DRAFT ENVIRONMENTAL IMPACT STATEMENT

NEW YORK/NEW JERSEY/PHILADELPHIA METROPOLITAN AREA AIRSPACE REDESIGN

DECEMBER 2005

Prepared by:

United States Department of Transportation
Federal Aviation Administration

UNITED STATES DEPARTMENT OF TRANSPORTATION, FEDERAL AVIATION ADMINISTRATION, has prepared this Draft Environmental Impact Statement (Draft EIS) in accordance with the requirements and standards set forth in the FAA's Order 1050.1E, *Environmental Impacts: Policies and Procedures.* This Draft EIS evaluates impacts associated with the proposed airspace redesign in the NY/NJ/PHL Metropolitan Area, including the entire State of New Jersey and portions of Delaware, New York, Pennsylvania, and Connecticut. The purpose of this project is to increase the efficiency and reliability of the airspace structure and air traffic control system. The airspace redesign is needed to accommodate growth while maintaining safety and mitigating delays, and to accommodate changes in the types of aircraft using the system. Major airports affected by this airspace redesign include John F. Kennedy International Airport, Newark International Airport, Teterboro Airport, Philadelphia International Airport, and LaGuardia Airport. Four airspace redesign alternatives were considered in this Draft EIS: the No Action Airspace Alternative, the Modifications to Existing Airspace Alternative, the Ocean Routing Alternative, and the Integrated Airspace Alternative.

This Draft EIS is submitted for review pursuant to the following public law requirements: the National Environmental Policy Act of 1969, as amended, 42 USC Sections 4321-4347; , the Clean Air Act, as amended, 42 USC Sections 7401-7671; the Coastal Zone Management Act, as amended, 16 USC Sections 1451-1464; the Aviation Safety and Noise Abatement Act of 1979, as amended, Sections 47501-47507; Department of Transportation Act of 1966, Section 4(f), 49 USC 303(c); the Migratory Bird Treaty Act of 1981, 16 USC Sections 703-712; the National Historic Preservation Act of 1966, as amended, 16 USC Section 470; Executive Order 12989, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, and the Land and Water Conservation Fund Act Section 6(f) 16 USC Section 4601.

The FAA will consider and respond to all comments on the Draft EIS. These responses will be contained in the Final EIS. Comments on the Draft EIS will be accepted until June 1, 2006.

Please submit written comments on the Draft EIS to:

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Electronic Comments may be sent to:

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(Please include the word "Comment" in the subject line)

For additional information call 1-866-EISLINE (1-866-347-5463)

A series of public workshops will be held throughout the Study Area from February to April 2006. Meeting location and schedule information can be obtained by calling the number listed above or via the following webpage: **http://www.faa.gov/nynjphl_airspace_redesign**. The Draft EIS may also be viewed at this webpage.

EXECUTIVE SUMMARY

The Federal Aviation Act of 1958 delegates various responsibilities to the Federal Aviation Administration (FAA) including controlling the use of the navigable airspace and regulating civil and military operations in that airspace in the interest of maintaining the safety and efficiency of both of these operations. In its effort to continually maintain safety and increase efficiency of the airspace, the FAA is proposing to redesign the airspace in the NY/NJ/PHL Metropolitan Area.

This redesign was conceived as a system for more efficiently directing Instrument Flight Rule (IFR) aircraft to and from major airports in the NY/NJ/PHL Metropolitan Area, including John F. Kennedy International Airport (JFK) and LaGuardia Airport (LGA) in New York, Newark Liberty International Airport (EWR) and Teterboro Airport (TEB) in New Jersey, and Philadelphia International Airport (PHL) in Pennsylvania.

The purpose of this Draft Environmental Impact Statement (Draft EIS) is to evaluate the environmental effects of the NY/NJ/PHL Metropolitan Area Airspace Redesign (Airspace Redesign) in accordance with the National Environmental Policy Act of 1969 (NEPA).[1] This Draft EIS was officially initiated when the FAA issued a Notice of Intent (NOI) to prepare an EIS on January 22, 2001. The format and subject matter in this environmental study conform to the requirements and standards of the Council on Environmental Quality (CEQ) regulations[2] and the FAA as set forth in FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*.

ES.1 PURPOSE AND NEED

The basic air traffic environment for the NY/NJ/PHL Metropolitan Area airspace was designed and implemented in the 1960s. Since that time, the volume of air traffic and the type of aircraft that use the air traffic control (ATC) system have changed significantly. However, the basic structure of the NY/NJ/PHL airspace has essentially remained the same and has not been adequately modified to address changes in the aviation industry, including increase air traffic levels and the use of new aircraft types. Therefore, the Airspace Redesign is needed to accommodate growth while maintaining safety and mitigating delays, and to accommodate changes in the types of aircraft using the system (e.g., smaller aircraft, more jet aircraft). The purpose of the Airspace Redesign is to increase the efficiency and reliability of the airspace structure and ATC system.

ES.2 PROPOSED ACTION

The Proposed Action for this Draft EIS is to redesign the airspace in the NY/NJ/PHL Metropolitan Area. This involves developing new routes and procedures to take advantage of improved aircraft performance and emerging ATC technologies.

The Proposed Action does not include any physical changes or development of facilities, nor does it require local or state actions. Therefore, no physical alteration to any environmental resource would occur and no permits/licenses would be required. Additionally, the Airspace Redesign would

[1] P.L. 91-190, 32 USC Section 3321 et. seq.

[2] 40 CFR Part 1500

not require changes to any Airport Layout Plan and infrastructure funding is not expected to be necessary.

Since the Airspace Redesign involves modifications to airspace configuration and air traffic management procedures, the project requires direct FAA action in order to be implemented. This consists of the design, development, implementation, and use of new or modified ATC procedures and reconfigured airspace.

ES.3 ALTERNATIVES

The examination of alternatives is of critical importance to the environmental review process. Those alternatives that meet the Purpose and Need will be included for detailed environmental analysis for the study years of 2006 and 2011.

The range of alternatives considered in this Draft EIS include those within the following categories: (1) alternative modes of transportation and communication, (2) changes in airport use, (3) congestion management programs, (4) improved air traffic control technology, and (5) airspace redesign. Of the five categories of potential alternatives considered, alternatives one through four are not carried forward for detailed analysis because they do not meet the Purpose and Need. Airspace Redesign is the only category that offers the potential to meet the Purpose and Need because the airspace redesign can result in an air traffic system with enhanced safety, reduced delays, and the ability to accommodate growth.

This Draft EIS considers four airspace redesign alternatives including:

- **Future No Action Alternative**, which assumes no changes to the existing airspace;
- **Modifications to Existing Airspace Alternative**, which includes modifications to current routes and procedures to improve efficiency in the current airspace system;
- **Ocean Routing Airspace Alternative**, proposed by the NJ Citizens for Environmental Research (NJCER), which moves all flights departing from Newark International Airport over the Atlantic Ocean before turning in the direction of their final destinations; and
- **Integrated Airspace Alternative,** integrates the New York Terminal Radar Approach Control's (New York TRACON's) airspace with portions of surrounding Air Route Traffic Control Centers' airspace to operate more seamlessly.

These alternatives are described in the sub-sections that follow. Descriptions of each alternative are followed by a summary of the Purpose and Need evaluation. The alternatives are evaluated based on Purpose and Need, operational viability, and operational efficiency criteria. Operational viability refers to whether a particular airspace redesign is workable and thus, safe. Operational viability criteria include reduced airspace complexity and reduced voice communications. Operational efficiency refers to how well a particular design works. Operational efficiency criteria include: reduced delay; balanced controller workload; meeting system demands; improved user access to the system; expedited arrivals and departures; increased flexibility in routing; and maintaining airport throughput.

ES.3.1 Future No Action Airspace Alternative

Although it does not meet the Purpose and Need of the Proposed Airspace Redesign Project, the Future No Action Airspace Alternative is analyzed as required by NEPA and CEQ regulations. Note that under the Future No Action Airspace Alternative, the airspace will operate as it did during existing or baseline conditions (2000), with the exception of two procedural changes (i.e., the Dual Modena and the Flip-Flop) that have been implemented and have independent utility with regards to the Airspace Redesign. As these changes have been implemented, they are included as part of the Future No Action Airspace Alternative. The only major difference between this alternative and present day operations will be in the type and quantity of aircraft operations otherwise known as the flight schedule.

ES.3.2 Modifications to Existing Airspace Alternative

This alternative takes the current routes and procedures and modifies them to improve efficiency in the current airspace system. The differences between this alternative and the Future No Action Airspace Alternative include additional departure headings as well as shifting of the NY Metropolitan Area airports' South departure gate and the PHL East departure gate.

New departure headings for LGA, EWR and PHL would be implemented as part of this alternative. For example, a more direct LGA Ocean departure procedure would be added.

In this alternative, the South departure gate is shifted 10 miles to the west. Departures to the south originating from JFK, LGA, TEB and EWR, would be shifted to the new South departure gate. In addition, the PHL East departure gate would be shifted to the east; PHL departures to the east would have to continue farther east before tuning to the northeast.

Arrivals in the Modifications to Existing Airspace Alternative would not be changed from today's configuration.

The Modifications to Existing Airspace Alternative enhances safety by reducing complexity. This alternative improves efficiency by increasing flexibility, maintaining airport throughput, and expediting departures. Therefore, this is a reasonable alternative for meeting the Purpose and Need of the Airspace Redesign and is carried forward for a detailed environmental analysis.

ES.3.3 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).[3]

The Ocean Routing Airspace Alternative proposes to move EWR departures out over the Atlantic Ocean prior to turning them west to their final destinations. This alternative proposes significant changes to EWR and JFK departures. It also creates a new JFK arrival post which is located approximately 10 miles east of Mantoloking Shores, NJ. In addition, LGA departures flying to the North gate remain east of the Hudson River for a longer distance prior to

[3]"Development of Air Traffic Routings for the Mitigation of Aircraft Noise in New Jersey," submitted to New Jersey Citizens for Environmental Research, Inc.; June 1993; Section 1.0 – Executive Summary, p. 1.

turning toward the North gate than in the Future No Action Airspace Alternative.

The purpose of the Ocean Routing Airspace Alternative is to reduce noise impacts on the citizens of New Jersey. The purpose of the Proposed Action is to increase the efficiency and reliability of the entire NY/NJ/PHL Metropolitan Airspace. Therefore, because the Ocean Routing Airspace Alternative is focused on reducing noise in one specific area and not on increasing the efficiency and reliability of the entire NY/NJ/PHL Metropolitan Airspace, it was apparent that from its inception this alternative did not meet the Airspace Redesign Purpose and Need. The evaluation of the Purpose and Need Criteria supported this finding. The Ocean Routing Airspace Alternative would not: reduce delay, balance controller workload, meet system demand, improve user access, expedite arrivals and departures, increase flexibility, nor maintain airport throughput.

Although it was apparent that the Ocean Routing Airspace Alternative would not meet the Purpose and Need, the FAA elected to include this alternative for a detailed environmental analysis due to the long standing concerns of the NJCAAN.

ES.3.4 Integrated Airspace Alternative

The Integrated Airspace Alternative integrates the NY TRACON airspace with portions of surrounding Center's airspace to operate more seamlessly in either a standalone (existing facilities) or consolidated manner. The Integrated Airspace Alternative could be accomplished either with standalone or consolidated facilities because the key component is a common automation platform.[4] The consolidated facility is called the Integrated Control Complex (ICC). ICC is an operational concept that would merge the current New York TRACON and New York Center into a single facility.

The Integrated Airspace concept would expand the airspace in which terminal separation rules could be used. Where en route airspace separation rules of five nautical miles are typically used today, this concept would allow for the use of three nautical mile terminal airspace separation rule. This would permit less restrictive separations to be used over a larger geographical area and at higher altitudes.

The initial phase of the Integrated Airspace Alternative involves modifications to a departure gate, as well as close-in departure procedures. This phase is called the Integrated Airspace Alternative Variation without 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 Variation without ICC because the airspace structure does not change from phase one. The second variation of phase two 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 is known as the Integrated Airspace Alternative Variation with ICC. Each variation of the Integrated Airspace Alternative is presented below and each is evaluated separately for the potential to meet

[4] A common automation platform includes shared displays on screens, radar, data processing and presentation, and communications.

the Purpose and Need of the Proposed Airspace Redesign Project.

ES.3.4.1 The Integrated Airspace Alternative Variation without ICC

The major changes associated with this variation versus the Future No Action Airspace Alternative involve departures to the West gate from EWR, TEB, and LGA flights, and departure headings at EWR, LGA, and PHL. The West gate has been extended. The departure headings changes are the same as those in the Modifications to Existing Airspace Alternative, but how the aircraft transition to the expanded West departure gate will vary due to the movement of the gate. In addition, a new turboprop arrival route to TEB would be established as part of this alternative. No major changes would be made to JFK arrival or departure routings as a result of this design.

The Integrated Airspace Alternative Variation without ICC enhances safety by reducing complexity and voice communications. It improves efficiency by reducing delay, balancing controller workload, meeting system demands, improving user access to the system, expediting departures, increasing flexibility in the West gate area, and maintaining airport throughput primarily at EWR.

Therefore, this is a reasonable alternative for meeting the Purpose and Need of the Proposed Airspace Redesign Project and is carried forward for environmental analysis.

ES.3.4.2 The Integrated Airspace Alternative Variation with ICC

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 departure headings. The second variation is called the Integrated Airspace Alternative Variation with ICC.

This variation represents a full airspace consolidation and is a new approach to the redesign of airspace from NY 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 (as opposed to 19,000 feet MSL with current airspace structure).[5] The airspace would be comprised of the majority of current NY TRACON and NY Center airspace, in addition to several sectors from Washington Center and Boston Center.

This variation would lead to reduced complexity, reduced voice communications, reduced delays, more balanced controller workload, increased ability to meet system demand, improved user access to the system, expedited arrivals and departures, greater flexibility in routing, and the ability to maintain greater airport throughput. Therefore, this is a reasonable alternative for meeting the Purpose and Need of the Proposed Airspace Redesign Project and is carried forward for a detailed environmental analysis.

ES.3.5 Comparison of the Airspace Redesign Alternatives

The Future No Action Airspace Alternative was carried forward as required by CEQ Regulations to provide a benchmark, enabling decision makers to compare the

[5]Many air traffic control altitudes are given in flight levels representing altitude above mean sea level (MSL) in increments of 100 feet (i.e., flight level 230 equates to 23,000 feet above MSL).

magnitude of environmental effects of the other alternatives. Two airspace redesign alternatives meet the Purpose and Need for the Airspace Redesign: Modifications to Existing Airspace Alternative and Integrated Airspace Alternative Variations with and without ICC. These alternatives were carried forward for detailed environmental analysis. Although the Ocean Routing Airspace Alternative did not meet the Purpose and Need, it was carried forward for environmental analysis to address long standing public concerns.

Each Airspace Redesign Alternative is qualitatively and quantitatively evaluated and compared based on the Purpose and Need Evaluation Criteria. The results of this analysis will be used by the decision makers as a means of comparing the alternatives to assist in selecting a preferred alternative.

The qualitative analysis is based on the expected results of a particular change relative to the existing airspace structure. For example, when a departure gate is added it is expected that the ability of that alternative to meet system demands will improve. The existing airspace structure is equivalent to that of the Future No Action Airspace Alternative; therefore, all qualitative discussions relate changes to an alternatives' airspace design to the Future No Action Airspace.

The quantitative analysis is based on operational metrics obtained through the use of computer modeling of the Alternatives. Flight paths for each alternative are modeled using the Total Airspace and Airport Modeler (TAAM) fast-time simulation tool, which is used to calculate metrics. These metrics provide a basis for comparison of the Alternatives.

A summary of the quantitative evaluation of the Airspace Redesign Alternatives in terms of the Purpose and Need Criteria is presented in **Table ES.1**. The following paragraphs summarize the qualitative discussions of each of the Proposed Action Alternatives.

Table ES.1
Operational Comparison of Alternatives
(The most advantageous operational metric has been shaded and boldfaced)

Purpose & Need Evaluation Criteria	**How Measured**	**Alternative**				
		Future No Action	**Modifications to Existing Airspace**	**Ocean Routing Airspace**	**Integrated Airspace**	
					without ICC	**with ICC**
Reduce Complexity	Jet route Delays + time below 18,000 feet (minutes)	12	12	12	11	**10**
	Arrival Distance below 18,000 feet (nautical miles)	96	**95**	99	96	102
Reduce Voice Communications	Maximum Inter-facility handoffs per hour	525	525	521	529	**382**

Table ES.1 (continued)
Operational Comparison of Alternatives
(The most advantageous operational metric has been shaded and boldfaced)

Purpose & Need Evaluation Criteria	How Measured	Alternative				
		Future No Action	Modifications to Existing Airspace	Ocean Routing Airspace	Integrated Airspace	
					without ICC	with ICC
Reduce Delay	Traffic weighted arrival delay 2011 (minutes)	22.9	22.6	23.6	22.8	**19.9**
	Traffic weighted departure delay 2011 (minutes)	23.3	20.9	29.5	20.8	**19.2**
Balance Controller Workload	Equity of West gate fix traffic counts	0.37	0.37	0.37	0.34	**0.30**
Meet System Demands & Improve User Access to System	End of day's last arrival push (time)	23:54	23:54	23:54	23:54	**23:00**
Expedite Arrivals and Departures Expedite Arrivals and Departures	Time below 18,000 ft (minutes)	18.5	**18.2**	18.8	18.2	18.6
	Change in route length per flight (nautical miles) (1)	0.0	0.0	4.5	**-1.2**	3.7
	Change in block time (minutes per flight) (1)	0.0	-0.9	3.9	-1.0	**-1.4**
Flexibility in Routing	Delay saved per flight per day (minutes)	0	0	0	0	**12.6**
Maintain Airport Throughput	Arrival Maximum Sustainable Throughputs	223	223	223	223	**238**
	Departure Maximum Sustainable Throughputs	238	239	221	240	**245**

Notes:
(1) A negative value indicates a net decrease in the category.

Source: Operational Analysis of NY/NJ/PHL Metropolitan Area Airspace Redesign Alternatives, (MITRE Technical Report - MTR 05W0000025, March 2005, Table ES-1. Summary of Operational Impacts, p. ix.)

The Modifications to Existing Airspace Alternative increases departure efficiency to the west by fanned headings and by splitting the major westbound airway (J80) into two independent airways. This alternative has small benefits.

The Ocean Routing Airspace Alternative will increase route distance and flying time for EWR, LGA, and JFK. Departure efficiency at EWR is greatly reduced. JFK arrivals and departures share one part of the airspace, thereby increasing complexity. The reroute of departures from EWR and JFK increases airspace complexity above PHL which is already a bottleneck in the en route system. These drawbacks are not offset by operational benefits.

Like the Modifications to Existing Airspace Alternative, the Integrated Airspace Alternative Variation without ICC increases departure efficiency to the west by fanned headings and by splitting the major westbound airway (J80) into two independent airways. In addition, this variation reduces congestion on the South departure gate. This variation shows a slight increase in required interfacility voice communications.

The Integrated Airspace Alternative Variation with ICC provides the most substantial operational benefit of any of the designs. It is a wholesale restructuring of arrival and departure routes. Efficiency is increased by more use of available runways and departure headings. Airspace delays are virtually eliminated and route flexibility is enhanced. Flying distances are increased for many flights, but the delay reductions are large enough to make this a net benefit to traffic.

ES.4 STUDY AREA

The Study Area is defined as the geographic area potentially environmentally impacted by the proposed action. The Proposed Airspace Redesign Project Study Area encompasses the entire state of New Jersey and portions of four other states: Connecticut, Delaware, New York, and Pennsylvania (See **Figure ES.1**). The Study Area is comprised of approximately 31,180 square miles and encompasses all or portions of 64 counties, 490 independent cities as well as other municipal areas.

Criterion from FAA Order 1050.1E was used to determine the Study Area for the Proposed Airspace Redesign. According to FAA Order 1050.1E, the altitude ceiling for environmental considerations regarding airspace studies is 10,000 feet above ground level AGL. The highest point in the Study Area is 4,000 feet MSL at Hunter Mountain, New York, making the overall altitude ceiling of the Study Area 14,000 feet MSL (resulting in 10,000 feet AGL). Thus, using input from the Airspace Redesign Team, the Study Area was created to encompass the geographic areas where proposed changes to aircraft routes occurred below 14,000 MSL. This Study Area is then the basis for the analysis of the alternatives and their potential impacts associated with alternative routings for aircraft flying IFR at altitudes up to 14,000 feet MSL.

ES.5 STUDY AREA AIRPORTS

Because there are many public and private airports in the Study Area, the air traffic flows to and from these airports are highly interrelated. The NY/NJ/PHL Metropolitan Area Airspace Redesign focuses on five major airports and 16 satellite airports in the Study Area. The five major airports are as follows:

Airports within the Study Area

Figure ES.1

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- John F. Kennedy International (JFK)
- LaGuardia (LGA)
- Newark Liberty International (EWR)
- Teterboro (TEB)
- Philadelphia International (PHL)

The 16 satellite airports are as follows:

- Allentown/Lehigh Valley International (ABE)
- Atlantic City International (ACY)
- Bridgeport/Igor I. Sikorsky Memorial (BDR)
- Caldwell/Essex County (CDW)
- Westhampton Beach/ The Francis S. Gabreski (FOK)
- Islip Long Island MacArthur (ISP)
- Linden (LDJ)
- Morristown Municipal (MMU)
- Newburgh/Stewart International (SWF)
- New Haven/Tweed-New Haven (HVN)
- Northeast Philadelphia (PNE)
- Republic (FRG)
- Trenton/Mercer County (TTN)
- White Plains/Westchester County (HPN)
- Wilmington/New Castle County (ILG)
- McGuire Air Force Base (WRI)

The five major airports and 16 satellite airports in the Study Area are depicted in Figure ES.1.

While there are many satellite airports physically located within the Study Area, they were not included in the operational modeling or noise analysis. The decision to include or exclude airports was based on the fact that the Airspace Redesign applies to IFR operations. Airports without a significant amount of IFR traffic were not modeled because there will be little or no change to their operations as a result of the Proposed Action. The resulting list of airports to be modeled was reviewed and found to be consistent with the airports that may be impacted based on the Proposed Action.

