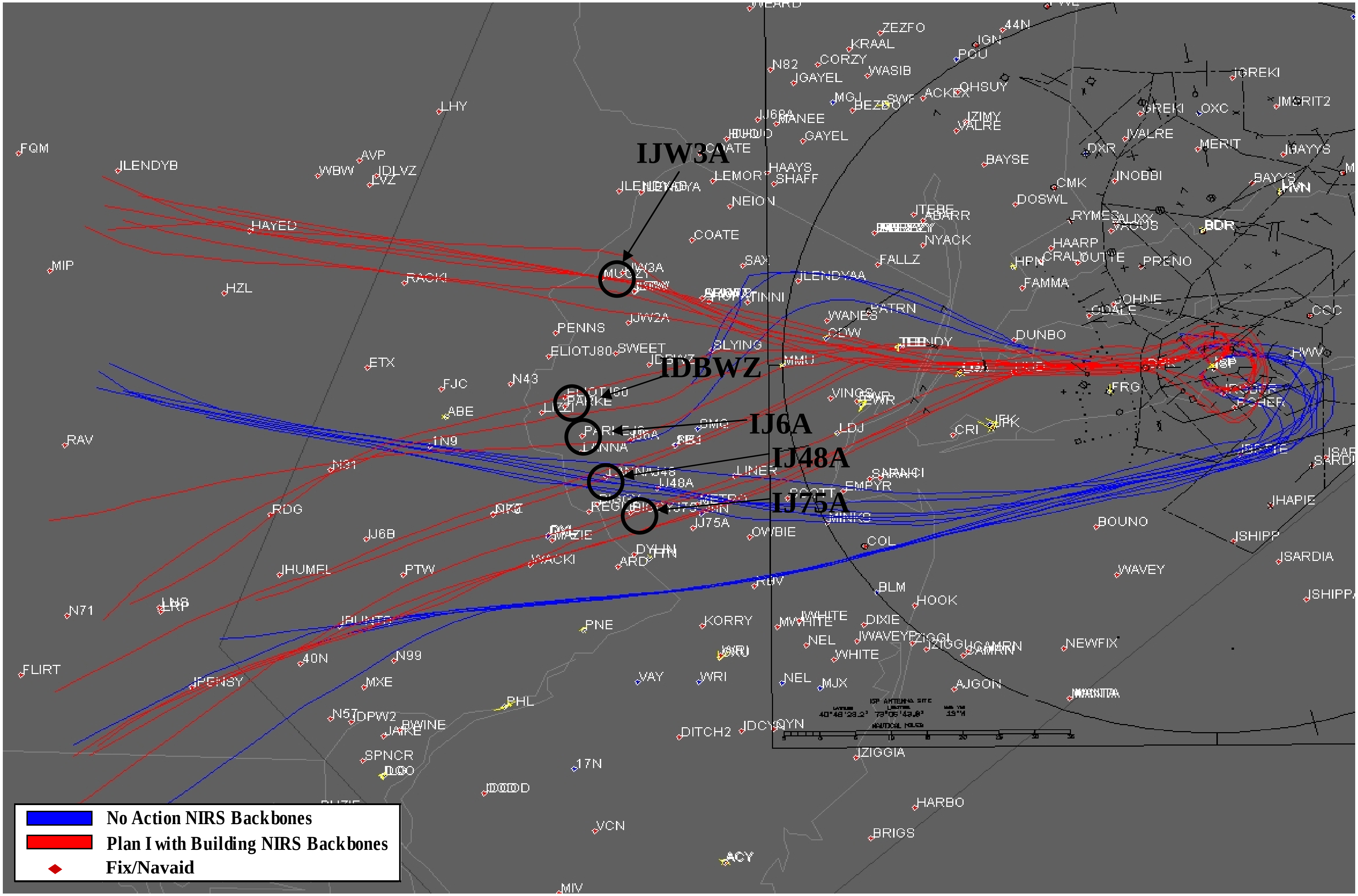
ISP Northwest Departure Routes – Plan I with Building vs. No Action



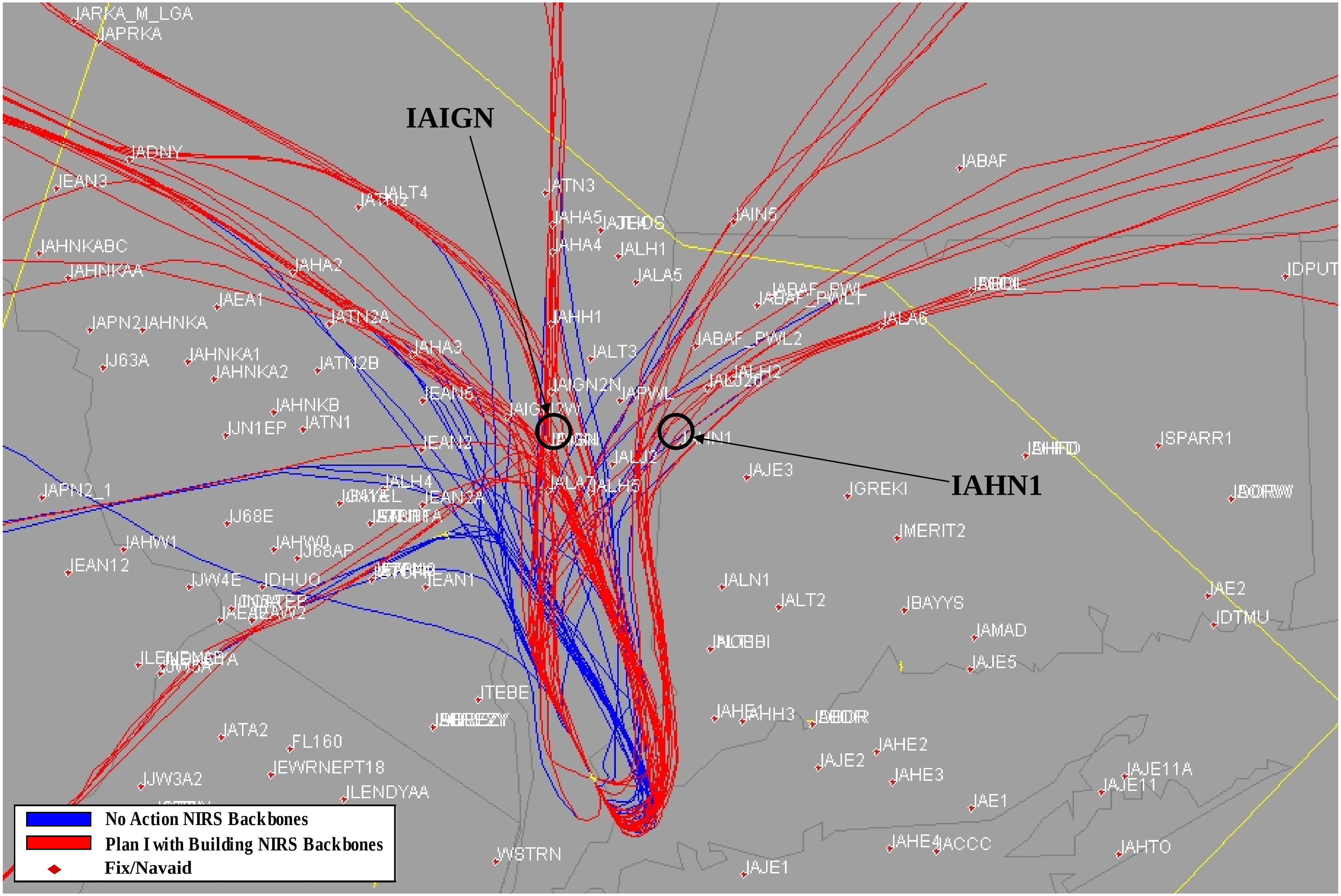
ISP South Departure Routes – Plan I with Building vs. No Action