ES.6 ENVIRONMENTAL CONSEQUENCES

The Proposed Airspace Redesign Project does not include construction of any infrastructure, and as such is not expected to cause adverse environmental impacts to most resource categories relating to the physical environment. Thus, the following resource categories would not be affected by the Proposed Airspace Redesign Project:

- Coastal Resources
- Construction Impacts
- Farmlands
- Floodplains
- Hazardous Materials, Pollution Prevention, and Solid Waste
- Water Quality

- Wetlands
- Wild and Scenic Rivers

The following resource categories were also evaluated for potential impacts, but further analysis was not deemed necessary for the reasons stated:

- Air Quality - since the Proposed Action Airspace Redesign alternatives would be considered *de minimus* actions and would have little effect on vehicle traffic, no negative air quality impacts would be expected.

- Light Emissions and Visual Impacts – Radar data indicates that areas where lower altitude airspace changes would take place are likely already exposed to aircraft lights and aircraft flights; therefore, no light emissions or visual impacts would be expected in these areas. In addition, because of the unique cultural qualities of Tribal Lands, additional analysis of potential visual impacts on Native American Tribes located in the Study Area was completed. It was determined that Tribal Lands were either subject to minor changes in aircraft routes or were already exposed to regular overflights. Therefore, the implementation of any of the Airspace Redesign alternatives would not result in significant visual impacts to Tribal lands within the Study Area.

- Natural Resources and Energy Supply – The proposed changes in air traffic procedures are intended to improve air traffic flow and enhance the safe operation of aircraft within the airspace structure. With the exception of the Ocean Routing Airspace Alternative, the Proposed Action Airspace Redesign alternatives propose changes in air traffic procedures that would result in more direct routing and less delay. When compared to the Future No Action Airspace Alternative, these alternatives would result in reduced fuel consumption; therefore, significant impacts to natural resources and energy supply are not expected.

Resource categories that would potentially be impacted by the Proposed Airspace Redesign Project are discussed in the following subsections.

ES.6.1 Noise/Compatible Land Use

Noise increases resulting from implementation of the Proposed Action may affect the quality of the human environment and are analyzed in this Draft EIS. Noise impacts are analyzed by predicting the community exposure to aircraft noise attributable to each of the Proposed Action Airspace Redesign alternatives. The analysis 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 change in aircraft noise is compared to the noise impact criteria to determine the level of potential noise impacts. The results of the noise analysis are also used to determine whether the existing and planned land use is compatible with the change in noise exposure.

The analysis includes determination of aircraft noise exposure in the Study Area as forecast for the years 2006 and 2011. The analysis focuses on the noise conditions for specific locations at the population centroids (i.e., centers of census blocks) using the Day/Night Average Sound Level (DNL). The number of people exposed to various noise levels is estimated based on the number of people 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 the FAA in Order 1050.1E.

The FAA has established 65 DNL as the threshold above which aircraft noise is considered to be incompatible with residential areas. In addition, the FAA has 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.[6]

Three categories of impacts are examined in this analysis, based on FAA Order 1050.1E:

- Significant Impacts: 1.5 DNL minimum increase resulting in 65+ DNL noise exposure, or 1.5 DNL minimum increase where noise exposure already exceeds 65 DNL

- Slight to Moderate: 3 DNL minimum increase resulting in noise exposure between 60 and 65 DNL, or 3.0 DNL minimum increase where noise exposure is already between 60 and 65 DNL

- Slight to Moderate: 5 DNL minimum increase resulting in noise exposure between 45 and 60 DNL, or 5 DNL minimum increase where noise exposure is already between 45 and 60 DNL

Tables ES.2 and ES.3 present a summary of the affected population projected in 2006 and 2011 for each alternative in terms of the FAA threshold criteria. The table is color coded based on the centroid mapping scheme presented in **Figures ES.2 through ES.5**. The analysis indicates that each of the alternatives would result in some changes where noise exposure is increased to within one of the FAA criterion thresholds.

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 airspace alternative is expected to generate significant noise impacts in the future. This is largely due to the fact that the Modifications to Existing Airspace and the Integrated Airspace Alternatives include departure heading changes at the major airports while the Ocean Routing Airspace Alternative uses the current headings. The Modifications to Existing Airspace Alternative tends to create the fewest significant impacts and has the best aggregate significant impact totals. The Integrated Airspace Alternative Variations both generate similar levels of significant impacts in the future.

Therefore, it may be concluded that the implementation of the Modifications to Existing Airspace or the Integrated Airspace Alternatives would result in significant noise impacts. These significant noise impacts to noise sensitive areas would also be considered a significant impact in terms of land-use compatibility. Mitigation measures to avoid, minimize, rectify, reduce, eliminate, or compensate for these significant impacts will be considered in the Final EIS.

ES.6.2 Socioeconomic Impacts and Environmental Justice

According to FAA Order 1050.1E, the proposed changes in air traffic procedures should be evaluated for their potential to result in the relocation of residences and businesses; alter surface transportation patterns; divide established communities;

[6] FAA Order 1050.1E; 14 CFR Part 150 Section 150.21(a)(2)(d); FICON 1992, Pp. 3-5.

2011 Modifications To Existing Airspace Alternative Change In Noise Exposure

Figure ES.2

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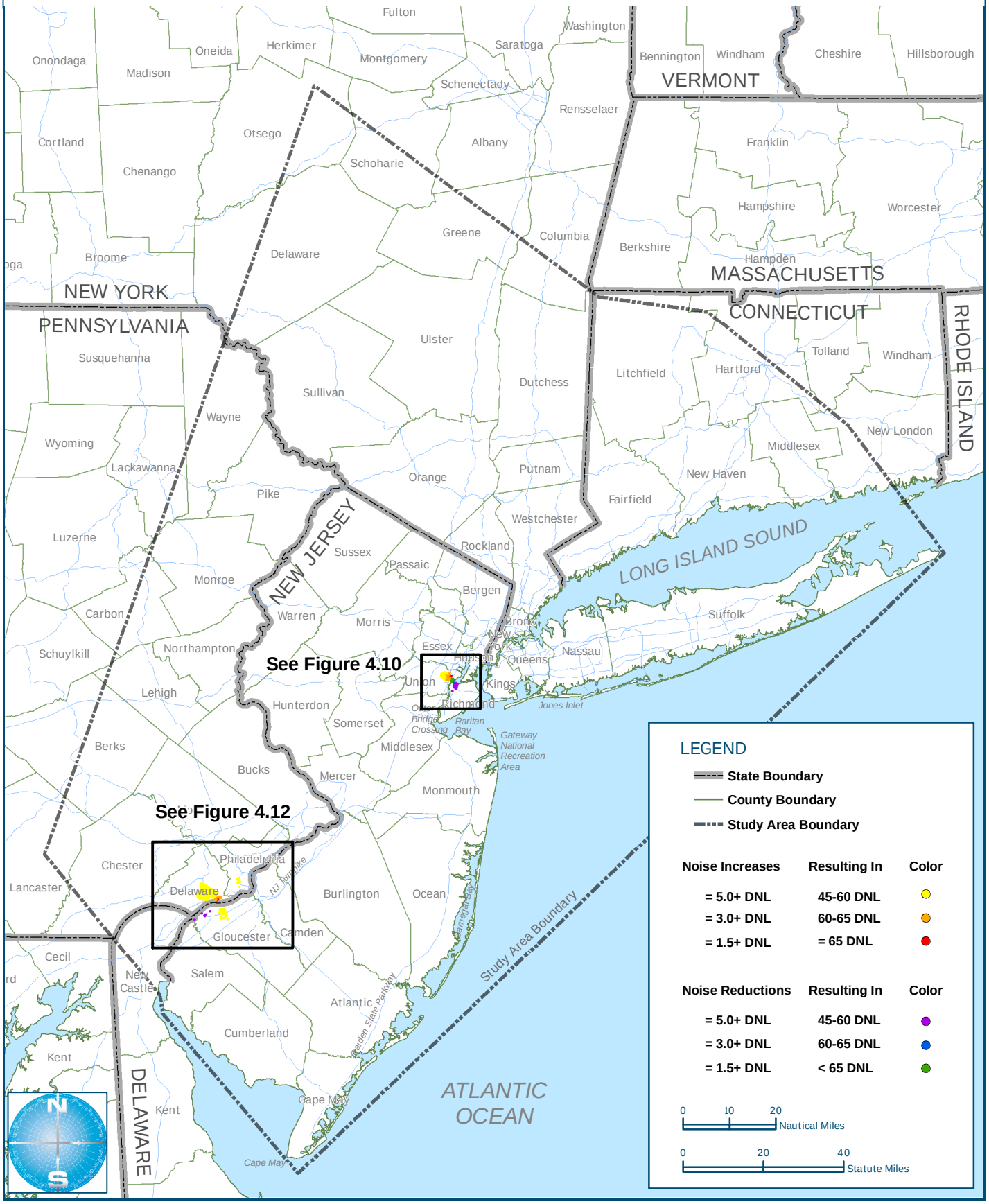

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2011 Ocean Routing Airspace Alternative Change In Noise Exposure

Figure ES.3

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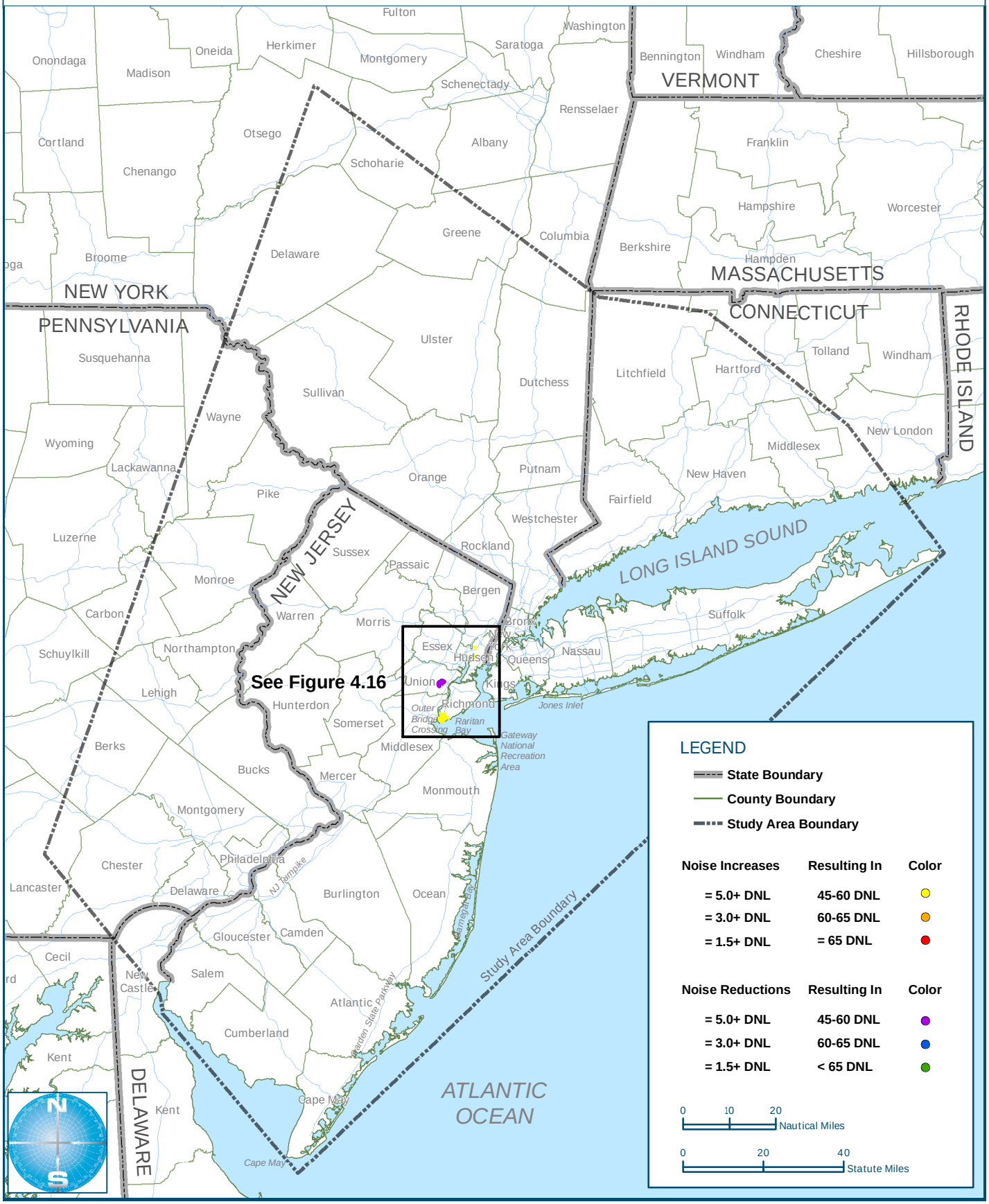

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2011 Integrated Airspace Alternative Variation Without ICC Change In Noise Exposure

Figure ES.4

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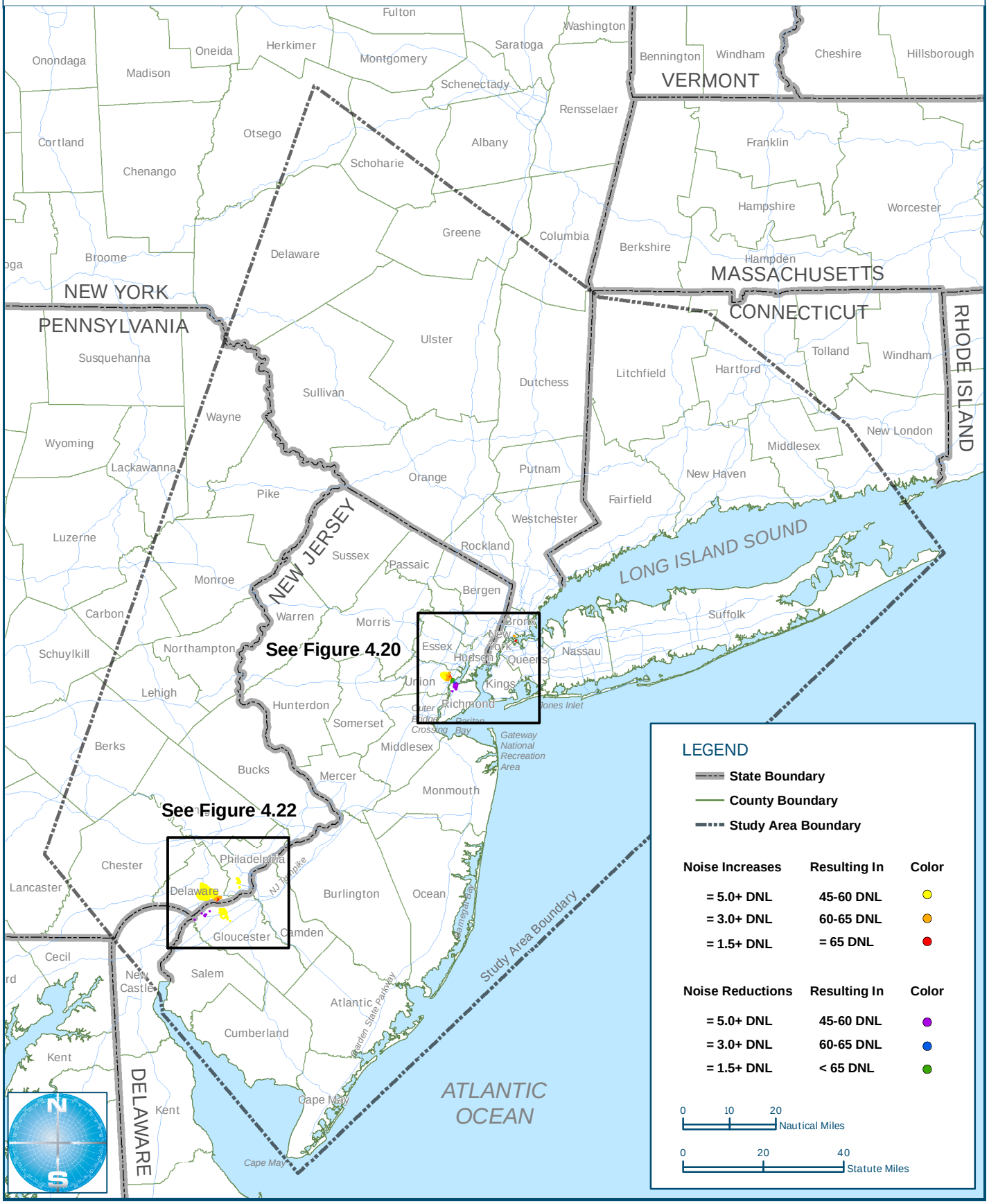

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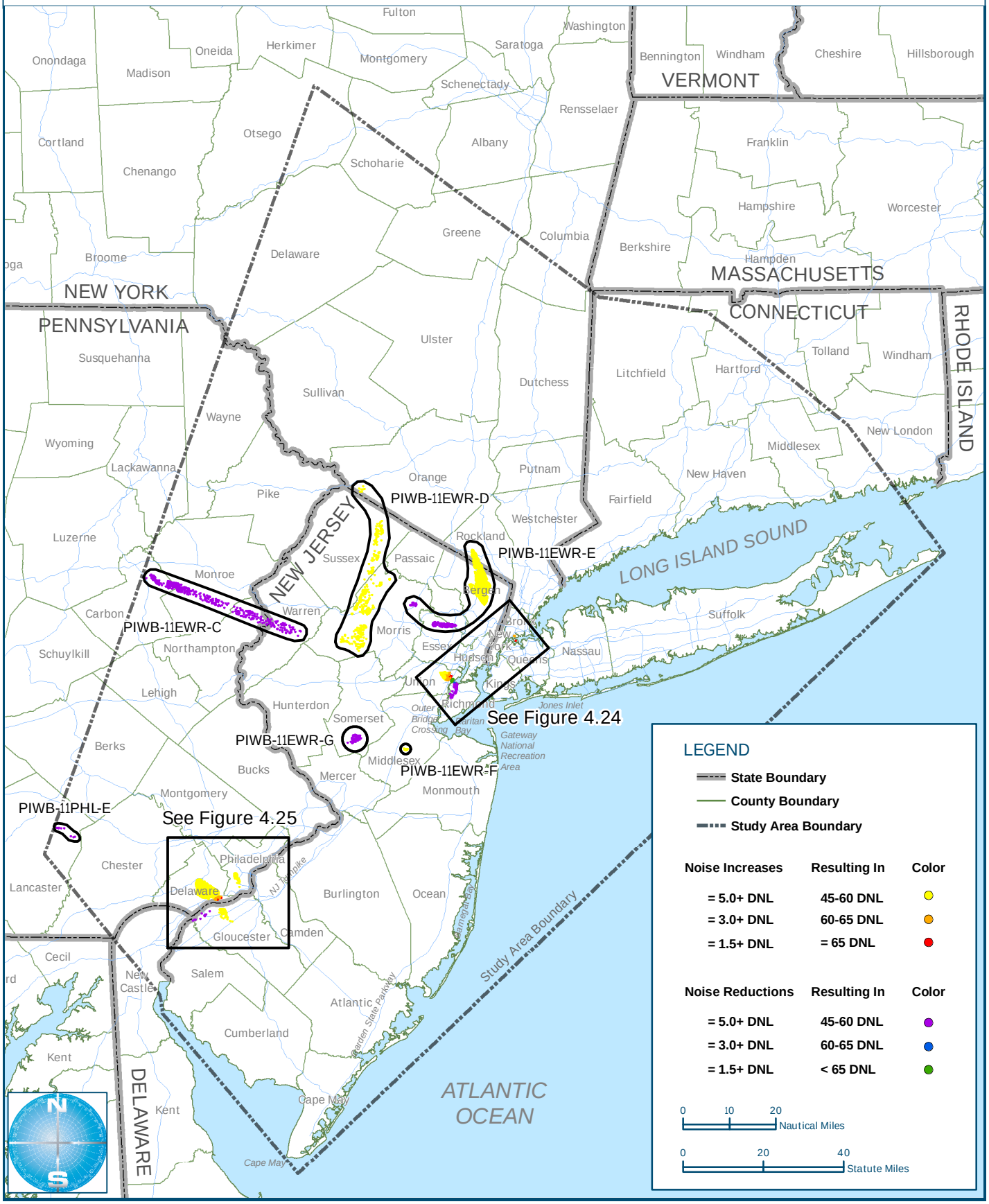
2011 Integrated Airspace Alternative Variation With ICC Change In Noise Exposure

Figure ES.5

DRAFT ENVIRONMENTAL IMPACT STATEMENT



NEW YORK / NEW JERSEY / PHILADELPHIA METROPOLITAN AIRSPACE REDESIGN PROJECT

Table ES.2
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	8,068	36,803	142,559
Ocean Routing Airspace	0	0	7,504
Integrated Airspace Variation without ICC	16,290*	36,828	138,840
Noise Decreases			
Modifications to Existing Airspace	5,970	1	36,628
Ocean Routing Airspace	180	1,600	117,988
Integrated Airspace Variation without ICC	5,970	1	37,120

*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. 2005.

Table ES.3
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	33,280	109,482
Ocean Routing	0	0	18,633
Integrated without ICC	13,584*	33,212	109,803
Integrated with ICC	15,538*	34,705	281,884
Noise Decreases			
Modifications to Existing Airspace	5,094	22	8,440
Ocean Routing	0	0	16,166
Integrated without ICC	5,094	22	8,695
Integrated with ICC	6,984	22	60,591

*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. 2005

disrupt orderly; planned development; or to create an appreciable change in employment.

The proposed alternatives would not result in the construction of facilities. Therefore, the alternatives considered would not result in a direct impact causing the relocation of residences or businesses; alteration of surface transportation patterns; division of established communities; disruption of orderly; planned development; or creation of an appreciable change in employment.

Although direct socioeconomic impacts would not be expected, there is the potential for indirect impacts because all of the Proposed Action Airspace Redesign

alternatives except the Ocean Routing Airspace Alternative would potentially result in significant noise impacts. All of the significantly impacted census blocks are located in the vicinity of LGA, EWR, and PHL. These areas are already exposed to extensive aviation noise. In addition, because of their urban setting ambient noise is also high in these areas. For example the noise levels recorded at noise measurement sites near EWR ranged from 64 to 68 DNL (See Section 3.3.2, Background Noise Measurement.) Therefore, it would be unlikely that residences or business would relocate, surface transportation patterns would be altered, established communities would be divided, planned development would be disrupted or employment levels would be changed as a result of any of the Airspace Redesign Alternatives. Therefore, socioeconomic impacts are not likely as a result of any of the Airspace Redesign Alternatives.

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, and the accompanying Presidential Memorandum and Order DOT 5610.2, *Environmental Justice in Minority and Low-Income Populations*, require the FAA to identify and address disproportionately high and adverse human health or environmental impacts on low-income and minority populations in the communities potentially impacted by the Proposed Action. In order to comply with Order DOT 5610.2, the FAA must conduct meaningful public involvement with minority and low-income populations and analyze the potential for disproportionate adverse impacts to these communities.

Public involvement included informal pre-scoping meetings and formal scoping meetings. Pre-Scoping meetings were held from September 1999 to May 2000. Scoping meetings were held between January and June 2001. FAA presentations at these meetings included project information such as the need for the Proposed Action, to accomplish potential alternatives to the Proposed Action and the environmental process. During the pre-scoping and scoping meetings, the public was encouraged to comment on issues regarding the EIS.

All these meetings were designed with sensitivity to low-income and minority populations. To conduct meaningful public involvement, the FAA considered the special needs of the low-income and minority communities. Special needs were accommodated by holding meetings in locations accessible by public transit, providing translators, advertising meetings in specialized local foreign language media, and contacting community and church leaders.

The environmental justice analysis examined the areas significantly impacted by noise for disproportionate adverse impacts to low income and minority communities. Areas near LGA, EWR, and PHL would be significantly impacted by noise resulting from the Airspace Redesign alternatives.

One census block near LGA would be significantly noise impacted by the Integrated Airspace Alternative Variation without the ICC and the Integrated Airspace Alternative Variation with ICC. This block consists of the entirety of Rikers Island, which is New York City's main penal facility. Riker's Island is projected to have a population that is over 91% minority in 2006 and over 92% minority in 2011. Therefore, the population of Rikers Island would be considered a minority population.

Census blocks near EWR would be significantly impacted as a result of the Modifications to Existing Airspace and Integrated Airspace Alternatives. The minority population of the significantly impacted census blocks near EWR exceeds 50% in both 2006 and 2011. Therefore, the population of the significantly impacted census blocks would be considered a minority population.

The population of the significantly noise impacted census blocks near PHL was not found to be a minority or low income population.

Therefore, the significant noise impacts near LGA and EWR would constitute a disproportionate impact on a minority population. The Modifications to Existing Airspace Alternative, Integrated Airspace Alternative Variation without ICC, Integrated Airspace Alternative Variation all would result in disproportionate impacts to minority populations and therefore would result in significant environmental justice impacts. Mitigation measures to avoid, minimize, rectify, reduce, eliminate, or compensate for these significant impacts will be considered in the Final EIS.

ES.6.3 SECONDARY OR INDUCED IMPACTS

Major development proposals have the potential to produce induced or secondary impacts on surrounding communities. Induced impacts could include shifts in population and growth; increased (or decreased) demand for public services; and changes in business and economic activity within the confines of the Study Area.

Significant induced impacts would normally result from significant impacts to other impact categories especially noise, compatible land use and social impacts. Therefore, potential secondary impacts were considered based on analysis of noise, land use, and social impacts. There is potential for significant noise impacts with all of the proposed alternatives with the exception of the Ocean Routing Alternative, however, it is not expected that any of the Airspace Redesign alternatives would result in shifts in population and growth; increased demand for public services; or changes in business and economic activity.

All of the significantly impacted census blocks are located in the vicinity of LGA, EWR, and PHL. These areas are already exposed to extensive aircraft noise. In addition, because of their urban setting, ambient noise is also high in these areas. For example the noise levels recorded at noise measurement sites near EWR ranged from 64 to 68 DNL. Therefore, it would be unlikely that noise impacts associated with the Proposed Action Airspace Redesign alternatives would result in significant secondary impacts.

ES.6.4 Department of Transportation Act: Section 4(f)

Section 303(c), Title 49 USC, commonly referred to as Section 4(f) of the DOT Act,[7] states that the "…Secretary of Transportation will not approve a project that requires the use of any publicly-owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance or land from a historic site of national, state, or local significance as determined by the officials having jurisdiction thereof, unless there is no feasible and prudent alternative to the use of such land…and [unless] the project

[7] Department of Transportation Act of 1966, § 4(f) [recodified at 49 USC 303 (c)].

includes all possible planning to minimize harm resulting from the use."[8]

In regard to 4(f) properties the term use encompasses both direct and indirect impacts to Section 4(f) properties. The term use encompasses both physical use of the property as well as constructive uses. Indirect adverse impacts, such as noise, that prevent the use of Section 4(f) properties for their intended purpose are considered as constituting a constructive use. In determining whether there is a constructive use, the FAA must determine if the impacts would substantially impair the property. A Section 4(f) property is determined to be substantially impaired when the activities, features, or attributes of the site that contribute to its significance or enjoyment are substantially diminished. According to FAA Order 1050.1E, the Part 150 land use compatibility guidelines may be used to determine if there is a constructive use of a Section 4(f) property, if the guidelines are relevant to the value, significance, and enjoyment of that particular property.

The Airspace Redesign alternatives do not require land acquisition or facility construction. Therefore, the Airspace Redesign alternatives do not result in a physical use of any Section 4(f) property. However, because the Proposed Action Airspace Redesign alternatives would potentially result in significant changes in noise, constructive use of Section 4(f) properties is also addressed.

Two methods were used to evaluate noise impacts to the Section 4(f) properties. The first method was to determine which Section 4(f) properties were located within the significantly impacted census blocks by using the GIS land use data. The second method was to input location data (latitudes and longitudes) for Section 4(f) properties within these census blocks into the noise model and calculate noise values at the specific Section 4(f) locations.

Based on these analyses it was determined that the noise level would potentially increase significantly at two historic sites located south of PHL: the Lazaretto and Printzhof sites. Although a significant noise change would result at both sites for the Modifications to Existing Airspace Alternative and the Integrated Airspace Alternative Variation without ICC, this noise would not result in a constructive use. A quiet setting is not a recognized purpose or attribute of either site. Therefore, Part 150 land use compatibility guidelines may be applied to determine where there is a constructive use. Since neither site is or is expected to be used as a residence these sites are compatible with noise exposure levels of up to 70 DNL. Since the noise exposure at these sites remains below 70 DNL, neither the Modifications to Existing Airspace Alternative nor the Integrated Airspace Alternative Variation without ICC would result in a constructive use of either historic site.

One other noise sensitive site, the Frank M. Charles Memorial Park, was identified for further analysis. As a result of the implementation of the Ocean Routing Airspace Alternative (2006) the noise exposure at this park increased to 65.0 DNL. The Frank M. Charles Memorial Park, is part of the Gateway National Recreation Area located in the heart of the New York metropolitan Area. Due to this Park's urban setting and given it is intended to provide outdoor recreation for large numbers of people, a quiet setting would not be a recognized purpose or attribute of the Frank M. Charles Memorial Park. Therefore Part 150 land use compatibility guidelines may

[8] FAA Order 1050.1E, Appendix A, page A-19.

be applied to determine where there is a constructive use. According to the compatibility guidelines, a park is compatible with noise exposure levels of up to 75 DNL. However, if a park's features include an amphitheatre, a lower level of noise exposure is appropriate. Noise exposure of less than 65 DNL is considered compatible with an amphitheatre. There is not an amphitheatre within the Frank M. Charles Memorial Park. Therefore, the increase in noise exposure resulting from the Ocean Routing Airspace Alternative would not be considered a constructive use of the Frank M. Charles Memorial Park

The noise impacts associated with the Airspace Alternatives do not substantially impair any Section 4(f) sites because the activities, features, or attributes that contribute to its significance or enjoyment are not substantially impaired. Since no constructive use of Section 4(f) resources is anticipated, Section 4(f) of the DOT Act is not invoked and a Section 4 (f) determination is not required. Additionally, because the Airspace Redesign Alternatives would not result in a constructive use of Section 4(f) properties, it may also be concluded that there are no significant impacts to Section 4(f) properties.

Many Section 4(f) lands are also subject to the Land and Water Conservation Fund (LWCF) Act Section 6(f). Section 6(f) states that no public outdoor recreation areas acquired or developed with any LWCF assistance can be converted to non-recreation uses without the approval of the Secretary of the Interior. No 6(f) properties were determined to be significantly impacted by noise associated with the Proposed Action Airspace Redesign alternatives.

ES.6.5 Historical, Architectural, Archaeological, and Cultural Resources

Historical, architectural, archaeological, and cultural resources that will be affected by federally funded and licensed undertakings come under the protection of the National Historic Preservation Act of 1966 (16 U.S.C. 470), as amended. This Act, in Section 106, requires Federal agencies to consider the effects of such undertakings on properties listed, or eligible for listing, in the National Register of Historic Places (NRHP). Regulations related to this process are described in 36 CFR Part 800, Protection of Historic Properties.

To date, two historic sites have been identified in the APE, the Lazaretto and the Printzhof sites. The Lazaretto, located on the Delaware River in Essington, PA, and the Printzhof, also located in Essington, PA, would be exposed to a significant change in noise exposure. Although a significant noise change would result at both sites for the Modifications to Existing Airspace Alternative and the Integrated Airspace Alternative Variation without ICC, this noise does not alter the historic characteristics which made them eligible for listing in the National Register. A quiet setting is not a recognized purpose or attribute of either site. Moreover, the Lazaretto site has been purchased by a community to in part construct a fire house. The Printzhof, of which only the foundation remains, is located within a recreational park already subjected to aircraft noise. Even at 65.7 DNL the site is considered a compatible land use according to 14 CFR Part 150 guidelines. (These guidelines identify that noise levels up to 75 DNL as compatible with parks.) Therefore, the noise impacts would not constitute an adverse effect on these historic sites.

Pending the results of windshield surveys of the APE, analysis will be completed to determine if the alternatives would have an adverse effect on historic and cultural resources eligible for listing in the NRHP.

ES.6.6 Fish, Wildlife, and Plants: Specifically, Migratory Birds

The potential hazards from the simultaneous use of airspace by both birds and aircraft is a function of several factors: 1) the relative abundance of bird habitat adjacent to or in the proximity of airports, 2) the increased abundance of migratory birds resulting from successful management, 3) the increased pressure from the growing volume of air traffic, and 4) the difficult task of redesigning airspace within the primary bird impact zone of 500 feet of altitude or less.

Under the Airspace Redesign Alternatives being evaluated, aircraft departing from Runways 22R and 4L at EWR, Runways 9L/R and 27L/R at PHL, and Runway 4 at LGA would use new departure headings. Essentially, this means that ATC would be able to direct takeoffs into three or four departure paths rather than the previous one or two. Such flight paths could increase the exposure of any avian species that utilize habitat and airspace adjacent to these runways. However, the degree of exposure depends on whether habitat even exists in that location, the position of the habitat with respect to the flight-path and whether the headings achieve an altitude in excess of 500 feet before interfacing with the habitat. The data show that 73 percent of all birdstrikes occur within the first 500 feet of altitude, and the frequency of strikes decrease consistently by approximately 31 percent for every 1,000 feet of altitude above 500 feet.

Under the Proposed Action, impacts to various bird categories would be expected to continue but not necessarily increase. Since most bird strikes and all mammal (e.g., deer) strikes take place on or near airport property, mortality to birds from aircraft are expected to continue as a component of a much larger mortality equation nationwide.

ES.6.7 Cumulative Impacts

Consideration of cumulative impacts applies to the impacts resulting from the implementation of the Proposed Action as well as other actions. The concept of cumulative impacts addresses the potential for individually minor but collectively significant impacts to occur over time. Council on Environmental Quality Regulations, Section 1508.7, defines “Cumulative Impact” as the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of the agency, Federal or non-Federal, undertaking such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Projects within the vicinity of the Study Airports were reviewed to evaluate the potential for cumulative impacts. Airport improvement projects and other construction projects were considered and potential for cumulative impact is not anticipated.

Other airspace redesign projects were also considered during the evaluation of potential cumulative impacts. EISs for the Chicago Terminal Airspace Project (CTAP) and the Potomac Consolidated TRACON Airspace Redesign have been completed and the FAA issued Record of Decisions for both projects. Neither of the Study Areas for these projects overlaps the NY/NJ/PHL Metropolitan Area Airspace Redesign Project’s Study Area and the projects themselves do not induce growth or increase

capacity; therefore, significant cumulative impacts are not anticipated. The FAA is in the process of completing an EA for the Midwest Airspace Enhancement Airspace Redesign in the Cleveland/Detroit Metropolitan Areas. The environmental study area for this project does not overlap the Study Area for the NY/NJ/PHL Metropolitan Airspace Redesign and the project itself does not induce growth or increase capacity; therefore, significant cumulative impacts are not anticipated. Therefore, no cumulative impacts from the implementation of the NY/NJ/PHL Metropolitan Airspace Redesign and other airspace redesign projects are anticipated.

Summary of Environmental Impacts

Table ES.4 summarizes the potential for significant impacts associated with each alternative. Potential significant impacts exist for Noise/Compatible Land Use and Socioeconomic Impacts/Environmental Justice. There is no potential for significant impacts associated with the Ocean Routing Airspace Alternative.

ES.7 MITIGATION

Mitigation measures are those designed to avoid, minimize, rectify, reduce, eliminate, or compensate for significant impacts. Since significant noise-related impacts would potentially result from the implementation of any of the Airspace Alternatives, mitigation will be considered. Any mitigation measures will be developed upon receipt of public and agency comments regarding the Draft EIS. This ensures that public and agency input is appropriately considered in the development of mitigation. Also, potential specific mitigation strategies would be coordinated with the appropriate airport operators. Mitigation strategies that may be considered include:

- Continuous Descent Approach (CDA): Today, aircraft on approach perform a series of short descents and level offs to join the glide slope for landing. With CDA, aircraft on approach do a continuous steady descent to landing, which results in a higher altitude flight path and lower engine power levels. This reduces noise on the ground. CDA is currently in a limited testing and development phase at several airports around the U.S. Noise benefits would typically be realized for areas with DNL levels below 65 dB.

- Nighttime abatement procedures: During nighttime hours when traffic demand decreases, it may be possible to implement flight track and runway use programs that direct aircraft away from residential and noise sensitive land uses.

- Additional use of water and/or industrial areas: Proposed flight tracks may be refined so that aircraft are routed away from residential and noise sensitive uses, to the extent possible.

- Sound insulation of impacted buildings with educational or medical uses: these buildings may be eligible for Airport Improvement Program (AIP)-funded sound insulation, if sponsored by an airport as part of its Noise Compatibility Program or by a non-airport public agency per FAA Order 5100.38C.

ES.8 PUBLIC AND AGENCY INVOLVEMENT

In accordance with NEPA guidelines, the FAA has involved the public and other agencies in the impact assessment process.

During the informal pre-scoping and formal scoping period for the EIS, the public and agencies were given the opportunity to assist

Table ES.4
Summary of Potential for Significant Environmental Impacts

Environmental Impact Category	Alternative							
	Modifications to Existing Airspace		Ocean Routing Airspace		Integrated Airspace			
					without ICC		with ICC	
	2006	2011	2006	2011	2006	2011	2006	2011
Noise / Compatible Land Use	**Yes**	**Yes**	No	No	**Yes**	**Yes**	N/A	**Yes**
Socioeconomic Impacts / Environmental Justice	**Yes**	**Yes**	No	No	**Yes**	**Yes**	N/A	**Yes**
Secondary or Induced Impacts	No	No	No	No	No	No	N/A	No
Department of Transportation Act: Sections 4(f) and 6(f)	No	No	No	No	No	No	N/A	No
Historical, Architectural, Archaeological and Cultural Resources	No	No	No	No	No	No	N/A	No
Wild and Scenic Rivers	No	No	No	No	No	No	N/A	No
Fish, Wildlife, and Plants	No	No	No	No	No	No	N/A	No
Light Emissions and Visual Impacts	No	No	No	No	No	No	N/A	No
Air Quality	No	No	No	No	No	No	N/A	No
Natural Resources and Energy Supply	No	No	No	No	No	No	N/A	No
Construction Impacts	No	No	No	No	No	No	N/A	No
Farmlands	No	No	No	No	No	No	N/A	No
Coastal Resources	No	No	No	No	No	No	N/A	No
Water Quality	No	No	No	No	No	No	N/A	No
Wetlands	No	No	No	No	No	No	N/A	No
Floodplains and Floodways	No	No	No	No	No	No	N/A	No
Hazardous Materials and Solid Waste	No	No	No	No	No	No	N/A	No

Source: Landrum & Brown, Metron and HNTB analysis, 2005.

in determining the scope of issues to be addressed in this EIS. After the scoping meetings, the FAA held a number of agency meetings, distributed newsletters, and created a website to educate, inform, and receive feedback from concerned citizens and organizations.

The pre-scoping process included a series of airspace redesign workshops. Thirty-one workshops were held throughout the Study Area between September 22, 1999, and February 3, 2000. A total of 1,174 people attended the workshops and 712 comments were received.

The formal scoping period was January 22, 2001 through June 29, 2001. The scoping process consisted of 28 public meetings and three agency meetings held in various locations throughout the Study Area. A total of 1,031 people attended the scoping meetings and 901 comments were received.

In addition to formal scoping meetings, the FAA met with agencies with jurisdiction or special knowledge relative to the Airspace Redesign project on an as needed basis. Typically, each meeting consisted of introductions, a slide show presentation, and a video on the NY/NJ/PHL Metropolitan

Airspace Redesign project. The agencies were encouraged to share their concerns or comments regarding the Airspace Redesign. The agency comments and concerns were used by the FAA in assembling the materials needed for the Draft EIS. **Table ES.5** provides a list of agencies consulted. Periodic briefings were also given to members of Congress, the New Jersey and Delaware Congressional delegations, and various Governors' offices.

Currently, the Draft EIS is being distributed to interested federal, state, and local agencies, and citizens for review and comment. (See Chapter Eight for a comprehensive list.) A series of public workshops/hearings will be held from February to April, 2006. These meeting locations will be listed on the website at http://www.faa.gov/nynjphl_airspace_redesign/. The comment period will run through June 1, 2006. Comments can be sent to Steve Kelley, FAA NAR, c/o Nessa Memberg, 12005 Sunrise Valley Drive, MS C3.02, Reston, VA 20191, or submitted via email to faa.deis@ngc.com (please include the word "comment" in the subject line).

Table ES.5
Agencies Consulted

Airline Pilots Association
Brandywine Hundred, Delaware
Connecticut State Department of Transportation
Connecticut State Historic Preservation Officer
Delaware Department of Natural Resources and Environmental Control
Delaware State Historic Preservation Officer
Delaware Valley Regional Planning Commission
Eastern Region Helicopter Council
Environmental Protection Agency Regions 1, 2, and 3
Manhattan Borough President, Manhattan Borough President's Helicopter Task Force
Metropolitan New York Aircraft Noise Mitigation Committee (Governor's Group of Nine)
Mid-Atlantic Federal Partners for the Environment
NBAA Users Forum
New England Airspace/Range Council
New Jersey Department of Environmental Protection
New Jersey Department of Transportation
New Jersey State Commerce Department
New Jersey State Historic Preservation Officer
New York Department of Transportation
New York State Department of Environmental Conservation
New York State Historic Preservation Officer
Newark International Airport Aircraft Advisory Committee
New Jersey Acting Governor and Director of Aeronautics
Pennsylvania Department of Environmental Protection
Pennsylvania Department of Transportation
Pennsylvania State Historic Preservation Officer
Philadelphia Airport Authority
Port Authority of New York/New Jersey
Queens Borough President's Aviation Advisory Committee
State Aviation Directors
Town and Village Aviation Safety/Noise Abatement Committee
Transportation Research Board

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Chapter One
PROJECT BACKGROUND AND PURPOSE AND NEED FOR THE ACTION

This Chapter provides background on the Federal Aviation Administration's (FAA) proposal to consider airspace changes in the New York/New Jersey/Philadelphia (NY/NJ/PHL) Metropolitan Area, along with the purpose and need for airspace redesign in this area.

1.1 INTRODUCTION

The Federal Aviation Act of 1958, codified as 49 U.S.C. Sections 40101 et seq., delegates various responsibilities to the FAA including controlling the use of the navigable airspace and regulating civil and military operations in that airspace in the interest of maintaining the safety and efficiency of these operations.[1] In its effort to continually maintain safety and increase efficiency of the airspace, the FAA is proposing to redesign the airspace by making modifications to aircraft routes and air traffic control (ATC) procedures used in the NY/NJ/PHL Metropolitan Area. This redesign was conceived as a system for more efficiently directing Instrument Flight Rule (IFR) aircraft to and from major airports in the NY/NJ/PHL Metropolitan Area, including John F. Kennedy International Airport (JFK) and LaGuardia Airport (LGA) in New York, Newark Liberty International Airport (EWR) and Teterboro Airport (TEB) in New Jersey, and Philadelphia International Airport (PHL) in Pennsylvania. In total, 21 airports are included in the Airspace Redesign Project.

The purpose of this Draft Environmental Impact Statement (Draft EIS) is to evaluate the environmental effects of the NY/NJ/PHL Metropolitan Area Airspace Redesign (Airspace Redesign) in accordance with the National Environmental Policy Act of 1969 (NEPA).[2] This Draft EIS was officially initiated when the FAA issued a Notice of Intent (NOI) to prepare an EIS on January 22, 2001. The format and subject matter in this environmental study conform to the requirements and standards of the Council on Environmental Quality (CEQ) regulations[3] and the FAA, as set forth in FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*.

- Chapter One defines the proposed action and the purpose and need for the Airspace Redesign.
- Chapter Two evaluates alternatives to determine whether they are reasonable and meet the purpose and need of the project. Airspace redesign alternatives were developed for analysis in accordance with NEPA, including the required No-Action Alternative. This chapter also briefly describes FAA consideration of integrating the New York Terminal Radar Approach Control

[1] Title 49 United States Code (USC) Section 40101(d)(4)] ([49 USC 40101(d)(4).

[2] P.L. 91-190, 32 USC Section 3321 et. seq.

[3] 40 CFR Part 1500.

(TRACON) and the Air Route Traffic Control Center (ARTCC) into a common facility, independent of Airspace Redesign. Any required environmental analysis for that effort will be handled separately. This Draft EIS evaluates changes in airspace usage that could occur with or without the physical integration of these two facilities.

- Chapter Three identifies the project Study Area and the associated existing environment. It provides a baseline for considering the environmental impacts of the Proposed Action. The Study Area is comprised of New Jersey and portions of four other states—Connecticut, Delaware, New York, and Pennsylvania. The Study Area encompasses approximately 31,180 square miles, from the surface to 14,000 feet above Mean Sea Level (MSL). By policy, the altitude ceiling for environmental considerations regarding airspace studies is 10,000 feet Above Ground Level (AGL).[4] To account for the highest point in the Study Area, 14,000 feet MSL was used in this study. **Figure 1.1** illustrates the Study Area. A detailed description of the Study Area and of the airports modeled is included in Chapter Three.