ISP West Departure Routes – Plan I with Building vs. No Action

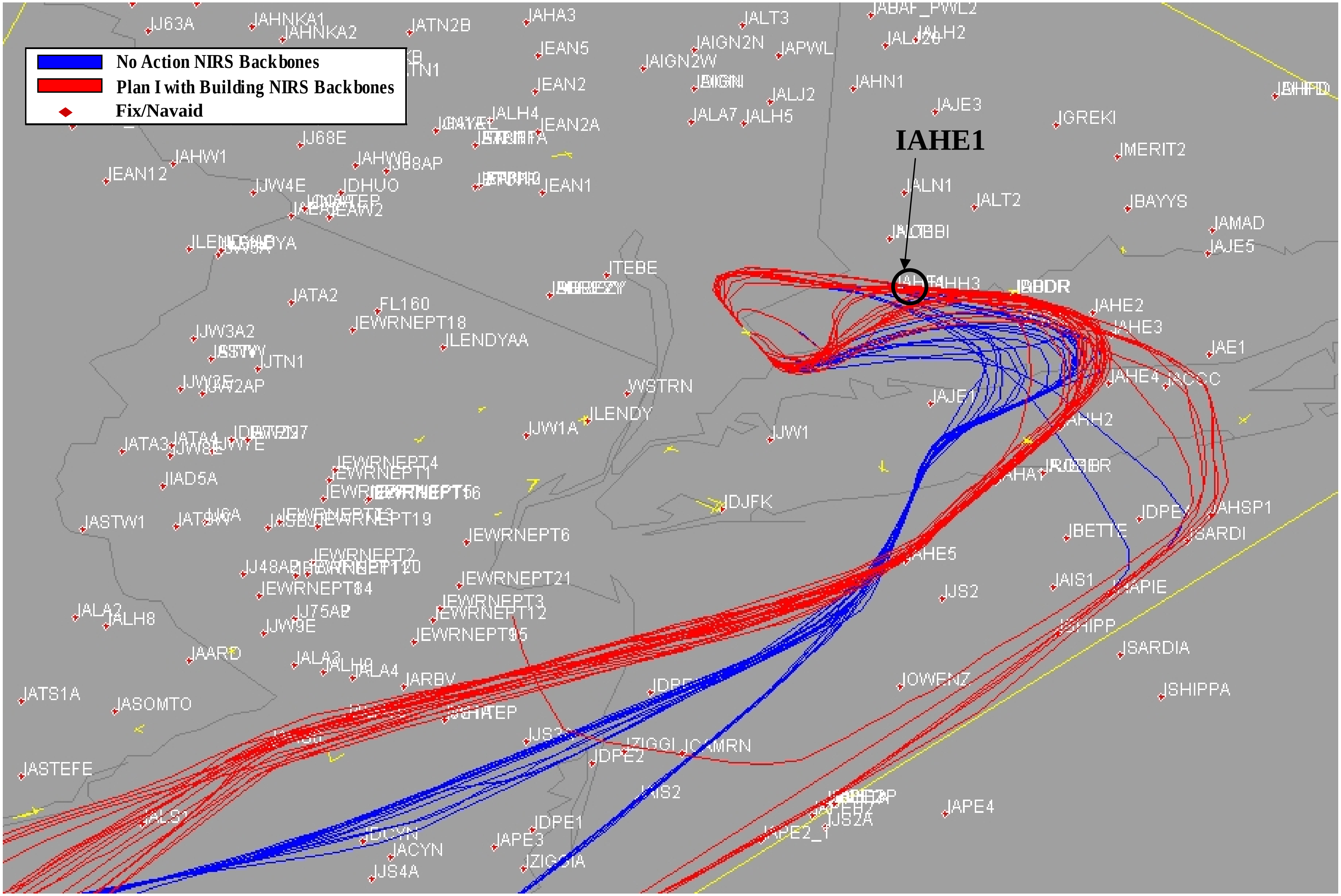


HPN Arrivals PLAN I w/Bldg North Gate



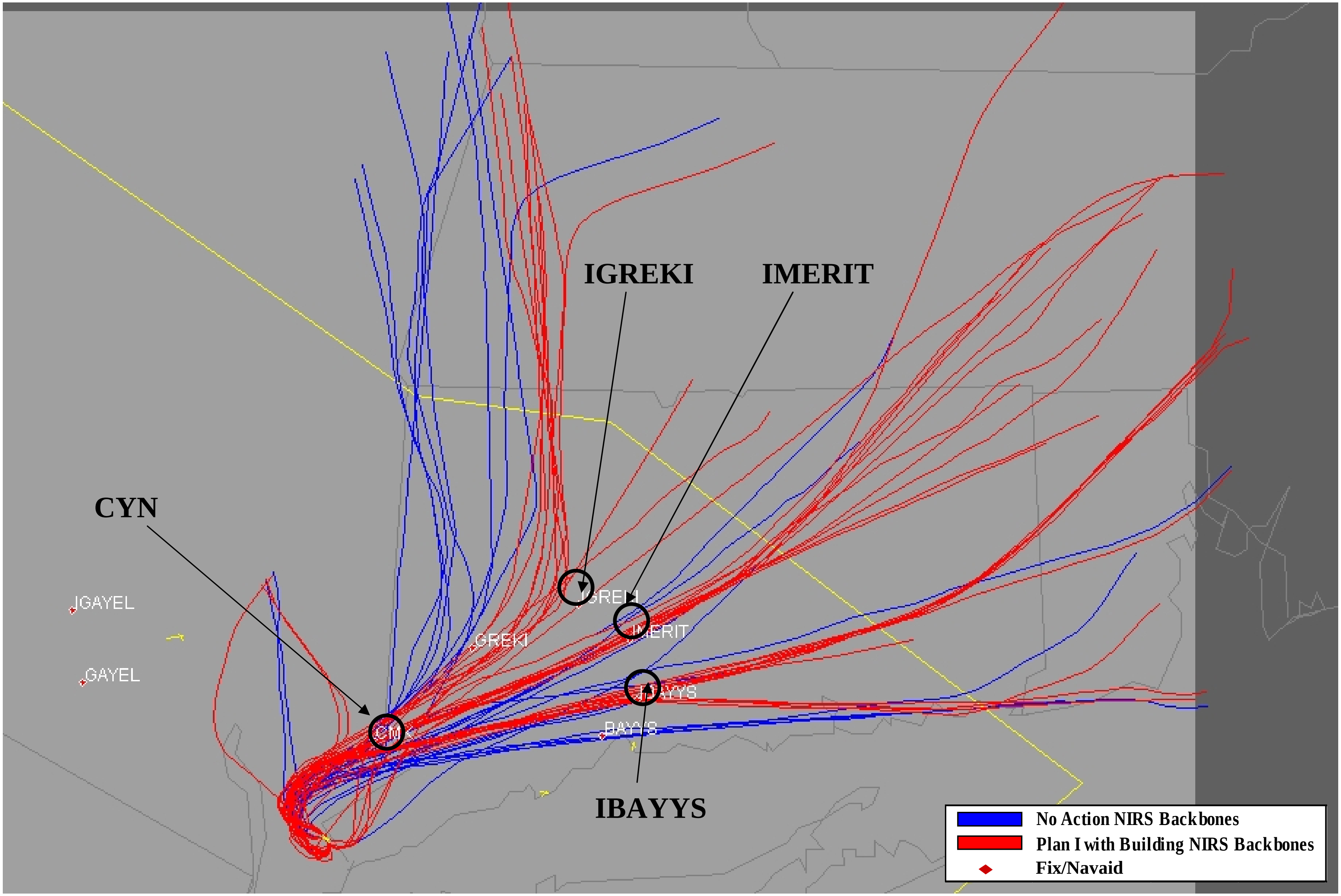
Appendix E
Attachment C-107

HPN Arrivals Plan I w/Bldg South Gate

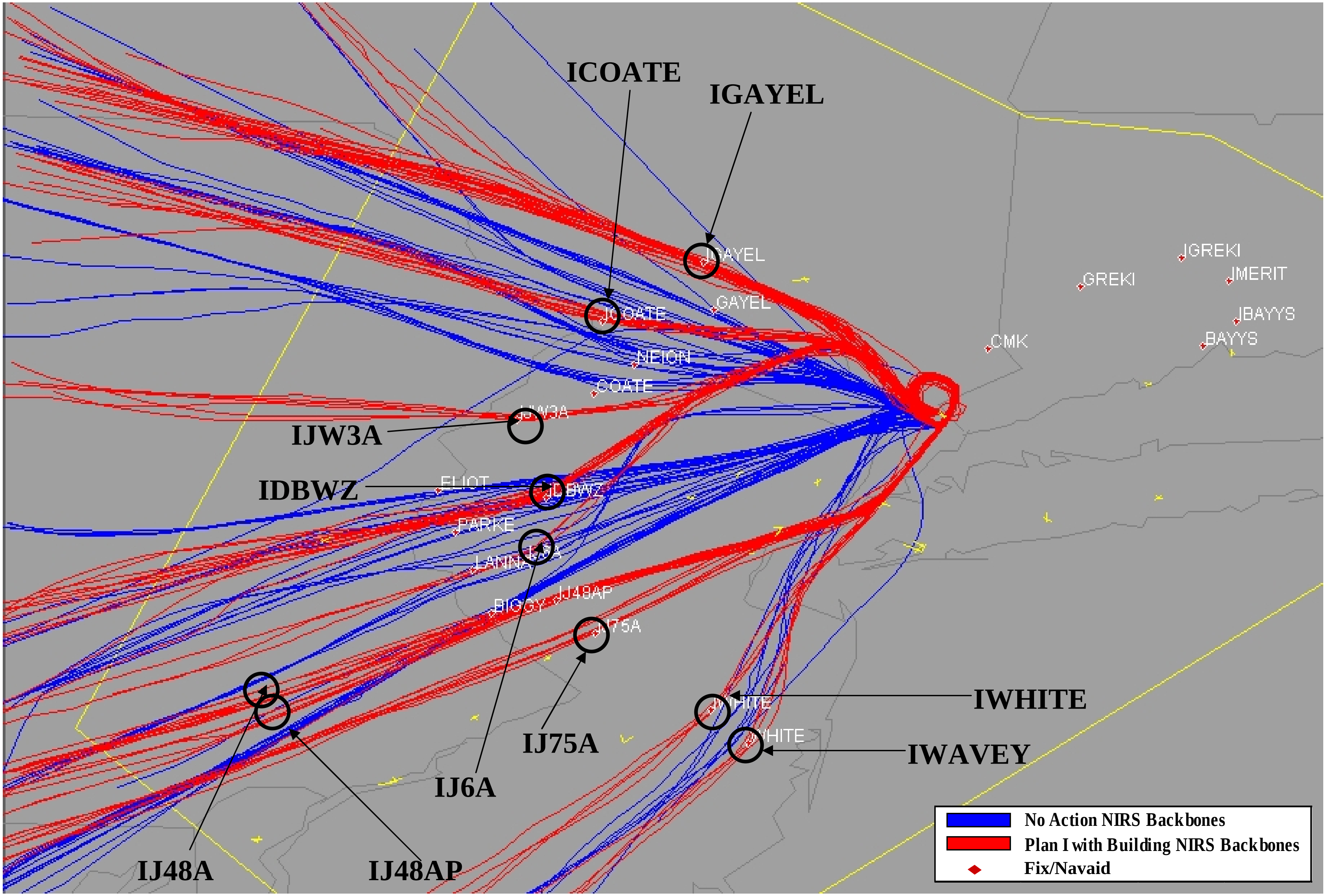


Appendix E
Attachment C-108

HPN Departures Plan I w/Bldg East Gate