- Chapter Four discloses the potential environmental impacts associated with the range of reasonable alternatives as required by Federal law and regulations. A total of 19 impact categories are considered. Chapter Four also includes a discussion of cumulative impacts, mitigation, and Section 4(f).[5]

- Chapter Five provides a summary of public and agency involvement.

- Chapter Six provides a list of study acronyms, abbreviations, and a glossary of terms used in this Draft EIS.

- Chapter Seven lists the document's preparers.

- Supportive material is provided in Appendices A through M.

1.2 BACKGROUND

This section provides background information relevant to the airspace redesign, including an overview of the National Airspace System (NAS, or the System), air traffic control (ATC) facilities and airports within the Study Area, and the history of the airspace system in the NY/NJ/PHL Metropolitan Area.

1.2.1 National Airspace System

The function of the NAS is to provide a safe and efficient environment for civil, commercial, and military aviation. It is made up of a network of airspace, airports, air navigation facilities, ATC facilities, communication, surveillance, supporting technologies, and operating rules and regulations (see **Figure 1.2**). The following subsections provide an overview of the NAS; additional information is provided in Appendix A.

1.2.1.1 Aircraft Separation

In the early days of aviation, aircraft only flew during good weather conditions (referred to as Visual Meteorological Conditions or VMC) when a pilot could maintain orientation (e.g., up/down, turning, etc.) by reference to the horizon and visual ground references. Flight through clouds

[4] Vol. 65 Federal Register [FR] Page 76339 [65 FR 76339].

[5] Department of Transportation Act of 1966, section 4(f) [recodified at 49 USC 303 (c)].

(i.e., poor weather with low ceilings or restricted visibility, referred to as Instrument Meteorological Conditions or IMC) was not possible, as the aircraft instruments of the time did not provide orientation information. A pilot could easily lose orientation and control of the aircraft. In a visual-only airspace environment, it was possible to see other aircraft and avoid a collision – and thus maintain aircraft separation.

Flight through clouds became possible with the use of gyroscopic flight instruments. Because it is not possible to see other aircraft in the clouds, ATC was established to coordinate aircraft positions and maintain separation between aircraft. Aircraft separation is the physical distance, both vertically and laterally, between two aircraft. Today, maintaining separation between aircraft is a fundamental mission of ATC. The evolution of the NAS and existing ATC procedures can be directly tied to this requirement.

During VMC, aircraft may operate under Visual Flight Rules (VFR), and the pilot is primarily responsible for seeing other aircraft and maintaining safe separation. Aircraft operating under VFR typically navigate by orientation to geographic and other visual references. During IMC, aircraft operate under Instrument Flight Rules (IFR). ATC exercises positive control (i.e., separation of all air traffic within designated airspace) over all aircraft in controlled airspace, and is primarily responsible for aircraft separation. IFR aircraft fly assigned routes and altitudes, and use a combination of radio navigation aids (NAVAIDs) and vectors from ATC to navigate. Air carrier aircraft operate under IFR at all times, regardless of weather, as required by FAA regulations.

Specific aircraft separation standards, and the flight procedures used to maintain separation, are set forth in FAA Order 7110.65P, *Air Traffic Control*. Separation standards vary depending upon multiple factors, including availability of radar service, location of radar antenna sites, aircraft type and weight, type of airspace, operating rules of specific aircraft (i.e., IFR or VFR), weather conditions, aircraft altitude, and/or runway configuration.

Inside TRACON airspace, commonly known as terminal airspace, aircraft are separated by a distance of three nautical miles (NM) laterally and 1,000 feet vertically. Terminal airspace consists of regional areas of airspace used by aircraft climbing after takeoff or descending for landing.

Inside Center airspace, which is used by aircraft traveling at high altitude during the cruise potion of their flight, aircraft below 41,000 feet MSL are separated by a distance of five NM laterally and 1,000 feet vertically per the implementation of Domestic Reduced Vertical Separation Minimum (DRVSM) Standards in January 2005 (see **Figure 1.3**). At and above 41,000 feet, vertical separation increases to 2,000 feet while lateral separation remains at five NM.

The short-range radar used by TRACONs to manage smaller volumes of airspace updates more frequently than the long-range radar used by Centers; as a result, the lateral separation can be reduced in the terminal airspace. As will be discussed in Chapter Two, Alternatives, the different separation standards that exist in terminal versus Center airspace are an important factor in the Airspace Redesign Alternatives.

Visual separation (i.e., see and avoid) is more flexible than IFR radar separation. Visual separation standards may be used by some IFR aircraft during good weather conditions which results in reduced separation. There are two ways to achieve visual separation: (1) the tower controller sees the aircraft involved and issues instructions to ensure the aircraft maintain separation from each other; or (2) a pilot sees the other aircraft involved and is instructed by ATC to maintain visual separation.

In addition to the basic separation standards, additional separation standards apply for avoidance of aircraft wake turbulence. These "in-trail" separation standards apply when one aircraft is behind another aircraft, and the trailing aircraft must maintain safe separation from the hazardous wake vortices produced by the leading aircraft. Wake vortices are the result of the airflow around and about an aircraft wing during flight. The vortices rotate rapidly and increase in intensity with heavier aircraft. As a result, the vortices from heavy and large aircraft can be hazardous to smaller aircraft. The in-trail separation standards shown in **Figure 1.4** are based on an aircraft's maximum takeoff weight and provide for safe distances between aircraft due to the effect of wake vortices.

1.2.1.2 Air Traffic Control Facilities

As shown in **Figure 1.5** and described in the following subsections, the ATC system is composed of several types of facilities with different areas of responsibility. Airport Traffic Control Towers (ATCTs or Towers) manage the takeoff and landing of aircraft, as well as ground flows. TRACONs manage regional areas of airspace that are used by aircraft climbing after takeoff or descending for landing. Air Route Traffic Control Centers (ARTCCs, commonly called Centers) manage the largest areas of airspace that are used by aircraft traveling at high altitude during the cruise portion of flight.

In ATC facilities, ATC specialists function in teams to provide for the safe, orderly, and expeditious flow of air traffic. These teams use specific procedures designed for safe and efficient traffic flow while ensuring that applicable separation standards are met. Using a variety of tools, air traffic controllers maintain these standards by issuing specific routes with altitude and speed assignments. Control responsibility for an aircraft operating under Instrument Flight Rules (IFR) is transferred from facility to facility from its point of origin until it reaches its destination.

Air Traffic Control System Command Center

A key component of the NAS is the Air Traffic Control System Command Center (Command Center), located in Herndon, Virginia. The Command Center receives data from NAS facilities across the country and maintains a real-time electronic picture of flights and the operational status of NAS components. Figure 1.2 illustrates the role of the Command Center in the NAS. The Command Center is responsible for ensuring the efficient use of all NAS resources through interaction with the other ATC facilities and airline operations centers. This interaction allows the Command Center to manage a collaborative decision making process that serves to implement alternative procedures so that the NAS remains efficient during inclement weather, equipment outages, and/or periods of congestion. The procedures may include

arrival and departure restrictions (e.g., ground holds) or alternative routings.[6]

Air Route Traffic Control Centers

As shown in **Figure 1.6**, the FAA has established 20 Centers in the continental United States to manage IFR aircraft operating within controlled airspace during the en route phase of flight. Using long-range radar, Centers track aircraft and assign specific routes and altitudes in order to maintain separation and provide for the orderly flow of air traffic. Center airspace is divided into multiple sectors (i.e., portion of airspace having defined lateral and vertical boundaries) that are each managed by a controller or team of controllers. Each sector has its own discrete radio frequency which is used by controllers and pilots to communicate. As an aircraft travels through the Center airspace, ATC management of the aircraft is transferred from one sector to another. Centers also provide approach and departure control services to airports that are not served by TRACONs, as described in the next section.

Five Centers, including the New York Center, provide Oceanic Control for management of aircraft flying across the oceans. These centers manage flights over the portions of the Atlantic, Pacific, and Arctic Oceans that are delegated to the United States. Handling oceanic operations is different from controlling aircraft over land. Once an aircraft is outside radar range, controllers must rely on periodic radio communications of position reports to determine the aircraft's location (i.e., non-radar procedures). The United States is responsible for almost 80 percent of the world's controlled oceanic airspace.[7] The majority of this airspace is on the west coast and is managed by the Anchorage and Oakland Centers.

Terminal Radar Approach Control

Centers delegate specific airspace to local terminal facilities, known as TRACONs, which assume responsibility for the orderly flow of air traffic arriving and departing from major airports. Using short-range radar, TRACONs use radar vectoring, published routes, and procedures to manage the sequencing of IFR aircraft during the transition to/from the ATCT and the overlying Center airspace. TRACONs also provide air traffic service to aircraft operating from non-major airports within their airspace and traffic advisories for VFR aircraft operating in the area. Like Centers, a TRACON's airspace is divided into a number of different sectors to make the workload of air traffic controllers manageable. TRACON airspace is often referred to as terminal airspace.

There are 160 TRACONs in the United States.[8] They can be stand alone facilities such as the New York TRACON, or combined with a tower facility as in the co-located Philadelphia TRACON and ATCT.

Airport Traffic Control Towers

Traffic at busy airports is controlled by an ATCT. ATCTs are the most recognizable symbol in the NAS, as tower controllers are located in the glass booth at the top of the tower at airports. Using visual sighting and

[6] Federal Aviation Administration. Air Traffic Control System Command Center (ATCSCC), 2005, <http://www.fly.faa.gov/sitemap.html>.

[7] Federal Aviation Administration. *Blueprint for NAS Modernization, 2002 Update*, page 26. October 2002, available online at <http://www.faa.gov/nasarchitecture/blueprnt/2002Update/PDF/2002Update_complete.pdf>.

[8] FAA ATO Locator Tool. <http://www.ato.faa.gov/locator>.

radar, ATCT controllers provide air traffic control services to aircraft operating in the immediate vicinity of an airport (i.e., within approximately five miles and below 3,000 feet AGL). The ATCT is responsible for ensuring that the runways are clear for all takeoffs and landings. ATCTs also control the ground movement of aircraft and any vehicles that need access to runways or taxiways, and aircraft in aircraft parking areas.

1.2.2 Aircraft Navigation

Aircraft operating under IFR use both ground- and satellite-based navigation systems. Navigation systems essentially allow an aircraft to determine its existing location and the heading needed to reach the next point on its route. These systems are critical for aircraft that are in IMC or at high altitude and cannot use visual landmarks for navigation. Navigation systems are also used by ATC to manage and separate aircraft. VFR aircraft use the same systems, but do not necessarily rely on them for primary navigation.

Aircraft navigate via a network of fixes. Fixes are geographic locations that are referenced with a single five-letter name. The location of a fix is defined by latitude/longitude coordinates and by reference to navigation facilities, known as NAVAIDs, which are described later in this section. The location of a fix is known to both air traffic controllers and pilots, and is identified on aeronautical charts. The flight plan is a series of fixes that establish the route that will be used to navigate from one airport to another.

The most common and important ground-based NAVAID is the VHF omni-directional radio range (VOR) station. The VOR is a ground-based NAVAID that transmits high frequency radio signals (known as radials) 360 degrees in azimuth from the station. A pilot can select a specific radial from a VOR, and use this to fly to or from another point. A pilot can also use distance measuring equipment (DME) to measure an aircraft's distance from a DME-equipped VOR. Some VORs are also co-located with TACAN (tactical air navigation equipment) which is used by the military. These installations are known as a VORTAC, and operate in the same way as a VOR station. Intersecting radials from two VORs, or DME and a specific radial, can be used to define a fix. The location of a VOR station can also be used as a fix. The straight line between two VORs is often designated as a federal airway. Federal airways include both low altitude (Victor, 18,000 feet and below) and high altitude (jet route) airways.

A non-directional beacon (NDB) is a general purpose, low-frequency radio beacon that transmits a non-directional signal. An aircraft equipped with direction finding equipment can determine a bearing to or from the radio beacon, and use this to navigate. The location of an NDB station can also be used as a fix.

Area navigation (RNAV) is a hybrid navigation system that uses multiple ground and/or satellite based NAVAIDs to accurately provide aircraft location and navigational guidance to pilots. The RNAV equipment installed on aircraft has a database with the name and location of fixes used in the NAS. Without RNAV equipped aircraft, pilots fly from one ground based NAVAID to another. RNAV makes possible point-to-point navigation using both ground based and/or satellite fixes. Point-to-point navigation uses waypoints, which are fixes defined by latitude and longitude references rather than by sole

reference to a ground-based NAVAID. Using point-to-point navigation allows pilots to take the most advantageous flight path directly between any two points (e.g., fixes or airports). Therefore, this type of navigation promotes a more efficient use of congested airspace.

The Global Positioning System (GPS) is an RNAV satellite-based navigation system that provides precise three-dimensional location, speed, and time information to aircraft. The system is compromised of 24 satellites and is operated by the U.S. Department of Defense. GPS receivers installed in aircraft use signals from at least four satellites to determine aircraft position. An internal database in the receiver is used to plot the aircraft's position relative to fixes, airports, and waypoints, and then to plot courses to the aircraft's destination. Compared to many ground-based NAVAIDs, GPS has improved reliability, usability, and accuracy, as well as lower costs. GPS is also more flexible than ground based systems, as it permits the location of fixes to be established without the constraints inherent in ground-based systems.

Two systems, the Wide Area Augmentation System (WAAS) and the Local Area Augmentation System (LAAS) are intended to augment the accuracy of GPS signals for use with precision instrument approach procedures. WAAS currently provides coverage to 95 percent of the United States, with near 100 percent coverage expected in 2006. Initial use of LAAS is scheduled at a few airports beginning in late 2006. The FAA envisions that GPS will become the primary navigation system used in the United States. The use of GPS may eventually lead to the phase-out of existing ground-based NAVAIDs.

NAVAIDs are also used to guide aircraft to landing at an airport during the arrival portion of flight. The procedures used with these NAVAIDs are known as Instrument Approach Procedures (IAP), and are used to guide aircraft to a specific runway for landing in IMC. IAPs that use VORs and NDBs as the primary NAVAID are known as non-precision approaches because they only provide lateral (i.e., position) guidance and do not provide precise altitude guidance. An Instrument Landing System (ILS) is known as a precision approach because it provides both precision lateral and altitude guidance for an aircraft during landing. ILSs also have more precise lateral guidance than available from VORs or NDBs.

1.2.3 Phase of Flight: ATC Procedures, Navigation, and Aircraft Flight Routes

An aircraft traveling from one airport to another goes through three phases of flight: departure (i.e., takeoff), en route (i.e., cruise), and arrival (i.e., landing). As shown in Figure 1.2, different components of the NAS are used during each phase of flight. All of the components of the NAS, including airports, NAVAIDs, ATC, and pilots, must be able to interact so that aircraft can travel safely and efficiently from one airport to another.

Due to high traffic demand and the frequent use of multiple runways, large airports operate in a safe, systematic departure and arrival configuration that is based on the prevailing winds and the physical layout of the runways. Aircraft operations at multiple airports that are in proximity to each other must be able to smoothly interact; this requires extensive planning and coordination between the ATC facilities that operate within an area.

ATC relies on pre-determined, coordinated arrival and departure procedures and routes to direct aircraft through the NAS. Coordinated routes allow for the safe and orderly flow of aircraft, and allow ATC to function as a team. Because routes are predetermined and coordinated with an aircraft's flight plan, a controller responsible for one sector can anticipate the actions of a controller in an adjacent sector. Aircraft rarely fly directly from one airport to another, as ATC has to weave departing and arriving aircraft flows through limited areas of airspace (i.e., sectors) due to the proximity of multiple, busy airports. This is especially true in the NY/NJ/PHL Metropolitan Area. Changes to a single route can affect many other routes. It is important to recognize the NAS as a mechanized, interdependent system.

The ATC procedures and requirements used to manage airspace are highly technical and complex. This complexity is due to the intermingling and crossing of routes, the number of flights traveling on those routes, and the varying performance characteristics inherent to different aircraft types. In addition, controller workload will vary depending on the volume of airspace for which he is responsible, the number of flights managed within a given time period, and the number of radio communications needed to manage the sector. All of these factors combine to create what is termed "airspace complexity" for the purpose of this document.

While aircraft generally follow the routes assigned in their flight plans, ATC can also use vectors to direct aircraft. A vector is a heading issued to an aircraft to provide navigational guidance by radar. Vectors are used regularly to route aircraft around weather, provide sequencing to separate aircraft, and direct aircraft onto an IAP. Vectors can also be used to separate aircraft with dissimilar operating characteristics. Vectors add flexibility to the system by allowing controllers to mitigate inefficiencies and improve overall traffic flow.

1.2.3.1 Departure Phase

Prior to departure, IFR flights must file a flight plan with ATC. The flight plan lists the aircraft type, airline and flight number, intended departure time, navigation equipment on board the aircraft, and the proposed route. ATC uses this information to finalize the planned route for the aircraft, given ATC procedures, en route weather, and the preferred route that is used between two specific airports. For air carrier aircraft operating under 14 CFR Part 121 (which includes nearly all passenger and cargo airlines operating in the United States), the airline's dispatch center coordinates with ATC on the flight plan. Like ATC, the dispatch center also maintains contact with the pilots throughout the flight.

Once the flight plan is finalized, ATC issues a clearance for a specific flight. The clearance is essentially a slot in the NAS for an aircraft to "proceed under specified traffic conditions within controlled airspace" to its destination.[9] The clearance includes the routes and initial altitudes that are to be used on the flight. ATCT will transmit the clearance to the pilot and will also direct the aircraft to taxi to the runway for takeoff. The decision to clear an aircraft for takeoff is made by the TRACON and/or Center and relayed to the aircraft by the ATCT. The TRACON and/or ARTCC may delay an aircraft from taking off due to airspace

[9] Pilot/Controller Glossary. http://www.faa.gov/ATpubs/PCG/.

traffic congestion; this is known as a "ground hold."

At many airports, fanned departure headings (also known as divergent headings) are used to maximize runway capacity. A departing aircraft is directed to follow a specific heading on takeoff. The next departure from the same runway, or another departure on a parallel runway, will be assigned to a heading that is at least 15-degrees to the left or right of the heading used by the preceding aircraft. Because the aircraft are using fanned headings, the distance (i.e., separation) between the departing aircraft is constantly increasing, thereby reducing the time between successive departures. This increases the throughput of the runway and can lead to decreased delays.

A published departure procedure (DP) may be included in the clearance for a flight. A DP is a standardized ATC departure routing containing a group of routes that would otherwise be transmitted piece by piece. DPs are used at many airports to simplify clearance delivery procedures. As discussed earlier, many busy airports have a systematic and coordinated arrival and departure airspace structure. As a result, many aircraft may receive the same clearance to depart from the airport and transit to the en route portion of their flight. DPs permit the controller to relay this clearance simply and quickly without having to repeat the information for every flight. DPs can be combined with fanned departure headings.

Shortly after takeoff, management of the aircraft is handed off (i.e., ATC management of the aircraft is transferred from one facility to another) from the ATCT to the TRACON. The ATCT and TRACON pre-coordinate and agree to the handoff, and the pilot is then instructed to change radio frequencies from the ATCT to the TRACON. As part of the handoff, the TRACON acquires the aircraft on radar. While ATC radar detects the radio signals reflected off the aircraft, the radar is primarily intended to seek the aircraft's transponder. The transponder is a radio that sends a coded reply and altitude information to the radar system. The code is linked to the aircraft's flight plan.

The TRACON controller manages the aircraft as it proceeds on its assigned route and will give it instructions to climb to specific altitudes. The controller may vector the aircraft to follow a specific course around weather or to avoid other air traffic. Just before the aircraft leaves the terminal environment, the TRACON will handoff management of the aircraft to the Center at a specific, predetermined transfer point, known as a departure gate. Departure gates are used by ATC as doorways to transfer control of aircraft from one facility to another. Aircraft are routed to transition through a gate at a specific location, direction, and altitude. Departure gates have specific location and boundaries, and differ from specific fixes in that they cover a larger area in the airspace and are usually associated with multiple fixes. Jet aircraft usually reach the departure gate when at high altitudes, but before the cruise portion of the flight.

1.2.3.2 En Route Phase

By definition, the en route system of ATC is devoted to controlling IFR aircraft between the terminal area of origination and the terminal area of destination. After accepting the handoff of an aircraft from the TRACON, the Center will direct the flight to ascend to its cruise altitude. The flight will proceed along its assigned route, which will be made up of a combination of

waypoints, fixes, airways, and the occasional radar vector. The aircraft will be handed off to different sectors and Centers as it traverses along the route towards its destination.

Depending upon congestion in the system, an FAA Traffic Management Initiative (TMI) may be in use. The Command Center monitors the future flow of aircraft into an airport, from 6 to 15 hours in advance, based upon flight schedules. In instances where demand is estimated to exceed an airport's capacity, a TMI may be implemented to meter the flow of aircraft so that demand is in line with capacity. In the en route environment, this often means that a flight may be directed to reduce airspeed to delay its arrival to an airport.

Congestion may also require holding in the airspace. During holding, aircraft are instructed to fly a racetrack holding pattern at specific altitudes. Flights typically enter a hold at a higher altitude and drop in altitude with every circumvention of the pattern. Other flights may be stacked above or below in the holding pattern. Holding may be part of a TMI or it may be caused by specific, unforeseen factors such as weather events. Holding may occur in either the en route or terminal airspace. Aircraft holding under en route ATC separation rules must hold for a multiple of four complete minutes (one complete lap around the holding pattern), even if only one minute is needed to appropriately sequence the aircraft into a gap for arrival sequencing purposes. In addition, the aircraft must be taken out of the holding pattern in the order in which it entered, for example, the aircraft must be at the bottom of the holding pattern and at the lowest altitude being used. In the terminal airspace, by contrast, the system is more flexible and aircraft may be taken out of the holding pattern at any time and in any order.

1.2.3.3 Arrival Phase

When a flight comes within a couple hundred miles of its destination, the Center will direct it to begin a descent to a specified lower altitude. As the aircraft approaches the terminal area, the Center will handoff management of the aircraft to a TRACON at a specific, predetermined transfer point/gate called an arrival post. Arrival posts are designated by a fix. Aircraft are routed to transition through an arrival post at a specific location, direction, and altitude.