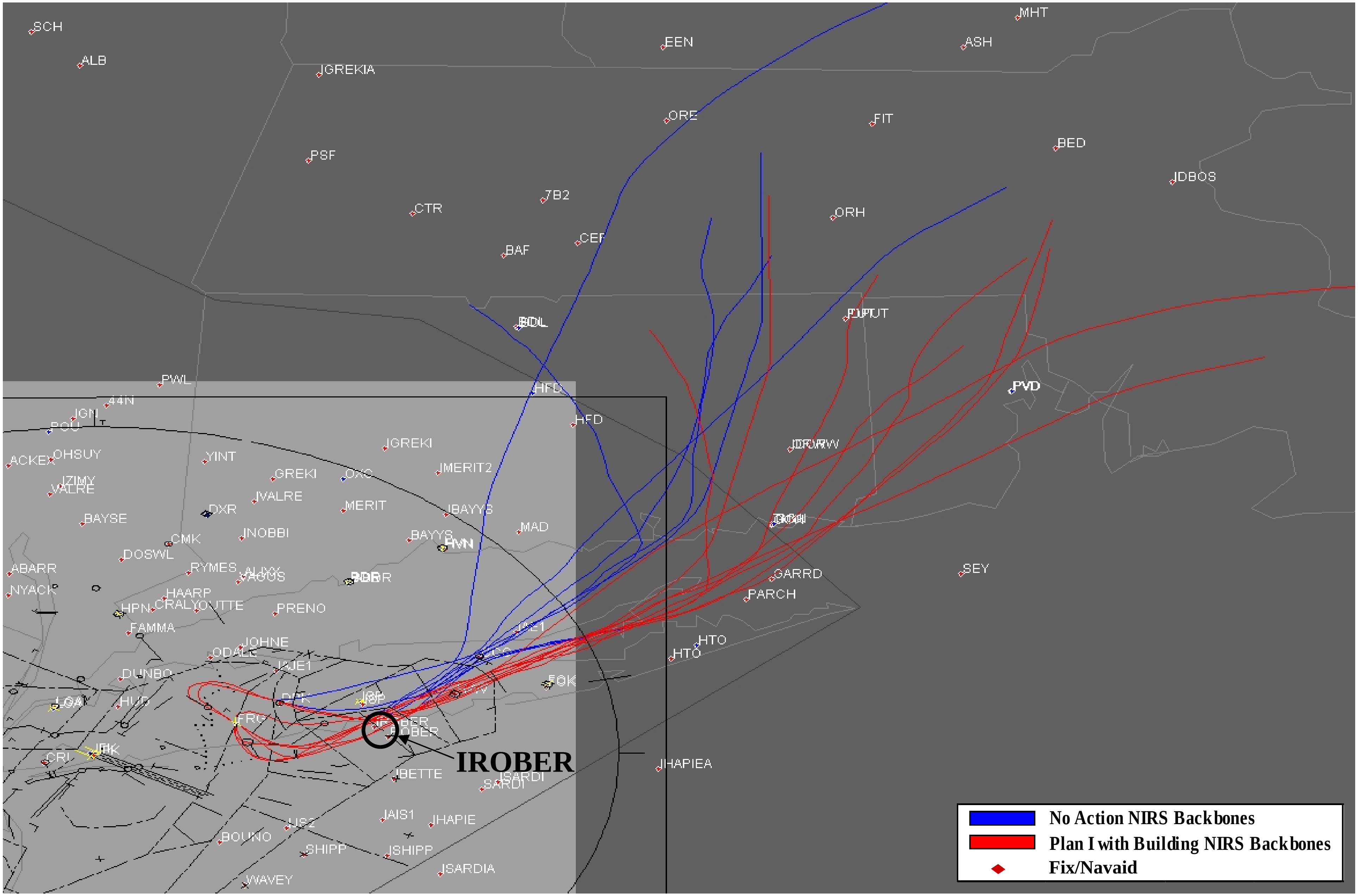


HPN Departures Plan I w/Bldg North/West/South Gates

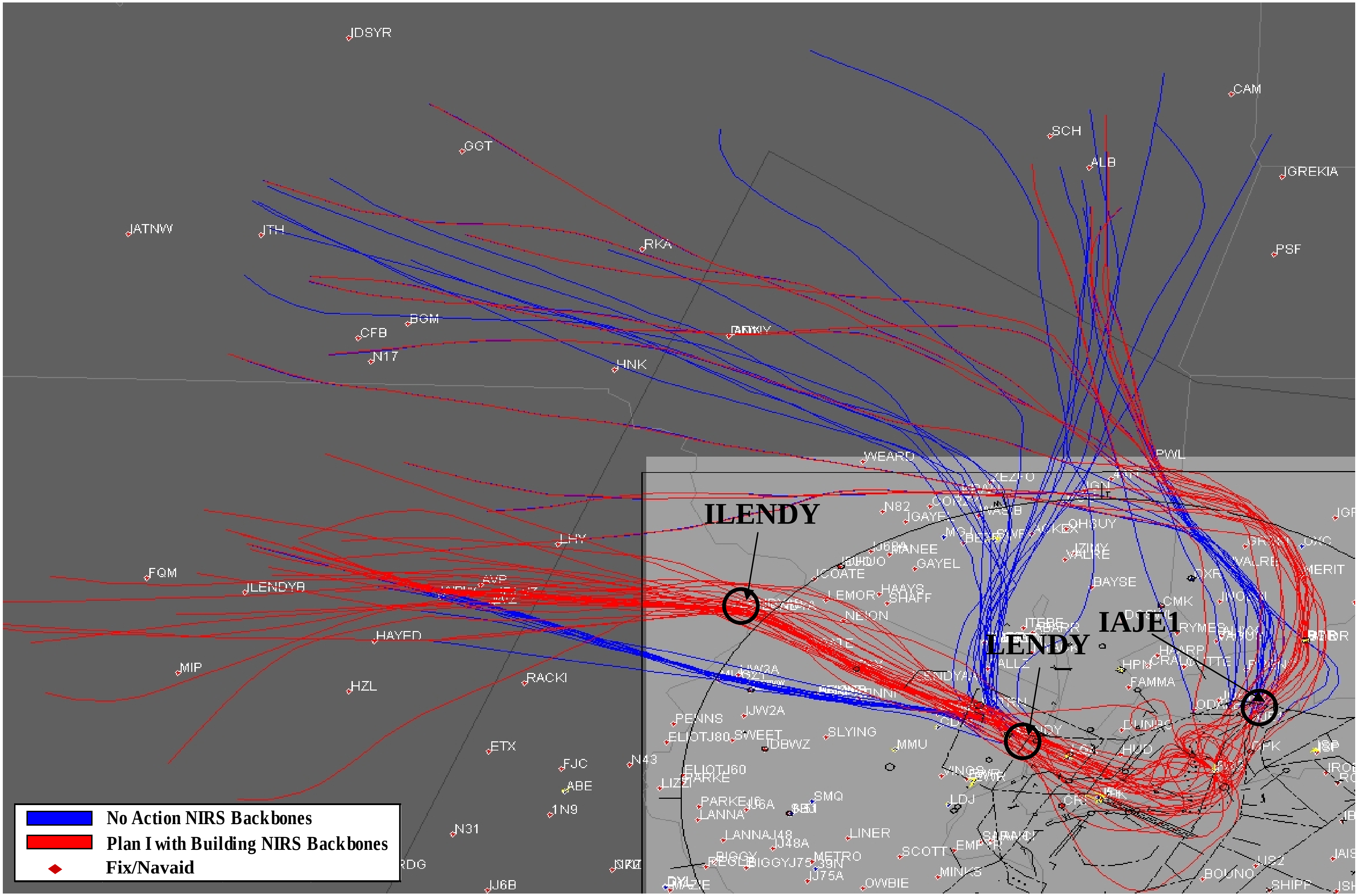


Appendix E
Attachment C-110

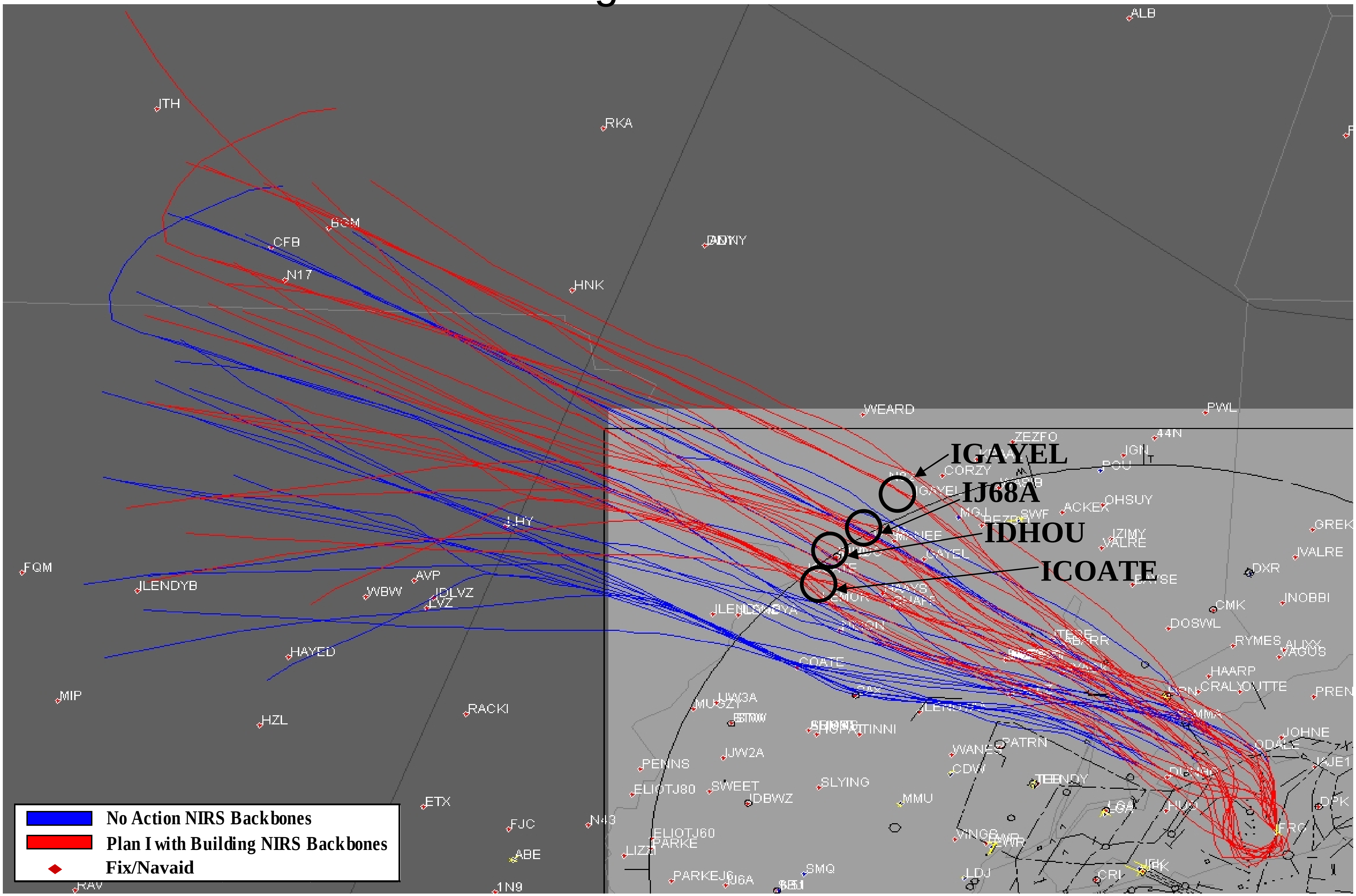
FRG East Arrivals Routes – Plan I with Building vs. No Action



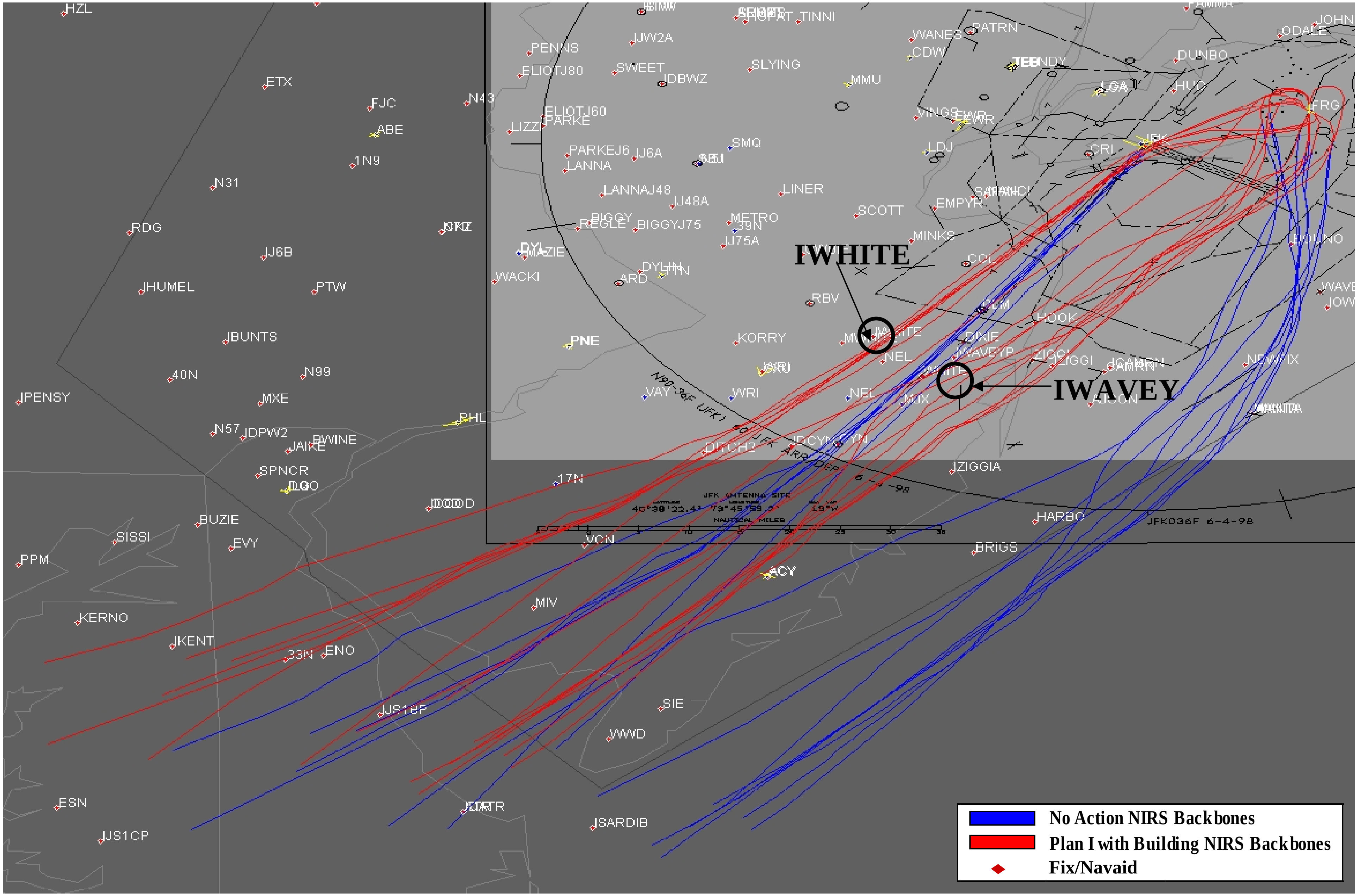
FRG North Arrival Routes – Plan I with Building vs. No Action



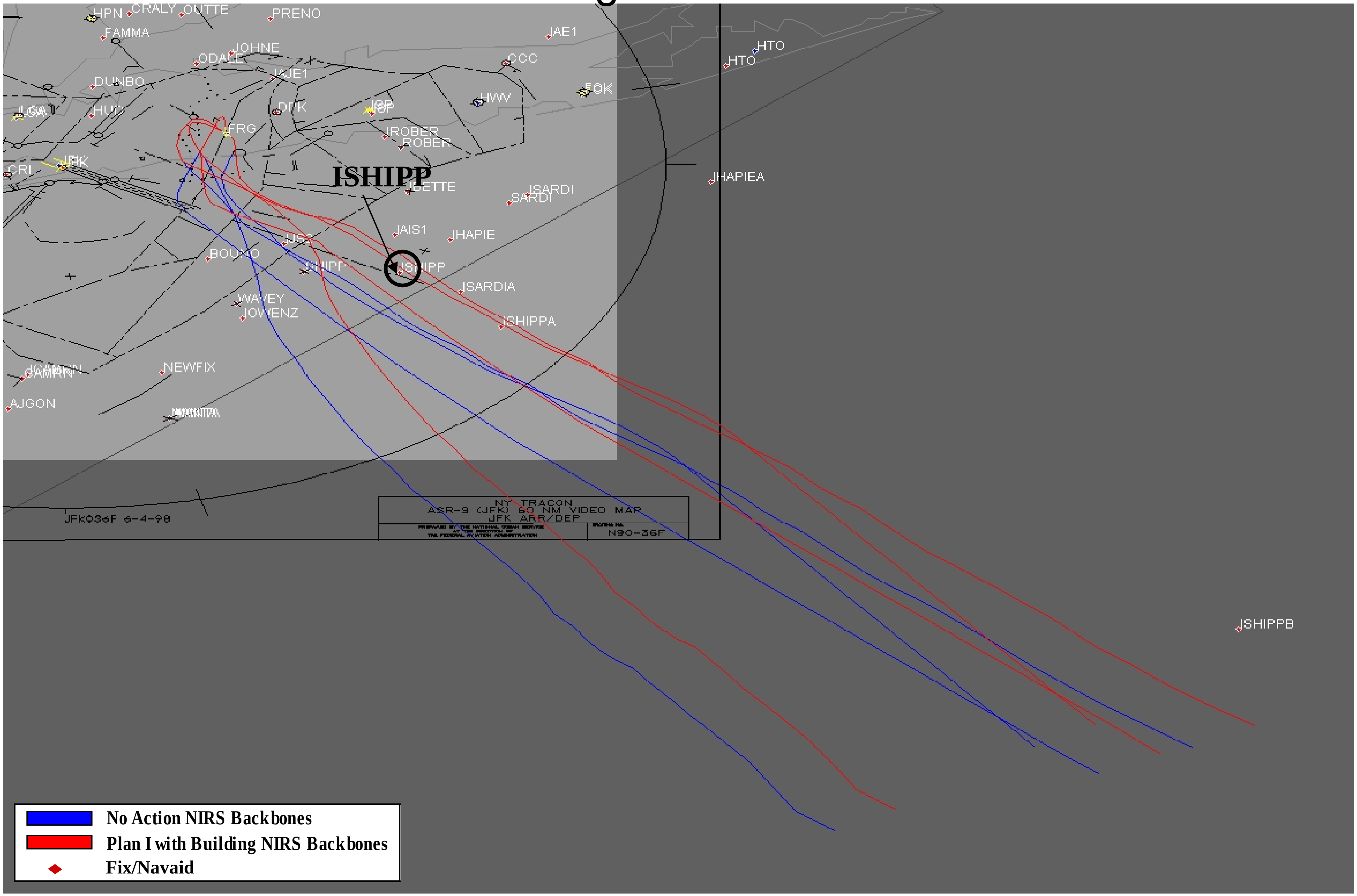
FRG Northwest Departure Routes – Plan I with Building vs. No Action



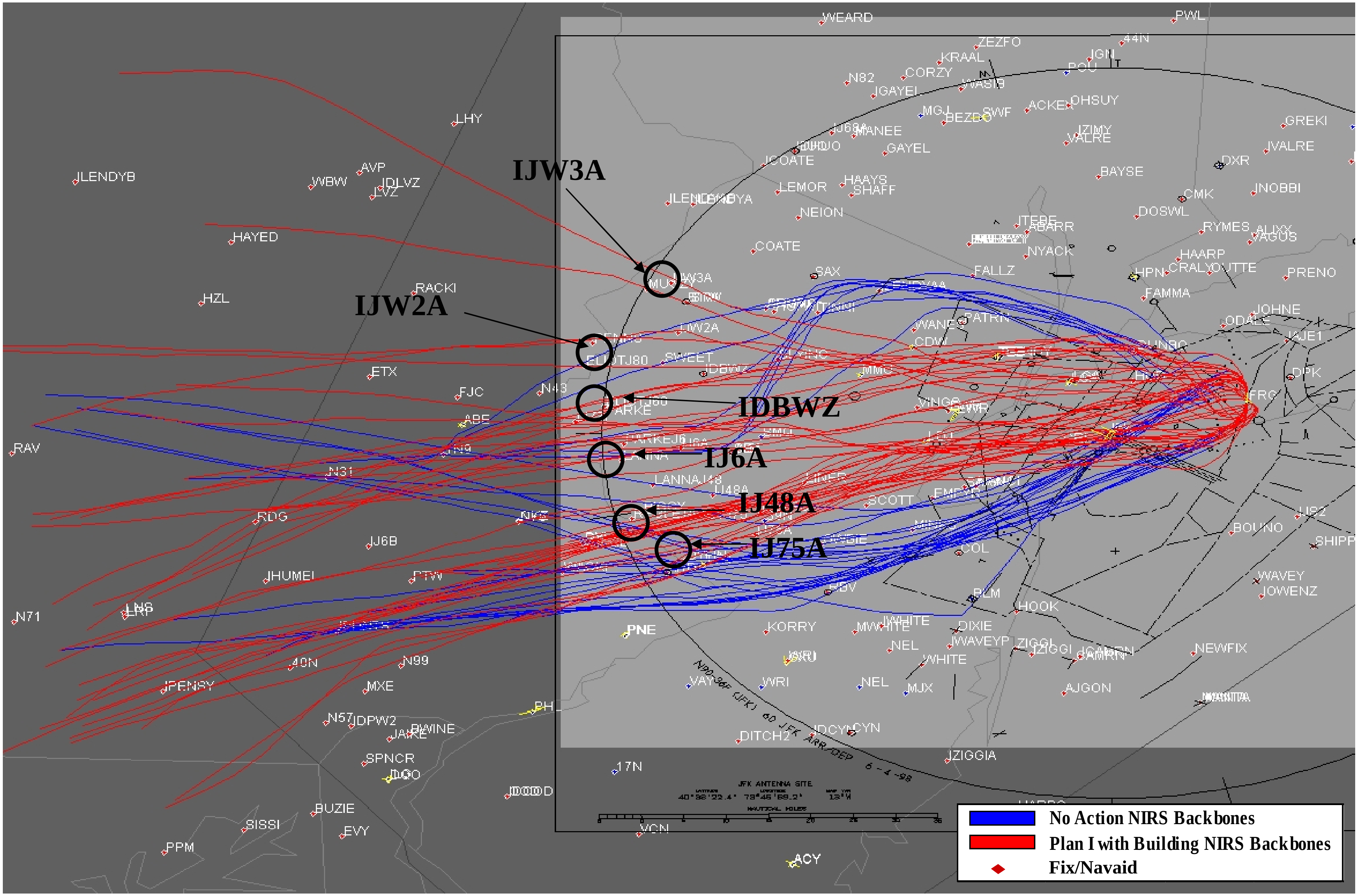
FRG South Departure Routes – Plan I with Building vs. No Action