TRACONs funnel flights from multiple routes into a single route that is used for arrivals to a specific airport's runway. Sequencing is designed to achieve a specified distance between two aircraft. In order to sequence two aircraft that are converging onto the same course, ATC may direct one aircraft to slow while directing the other to accelerate in order to create the needed gap between the flights on the route. Alternatively, a flight may be vectored off course, and then vectored back onto course, in order to create the necessary spacing. Sequencing programs are also used for departures and in the en route environment, in order to provide adequate separation.

The aircraft's clearance may include use of a standard terminal arrival route (STAR). A STAR is similar to a DP; it contains a group of routes and fixes to be used by the aircraft as it approaches the airport. Like a DP, a STAR is intended to simplify clearance delivery procedures.

As the aircraft reaches the end of its STAR, the TRACON will give clearance for a flight to use a specific IAP. Most arriving air carrier aircraft are routed to an ILS IAP for landing at the destination airport.

The TRACON will often route aircraft to the airport using a local traffic pattern. The

pattern is used by aircraft operating to and from an airport, to ensure that all aircraft use similar procedures and follow similar routes to and from the runways. If at all possible, aircraft should land and takeoff into the prevailing wind. This reduces takeoff and landing distance, and also helps to create an orderly traffic flow. The terminology used to describe the different segments of the traffic pattern is based upon the segment position relative to the direction of the prevailing wind and the runway. An aircraft taking off is flying into the wind, and hence the segment is known as the "upwind" segment. An aircraft that is flying perpendicular to the wind, near the departure end of the runway, is on the "crosswind" segment of the pattern. An aircraft flying parallel and towards the arrival end of the runway is on the "downwind" segment. The "base" segment is also perpendicular to the prevailing wind, and is intended as a "base" as the aircraft begins it approach for landing on the runway. The last segment, when the aircraft is aligned with the runway for landing, is known as "final." For jet airline traffic, the traffic pattern is usually fairly 'wide,' meaning it is flown several miles away from the airport. During IMC conditions, the pattern flown may be very wide for sequencing purposes. The pattern segments are used to describe the aircraft's position relative to the airport and intended runway.

The TRACON hands the aircraft off to the airport's ATCT when it is within approximately five to 10 NM of the airport, or when the ATCT has visual contact with the aircraft. The ATCT gives the aircraft final clearance to land. After using the various components of the NAS, the aircraft then safely completes it flight.

1.2.4 Air Traffic Control Facilities in the Study Area

Three Centers, two TRACONs, and multiple ATCTs have jurisdiction over the airspace above the NY/NJ/PHL Metropolitan area, as described in the following sections.

1.2.4.1 New York Center

New York Center, located in Ronkonkoma, NY, controls aircraft entering, exiting, and overflying the NY region. Figure 1.6 shows the lateral confines of New York Center airspace in relation to the other Centers in the United States. It is designated by its three-letter code of ZNY. New York Center controllers are responsible for approximately 72,000 square miles of domestic airspace over portions of Pennsylvania, New York, New Jersey, Delaware, and Maryland. New York Center is also responsible for 3.25 million square miles of oceanic airspace.[10]

New York Center is among the world's busiest air traffic centers, and was ranked by the FAA as the 3rd busiest Center in the *Administrator's Fact Book*[11] based on 2004 operations. New York Center experienced an operations count of over three million aircraft in 2004, representing an increase in traffic levels of over 49 percent over the past decade. The volume of the operations within the New York Center airspace continues to increase.

1.2.4.2 Boston Center

Boston Center, located in Nashua, New Hampshire, controls aircraft entering,

[10] FAA Facts for Immediate Release, New York En Route Air Traffic Control Center (New York Center) http://aea.faa.gov/aea5/pr1.htm

[11] March 2005.

exiting, and overflying the New England area. Figure 1.6 shows the lateral confines of Boston Center airspace in relation to the other Centers in the United States. It is designated by its three-letter code of ZBW. Boston Center controllers are responsible for approximately 165,000 square miles of airspace, over portions of Maine, New Hampshire, Vermont, New York, Massachusetts, Connecticut, and Rhode Island.

Boston Center was ranked by the FAA as the 15th busiest Center in the *Administrator's Fact Book*,[12] based on 2004 operations. Boston Center had an operations count of over 1.8 million aircraft in 2004, representing an increase in traffic levels of over 16 percent over the past decade.

1.2.4.3 Washington Center

Washington Center, located in Leesburg, Virginia, controls aircraft entering, exiting, and overflying the Mid-Atlantic region. Figure 1.6 shows the lateral confines of Washington Center airspace in relation to the other Centers in the United States. It is designated by its three-letter code of ZDC. Washington Center controllers are responsible for 119,679 square miles of airspace located over portions of Delaware, Maryland, North Carolina, Pennsylvania, South Carolina, Virginia, and West Virginia, and the District of Columbia.

Washington Center was ranked fifth among the busiest Centers in the FAA's *Administrator's Fact Book*,[13] based on their 2004 operations. Washington Center had an operations count of over 2.9 million aircraft in 2003, representing an increase in traffic levels of over 24 percent over the past decade.

1.2.4.4 New York TRACON

The New York TRACON, located in Westbury, New York, provides radar air traffic control service to aircraft operating in the New York Metropolitan Area. The New York TRACON has control responsibility for all aircraft within an area of airspace 150 by 125 nautical miles up to an altitude of 17,000 feet MSL. **Figure 1.7** shows the lateral confines of the New York TRACON airspace. As shown in **Table 1.1**, the New York TRACON handled over two million instrument operations in 2004, an increase of approximately 12 percent over the past 10 years.

Table 1.1
TRACON Instrument Operations

TRACON	1994 Instrument Operations	2004 Instrument Operations	Percent Increase
New York	1,846,188	2,066,720	11.9
Philadelphia	556,189	672,444	20.9

Source: FAA OPSNET, January 2005.

Controllers at the New York TRACON interact with numerous ATCTs, adjacent TRACONs, New York Center, Washington Center, and Boston Center.[16] The four major airports located within the New York TRACON airspace are JFK, LGA, EWR, and TEB. Long Island MacArthur (ISP), White Plains/Westchester County (HPN), Morristown Municipal (MMU), and nearly

[12] Ibid.

[13] Ibid.

[13] New York TRACON Briefing Guide New York. TRACON Airspace and Procedures Office.

43 smaller satellite airports[17] are also within the confines of New York TRACON airspace. The New York TRACON is unique in the number of facilities with which it interacts: four major airports, numerous satellite airports, and three Centers. In addition, the proximity of many busy airports in a limited geographic area contributes to the high level of complexity of air traffic operations in the NY Metropolitan Area.

1.2.4.5 Philadelphia TRACON

The Philadelphia TRACON is co-located with the PHL ATCT at the PHL Airport. The Philadelphia TRACON is responsible for providing services to PHL and 29 satellite airports and airport traffic control towers in the Greater Philadelphia Metropolitan Area. Figure 1.7 shows the lateral confines of the Philadelphia TRACON airspace. As shown in Table 1.1, the Philadelphia TRACON handled over 672,000 instrument operations in 2004, representing an increase of approximately 21 percent over the past decade.

1.2.4.6 Airport Traffic Control Towers

There are 129 ATCTs in the NY/NJ/PHL Metropolitan Area.[18] The airspace assigned to these ATCTs typically consists of a five NM radius around each airport, creating a cylindrical boundary that extends upward from ground level to about 2,000 feet AGL. JFK, LGA, EWR, and PHL ATCTs are among the 50 busiest ATCTs in the NAS.[19]

1.2.5 Airports in the Study Area

Because there are many public and private airports in the Study Area, the air traffic flows to and from these airports are highly interrelated. The NY/NJ/PHL Metropolitan Area Airspace Redesign focuses on five major airports and 16 satellite airports in the Study Area. The five major airports are as follows:

- John F. Kennedy International (JFK)
- LaGuardia (LGA)
- Newark Liberty International (EWR)
- Teterboro (TEB)
- Philadelphia International (PHL)

The 16 satellite airports are as follows:

- Allentown/Lehigh Valley International (ABE)
- Atlantic City International (ACY)
- Bridgeport/Igor I. Sikorsky Memorial (BDR)
- Caldwell/Essex County (CDW)
- Westhampton Beach/ The Francis S. Gabreski (FOK)
- Islip Long Island MacArthur (ISP)
- Linden (LDJ)
- Morristown Municipal (MMU)
- Newburgh/Stewart International (SWF)
- New Haven/Tweed-New Haven (HVN)
- Northeast Philadelphia (PNE)

[17] Federal Aviation Administration ATO Locator Tool. <http://www.ato.faa.gov/locator>.

[18] Federal Aviation Administration ATO Locator Tool. <http://www.ato.faa.gov/locator>.

[19] FAA Administrator's Fact Book, March 2005.

- Republic (FRG)
- Trenton/Mercer County (TTN)
- White Plains/Westchester County (HPN)
- Wilmington/New Castle County (ILG)
- McGuire Air Force Base (WRI)

The five major airports and 16 satellite airports in the Study Area are depicted in **Figure 1.8**.

While there are many satellite airports physically located within the Study Area, they were not included in the operational modeling or noise analysis. The decision to include or exclude airports was based on the fact that the Airspace Redesign applies to IFR operations. Airports without a significant amount of IFR traffic were not modeled because there will be little or no change to their operations as a result of the Proposed Action. This is because aircraft from these airports are managed by ATC on an as needed basis. For the purposes of this study, 20 IFR operations per year were used as an initial threshold to logically screen the large number of airports in the Study Area. The resulting list of airports (See **Appendix B**) to be modeled was reviewed and found to be consistent with the airports that may be impacted based on the Proposed Action. Therefore, airports with less than 20 daily IFR operations were not modeled in this study.

1.2.6 Airspace History

The Airspace Redesign is an outgrowth of continuing efforts to serve air traffic demand efficiently. The following sections highlight efforts made by the FAA since the late 1960s to reduce delay and improve the efficiency of the airspace system over the NY/NJ/PHL Metropolitan Area.

1.2.6.1 Consolidation of Approach Control Facilities

Consolidation of smaller facilities and their associated airspace into larger facilities and more efficient blocks of airspace began in 1968, with the creation of the Common IFR Room (CIFRR) at JFK. CIFRR combined EWR, LGA, and JFK approach control airspace into one facility, and thus originated the concept of combining smaller, separate facilities into more efficient and cohesive operations. New York's current TRACON evolved from the CIFRR. This included incorporating the terminal airspace around HPN, ISP, and SWF after 1982.

1.2.6.2 Re-allocation of New York Center Airspace

New York Center originally encompassed all the airspace above and around the NY/NJ/PHL area airports. Using a common automation platform,[20] the New York Center computer system "hosted" the computer systems of the numerous terminal facilities under its jurisdiction. The common automation platform and the layout of the airspace and facilities provided an uninterrupted flow of flight data to and from surrounding en route facilities through New York Center to the NY/NJ/PHL area airports. New York Center provided in trail spacing for all arrivals and departures to the NY and PHL airports. Thus, New York Center had the ability to shift routings in proximity to the airports to more efficiently balance the traffic demands.

In the 1980s, portions of New York Center's airspace were transferred to other facilities. The southern arrival and departure sectors were relocated to the Washington Center in

[20] Automation platform refers to a single radar data processing system and the information it provides to controllers.

stages between 1982 and 1985. The northern arrival and the northeast departure sectors were relocated to the Boston Center in 1987. The resulting configuration of multiple Centers above and adjacent to the NY and PHL TRACONs, with different automation systems exchanging flight data, severely limited operational flexibility and the ability to achieve maximum efficiency in the airspace.

1.2.6.3 Expanded East Coast Plan

In the mid-1980s, a plan to improve airspace efficiency in and around the NY Metropolitan Area was implemented. The plan, which was initially called the East Coast Plan, focused on developing common departure routes out of the NY Metropolitan Area. During development and design of the plan, however, it became obvious that any change to routes and flows in the NY Metropolitan Area would require coordination with all adjacent ATC facilities. Because of the larger geographical area covered by the design, it was re-named the Expanded East Coast Plan (EECP).

The key elements of the EECP were the: (1) use of flow control to monitor and maintain the arrival rate at airports, (2) relocation of the holding patterns into the en route airspace to allow more room for departure transitions, and (3) the development of multiple departure routes to the west and north to allow for staging of departures from key NY/NJ metropolitan airports over integrated departure tracks. This created a new area within the New York TRACON called the Liberty Area which performed departure sequencing and spacing. This function was previously accomplished in the en route environment, but was converted to the terminal airspace which allowed reduced separation standards to be used.

The EECP was implemented in phases in 1987 and 1988, during a time of substantial growth in aircraft operations at EWR.

1.2.6.4 Other Initiatives

Two other initiatives were undertaken by the FAA in the early 21st century to reduce delay and improve the efficiency of the airspace system in the Study Area. These initiatives include the Robbinsville-Yardley Flip-Flop Procedure and the Dual Modena Procedure. These two procedures are described in the following sections.

Robbinsville-Yardley Flip-Flop Procedure

With the implementation of EECP, airplanes flying from points south passed over Robbinsville, NJ (RBV) for arrival at EWR and over Yardley, PA (ARD) for landing at LGA. Once past these fixes, the aircraft would crisscross to get to their destination airports. This crossing, done relatively close to landing, created complex and inefficient arrival streams into the NY/NJ Metropolitan Area. In December 2001, these routes were "flip-flopped." Aircraft now fly straighter and more efficient routes. The new procedure permitted the creation of a dedicated controller position in the New York TRACON that is responsible for sequencing arrivals to Runway 4 at EWR. By reducing the complexity and allowing ATC to concentrate solely on the sequencing of airplanes to the runway (rather than on the crisscrossing of airplanes), a major inefficiency in the procedures used to manage airplanes arriving at EWR and LGA has been eliminated. The results of the environmental analysis of the Flip-Flop Procedure indicated that no significant environmental impacts would result from this action and this procedure was categorically excluded from further NEPA analysis. **Figure 1.9**

depicts the arrival tracks of aircraft approaching EWR and LGA before and after implementation of the Flip-Flop Procedure.

Dual Modena Procedure

The Dual Modena Procedure was implemented on October 30, 2003, to help reduce departure delays at PHL. Due to PHL's location along the east coast between NY/NJ to the north and the Washington D.C. Metropolitan Area to the south, departures from PHL are often routed to the west. In the past, about 40 percent of all jet departures from PHL were routed west over a single Modena (MXE) fix before continuing on course to their destinations. Aircraft destined for cities along the west coast of the nation, Florida, and all destinations in between were routed via this fix. After passing over MXE, the departures would be split onto four separate jet airways and then sequenced with other aircraft already on these routes. This configuration created a "bottleneck" over MXE, much like a single lane on-ramp to a busy highway. The Dual Modena Procedure added a fix to the south of the existing one. Westbound departures can now gain more efficient access to jet routes, thereby alleviating some ground delays at PHL. The results of the environmental analysis of the Dual Modena procedure indicated that no significant environmental impacts would result from this action and this procedure was categorically excluded from further NEPA analysis. **Figure 1.10** shows the new fix as well as the MXE fix and jet airways.

1.2.7 System Perspective

Major metropolitan areas have experienced increased air traffic demand resulting from influences such as population growth, the emergence of low-cost carriers, and increased use of regional jets. As a result, the NAS is currently experiencing deficiencies that are evident to both the users of the system and to the FAA. Some of the ways these deficiencies materialize are flight delays, inefficient routings, and airspace saturation. Today's aircraft technology far exceeds the capabilities of the land-based navigation system used by the NAS, as discussed in Section 1.2.2. Additionally, the existing system was not designed to accommodate the use of advanced navigation systems, such as Flight Management Systems and GPS, which permit increased flexibility and efficiency as compared to the ground-based systems.

Nationwide, airspace management has become increasingly complex and more challenging as aircraft technology advances and air traffic activity grows. To maintain safety and efficiency, the FAA, airlines, and airport operators have worked to keep pace with these challenges through advances in ATC technology, airline efficiencies, and airport improvements. Nonetheless, inefficiencies continue to occur and will increase as traffic levels increase unless further improvements are made. As the air traffic levels continue to grow over time, and additional demands are placed upon the NAS, the system will be further strained.

In 2001, the FAA implemented a system-wide strategy for the advancement of the NAS called the Operational Evolution Plan (OEP).[21] The OEP is a living, 10-year plan which is updated by the FAA as needed. An element of the OEP is the National Airspace Redesign (NAR) program. The goals of the NAR program are:

- Improve the air traffic flows into and out of all of the nation's major airports;

[21] Federal Aviation Administration National Airspace System Operational Evolution Plan , January 2004, Version 6.0.

- Increase system flexibility, predictability, and access;
- Maintain and improve system safety;
- Improve efficiency and reduce delays; and
- Support an airspace system that takes advantage of emerging technologies.

In 2003, the FAA initiated a study, the Future Airport Capacity Task (FACT), to determine whether the improvements included in the OEP were sufficient to meet future demand. FACT[22] was an assessment of the future capacity of the nation's airports and metropolitan areas. The goal of FACT was to determine which airports and metropolitan areas would need additional capacity in the future and why.

For 2013, FACT showed that 15 airports and seven metropolitan areas would need additional capacity. The FACT analysis is based on the assumption that the improvements in OEP Version 5.0 are completed. Therefore, despite the improvements included in the OEP, additional capacity would be required in 2013 for the identified locations. Of the 15 airports and seven metropolitan areas identified in FACT, four airports (JFK, LGA, EWR, and PHL) and the NY Metropolitan Area are within the Study Area.

If future capacity enhancements are made at airports in the Study Area, the existing airspace structure is likely to impact the efficiency of future traffic demands. Additionally, procedures, technologies, and policy options must be improved to address existing airspace inefficiencies. Thus, FACT provides further support for the need for Airspace Redesign. The NY/NJ/PHL Airspace Redesign is the cornerstone of the FAA's initiative to redesign airspace all across the United States. This initiative fulfills the FAA's primary statutory mission to assure safe and efficient use of the navigable airspace under 49 USC 40103.

In addition to the NY/NJ/PHL Metropolitan Area project, numerous proposals for airspace redesign have begun in the NAS. Airspace Redesign studies have already been completed for the Chicago and Baltimore-Washington areas. A Record of Decision (ROD) for the Chicago Terminal Airspace Project (CTAP) was published in November 2001 and a ROD for the Potomac Consolidated TRACON (PCT) Airspace Redesign was issued in May 2003.

The airspace controlled by the NY/NJ/PHL facilities is one of the busiest air traffic areas in the world. Located in the Northeastern Corridor of the United States, the area is a hub for domestic and international air traffic. Inefficiencies in this airspace create a ripple effect that routinely impact major portions of the NAS. Additionally, the proximity of JFK, LGA, EWR, TEB, and PHL creates a unique and challenging interaction of air traffic flows. These interactions often produce a significant reduction in the operational efficiency at each airport. **Figure 1.11** shows the intermingling of traffic flows in the Study Area.

From a historical perspective, the airspace and the air traffic procedures in the NY/NJ/PHL Metropolitan Area were adequate after the last airspace change

[22] US Department of Transportation, Federal Aviation Administration, and The MITRE Corporation Center for Advanced Aviation System Development. "Capacity Needs in the National Airspace System: An Analysis of Airport and Metropolitan Area Demand and Operational Capacity in the Future". June 2004 <http://www.faa.gov/arp/publications/reports/capneedsnas.pdf>.

which was implemented in the late 1980s. However, over time, increases in air traffic volume, changes in airport utilization, and aircraft type and mix have outpaced the airspace's ability to meet demand. The FAA's High Density Rule, commonly known as the slot program, restricts aircraft access at JFK and LGA. Exemptions from the slot program to promote airline competition and service to smaller communities resulted in a rapid increase in air traffic at LGA in 2001, which consequently prompted a temporary reallocation of slots by the FAA in order to reduce massive delays. Slots will no longer be in effect at JFK and LGA as of January 1, 2007.[23] The elimination of the slot program will further highlight the shortcomings of the airspace system in this region.

1.3 AVIATION DEMAND FORECASTS

Many aspects of airspace planning and environmental analysis are based on forecasts of future aviation activity. Thus, the level of IFR aviation activity expected throughout the planning period is an important consideration in the EIS process.

The FAA's office of Aviation Policy and Plans (APO) develops and regularly updates the Terminal Area Forecasts (TAF) for about 3,400 airports throughout the country. These forecasts are prepared by the agency to assist in meeting planning, budgeting, and staffing requirements. While some state aviation authorities and other aviation planners may use the TAF as a basis for planning future airport improvements, the volume of airports included in the TAF often precludes annual updates of the forecast for a given airport. As a result, the TAF forecast for even a major airport may not undergo a rigorous forecast update for several years. Furthermore, the TAF generally does not provide sufficient detail (e.g., aircraft type, destination, time of day, etc.) for environmental modeling.

Accordingly, specific forecasts were developed for IFR operations at each of the 21 airports evaluated in this study in order to provide the necessary data for the operational and environmental impacts analyses. The study forecasts were developed differently than the TAF and include detailed assumptions specific to the NY/NJ/PHL Metropolitan Area and the 21 airports of interest. The study provided forecasts specific to aircraft type, schedule, and origin/destination.

Considerable analytical attention was applied to forecast development for the general aviation sector. The corporate aviation market, which is generally identified as business executive transportation via small jets and turboprop aircraft, is expected to grow at a more robust rate than scheduled airline service. This is primarily due to the success and growth of fractional ownership programs where businesses or individuals purchase a portion of an aircraft and share its use with other owners.

Among the most pronounced changes in commercial passenger fleets in the late 1990s has been the replacement of turboprop aircraft with regional jets. This trend toward the use of regional jets has continued in recent years with many major airlines replacing narrow body jet aircraft with regional jets in search of more profitable operations.

A number of other general assumptions and factors affecting demand were also

[23] 49 USC, Subtitle VII, Part A, subpart ii, Chapter 417, Subchapter I, Section 41715.

considered in development of the forecast. These assumptions, a detailed methodology describing the process by which the forecasts were constructed, and actual forecasts may be found in **Appendix B. Table 1.2** shows the total operations for the 21 study airports for the base year (2000), the Airspace Redesign implementation year (2006), and a future year (2011).

After developing forecasts for each of the 21 study airports, individual forecasts were compared to the FAA's TAF. The comparison of these forecasts served as a method to verify the reasonableness of the Airspace Redesign forecast. The FAA's Airports Division uses a 15 percent threshold within 10 years as a rule-of-thumb for accepting non-TAF forecasts as the basis for planning and environmental studies associated with airport development projects. For the 21 study airports, the new passenger forecasts were within 15 percent of the TAF levels. The weighted average variance for total operations and the aggregate TAF passenger forecasts for 2006 is less than one percent. The weighted average variance in 2011 from the TAF is less than two percent. For SWF, the forecast included the introduction of new low-fare service that was not anticipated in the TAF. Also, TAF for year 2000 for TTN overstated enplanement levels due to the mid-year withdrawal of service by Westwind Airlines.

When considering the forecasts developed for this analysis, it should be noted that they have been developed specifically for this Airspace Redesign Study. Thus, their make-up and content may differ from other forecasts developed specifically for a given

Table 1.2
Total Annual IFR Operations for Noise Modeling

Airport	Identifier	2000	2006	2011
LaGuardia	LGA	387,995	416,465	416,465
John F. Kennedy International	JFK	347,115	413,910	451,505
Newark Liberty International	EWR	451,505	506,985	524,140
Teterboro	TEB	144,175	162,790	184,325
Philadelphia International	PHL	407,340	550,420	598,600
Morristown Municipal	MMU	36,500	40,880	45,990
Islip Long Island MacArthur	ISP	51,100	64,240	74,095
White Plains/Westchester County	HPN	96,360	116,435	125,195
Allentown/Lehigh Valley International	ABE	44,530	47,815	52,195
Atlantic City International	ACY	25,550	27,375	30,295
Bridgeport/Igor I. Sikorsky Memorial	BDR	8,030	8,760	9,490
Caldwell/Essex County	CDW	5,110	5,475	5,475
Westhampton Beach/The Francis S. Gabreski	FOK	1,095	1,460	1,460
Linden	LDJ	365	365	365
McGuire AFB	WRI	10,585	10,585	10,585
Newburgh/Stewart International	SWF	32,120	40,515	54,385
New Haven/Tweed-New Haven	HVN	8,030	8,760	9,490
Northeast Philadelphia	PNE	13,505	14,965	16,425
Republic	FRG	18,250	20,075	21,535
Trenton/Mercer County	TTN	22,630	20,805	24,090
Wilmington/New Castle County	ILG	22,995	26,280	30,660
Total		2,134,885	2,505,360	2,686,765

Source: Landrum & Brown, 2005.

airport. For example, these operational forecasts focus solely on the IFR traffic activity at each of the 21 airports being evaluated. Conversely, a forecast developed for infrastructure planning at a specific airport may include VFR, IFR, and training traffic at that airport. Also, because aviation trends are used to develop forecasts, the period of time when a forecast is developed can substantially affect the results. Forecasts developed for a specific airport before or after the analysis conducted here may indeed present different results.

The bulk of the forecast effort was conducted before the events of September 11, 2001. The tragic events of September 11, 2001 led to increased security and short-term reductions in activity at the NY/NJ/PHL Metropolitan Area airports, as well as airports nationwide. In addition, both the Iraq War and the increasing oil prices have impacted the aviation industry. Given the relatively long forecast horizon (2001-2011), any short-term suppression of aviation demand due to the terrorist attacks is expected to recover by the first benchmark year of 2006. According to the FAA, "This year [2004] we foresee that the demand for aviation products and services will continue to increase from the low levels of the past few years, with most measures of aviation activity predicted to return to pre-September 11th levels in 2005."[24] Delays at airports in the NY/NJ/PHL Metropolitan Area are growing again and in the case of PHL are exceeding pre-September 11th conditions.[25] Also, observations are included in Appendix B that support the expectation that aviation growth will continue to rebound over the forecast horizon. Therefore, the events of September 11th and other near-term impacts are considered short-term and are not expected to affect long-term demand at the Study Area airports.

1.4 PURPOSE AND NEED

The identification of a proposed action's purpose and need is the primary foundation for the identification of reasonable alternatives to the proposed action and the evaluation of the impacts of the alternatives in an EIS.

The FAA's first consideration and highest priority in defining the Purpose and Need for any proposed action is to serve the public interest by exercising its authority to assign, maintain, and enhance safety and security of the national airspace (per 49 USC 40101(d)).

1.4.1 Need

In the case of the existing NY/NJ/PHL Metropolitan Area airspace, the basic air traffic environment was designed and implemented in the 1960s. Since that time, the volume of air traffic and the type of aircraft that use the ATC system have changed significantly. However, the basic structure of the NY/NJ/PHL airspace has essentially remained the same and has not been adequately modified to address changes in the aviation industry, including increased air traffic levels, the use of new aircraft types, and emerging technologies to control air traffic.

1.4.1.1 Increased Aircraft Traffic Levels

Aircraft operations in the Study Area are growing. As illustrated in **Table 1.3**, the instrument operations at most of the major

[24] FAA Aerospace Forecasts Fiscal Years 2005-2016 U.S. Department of Transportation, Federal Aviation Administration, Office of Aviation Policy & Plans, March 2005.

[25] OPSNET: Delays Report from January 2000 through March 2005. http://www.apo.data.faa.gov/opsnet/delays.

Table 1.3
Instrument Operations at Major Airports

Airport	1980	2004	2020
John F. Kennedy International Airport	332,908	363,013	1,633,421
LaGuardia International Airport	405,918	445,915	1,590,822
Newark International Airport	235,423	476,952	2,032,649
Philadelphia International Airport	490,805	651,709	5,751,184
Teterboro Airport	65,280	168,659	225,924

Source: FAA TAF, Issued January 2005.

airports in the Study Area have increased. Dramatic increases have occurred at EWR, PHL, and TEB and these increases are forecast to continue. Inefficiencies due to the inherent limitations of the existing airspace design, including route structure and ATC procedures, will be exacerbated by growth in air traffic operations. The following inefficiencies must be addressed in order to accommodate growth:

- Access to en route airways is restricted by downstream congestion.
- EWR and LGA final approach courses are restricted and do not allow for optimal aircraft sequencing to the runways.
- Airspace sectors are currently associated with specific airports which cause an unbalanced use of the airspace, thus requiring excessive communications between controllers.
- Westbound departures from JFK create delays for westbound departures from EWR and LGA due to in-trail sequences.
- NY Metropolitan Area departures to north departure gate fixes are restricted due to inefficient airspace allocation.
- Arrivals to PHL are directed to lower altitudes to maintain separation from arrivals to the NY Metropolitan Area.

The airspace must accommodate growth in air traffic. To accommodate growth, the enhanced airspace system must maintain the current high level of safety and mitigate delays.

Safety

The FAA has the responsibility to control the use of navigable airspace in the interest of safety and efficiency. The following safety-related inefficiencies currently exist in the NY/NJ/PHL Metropolitan Area airspace:

- Arrivals to HPN from the south cross several traffic flows and create unnecessary complexity.
- Arrivals for airports to the north of the Study Area must be assigned high altitudes to avoid conflicts with the NY Metropolitan Area traffic. This creates the need to cross several traffic flows in a short distance while descending.
- Traffic to PHL, ISP, and their associated satellite airports[26] is restricted to intersecting courses in narrow corridors of airspace.

[26] PHL satellite airports include Chester County, Brandywine, New Garden, Wings Field, Northeast Philadelphia, Doylestown, Pottstown Limerick, and Capital City Airports. ISP Satellite airports include Brookhaven, Spadaro, Francis S. Gabreski, Republic, and Montauk Airports. Source: NPIAS 2005-2009.

- Airspace restrictions require incremental changes in altitude for arrivals and departures causing radio frequency congestion associated with additional control instructions.

- Departures from EWR to the Caribbean and South America must climb through PHL and ACY traffic resulting in traffic conflicts.

- High-performance general aviation aircraft operating out of satellite airports are restricted to less efficient altitudes below major airport flows. This creates increased controller workload to resolve traffic conflicts.

- Departures from ISP and ISP satellite airports to the south/southwest conflict with arrivals to the NY Metropolitan Area and northeast-bound departures from PHL.

Addressing the safety-related inefficiencies will contribute to enhanced safety in light of the growing traffic.

Delays

Delays affect aircraft operators with increased fuel use and operating costs, which are passed on to consumers in the form of higher ticket prices. Delays also impact the public by causing inconveniences with late arrivals, missed connections, and cancelled flights. The public expects a stable and reliable aviation system that supports on-time flights. People have dramatically increased their use of aviation as a mode of travel and increasing delays continue to receive much public attention. Delays are expected to increase in the future as traffic levels continue to grow. These issues prompted the airline industry and the Federal government to search for ways to reduce delays.

The current basic airspace structure was designed and implemented in the 1960s, based on the interaction of independent TRACONs and several overlying Centers. Today, it cannot efficiently handle the current and projected level of traffic within the NY/NJ/PHL Metropolitan Area. In 1988, when the last large scale airspace changes were made, the New York TRACON alone managed approximately 1,710,000 operations annually. In 2004, the New York TRACON handled 2,067,000 operations. By the year 2011, the traffic level is projected to increase to 2,290,000 annual operations. The increasing traffic levels result in excessive user delays and inefficient routes. Between 2000 and 2004, total aircraft delays at TRACONs and Centers in the Study Area have increased more than 50 percent (see **Table 1.4**). In addition, airports in the NY/NJ/PHL Metropolitan Area are routinely among the top 10 most delayed airports in the nation, due in part to the inefficiencies of the current airspace structure (see **Table 1.5**).

The following are among the causes for delay in the existing NY/NJ/PHL Metropolitan Area airspace:

- Aircraft departing from the NY Metropolitan Area to the Washington Metropolitan Area are sequenced onto the same routes as long-haul destinations (e.g., Los Angeles).

Table 1.4
Center and TRACON Delays

Facility	2000		2004	
	Total Aircraft Delays	Average Time (mins)	Total Aircraft Delays	Average Time (mins)
New York Center	438	33.6	5,402	25.4
Boston Center	121	29.4	403	33.4
Washington Center	596	32.1	1,193	29.0
New York TRACON	396	34.2	523	22.4
Philadelphia TRACON(1)	21,521	47.5	27,437	43.8

Note: Only includes aircraft delayed greater than 15 minutes.[27]
(1)Since the Philadelphia TRACON is collocated with PHL, Philadelphia TRACON statistics include delays for the Airport as well.

Source: FAA OPSNET, June 2005.

Table 1.5
Ten Most Delayed Airports in 2000 and 2004

2000 Delay				2004 Delay			
Rank	Airport	Total Aircraft Delayed	Average Delay (min)	Rank	Airport	Total Aircraft Delayed	Average Delay (min)
1	LaGuardia	61,120	47.54	1	Chicago O'Hare International	96,346	56.04
2	Chicago O'Hare International	57,545	57.71	2	Hartsfield-Jackson Atlanta International	69,635	43.94
3	Newark Liberty International	37,132	56.23	3	Newark Liberty International	30,903	59.41
4	Hartsfield-Jackson Atlanta International	28,229	37.39	4	Philadelphia International	27,437	43.81
5	San Francisco International	24,478	51.85	5	LaGuardia	22,682	55.85
6	Logan International	24,120	48.19	6	George Bush Intercontinental/ Houston	18,814	32.37
7	Philadelphia International	21,521	47.52	7	Dulles International	18,088	47.55
8	Dallas-Fort Worth International	20,638	44.45	8	Dallas-Fort Worth International	17,795	40.50
9	Los Angeles International	17,141	43.65	9	McCarran International	11,883	40.70
10	Phoenix Sky Harbor International	14,024	31.98	10	San Francisco International	11,250	47.84

Note: Only includes aircraft delayed greater than 15 minutes.[25]

Source: FAA OPSNET for ATC delays, issued January 2005.

[27] A "delay" to Instrument Flight Rules (IFR) traffic is reported when an individual flight is detained 15 minutes or more by the ATC system at the gate, short of the runway, on the runway, on a taxiway, and/or in a holding configuration anywhere enroute. Source: U.S. Department of Transportation. Federal Aviation Administration. Operational Data Reporting Requirements, June 11, 1999.

- Entering and exiting holding patterns in en route airspace are inefficient because more restrictive en route separation rules are used and require extensive coordination.

- Chicago O'Hare International Airport (ORD) is one of the busiest airports in the nation and experiences significant delays. Westbound traffic from the NY/NJ/PHL Metropolitan Area is frequently delayed as a result of ORD related in-trail restrictions.

- Aircraft departing from LGA and HPN have poor access to departure routes during severe weather conditions.

- Severe weather that occurs during periods of heavy traffic reduces flexibility for aircraft rerouting resulting in delays.

- During peak demand periods individual arrival fixes can become saturated while other arrival fixes are under used.

The Airspace Redesign is needed to address the system inefficiencies that cause delay.

1.4.1.2 Changes in Type of Aircraft

The overall fleet mix of aircraft types used by air carrier and general aviation operators has evolved rapidly over the past decade. Regional airlines have replaced propeller-driven aircraft with regional jets in response to consumer preferences and to begin service to new markets. Mainline air carriers have transitioned service on some routes from larger narrowbody aircraft to smaller regional jets, due to the lower operating costs of regional jets. The net effect of these changes is that the same numbers of passengers are now being transported with a higher number of operations by smaller aircraft. Also, fractional ownership programs have resulted in the increasing use of business jets. These factors have placed new strains on the NAS by increasing the number of high performance jets vying for the same routes and altitudes. Previously, there were substantial numbers of propeller-driven aircraft operating at lower altitudes on separate routes. The increasing number of jets has resulted in the saturation of jet routes.

1.4.2 Purpose

The purpose of the Airspace Redesign is to increase the efficiency and reliability of the airspace structure and ATC system, thereby accommodating growth while enhancing safety and reducing delays in air travel.

By taking advantage of new technologies and responding to new trends, the Airspace Redesign will increase efficiency and the reliability of the air traffic system.

1.4.3 Other Considerations

Noise reduction is not a component of the Purpose and Need for the Proposed Action. In the case of the NAR, reduction of noise is not appropriately identified as a Purpose because it is not FAA policy to reroute aircraft to reduce noise levels in one community at the expense of another.

Although reduction of noise is not included in the Purpose and Need, the FAA recognizes the concerns associated with aircraft noise. At the scoping meetings held in 1999 and 2001, the FAA committed to using the following techniques, where possible, to reduce aircraft noise and other potential environmental impacts:

- Increase altitudes,

- Disperse or concentrate tracks where appropriate,
- Reduce flying time, and
- Route aircraft over less noise-sensitive areas where feasible.

However, in both the scoping meeting and newsletters, the FAA has been careful to inform the public that airspace redesign is not a cure-all for noise problems for the 29 million people living in the Study Area.

1.5 PROPOSED ACTION

The Proposed Action for this Draft EIS is to redesign the airspace in the NY/NJ/PHL Metropolitan Area. This involves developing new routes and procedures to take advantage of improved aircraft performance and emerging ATC technologies.

To develop the Proposed Action, technical specialists with in-depth knowledge of regional ATC issues evaluated the existing airspace structure, ATC procedures and routes, and the interaction of local air traffic with the NAS as a whole. In designing the alternatives for the Proposed Action, the airspace designers considered the highest reasonable altitudes and the most direct routing when possible. Use of higher altitudes provides more flexibility for maintaining safety and provides greater economic benefits to aircraft operators than the use of lower altitudes.

The Proposed Action does not include any physical changes or development of facilities, nor does it require local or state actions. Therefore, no physical alteration to any environmental resource would occur in the Study Area. Additionally, the NY/NJ/PHL Metropolitan Area Airspace Redesign would not require changes to any Airport Layout Plan, and infrastructure funding is not expected to be necessary.

Since the Proposed Action involves modifications to airspace structure and air traffic management procedures, the project requires direct FAA action in order to be implemented. This consists of the design, development, implementation, and use of new or modified ATC procedures and reconfigured airspace.

1.6 IMPLEMENTATION

The various components of the Proposed Action are expected to be implemented in phases beginning in 2006.

Implementation of the Proposed Action would require revisions to Letters of Agreement and Facility Orders for all ATCTs, TRACONs, and Centers impacted by the Airspace Redesign. Letters of Agreement are formulated when operational and procedural needs require the cooperation and concurrence of more than one ATC facility. Letters of Agreement typically delegate airspace and responsibilities, specify ATC procedures, and standardize operating methods. Individual ATC facilities may also set forth policies and procedures through a local Facility Order.

Implementation of the Proposed Action would also require the FAA to establish new ATC procedures and revoke or modify existing procedures that would be inconsistent. This would include training of air traffic controllers and publication of the new procedures (i.e., aeronautical charts).

1.7 OTHER ACTIONS

According to CEQ Regulations, connected actions must be considered when determining the scope of an EIS. If actions

are connected, their impacts should be included in the same EIS. "Actions are connected if they:

- Automatically trigger other actions which may require environmental impact statements.
- Cannot or will not proceed unless other actions are taken previously or simultaneously.
- Are interdependent parts of a larger action and depend on the larger action of their justification."[28]

Actions that are independent or have independent utility can proceed separately and do not need to be analyzed in the same EIS. Independent actions are those that have benefit in and of themselves and do not require or trigger another action.

Ongoing airspace redesign activities (i.e., Midwest Airspace Enhancement (MASE) and PCT Airspace Redesign) in areas abutting the NY/NJ/PHL Metropolitan Area airspace will be coordinated; however, these are not considered connected actions as they can be accomplished independent of each other and are independently justified.

Other aviation projects were considered to determine whether or not they were independent or connected actions with respect to the Airspace Redesign, including the proposed New York Integrated Control Complex (NYICC), runway extensions and relocations at PHL, and the Part 150[29] Study at Bradley International Airport.

NYICC is an operational concept that would merge the current New York TRACON and New York Center into a single facility. The NYICC concept would expand the airspace in which terminal separation rules could be used. Where en route airspace separation rules of five nautical miles are typically used today, the NYICC would instead use three nautical mile terminal airspace separation rules. This would permit less restrictive separations to be used over a larger geographical area and at higher altitudes. The NYICC facility would be evaluated in a separate environmental study. However, the NY/NJ/PHL Metropolitan Area Airspace Redesign will consider the implications of the NYICC in its alternatives. Chapter Two provides additional discussion on how the Airspace Redesign would work with or without the NYICC.

The NYICC concept was developed as a means to solve operational and facility issues in the NY Metropolitan Area. The NYICC idea goes beyond the historical FAA consolidation model by seeking to integrate the best aspects of terminal and en route air traffic control into one facility. The integration can remove many of the artificial boundaries that now divide the en route and terminal environment and can provide seamless transitions through all phases of flight in the area. Other benefits to traffic management include the establishment of arrival and departure areas to maximize efficiency, terminal holding to efficiently manage arrival capacity, more effective use of separation rules to safely accommodate growth, and the flexibility to dynamically adapt flows to address volume or weather. NYICC would avoid the expense of rehabilitating the New York Center and replacing the New York TRACON. Additional benefits of the NYICC include a reduction in overall operations and maintenance costs from the

[28] CEQ 1508.25.

[29] 14 CFR Part 150.

use of one facility instead of two, reduced interface delays through the use of a single automation platform, and reduced telecommunications equipment, infrastructure, and line costs. Ongoing analysis of redesign alternatives associated with the Airspace Redesign has demonstrated the independent utility of the NYICC concept itself. Even without Airspace Redesign, the NYICC would permit efficiency gains in air traffic management, allow for the use of new technologies, reduce overall operations and maintenance costs, and allow for compliance with current Department of Justice security regulations.

Two projects are underway at PHL: extension to Runway 17/35 and the Capacity Enhancement Program (CEP), which considers major airfield development. In April 2005, the FAA issued a ROD approving the runway extension project, which is currently in the design phase. The EIS for the CEP is currently underway. Neither project is a connected action to this project because each can proceed independently of the Airspace Redesign and each has its own justification: to reduce airfield delays at PHL.

Bradley International Airport (BDL) has developed a Part 150 Study including a noise compatibility program involving airport-specific noise abatement measures. A two-day meeting held February 24-25, 2004, between the controllers from BDL Tower and the NY/NJ/PHL Airspace Redesign team concluded that changes associated with the Proposed NY/NJ/PHL Metropolitan Area Airspace Redesign Project would not change any activity at BDL, nor would the proposed procedure changes contained in BDL's Part 150 Study impact any changes contained within the Airspace Redesign. Additionally, BDL is located outside of the Study Area for this Draft EIS. See the end of Section M.4 of Appendix M for more information regarding the independence of the BDL Part 150 Study.

While there are no connected actions to be evaluated in this Draft EIS, the implications of the NYICC as it relates to the alternatives for the Airspace Redesign will be discussed in this Draft EIS.

1.8 SUMMARY

The Purpose and Need for the Proposed Action are:

- The purpose is to increase the efficiency and reliability of the airspace structure and the ATC system.

- This project is needed to accommodate growth while maintaining safety and mitigating delays, and to accommodate changes in the types of aircraft using the system.

Chapter Two
ALTERNATIVES

2.1 INTRODUCTION

The Purpose and Need for the Proposed Action have been established in Chapter One. The next step in the environmental process is to identify and screen alternatives.

Federal guidelines concerning the environmental review process require that all prudent, feasible, reasonable, and practical alternatives which might accomplish the objectives of a proposed project be identified and evaluated. The examination of alternatives is of critical importance to the environmental review process. This evaluation establishes whether an alternative addresses the project Purpose and Need. Those alternatives that meet the Purpose and Need will be included for detailed analysis while those alternatives that do not meet the Purpose and Need will be dismissed from further consideration.

This chapter documents the alternatives considered and the screening process. Alternatives were screened based on their ability to meet the Purpose and Need. All alternatives not meeting the Purpose and Need were removed from further consideration. The remaining alternatives were retained for environmental impact analysis.

This chapter includes the following sections:

- Section 2.2 – Identification of Potential Alternatives
- Section 2.3 – Alternatives Considered
- Section 2.4 – Airspace Redesign Alternatives
- Section 2.5 – Evaluation of Detailed Airspace Redesign Alternatives
- Section 2.6 – Comparisons of Airspace Redesign Alternatives

2.2 IDENTIFICATION OF POTENTIAL ALTERNATIVES

The range of alternatives considered in the initial screening for this Draft EIS include those within the following categories:

- **Alternative Modes of Transportation and Telecommunication** – Use alternative modes of transportation and communication including travel by automobile, bus, and rail, as well as use telecommunication methods such as video conferencing.
- **Changes in Airport Use** – Move operations to satellite airports or improve infrastructure of existing airports.
- **Congestion Management Programs** – Regulate air travel demand by limiting flight operations.
- **Improved Air Traffic Control Technology** – Use newly developed air traffic control technologies.
- **Airspace Redesign Alternatives** – Use restructured airspace routes, altitudes, and sectors.

Alternatives that are not within the jurisdiction of the FAA are included in this Draft EIS, in accordance with 40 CFR 1502.1(c). The following section identifies whether the alternative categories meet the Purpose and Need for the Proposed Action and why they were eliminated or carried forward for detailed environmental analysis.