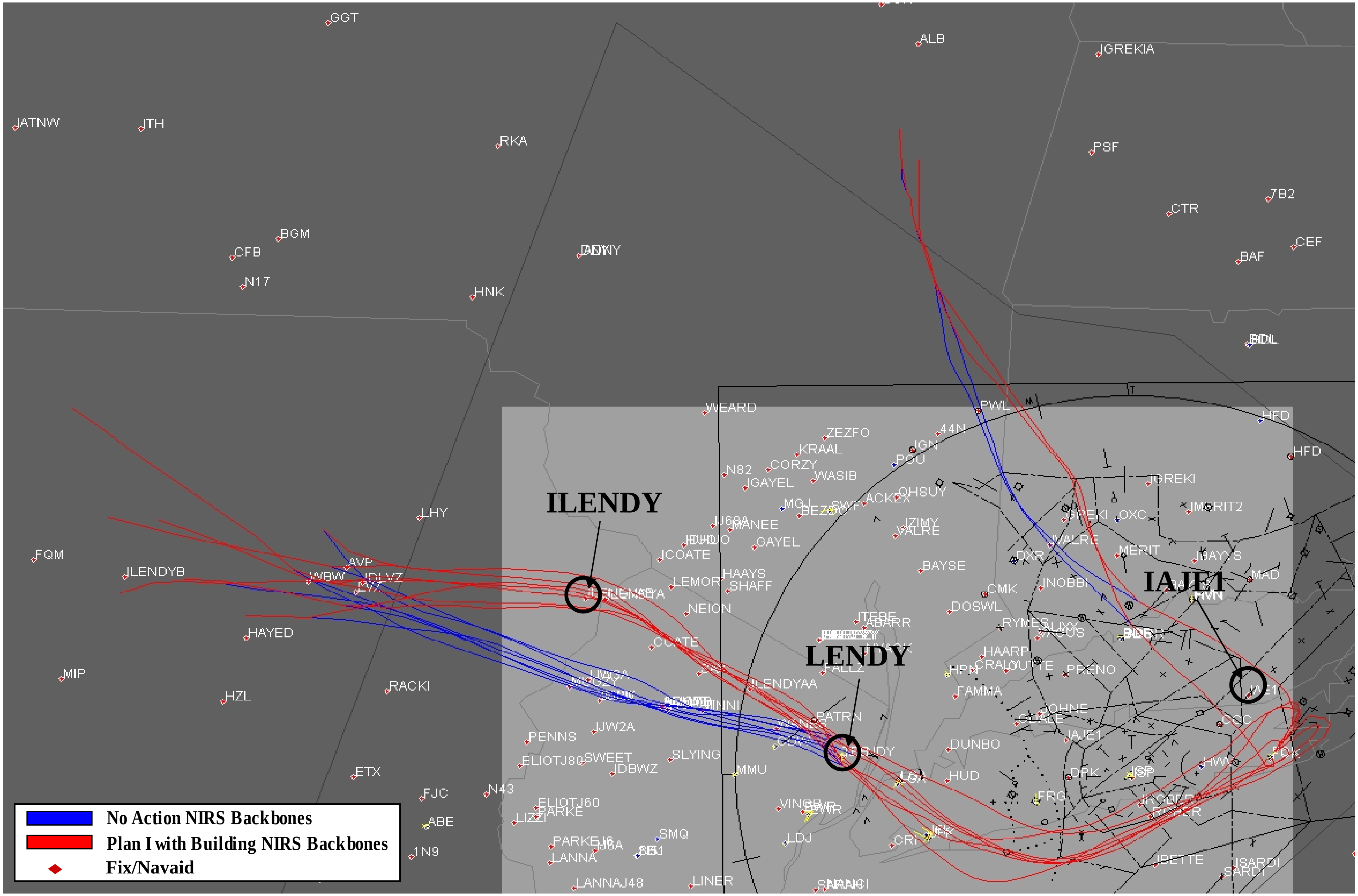
FRG Waters Departure Routes – Plan I with Building vs. No Action