2.3 ALTERNATIVES CONSIDERED

Each category of alternatives was examined as to whether it would meet the Purpose and Need for the Proposed Action. As stated in Chapter One, the Purpose and Need for the Proposed Action is as follows:

- The purpose of the airspace redesign is to increase the efficiency and reliability of the airspace structure and ATC system.
- The need is to accommodate growth in aircraft operations while maintaining safety and mitigating delays, and to accommodate changes in the types of aircraft using the System.

The following subsections explain why categories of alternatives are eliminated or retained for further analysis.

2.3.1 Alternative Modes of Transportation and Telecommunication

The Alternative Modes of Transportation and Telecommunication Category includes alternatives which expand the use of rail, bus or auto travel, or increase the use of telecommunications to avoid travel. Examples of alternatives within this category include: expanding the high-speed rail system in the Northeast Corridor linking New York, Boston, and Washington, D.C. Metropolitan Areas, developing dedicated highway lanes for Bus Rapid Transit systems, and increasing the use of video conferencing.

Although this category of alternatives may have the potential to decrease air travel, it does not meet the Purpose and Need for the Proposed Action. The Proposed Action is needed to improve a specific mode of transportation (i.e., air travel) as the current airspace structure was developed many years ago and better procedures and technology are now available to improve operational efficiency.

Use of other modes of transportation or telecommunications would not address present day inefficiencies of the NY/NJ/PHL Metropolitan Area airspace. Therefore, this category of alternatives is not considered to be a reasonable alternative for meeting the Purpose and Need for the Airspace Redesign, and will not be carried forward for additional consideration.

2.3.2 Changes in Airport Use

This category of potential alternatives includes moving operations to satellite airports, and building additional airport infrastructure. The potential for this category of alternatives to meet the Purpose and Need is discussed in the following two subsections.

2.3.2.1 Use of Satellite Airports

This subcategory includes alternatives which shift operations from congested airports to nearby satellite airports. An example would be an alternative designed to shift operations at LaGuardia (LGA) to Islip Long Island MacArthur (ISP), Republic (FRG), and Westhampton Beach/The Francis S. Gabreski (FOK).

One problem with this type of alternative is that the NY/NJ Metropolitan Area airports

are all located within a relatively small geographic area. Regardless of the airport, flights traveling to or from the New York, Philadelphia, Boston, or Washington, D.C. Metropolitan Areas will still be using the same flight routes to traverse the existing en route and terminal airspace structure. ATC would still need to manage aircraft through the inefficient airspace and route structure. As a result, shifting aircraft activity from highly used airports to lesser used airports may still cause flights to incur airspace delays and, thus, would have a negligible benefit to airspace efficiency.

Another problem with this type of alternative is that use of an airport is determined by aircraft operators and not the FAA. Aircraft operators choose to serve an airport in response to consumer demand for air service. No regulatory mechanism exists for the FAA to redistribute air traffic to satellite airports in the Study Area. Federal legislation would be needed in order to give the FAA the necessary authority to redistribute air traffic, which would represent a fundamental change to the nation's policy of a deregulated aviation system. In consideration of this deregulatory trend, legislation is not likely to be enacted.

Based upon this assessment, use of satellite airports would not address inefficiencies of the present day NY/NJ/PHL Metropolitan Area airspace, since this traffic would still be required to operate into and out of the current terminal and en route airspace structure. Therefore, use of satellite airports is not considered to be a reasonable alternative for meeting the Purpose and Need for the NY/NJ/PHL Airspace Redesign, and will not be carried forward for further consideration.

2.3.2.2 Improvements to Airport Infrastructure

Major improvements to the air carrier and general aviation airports in the Study Area are part of each airport's master planning process. Airfield improvements, such as new runways and improvements to taxiways, have the capability to improve the number of aircraft operations that an airport can efficiently support. That is, airfield improvements address airfield capacity constraints. Airfield improvements would do nothing to address the efficiency and reliability of the airspace structure nor would they accommodate growth or mitigate delays in the air. Moreover, airfield improvements would do nothing to permit the FAA to take advantage of emerging technologies for controlling air traffic.

Use of improvements to airport infrastructure would not address inefficiencies of the present day arrival or departure procedures for the NY/NJ/PHL Metropolitan Area airspace due to the limitations and inefficiencies of the airspace. Therefore, the use of airport improvement program initiatives alone is not considered to be a reasonable alternative for meeting the Purpose and Need for the Airspace Redesign, and will not be carried forward for further consideration.

2.3.3 Congestion Management Programs

The FAA, airport proprietors, and air carriers use congestion management strategies to align the demand for airfield capacity with the limited supply at an airport. The primary objective of congestion management programs is to increase the efficient use of airports. Such programs may include regulatory and/or economic measures designed to manage the number of flight operations during peak use periods,

potentially limiting the number of operations during peak-periods or shifting them to other less congested times of the day. In the context of airport congestion, Congress has articulated a policy that artificial restrictions on airport capacity are not in the public interest and should be imposed to alleviate air traffic delays only after other reasonably available and less burdensome alternatives have been tried. 49 U.S.C. 47101(a)(9)(A)(B). Artificial restraints on operations constrain the ability of air traffic to grow in accordance with market forces and have the potential to impede the use of emerging technologies. The three major congestion management techniques are discussed in the sections that follow.

Administrative Approaches

Administrative approaches to congestion management include both the use of operational controls, such as slots, or the convening of schedule reduction meetings with air carriers to reduce congestion-related delays under statutory authority enacted in 2003 and now codified at 49 U.S.C. § 41722. Under the FAA's High Density Rule (HDR),[1] the number of IFR operations at a specified airport may be limited by requiring aircraft to have a reservation, commonly known as a slot, for takeoff or landing. The HDR currently limits IFR operations at LaGuardia Airport, Kennedy International Airport, and Ronald Reagan Washington National Airport.[2]

By contrast, the FAA is currently limiting arrivals at O'Hare International Airport during peak hours as a result of an August 2004 FAA order, which made effective a series of schedule adjustments that air carriers individually agreed to during a scheduling reduction meeting under 49 U.S.C. § 41722. Scheduling reduction meetings offer a non-regulatory means of reducing overscheduling and flight delays at severely congested airports during hours of peak operation if the Administrator determines it is necessary and the Secretary determines that the meeting is necessary to meet a serious transportation need or achieve an important public benefit. In accordance with 49 U.S.C. § 41722, schedule reduction meetings may only be called regarding congestion at a severely congested airport. There is currently no statutory authority for the Secretary and Administrator to call a schedule reduction meeting to address congestion in a generalized area, such as the Study Area for the proposed Airspace Redesign.

Voluntary De-Peaking

Voluntary de-peaking is a congestion management approach initiated by an individual air carrier as a response to the free market. In some cases at airports where a single air carrier operates a network hub, the dominant carrier has on its own refined its schedule in a way that smoothes out operational spikes and thereby reduced delays.

Market-based Approaches

Market-based approaches, which include congestion-based landing fees and the auctioning of landing and take-off rights, use market forces to encourage system users to schedule their operations efficiently, given the available capacity, and may be instituted either by the FAA or by an airport proprietor to manage airport congestion. One approach that may be implemented by an airport proprietor could include a properly structured peak-period pricing program where the

[1] 14 C.F.R. Part 93, Subpart K.

[2] The HDR terminates at LaGuardia and Kennedy Airports after January 1, 2007. 49 U.S.C. 41715.

objective is to align the number of aircraft operations with airport capacity during severely congested periods of peak airfield usage. Other approaches that may necessitate appropriate legislative authority in order to be implemented either by the FAA or by the airport proprietor could include congestion-based landing or take-off fees or auctioned landing authority.

The Office of the Secretary and the FAA are presently considering market-based approaches to relieve congestion and delay at airports such as LaGuardia Airport in the context of the expiration of the HDR at LaGuardia. In connection with the FAA's reauthorization proposal for FY 2008,[3] the FAA has sought input from the flying public and first line stakeholders concerning future financing options to ensure that the FAA's revenues are adequate to fund the future needs of the aviation system. One of the questions posed regarding possible revisions to the current tax system is "What are your thoughts on using congestion pricing at locations and times of day when demand exceeds capacity, in order to capture the economic costs of congestion?" Questions on Future Funding of the Air Traffic Control System, Other Aviation System Components, and Related Issues (September 7, 2005) (http://www.faa.gov/about/office_org/headquarters_offices/aep/aatf/media/Questions%20for%20Stakeholders.pdf). Legislative authority would be necessary for the FAA to adopt user fees, whether or not market-based, for air traffic facilities and services.

[3] This proposal would take effect when the current Airport and Airway Trust Fund excise taxes expire at the end of fiscal year 2007.

2.3.3.1 Airspace Congestion Management Programs

To date, congestion management strategies have been available in the context of managing the imbalance between airport capacity and demand. When an airport begins to routinely experience increasing levels of delay, the airport operator often considers ways to increase the airport's limited capacity such as the addition of new runways or related infrastructure. This approach – of increasing airport capacity through infrastructure enhancements – is consistent with Congress' statutory finding that artificial restrictions on airport capacity are not in the public interest. Such restrictions should only be employed where airport improvements are physically impractical[4] or where improvements have been proposed but not yet implemented by the airport sponsor.

While congestion management programs may reduce delays, they would not accommodate growth in operations. Such programs are not reasonable alternatives to the proposed redesign of the airspace in the NY/NJ/PHL Metropolitan Area because they would not meet the project's purpose: to increase the efficiency and reliability of the airspace structure and ATC system, thereby accommodating growth while enhancing safety and reducing delays in air travel. Just as airfield projects are preferred over artificial restraints on airport capacity in accordance with the policies noted in the introduction above (namely, 49 U.S.C. 47101(a)(9)(A)(B)), airspace redesign projects are preferred over artificial restraints on use of the airspace to increase the

[4] E.g., Washington, D.C.'s Reagan National Airport, and NewYork City's LaGuardia Airport (66 Fed. Reg. 31731 (June 12, 2001)).

efficiency and reliability of the airspace structure and the ATC system. Congestion management programs premised upon assumptions of limited ability to enhance the airspace, like artificial restrictions on airport operations premised upon limited ability to enhance airfield capacity, should be considered only as a last resort to reduce delays in the national airspace system.

Based upon this assessment, congestion management is not a reasonable alternative for meeting the Purpose and Need for the Airspace Redesign, and will not be carried forward for detailed environmental analysis.

2.3.4 Improved Air Traffic Control Technology

A number of technological advancements are available, or in development, that have the potential to improve airspace efficiency. Examples of alternatives within this category of technological improvements that are currently in development are discussed in the following paragraphs.

Currently in use, the Traffic Management System (TMS) involves the use of computer systems that allow air traffic management coordinators to see aircraft activity on a national scale, identifying traffic surges, gaps, and volumes. Traffic managers can see the projected flow into specific airports or airspace sectors and take action to ensure that traffic demand does not exceed system capacity. The FAA is developing, testing, and implementing additional technologies to improve TMS; these upgrades are known as the Enhanced Traffic Management System (ETMS) and will expedite communication on traffic flow strategies.

The Center/TRACON Automation System (CTAS) includes software for accurately computing and predicting aircraft trajectories in real time and for scheduling aircraft landing times to achieve the least possible delay. CTAS will assist ATC in sequencing, spacing, and merging departing aircraft into the en route traffic system. The system incorporates radar flight track data and weather data and provides controllers with graphic displays. CTAS benefits controllers by reducing stress and workload, and benefits air travelers by reducing delays and enhancing safety. Components of CTAS are undergoing testing at several ATC facilities nationwide.[5]

The Free Flight Program is intended to create an Instrument Flight Rules (IFR) operating environment where aircraft operators have considerable flexibility in planning and flying their routes to minimize flight times and ultimately operational costs. Traditionally, aircraft operating under IFR have been subject to positive control by ATC throughout their flight and thus required to fly specific routes in the sky. This system of aircraft separation has been required to ensure operational safety for the many aircraft using the airspace. In recent years, numerous technologies have been developed that provide pilots and ATC with much more accurate and complete information about the operating environment and aircraft positions. These technologies promise to afford much greater flexibility and freedom to aircraft operators while maintaining safety and enhancing efficiency. While free flight is not available in the terminal airspace, it will promote more efficient and coordinated staging of aircraft in the en route airspace for unimpeded transfer into the terminal airspace. The initial phases of the Free Fight Program are being used in the airspace above 29,000 feet mean sea level (MSL). Further development of the Free Flight Program is ongoing.

[5] See: www.ctas.arc.nasa.gov.

While the potential exists for these technologies to allow controllers to better manage the airspace, they will not by themselves accommodate growth and enhance the safety and efficiency of the system. Technological improvements offer the potential to complement the Airspace Redesign by providing tools needed by controllers to more efficiently manage the flow of traffic. This should be especially helpful in the Study Area airspace given the high number of aircraft operations and the complex pattern of potential arrival runways at a number of major airports in the area (i.e., EWR, JFK, LGA, and TEB).

That both new technologies and the Airspace Management Program (AMP) are included in the FAA's Operational Evolution Plan (OEP) is indicative of the need for revised airspace structures that allow new technologies to be fully used.[6] *However, the use of improved ATC technologies would not independently address the inefficiencies of the present day arrival or departure procedures for the Study Area airspace. This is because of the inherent limitations of the existing airspace design, route structure, and ATC procedures, and the fact that this airspace is operating near saturation during peak demand periods. Therefore, the alternative is not considered to be a reasonable alternative for meeting the Purpose and Need for the Airspace Redesign, and will not be carried forward for detailed environmental analysis.*

2.3.5 Airspace Redesign Alternatives

Airspace in the NY/NJ/PHL Metropolitan Area could be redesigned by changing or enhancing departure gates, arrival posts, routes, and/or the airspace boundaries of the various ATC facilities. An example of this type of airspace redesign is the Potomac Consolidated TRACON (PCT) Airspace Redesign under implementation in the Baltimore/Washington, D.C. Metropolitan Area.

For the Study Area under examination, new departure gates and arrival posts would permit the development of new routes in the airspace structure. Expanding the boundaries of the terminal airspace environment would permit less restrictive separation rules to be used in a larger volume of airspace. These actions have the potential to meet the need to accommodate growth in air traffic levels while maintaining safety and mitigating delays. New routes could add efficiency by reducing delays and providing more direct routings; this has the potential to achieve the purpose of increasing the efficiency and reliability of the airspace structure and ATC system.

Airspace Redesign has the potential to independently address the inefficiencies of the Study Area airspace and to increase efficiency and reliability in the airspace. Therefore this category of alternatives has the potential to meet the Purpose and Need for the Airspace Redesign, and will be carried forward for further analysis.

2.3.6 Summary of Alternative Categories Considered but Eliminated

Of the five categories of potential alternatives considered, the following four have been eliminated because they do not meet the Purpose and Need of the Airspace Redesign:

- Alternative Modes of Transportation and Communication,

[6] See http://www.faa.gov/programs/oep/.

- Changes in Airport Use,
- Congestion Management Programs, and
- Improved ATC Technology.

The Airspace Redesign Alternatives category has not been eliminated, and is discussed in Section 2.4.

2.4 CONCEPTS FOR AIRSPACE REDESIGN ALTERNATIVES

The evaluation of airspace redesign concepts has been an evolutionary process that began in 1999. The consideration of airspace and ATC changes began with the FAA's analysis of potential airspace redesign alternatives for the NY/NJ/PHL Metropolitan Area airspace. A working group, known as the NY/NJ/PHL Airspace Redesign Team (Airspace Redesign Team), was formed to design and evaluate conceptual airspace alternatives. The Airspace Redesign Team included ATC representatives from the affected facilities (New York TRACON, Philadelphia TRACON, New York Center, Washington Center, and Boston Center). The Airspace Redesign Team also included representatives from ATC facilities outside of the Study Area. This was done to ensure consideration of the airspace management responsibilities of the adjacent Centers and TRACONs.

Extensive coordination was a key component of the Airspace Redesign process. FAA internal coordination included exchange of information between the various ATC facilities. External input from airspace users (e.g. airlines, airport operators) and the public was solicited and considered. In addition, recommendations were received from RTCA. RTCA is a private not-for-profit corporation that functions as a Federal Advisory Committee. It develops industry consensus regarding air traffic management issues.

The Airspace Redesign Team developed specific assumptions and objectives for the Airspace Redesign. The assumptions are the common conditions upon which the alternatives were conceptualized. The objectives reflect the Purpose and Need and public concerns regarding the Airspace Redesign. The following assumptions and objectives guided the development of airspace alternatives:

Assumptions

- Point-to-point navigation used,
- Terminal area separation standards applied over a larger airspace area, and
- Present day restricted and prohibited areas, including post-September 11, 2001, Air Defense Identification Zone (ADIZ) and supporting military operations areas (MOAs) remained in place.

Objectives

- Reduce congestion in airspace sectors,
- Shorten routes,
- Segregate routes for aircraft of dissimilar operating characteristics (i.e., large aircraft from small aircraft),
- Impose fewer climb restrictions on departing aircraft and keep arrivals higher longer,
- Allow aircraft to operate at higher, more fuel-efficient altitudes for longer periods,
- Use area navigation (e.g., RNAV, GPS, etc.),

- Create a flexible airspace structure,
- Accommodate projected growth, and
- Reduce environmental impacts, where possible.

2.4.1 Airspace Redesign Concepts

The Airspace Redesign Team explored four broad concepts in developing detailed airspace redesign alternatives that met the Airspace Redesign objectives. The four concepts considered were: Four Corner-Post, Modifications of Existing Routing, Ocean Routing, and Clean Sheet.

2.4.1.1 Four Corner-Post Concept

The four corner-post concept starts with placing a square over the TRACON airspace as the basic structure. Arriving aircraft enter the TRACON airspace at any of the four corners of the square. Arriving aircraft are allowed to proceed to any of the four corners for entry, avoiding delays further from the TRACON airspace. Once aircraft enter at the corner, they can proceed to another corner, enter the square and go directly to the intended airport, or enter into a large overhead circular pattern to await final permission to proceed to their ultimate destination airport (a procedure known as holding). Aircraft in the circular pattern would be stacked at different altitudes to accommodate large quantities of aircraft in the metropolitan area. Departing flights would exit the box on any of the sides.

The four corner-post operation is typically most effective in single airport operations with arrivals from all corners, and departures routed between these arrival corners. For example, the four corner-post concept is currently used at the Atlanta TRACON.

The four corner-post concept would not work for the NY/NJ/PHL Metropolitan Area airspace because arrival and departure streams are concentrated in the west and southwest quadrants, and the north and east quadrants are limited by the requirements for over-water aircraft operation and warning area restrictions. Balancing traffic over arrival posts and departure gates is made more complex by the proximity of airports in other major metropolitan areas.

Thus, alternatives based on the four corner-post concept would not meet the objectives of, or the Purpose and Need for, the Airspace Redesign. Therefore, alternatives based on the four corner-post concept were eliminated from further consideration.

2.4.1.2 Modifications to Existing Routing Concept

This concept involves modifying the current routes and procedures to improve efficiency in the current airspace system. For instance, routes could be added into and out of the TRACON airspace, thus reducing congestion on current routes.

Alternatives based on this concept would have the ability to meet the objectives of the Proposed Action. Therefore, a detailed airspace redesign alternative was developed using the Modifications to Existing Routing Concept.

2.4.1.3 Ocean Routing Concept

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.

The purpose of the Ocean Routing Airspace Alternative is to reduce noise impacts on the citizens of New Jersey. The purpose of the Proposed Action is to increase the efficiency and reliability of the entire NY/NJ/PHL Metropolitan Airspace. Therefore, the Ocean Routing Airspace Alternative, which is focused on reducing noise in one specific area of the NY/NJ/PHL Metropolitan Airspace, does not meet the Purpose and Need for the Airspace Redesign. Since this concept does not meet the Purpose and Need for the Proposed Action, it would normally be eliminated from further consideration. However, due to the long standing concerns of the NJCAAN, the FAA elected to retain the Ocean Routing Alternative for detailed analysis.

2.4.1.4 Clean Sheet Concept

A clean sheet or "Area Concept" was initially explored as a concept that would be developed within the boundaries of the current NY Center and NY TRACON airspace. Any changes within this airspace would not require changes in adjacent Center's or TRACON's airspace. The Airspace Redesign Team discovered that the constraints of the NY Center's and NY TRACON's airspace boundaries did not facilitate the use of the clean sheet approach. This alternative therefore evolved into an integrated airspace concept that used some of the initial design elements of the Clean Sheet "Area Concept," and then added elements that more efficiently integrated the functions of the NY TRACON (N90) and NY Center (ZNY) to operate more seamlessly in either a standalone or consolidated manner. Therefore, a detailed airspace redesign alternative was developed based on the Integrated Airspace Concept.

2.5 EVALUATION OF DETAILED AIRSPACE REDESIGN ALTERNATIVES

After the Airspace Redesign Concepts were explored, detailed alternatives were developed. Two of the detailed alternatives, 'Modifications to Airspace' and 'Integrated Airspace,' were developed by the Airspace Redesign Team. These alternatives were based on the aforementioned Airspace Redesign Concepts that had the potential to meet the Purpose and Need. One alternative was developed by the NJCER and was based on the Ocean Routing Concept. The remaining alternative, Future No Action, was developed to satisfy the requirements of CEQ Regulations.

Each Airspace Redesign Alternative is described and illustrated and evaluated for its ability to meet the Purpose and Need for the Proposed Action.

2.5.1 Alternative Descriptions

The Future No Action Airspace Alternative is discussed first because it is the basis for all discussions and illustrations of the other alternatives. The descriptions and figures for the Modifications to Existing Airspace, Ocean Routing, and Integrated Airspace alternatives describe only those aspects that are different from the Future No Action Airspace Alternative. For example, the figures for each of these alternatives illustrate only those gates, posts, and major traffic flows that have changed from the Future No Action Airspace Alternative, based on the Noise Integrated Routing System (NIRS) analysis (See Appendix E, *Noise Modeling Technical Report*, for further discussion of NIRS). Changes to major traffic flows are only shown to just beyond the gates/posts; changes to traffic flows further out are not shown.

The alternative descriptions are focused on the five major airports: JFK, LGA, EWR, TEB, and PHL. These descriptions give the reader a high level understanding of how the FAA moves aircraft into and out of the metropolitan NY/NJ and PHL areas. The departure gates, arrival posts, and major traffic flows to and from the most frequently used runway configurations are described in detail.