FRG West Departure Routes – Plan I with Building vs. No Action

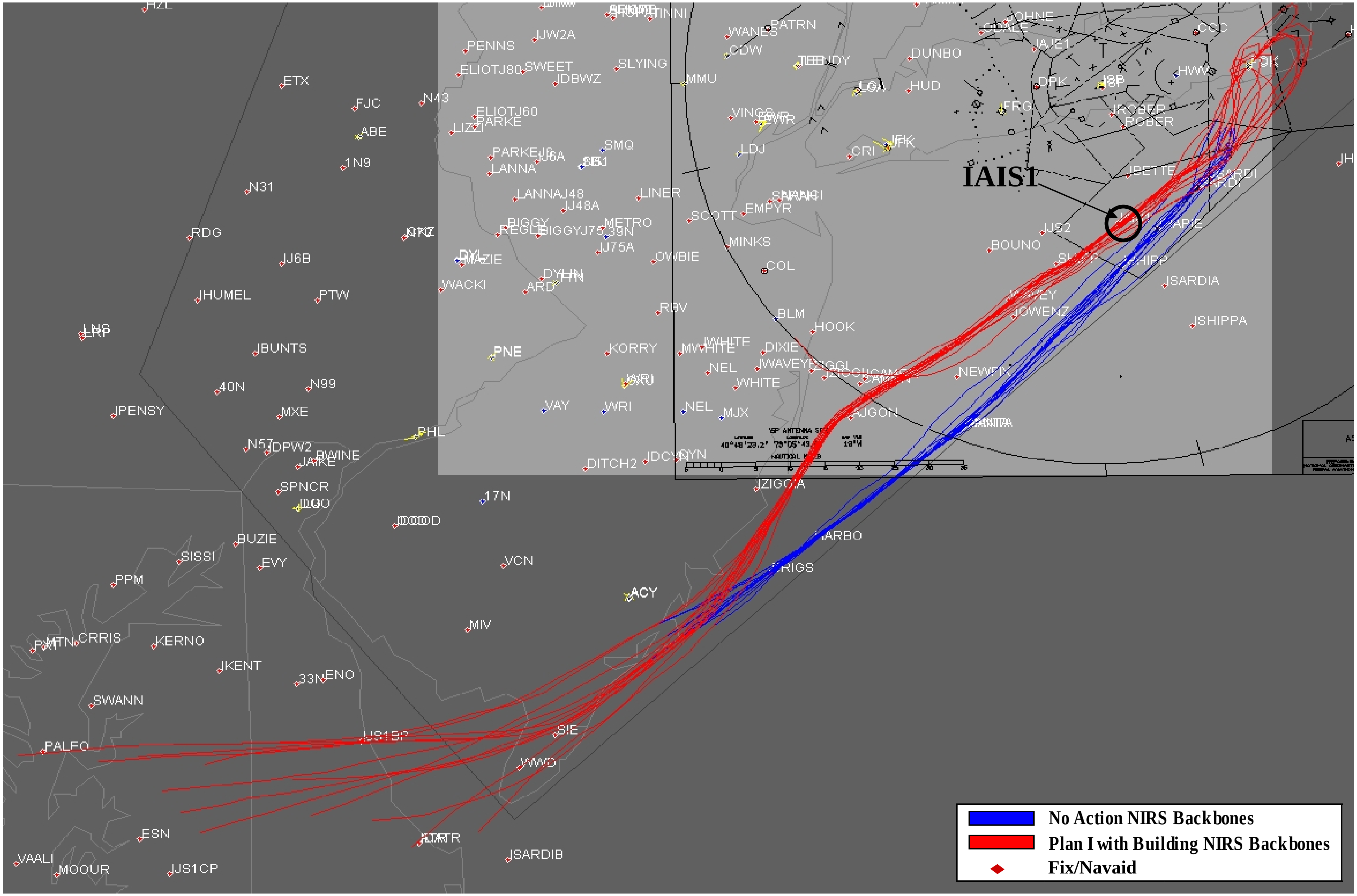


FOK North Arrival Routes – Plan I with Building vs. No Action

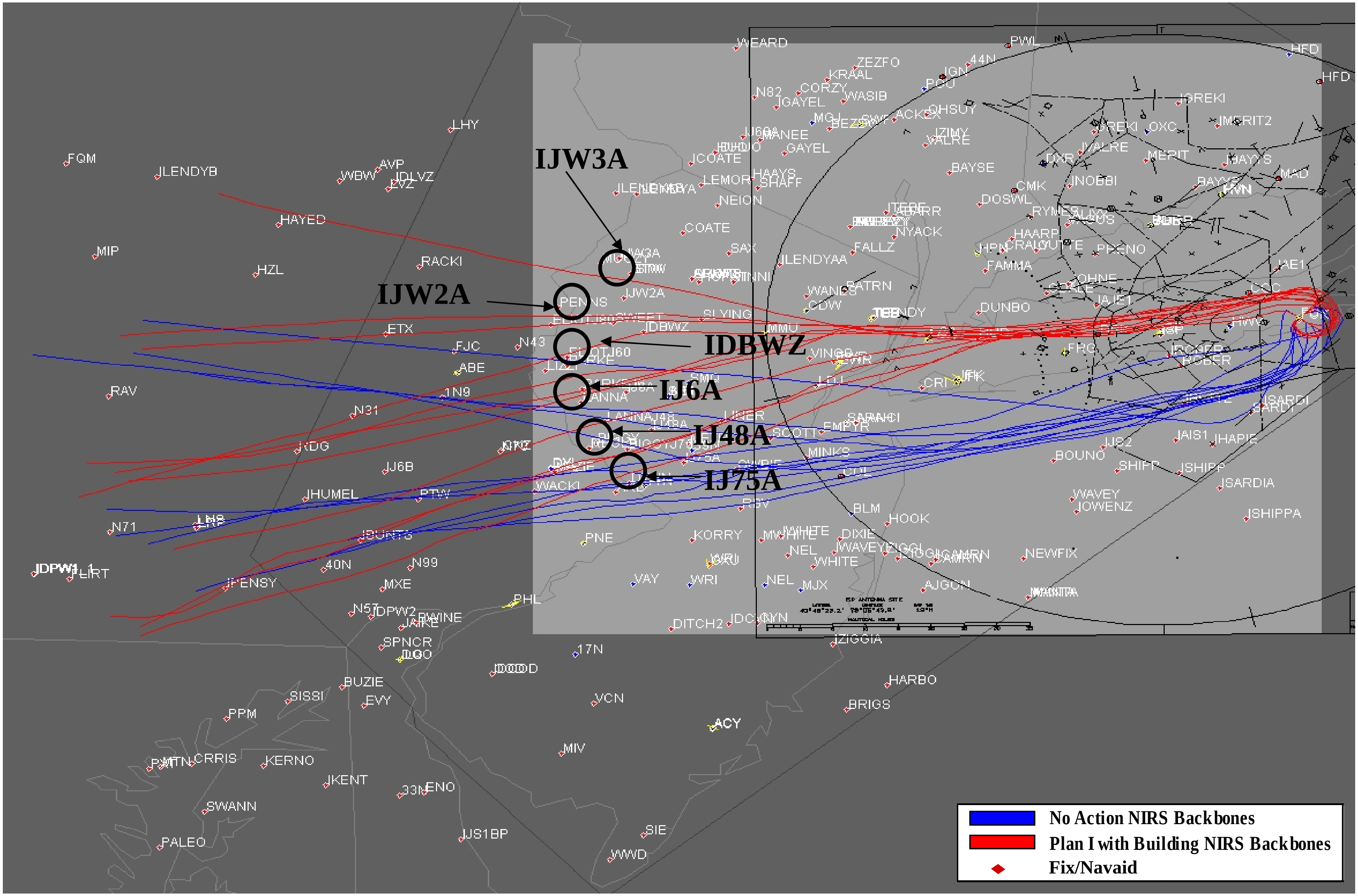


Appendix E
Attachment C-117

FOK South Arrival Routes – Plan I with Building vs. No Action

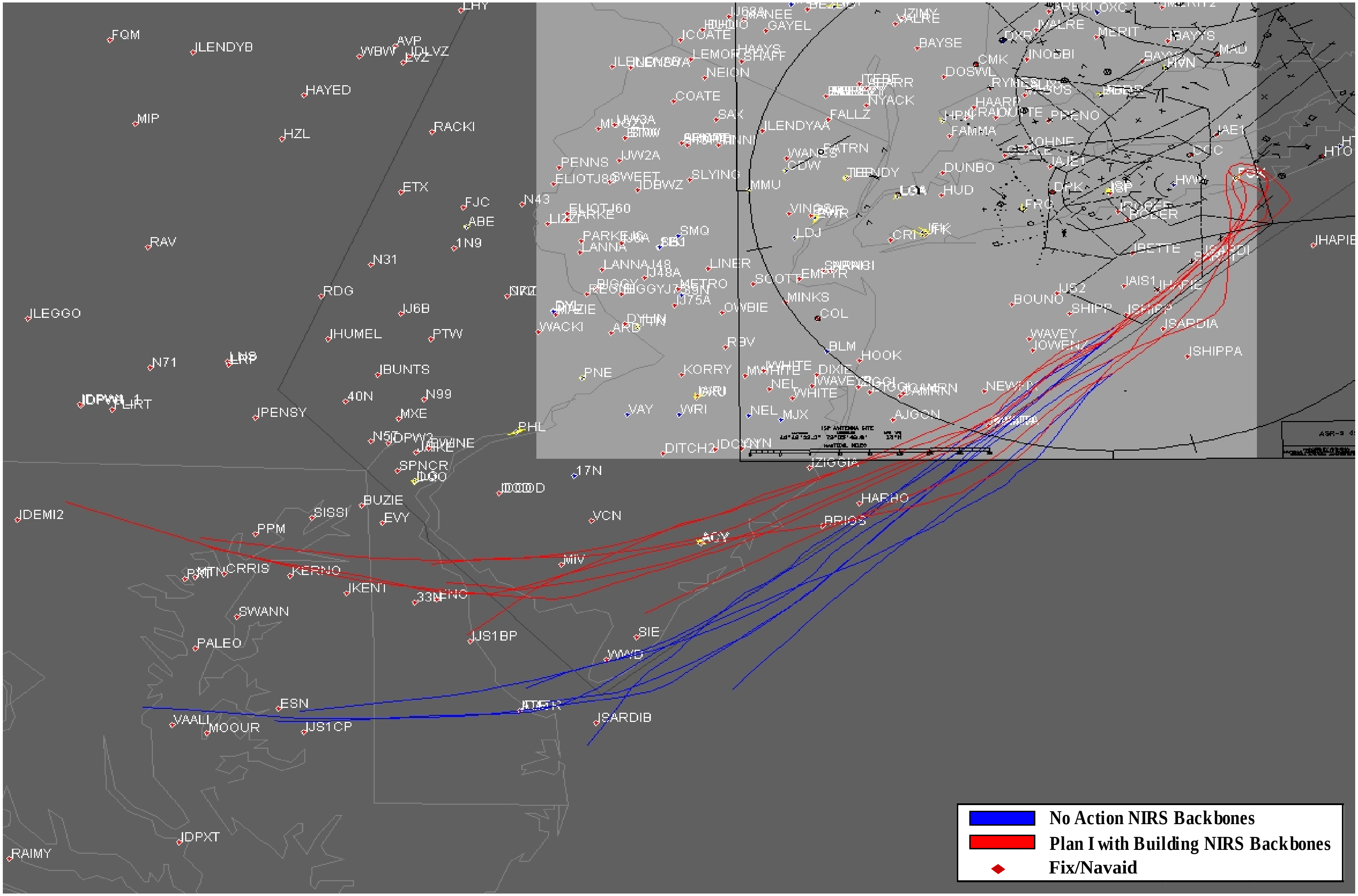


FOK West Departure Routes – Plan I with Building vs. No Action



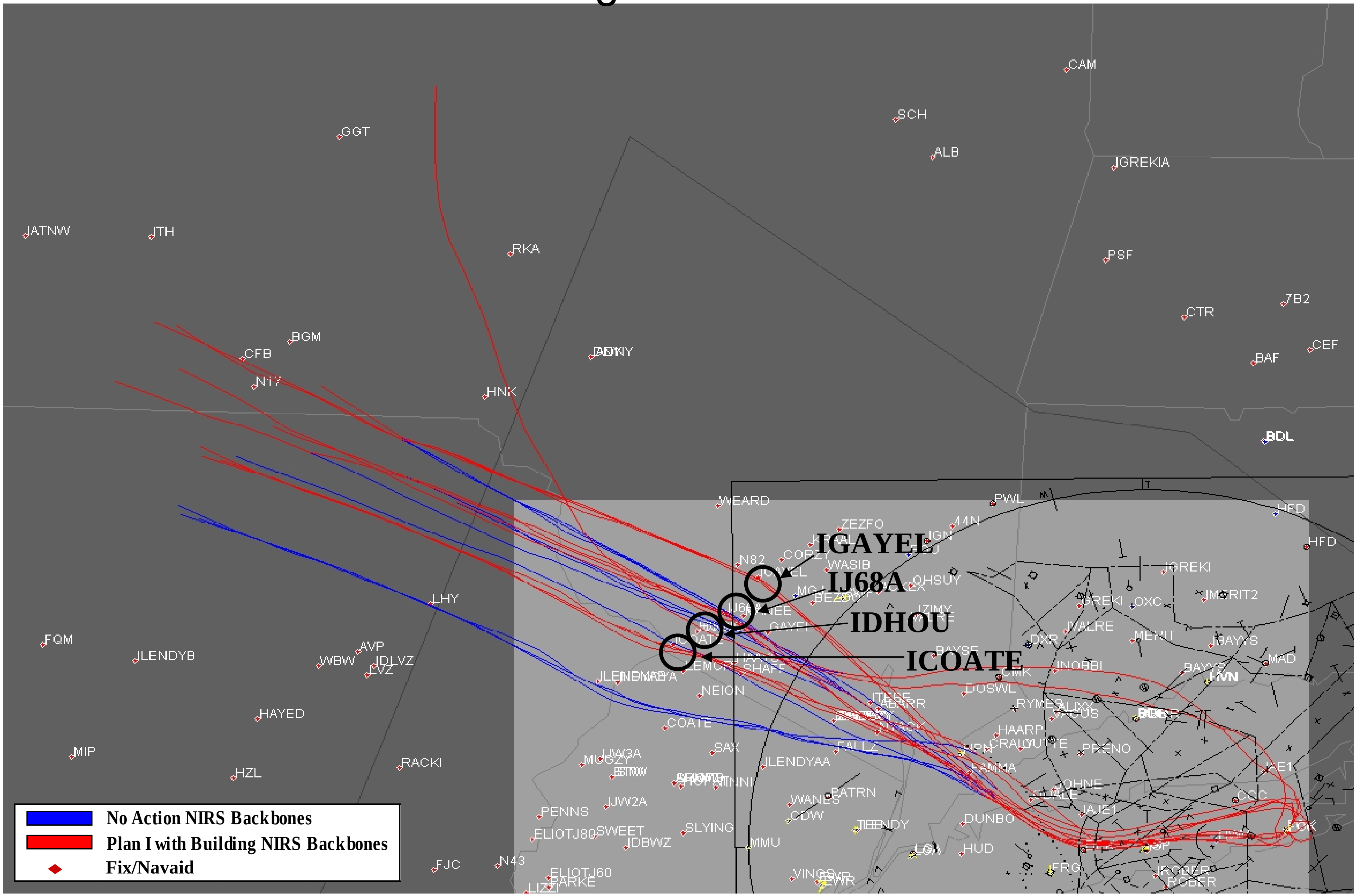
Appendix E
Attachment C-119

FOK South Departure Routes – Plan I with Building vs. No Action

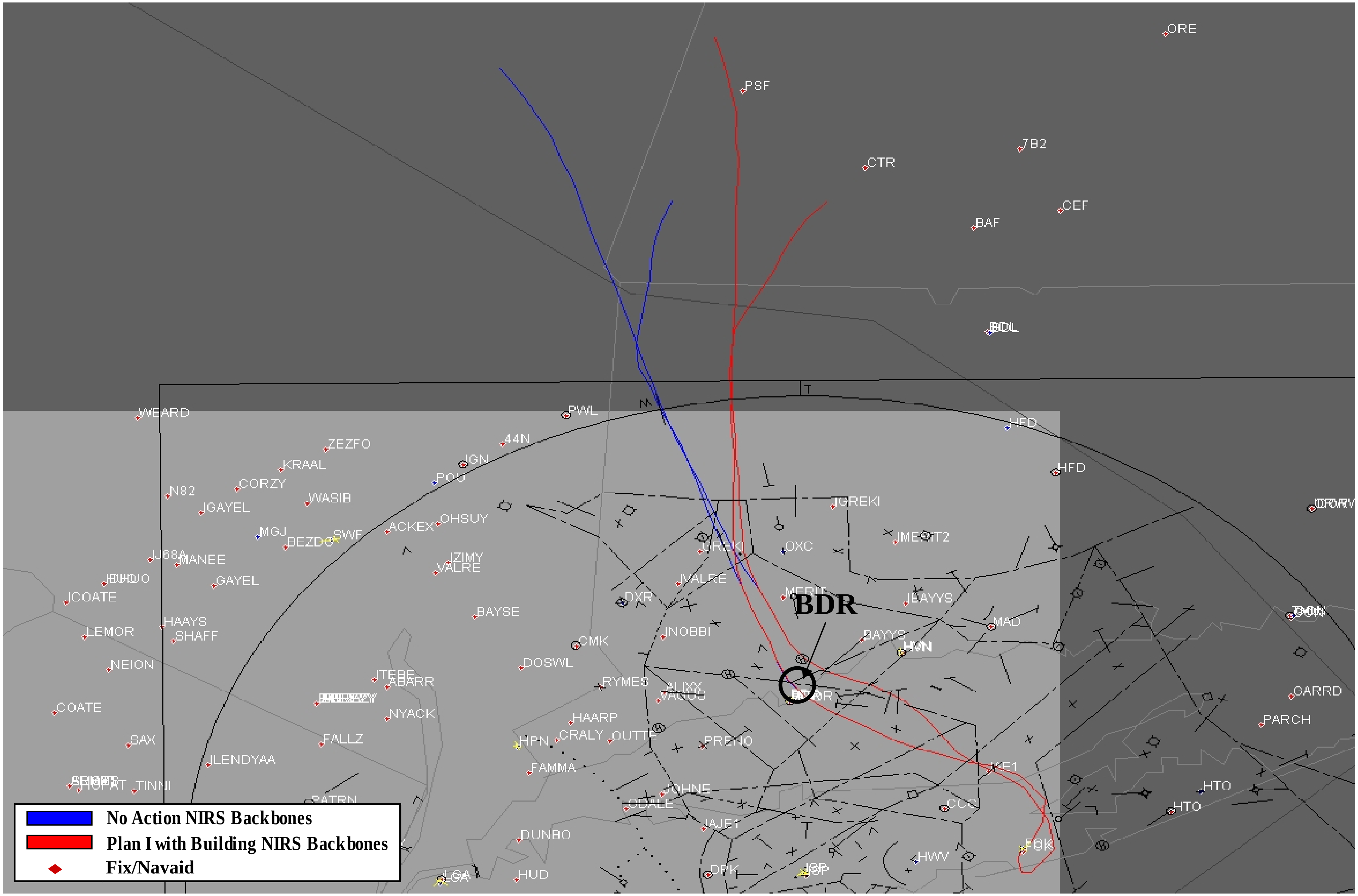


Appendix E
Attachment C-120

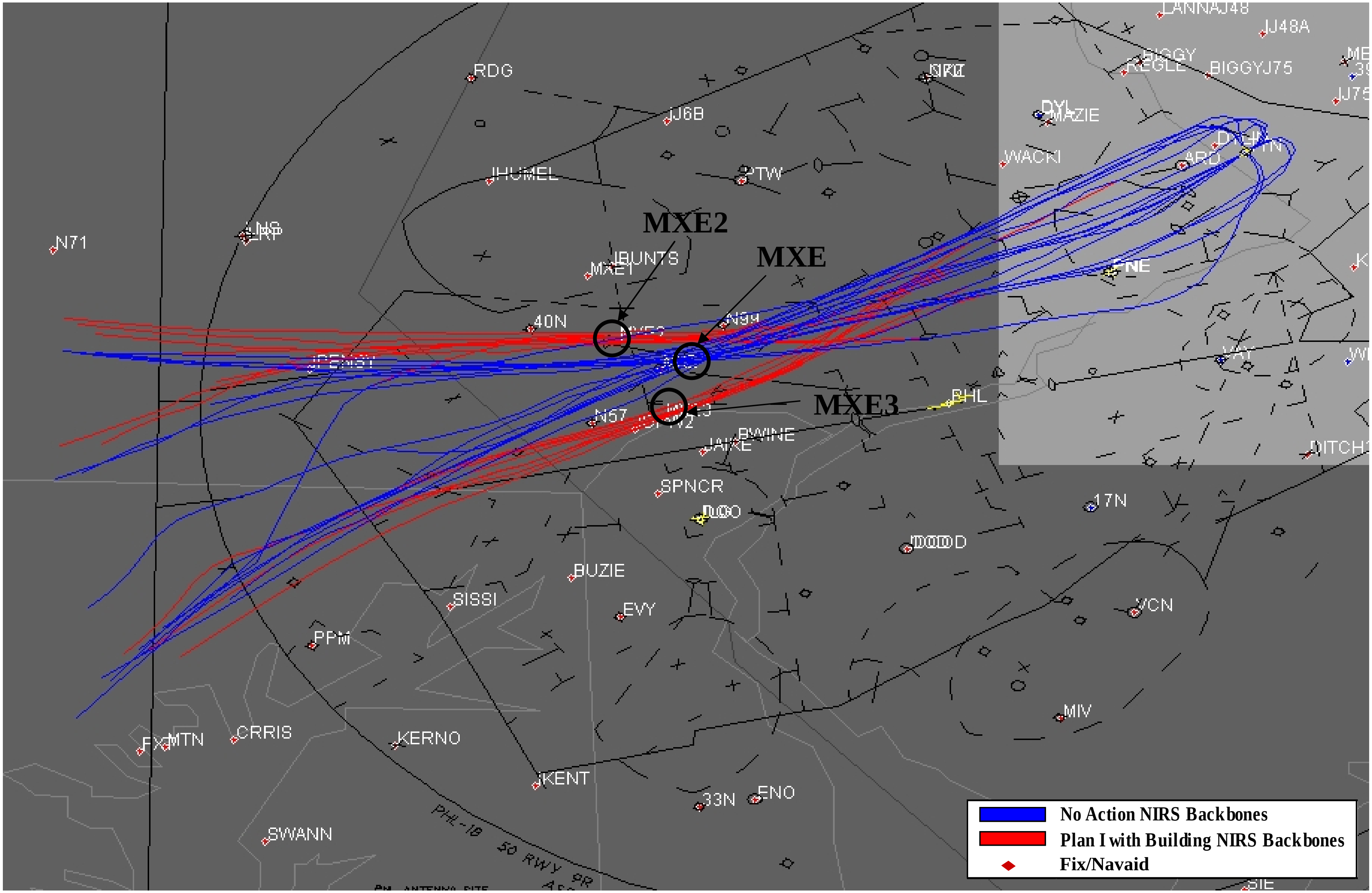
FOK Northwest Departure Routes – Plan I with Building vs. No Action



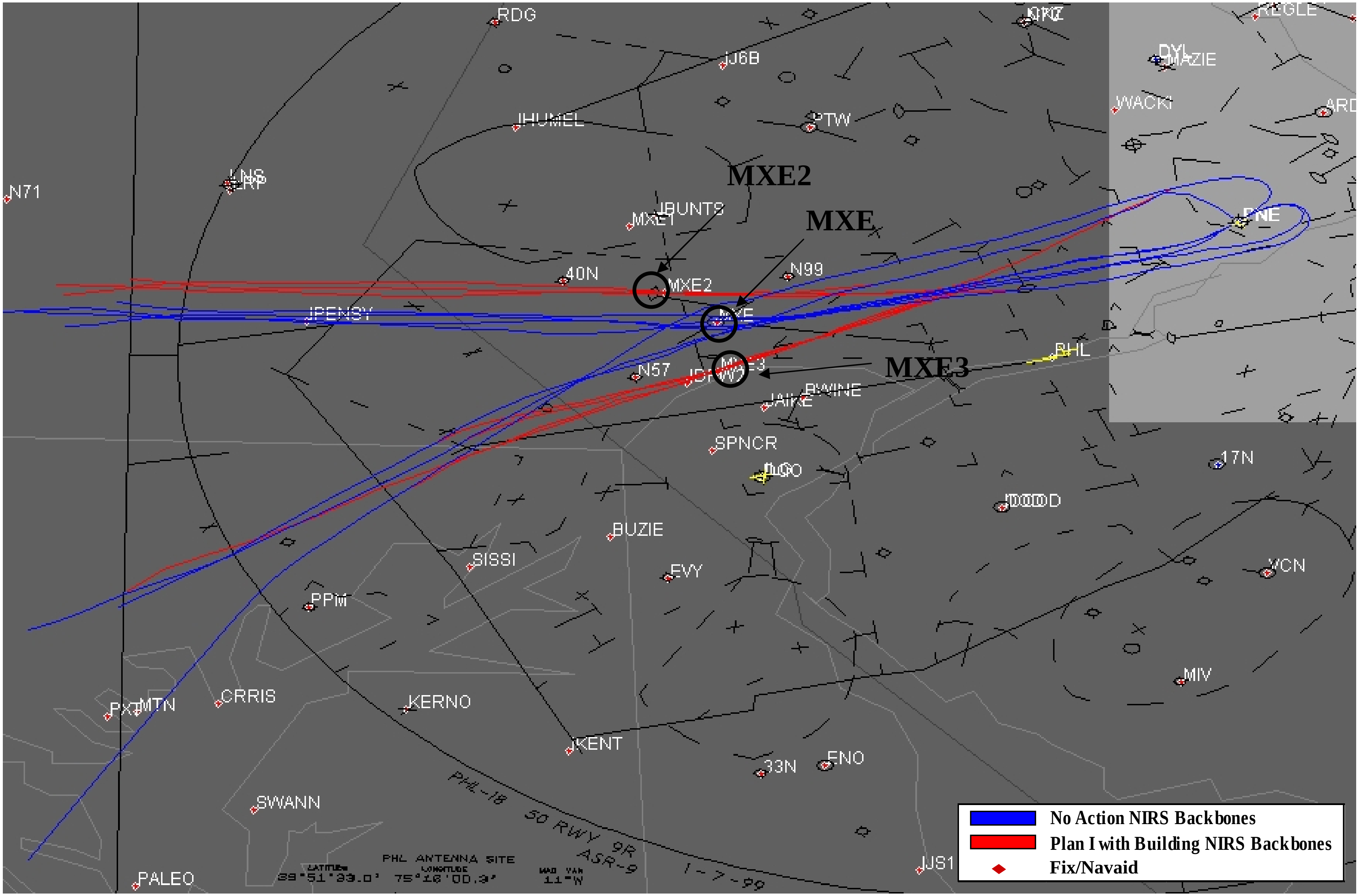
FOK North Departure Routes – Plan I with Building vs. No Action



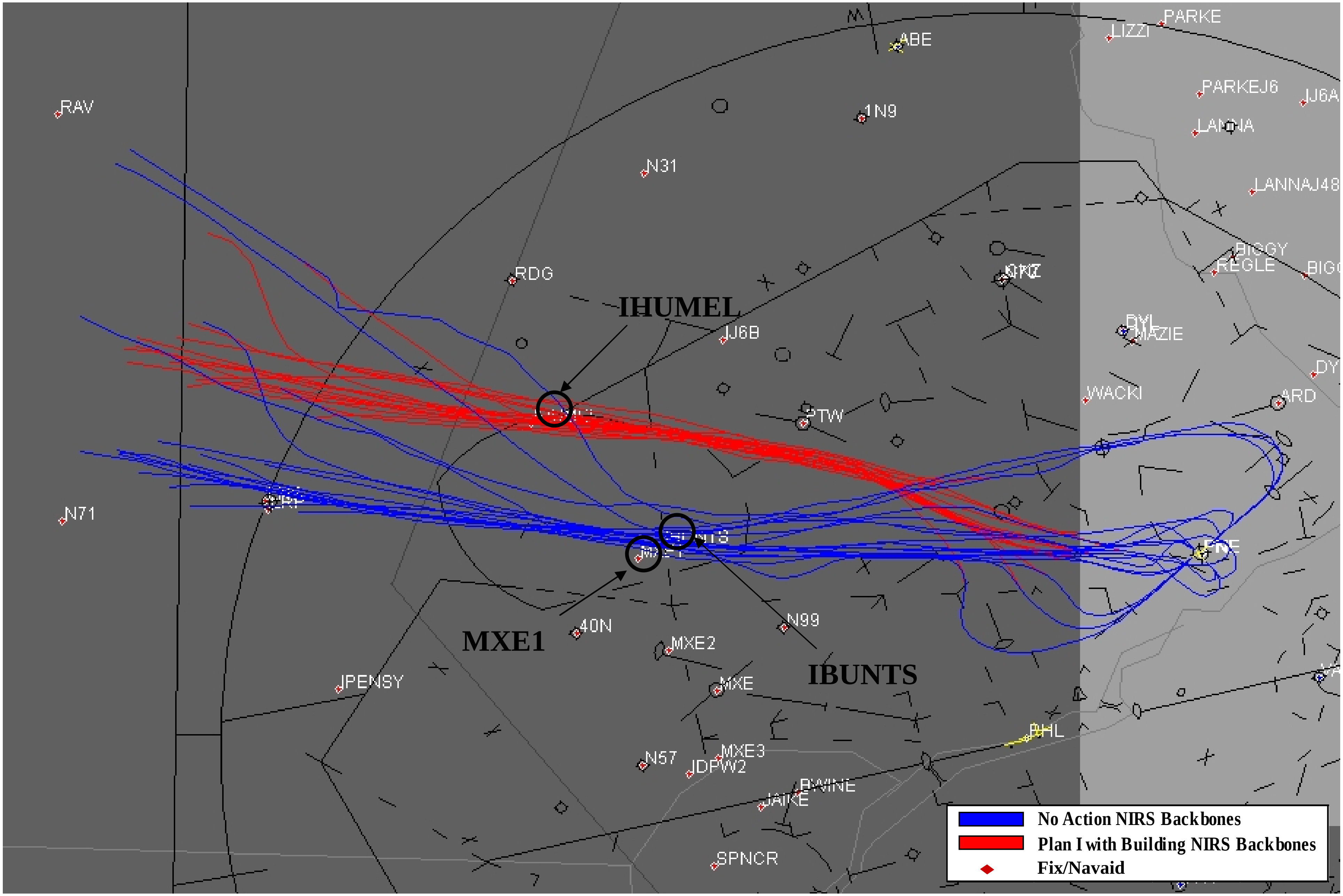
TTN Departure Routes – Plan I with Building vs. No Action



PNE Departure Routes – Plan I with Building vs. No Action



PNE Arrivals Routes – Plan I with Building vs. No Action



E.3

Noise Modeling Sensitivity Analysis

For

Airport Elevation Differences

July 2007

New York/New Jersey/Philadelphia Airspace Redesign - Airport Elevation Sensitivity Analysis

INTRODUCTION

After the release of the DEIS and prior to the mitigation analysis there were two minor changes performed in the project noise analysis in order to respond to comments received during the DEIS comment period. The first refinement affected the noise modeling itself and specifically how the Noise Integrated Routing System (NIRS) handles multiple airports within a large study area. The second refinement again relates to NIRS, but focused on the level of precision used to compute and tally noise impacts.

By default NIRS Version 6.0c3, which was used for this study, relates all aircraft flight profiles (arrival & departure) to the NIRS Study Center. For this project the Study Center was set to LaGuardia Airport (LGA). When creating a NIRS Study the user has the opportunity to assign a default study elevation that will be used if no terrain data is included when computing noise. However, if terrain data is included during noise calculations, the elevation of the study center, as identified by using the terrain data, will determine the runway elevations throughout the study area. Within this project some airports in the study, such as Westchester County (HPN) and Stewart (SWF), have airfield elevations that are substantially different (+400') than the elevation near LGA, JFK, Newark (EWR), and Philadelphia (PHL). Thus as the NIRS model departs and lands aircraft at the Study Center's elevation, some centroids near these airport may be exposed to aircraft passing at unusually small slant-range (line-of-sight) distances. For any centroid that is located in just the right place this could mean that the noise exposure levels at that centroid for both the Future No Action and alternative conditions would be higher than would be expected. Unfortunately the technique used to address this airport elevation issue did not have the desired affect in the revised noise analysis for the FEIS.

In an effort to understand the ramifications of the airport elevations not being considered, this sensitivity analysis was performed. Based on the resulting comparisons between the No Action scenarios and the Preferred Alternative, it was found that this refinement does not affect the results portrayed in the FEIS. In fact, this refinement would generally result in a slight reduction in computed noise levels near these higher elevation airports.

The following sections of the document present the process that was undertaken, as well as an overview of the findings of this sensitivity analysis.

GENERAL METHODOLOGY

Using NIRS 6.0c3, a refined set of NIRS projects were created to incorporate various airport elevations and more closely model these differences at the higher elevation airports. Three NIRS projects were created, with each one centered at a representative airport with an elevation differing substantially from the main project group. Three scenarios were then modeled and compared in an effort to evaluate the sensitivities of not having the various airport elevations in the FEIS. The three scenarios evaluated were:

- NoAction Alternative
- Original Preferred Alternative
- Mitigated Preferred Alternative

In total, nine of the airports within the study were affected by raising the runway elevations. After rerunning NIRS for all nine airports in their respective NIRS projects and aggregating their results with the remaining airports defined in the study, an in-depth analysis comparing noise changes before and after raising the airport elevations was performed.

The results of the change analysis reveal that there were no differences identified in the significant range (1.5 DNL increase with resulting noise greater than 65.0 DNL) or in the slight to moderate range (3.0 DNL increase with resulting noise greater than 60.0 DNL but less than 65.0 DNL) for the alternatives tested. However in the slight to moderate range (5.0 DNL increase with resulting noise greater than 45.0 DNL but less than 60.0 DNL) there were a few minor changes. **Table 1** below provides a comparison of each category of increase before and after including the adjustment for airport elevations.

Table 1
Airport Elevation Sensitivity Analysis – Increased Noise Change Comparison

FEIS - 2011 Noise Change Summary						
	65 DNL or higher		60 to 65 DNL		45 to 60 DNL	
Minimum Change in DNL With Alternative	1.5 DNL		3.0 DNL		5.0 DNL	
Level of Impact	Significant		Slight to Moderate		Slight to Moderate	
	Centroids	Population	Centroids	Population	Centroids	Population
Noise Increases						
Preferred Alternative W/ICC	21	15,826	262	34,824	3,814	290,758
Mitigated Preferred Alternative W/ICC	0	0	98	16,803	493	50,392
Raised Elevations - 2011 Noise Change Summary						
Noise Increases						
Preferred Alternative W/ICC	21	15,826	262	34,824	3,823	291,734
Mitigated Preferred Alternative W/ICC	0	0	98	16,803	494	50,430

Source: NIRS Analysis, Metron Aviation Inc. 2007.

The pink shading in the table indicates where there was in increase in impacts when the airport elevation adjustment was incorporated. In some cases yellow impact centroids were removed but the net change was an increase of nine new centroids in the preferred alternative and 1 additional centroid in the mitigated preferred alternative. This represents an increase in yellow impact centroids of 0.24% and 0.20% respectively as compared to the FEIS results. In all cases the new centroids are found in existing clusters of similar change levels and not in wholly new areas of change.

In review of the population changes associated with the centroids, the increase represents less than one-half of one percent increase in each alternative's slight to moderate impact category (yellow). Although it may seem counter intuitive that noise could increase as flights are raised, it should be noted that most threshold increases (new yellow centroid locations) were generated due to logarithmic nature of the noise metric. In many cases, the lower value (No Action) saw a reduction while the higher value (Alternative) remained the same such that points with a 4.9 DNL increase are now seeing a 5.0 DNL increase. In simple terms, the raising of the altitudes was generally uniform across each alternative. Thus, the amount of noise energy reduction is the same or similar for each alternative. In cases where the No Action noise was low and the alternative noise was higher, this fixed amount of energy was enough to reduce the No Action level by 0.1 DNL, but not quit enough to also drop the Alternative DNL by 0.1. Consequently, in a few cases where the change was originally 4.9 DNL, the change went to 5.0 DNL and became a new yellow centroid.

Similarly, when decreases in noise were reviewed the same pattern was observed. While the two higher categories of decrease remained unchanged, the lowest level of decrease saw very minor increases in the number of people that would benefit from both the preferred alternative and the mitigated preferred alternative. **Table 2** below illustrates these results.

Table 2
Airport Elevation Sensitivity Analysis - Decreased Noise Change Comparison

FEIS - 2011 Noise Exposure						
	65 DNL or higher		60 to 65 DNL		45 to 60 DNL	
Minimum Change in DNL With Alternative	1.5 DNL		3.0 DNL		5.0 DNL	
Level of Impact	Significant		Slight to Moderate		Slight to Moderate	
	Centroids	Population	Centroids	Population	Centroids	Population
Noise Decreases						
Preferred Alternative W/ICC	33	6,984	2	22	902	62,537
Mitigated Preferred Alternative W/ICC	15	3,201	1	1	2,285	207,629
Raised Elevations - 2011 Noise Exposure						
Noise Decreases						
Preferred Alternative W/ICC	33	6,984	2	22	908	63,318
Mitigated Preferred Alternative W/ICC	15	3,201	1	1	2,290	207,780

Source: NIRS Analysis, Metron Aviation Inc. 2007.

In addition to reviewing noise change zones, further analysis was performed to consider changes to overall noise exposure. **Table 3** below provides a comparison of the noise exposure in ranges of 5 DNL from less than 45 DNL to greater than 75 DNL. When comparing each alternative's population exposure with the FEIS exposure, all alternatives show an improvement or decrease in the number of people affected by aviation noise.

Table 3
Airport Elevation Sensitivity Analysis - Noise Exposure Comparison

		No Action		Preferred Alternative W/ICC		Mitigated Preferred Alternative W/ICC	
FEIS - 2011 Noise Exposure							
	DNL Range	Centroids	Population	Centroids	Population	Centroids	Population
2011	<45	233,532	19,182,001	226,089	18,606,577	238,695	19,801,024
	45-50	59,514	7,157,243	64,912	7,592,618	54,895	6,609,002
	50-55	22,216	3,612,159	23,401	3,590,613	20,887	3,431,748
	55-60	6,241	919,396	6,790	1,039,049	6,772	999,209
	60-65	1,691	209,793	1,997	252,361	1,948	240,387
	65-70	453	69,554	467	70,558	452	69,234
	70-75	55	5,724	46	4,094	53	5,266
	>75	6	181	6	181	6	181
Total		323,708	31,156,051	323,708	31,156,051	323,708	31,156,051
Raised Airport Elevations - 2011 Noise Exposure							
2011	<45	234,141	19,226,280	226,790	18,662,911	239,410	19,853,941
	45-50	59,363	7,135,853	64,641	7,560,103	54,605	6,580,512
	50-55	21,945	3,603,305	23,159	3,580,428	20,651	3,420,988
	55-60	6,165	910,859	6,715	1,030,926	6,694	991,009
	60-65	1,625	207,164	1,930	249,725	1,882	237,789
	65-70	409	66,803	422	67,801	408	66,483
	70-75	55	5,617	46	3,987	53	5,159
	>75	5	170	5	170	5	170
Total		323,708	31,156,051	323,708	31,156,051	323,708	31,156,051

(pink) indicates increases resulting from raised airport elevations
(green) indicates decreases resulting from raised airport elevations

By color coding the Raised Airport Elevation cells to show increases in light pink and decreases in light green, it can be seen that in general noise exposure by population for all DNL rangees above 45 DNL are reduced after raising runway elevations.

CONCLUSIONS

After the public comment period closed for the Noise Mitigation and Operational Analysis reports, further review of the noise results uncovered that the attempt to account for varying runway elevations within the study area was not successful. Based on the commitment of the FAA, as described in the Noised Mitigation Report, a sensitivity analysis was performed to understand the value associated with the incorporation of more accurate airport elevations. Upon inclusion of airport elevations, a review of the exposure and impacts associated did not show meaningful change in the noise results. In summary the sensitivity results show:

- The most current reruns of the three scenarios have captured the airport elevation changes correctly.

- Generally, the results are as expected however mechanisms for additional threshold-based impacts are possible.

- The models' use of air to ground attenuation algorithms based on source to receiver angle do create some areas of small noise increases when raising the altitude of flight routes.

- These increases are minor and generally don't contribute to the creation of new slight to moderate (5 DNL increase in 45-60 DNL) points.

- Where new slight to moderate (5 DNL increase in 45-60 DNL) change points were created, it was found that these represented less than one percent of the impact at this level and did not reveal any previously undisclosed area of change.

- The DNL noise exposure comparison shows drops in population exposed to noise in all DNL ranges

- This sensitivity analysis concludes that the differences between the elevation corrected results and the FEIS published results are insignificant.