The detailed descriptions of the Airspace Redesign Alternatives are developed in order to concisely depict a large, complex airspace system. Therefore, the gates, posts and flows are described to the degree necessary to understand the major features of an alternative.

The specific gates and posts described in this document are not necessarily the same as those used for the purposes of controlling air traffic. The gates and posts found in this document were developed specifically to describe and illustrate the various airspace alternatives. For example, in the current airspace configuration, flights departing from JFK, LGA, EWR, and TEB, and destined for locations south are directed to the same departure gate. However, the following descriptions and illustrations of the South departure gates for these four airports will not match exactly because the South departure gate was developed specifically to identify airspace changes to flights landing at each individual airport.

For simplicity sake, flows to and from the airports are discussed and illustrated in a two-dimensional manner, relative to their mapped location only (i.e., the altitude and number of aircraft in a particular flow are not discussed). Similarly, the width of the flows shown in the graphics does not indicate the number of aircraft in that flow; it only represents the dispersion of flights using that flow. The locations of flows are described and illustrated by using references to major landmarks in the area of significant routing changes. The figures also show special use airspace areas (prohibited, restricted, or warning areas). According to the Aeronautical Information Manual (AIM), "Special use airspace consists of that airspace wherein activities must be confined because of their nature, or wherein limitations are imposed upon aircraft operations that are not a part of those activities, or both."[7] These areas have both horizontal and vertical boundaries and are shown to illustrate where use of the airspace may be limited. Flows that are depicted as entering special use airspace may be flying over or under the boundaries of this airspace, or may be allowed access because it is compatible with current activities in the special use airspace.

The primary changes to airspace structure of each alternative are captured by the discussion of the flows to and from the major airports. Therefore, although changes may also occur to flows associated with the satellite airports (and those changes were modeled to complete operational and noise analysis), only the traffic flows to and from the major airports are described in this chapter.

2.5.2 Purpose and Need Evaluation

The ability of each detailed alternative to meet the Purpose and Need for the Proposed Action is discussed and evaluated, including the degree to which each alternative achieves the objectives of the Airspace Redesign.

The evaluations of the Airspace Redesign Alternatives are based on the following

[7] AIM, Section 4. Special Use Airspace, 2/19/04

Purpose and Need Evaluation Criteria, which are categorized into two groups, operational viability and operational efficiency, based upon similar measurable goals.

Operational viability refers to whether a particular airspace redesign is workable and thus, safe. This gauge of system safety reflects the potential to maintain standards that define spacing between multiple aircraft, aircraft and other physical structures, and aircraft and designated airspace. Operational viability criteria include:

- **Reduce airspace complexity** - Airspace complexity is often considered an important issue when airspace performance is assessed and sectors and routes are evaluated for redesign. Airspace complexity is a function of the degree to which aircraft routes are intermingled. The more route crossings, the more complex the airspace. Complexity is also related to the number of aircraft, types of aircraft, and duration of a flight in a particular volume of airspace.

- **Reduce voice communications** - Congested, complex airspace often requires the controller to increase the number of advisories, clearances, and instructions needed to manage the operations. Improved airspace design and routing can minimize vectoring and/or communications between the flight crews and the controllers.

Operational efficiency refers to how well a particular design works. Operational efficiency criteria include:

- **Reduce delay -** Delay is the primary measure of the operational efficiency of the airspace system. Delays in the airspace system may be caused by congestion and the limitations of a particular airspace structure.

- **Balance controller workload** – Balanced controller workload is achieved when airspace is divided into sectors handling approximately equal demand, and, geography permitting, all airspace resources are evenly used. Overworked sectors must be protected with traffic management initiatives that increase delay.

- **Meet system demands** - Meeting the projected growth of traffic is an important objective. Improving airspace efficiency is needed to accommodate projected growth in traffic levels.

- **Improve user access to the system** - The ability of users to act on or obtain services for additional flights is a measure of user access to the system. This measure reflects the quality and level of service, as well as the availability of system resources.

- **Expedite arrivals and departures** - Expediting arrivals and departures will increase the efficiency of the system. In the New York and Philadelphia TRACONS there are three problems that can impede arrivals and departures: high number of aircraft, longer routing distances, and altitude restrictions.

- **Increase flexibility in routing** - Flexible routing permits aviation users to more easily adapt their operations to changing operational conditions (e.g., a shift in the jet stream or to avoid severe weather). Flexibility indicators include the availability of runways, arrival and departure fixes, and arrival and departure routes, and the absence of aircraft equipment restrictions on routes.

- **Maintain airport throughput** - The terminal airspace provides arrival and departure paths to and from the runways. In some instances the capacity of the airspace, as defined by the routes into and out of an airport, limits the throughput of the airport. Ideally, the airspace route structure can support the maximum capacity of the runways, thus maintaining a steady stream of aircraft in and out of the airport.

In summary, various Operational Viability and Operational Efficiency Criteria are used to evaluate whether each Airspace Redesign Alternative meets the Purpose and Need and to compare the alternatives to one another. Following the detailed description of each alternative, the evaluation of that alternative is discussed in terms of the Purpose and Need Operational Viability and Operational Efficiency Criteria.

2.5.3 Future No Action Airspace Alternative

This alternative represents all major traffic flows into and out of the Study Area in the study years 2006 and 2011 if no changes are implemented via the Airspace Redesign. A composite representation of flight tracks for the Future No Action Airspace Alternative was developed using multiple sources including actual radar data. The only major difference between this alternative and present day operations will be the type and quantity of aircraft operations.

The following sections will breakdown the Study Area traffic patterns by major airport to simplify the description of how aircraft flow into and out of the NY/NJ/PHL Metropolitan Area.

Note that under the Future No Action Airspace Alternative, the airspace will operate as it did during existing or baseline conditions (2000), with the exception of two procedural changes (i.e., the Dual Modena and the Flip-Flop) that have been implemented and have independent utility with regards to the Airspace Redesign, see Section 1.2.6. As these changes have been implemented, they are included as part of the Future No Action Airspace Alternative.

Figures 2.1 through 2.10 identify existing major routing and flow patterns associated with the Future No Action Airspace Alternative.

2.5.3.1 Future No Action Airspace Alternative - JFK Traffic Routing

Future No Action Airspace Alternative – JFK Departure Routing

The majority of departure traffic from JFK is conducted on parallel Runways 31L/R or 13L/R. There are four JFK departure gates: the North, East, West, and Ocean gates. Aircraft are routed to these gates based primarily on their destination. The location and use of each gate, along with its associated air traffic, are discussed in the following paragraphs. See **Figure 2.1** for a graphic display of flows out of JFK.

<u>Future No Action Airspace Alternative – JFK North Departure Gate</u>

The North departure gate begins approximately 55 miles to the northwest of the Airport, and extends from Sussex County, NJ to Orange County, NY. This gate serves flights destined for the upper Midwest. JFK traffic flows from Runways 31L/R and 13L/R follow the same close-in flight paths[8] as East gate traffic. Between

[8] For the purposes of this Draft EIS, 'close-in' procedures refers to aircraft operations and routes within a few miles of the airport. It does not refer to the noise abatement departure profiles referenced in FAA AC 91-53A.

10 and 20 miles from the Airport, these flows will turn to the northwest. This traffic continues to the North departure gate, diverging into three flows when crossing the Hudson River. It finally passes through the North departure gate at three distinct points.

Future No Action Airspace Alternative – JFK East Departure Gate

This departure gate begins just southwest of Tweed-New Haven Airport and extends to the northwest. Flights destined for Canada and the northeastern U.S. use this gate. The majority of traffic departing Runways 31L/R makes an immediate left turn to avoid LGA traffic flows, circles back to the east, and then turns north. These flights diverge into three distinct flows and then proceed directly toward the East departure gate. Runways 13L/R traffic turn left after departure and then fly direct to the East departure gate.

Future No Action Airspace Alternative – JFK West Departure Gate

The West departure gate is located approximately 40 to 45 miles southwest of JFK in the vicinity of Robbinsville, NJ, to a point east of Lakehurst, NJ. This gate serves flights heading directly to the western United States, and to the Washington, D.C. Metropolitan Area. Departures from Runways 31L/R turn left immediately and proceed toward a point in the vicinity of Sandy Hook, NJ. From there, westbound flights will proceed directly towards Robbinsville, NJ. Aircraft departing from Runways 13L/R will turn right off the runway and proceed to a point in the vicinity of Sandy Hook, NJ and then continue from this point as previously described for Runways 31L/R.

Future No Action Airspace Alternative – JFK Ocean Departure Gate

The Ocean departure gate extends in an arc approximately 30 miles in length starting from a point approximately eight miles south of Bay Shore, NY, extending to a point approximately 20 miles east of Point Pleasant, NJ. Transatlantic flights and aircraft heading south along the eastern seaboard, which include flights to the Caribbean, use the Ocean departure gate. Departures close-in to the Airport follow the same tracks as previously described for the North departure gate. Runways 31L/R departures turn immediately to the left heading over Jamaica Bay, NY and proceed either to the east or to the southeast over the Atlantic Ocean. Within 10 miles of the Airport, traffic is established on specific tracks headed toward the Ocean departure gate. Departures off Runways 13L/R head directly toward the east or southeast and continue to the Ocean departure gate. All of the traffic through this gate stays over the Atlantic Ocean, south of Long Island, NY.

Future No Action Airspace Alternative – JFK Arrival Routing

JFK arrivals are primarily conducted on Runways 13L/R and 31L/R. There are three arrival posts into JFK: the North, East, and South posts. The location and use of each post is discussed in the following paragraphs. See **Figure 2.2** for a graphic display of these flows into JFK.

Future No Action Airspace Alternative – JFK North Arrival Post

The North arrival post is located approximately 25 miles northwest of JFK and approximately six miles northwest of TEB. This post serves all flights arriving to JFK from the north, northwest, and west. All major arrival streams from these

directions converge at this post. Aircraft landing Runways 13L/R proceed over the top of TEB, and then proceed over the top of LGA. These aircraft then head southeast, passing JFK on the north side and arcing in a right turn circling around the Airport to land on Runways 13L/R. Flights landing on Runways 31L/R will also proceed in the vicinity of TEB, but will turn to the southeast and pass JFK on the south side, and then turn left to circle and land on Runways 31L/R.

Future No Action Airspace Alternative - JFK East Arrival Post

The East arrival post is located approximately 30 miles east-northeast of JFK, just southeast of ISP over the Great South Bay, north of Fire Island, NY. This post serves flights arriving from Europe and the northeastern U.S. Arrivals proceed toward JFK just off the coast of Long Island. Flights landing on Runways 31L/R will turn northwest 10 to 20 miles from the Airport and proceed directly to Runways 31L/R to land. Flights destined for Runways 13L/R will continue to pass south of the Airport. Once past JFK, these flights will turn right and circle to land on Runways 13L/R.

Future No Action Airspace Alternative - JFK South Arrival Post

The South arrival post is located approximately 40 miles south of JFK over the Atlantic Ocean. The western most tip of the post is located in the vicinity of Point Pleasant, NJ, and the post extends approximately 20 miles to the east. Flights arriving over the Atlantic Ocean, from South America, the Caribbean, and the southwest, all converge at this arrival post. Flights from the Atlantic arrive over the ocean to the arrival post, while flights from the south arrive up the coast of NJ over Atlantic City. Aircraft landing on Runways 31L/R will continue heading northeast from the arrival post until the Airport is directly to the northwest, at which point they will turn northwest to land on Runways 31L/R. Aircraft landing Runways 13L/R will turn to the northwest and proceed to a point east of Sandy Hook, NJ. At approximately 10 miles from the Airport, the flights will turn to the northeast and proceed to the vicinity of Canarsie, NY. Once past this point, the flights will make a southeast turn to land Runways 13L/R.

2.5.3.2 Future No Action Airspace Alternative - LGA Traffic Routing

Future No Action Airspace Alternative – LGA Departure Routing

The majority of departure traffic from LGA is conducted on Runways 4 or 13, depending on which runway use configuration (i.e., north or south) the Airport is operating in. There are five LGA departure gates: North, East, South, West, and Ocean gates. Aircraft are routed to these gates based primarily on their final destination. The location and use of each gate, along with its associated air traffic, is discussed in the following paragraphs. See **Figure 2.3** for a graphic display of flows out of LGA.

Future No Action Airspace Alternative - LGA North Departure Gate

The North gate begins approximately 40 miles to the northwest of the Airport, and extends from Sussex County, NJ, to Orange County, NY. This gate serves flights to the upper Midwest. Before the aircraft reach this gate, they diverge into three distinct air traffic flows with two in the State of NJ and one in the State of NY. Aircraft departing from Runway 4 will initially make a right turn off the runway and then begin a turn to the left proceeding directly to the North

departure gate. Aircraft departing Runway 13 will follow the same path as the East departure gate flights close-in before circling back to the west, heading north of LGA and then proceeding direct toward the North departure gate. A small percentage will make a right turn initially, and continue circling back to the northwest, remaining south of the airport and finally continuing directly toward the North departure gate.

Future No Action Airspace Alternative – LGA East Departure Gate

This departure gate begins just southwest of Tweed-New Haven Airport and extends to the northwest. This gate serves transatlantic flights and flights heading to Canada and the northeastern U.S. Aircraft departing Runway 13 will make a left turn to avoid JFK traffic, proceed over Long Island Sound, and continue to the East departure gate. Aircraft departing Runway 4 make an initial right turn off the Runway, proceed over The Bronx, NY, and then continue to the East departure gate.

Future No Action Airspace Alternative - LGA South Departure Gate

The South departure gate is located approximately 50 miles south of the Airport in the vicinity of Lakehurst, NJ and serves LGA aircraft traveling to southeastern U.S. destinations. Aircraft departing Runway 13 will either make a right turn off the runway turning to the south, passing over the area of Canarsie, NY, then proceeding to the area in the vicinity of Sandy Hook, NJ, or aircraft will make a left turn circling back around LGA on the north side, proceeding to a point in the vicinity of Sandy Hook, NJ. Both flows will then proceed to the South departure gate. Aircraft departing off Runway 4 will turn left, circle to the south, proceed toward Sandy Hook, NJ, and then on to the South departure gate. The majority of the traffic departing LGA and heading to the South departure gate fly between EWR and JFK.

Future No Action Airspace Alternative - LGA West Departure Gate

The West departure gate is located approximately 60 miles west of the Airport. This gate runs along the NJ-PA state line for 30 miles and serves flights departing to the west and southwestern U.S. Aircraft departing from Runway 13 will initially make a left turn, fly north of the Airport, continue on toward TEB, and then proceed directly to the West departure gate. Some departures off of Runway 13 will initially turn right to the south, and then turn back to the west, flying south of the Airport. These flights will continue flying to the west, south of TEB, and proceed directly to the West departure gate. The majority of aircraft departing Runway 4 will initially make a slight turn to the right off the Runway, begin a left turn over The Bronx, NY, proceed towards TEB, and then proceed directly to the West departure gate.

Future No Action Airspace Alternative - LGA Ocean Departure Gate

The Ocean departure gate is located approximately 40 to 50 miles southeast of the Airport over the Atlantic Ocean. The Ocean departure gate extends in an arc approximately 30 miles in length starting from a point approximately eight miles south of Bay Shore, NY, extending to a point approximately 20 miles east of Point Pleasant, NJ. This gate serves both South American and southeastern U.S. flights. Aircraft departing both Runways 4 and 13 turn to the southeast in the vicinity of JFK, cross over Long Island, NY, and proceed over the Atlantic Ocean directly to the Ocean departure gate.

Future No Action Airspace Alternative – LGA Arrival Routing

The majority of arrival traffic to LGA is conducted on Runways 31 (north runway use configuration) and 22 (south runway use configuration). There are three arrival posts into LGA: the North, South, and West posts. The location and use of each post, along with its associated air traffic, are discussed in the following paragraphs. In addition, an arrival flow not associated with a particular post is described. See **Figure 2.4** for a graphic display of flows into LGA.

Future No Action Airspace Alternative – LGA North Arrival Post

The North arrival post is located approximately 50 miles north of LGA. The western most tip of the arrival post begins five miles east of SWF and extends 15 miles to the east just short of the Connecticut state line. This post serves arriving flights from the upper Midwest, eastern Canada, and the northeastern U.S. These three major flows converge at the North arrival post and then proceed to the south in the vicinity of HPN. From this point, aircraft landing Runway 22 continue south to land on the runway. Flights destined for Runway 31 once past the post will fly to the southeast over Long Island Sound. These flights will then turn to the northeast, aligning with the Runway and land.

Future No Action Airspace Alternative - LGA South Arrival Post

The South arrival post is located 45 miles southwest of LGA in the vicinity of Robbinsville, NJ. It primarily serves flights coming from the southwest, the southeast, and the Washington Metropolitan Area. This flow merges with the West gate flow just prior to flying in over Raritan Bay en route to LGA. The close-in patterns to LGA are the same as the West post flows once over Raritan Bay.

Future No Action Airspace Alternative - LGA West Arrival Post

The West arrival post is located approximately 70 miles west of LGA on the NJ state line. The West arrival post runs north and south and serves all flights arriving to LGA from the Midwest. Arriving flights continue to the southeast in the vicinity of Princeton, NJ, before making a gradual turn to the north toward LGA. This flow continues over Raritan Bay heading northeast where it is situated between EWR and JFK. Flights landing onto Runway 22 will pass the Airport on either side, then turn south to land onto Runway 22. Flights landing Runway 31 will fly over the top of LGA, turn to the east, and circle back to the northwest to land on Runway 31.

Future No Action Airspace Alternative - LGA Other Arrival Flows

Transatlantic traffic arrives in the vicinity of Sandy Hook, NJ and is sequenced with both the west and south arrival traffic over Raritan Bay where it then proceeds direct to LGA.

2.5.3.3 Future No Action Airspace Alternative - EWR Traffic Routing

Future No Action Airspace Alternative – EWR Departure Routing

The majority of departure traffic from EWR is conducted on Runways 4L or 22R, depending on which flow (north or south) the Airport is operating. There are four EWR departure gates: North, East, South, and West. Aircraft are routed to these gates based primarily on their final destination. The location and use of each gate, along with its associated air traffic, are discussed

in the following paragraphs. See **Figure 2.5** for a graphic display of flows out of EWR.

Future No Action Airspace Alternative - EWR North Departure Gate

The North departure gate is located 40 miles northwest of the Airport and extends from Sussex County, NJ, into Orange County, NY. This gate serves flights to the upper Midwest. Flights departing on Runway 4L make an initial turn to the right off the Runway, then turn immediately to the northwest climbing between CDW and MMU. These flights diverge into three distinct flows to the northwest approximately 20 to 30 miles from the Airport. Flights departing on Runway 22R make an initial left turn off the Runway, then turn back to the northwest climbing between CDW and MMU and proceeding as previously described to the gate.

Future No Action Airspace Alternative - EWR East Departure Gate

The East departure gate is located 65 miles northeast of EWR. This departure gate begins just southwest of Tweed-New Haven Airport and extends to the northwest. It serves flights destined for the northeastern U.S., Canada, and Europe. Flights departing Runway 4L make an initial right turn off of the Runway and proceed to the northeast towards TEB (approximately 10 to 15 miles). Once these flights are approximately 30 to 35 miles from EWR, they diverge into three distinct flows at the departure gate. Flights departing EWR on Runway 22R make an initial turn to the left, then head southwest turning prior to Linden, NJ and continue turning back to the northeast, climbing past TEB and proceeding as previously described to the East departure gate.

Future No Action Airspace Alternative - EWR South Departure Gate

The South departure gate is located 25 miles to the south of EWR, near Colts Neck, NJ. This gate serves flights heading to the southeastern U.S., the Washington, D.C. Metropolitan Area, South America, and the Caribbean. Flights departing Runway 4L make an initial right turn off the Runway, turn back to the south, climb west of LDN, and then proceed to the vicinity of Colts Neck, NJ. These flights will continue flying southwest over NJ. Flights departing Runway 22R will make an initial left turn off the Runway, turn back to the southwest, merging with the Runway 4L flow 10 miles from the Airport, and finally proceed as previously described for Runway 4L to the gate.

Future No Action Airspace Alternative - EWR West Departure Gate

The West departure gate is located 40 to 45 miles from EWR and serves flights departing to the western and southwestern U.S. This gate runs along the NJ-PA state line for 30 miles. Flights departing Runway 4L make an initial right turn off the Runway, and then turn to the west heading south of MMU. These flights diverge into four distinct flows prior to reaching the gate. Flights departing Runway 22R make an initial left turn off the runway, and then diverge into westerly and northwesterly flows in the vicinity of LDN. These distinct flows blend with Runway 4L traffic at 20 miles and then proceed as previously described to the gate.

Future No Action Airspace Alternative - EWR Arrival Routing

The majority of arrival traffic to EWR is conducted on Runways 4R (north configuration) or 22L (south configuration).

There are four arrival posts into EWR that deliver flights to these runways: North, South, West, and Ocean. The location and use of each post, along with its associated air traffic, are discussed in the following paragraphs. See **Figure 2.6** for a graphic display of flows into EWR.

Future No Action Airspace Alternative - EWR North Arrival Post

The North arrival post is located 30 miles northwest of EWR along a line that runs between Highland Lakes, NJ, and Sloatsburg, NY. This post serves flights arriving from the northeastern and the northwestern U.S., Canada, Europe, and the Pacific Rim. Four distinct flows from these areas converge at this post. Arrivals to Runway 4R will fly west of MMU heading south past the Airport, then turn back to the northeast at various distances from the Runway to land. For Runway 22L, flights will head southeast, and make a right turn to land when aligned with the runway.

Future No Action Airspace Alternative - EWR South Arrival Post

The South arrival post is located 40 miles to the southwest of EWR, in the vicinity of Yardley, PA and serves flights arriving from the southeastern U.S. and Washington, D.C. Metropolitan Area. For Runway 4R, flights arriving from the southwest proceed directly from the arrival post with a slight left turn to align with the runway and land. For Runway 22L, flights arriving from the southwest make a left turn heading north from the arrival post and proceed primarily north and west of MMU. These flights then turn right, continue to circle to the south, and align with the runway to land.

Future No Action Airspace Alternative - EWR West Arrival Post

The West arrival post is located 45 miles west of EWR one to two miles south of Mount Bethel, PA, and serves flights arriving from the western U.S. This flow diverges into two distinct flows at the post, depending on which runway is in use. For Runway 22L, flights will proceed to the east in the vicinity of CDW then make a right turn to the southeast, just west of TEB, to align with the Runway and land. For Runway 4R, flights will proceed to the east in the vicinity of LDJ and make a left turn to the north to land.

Future No Action Airspace Alternative - EWR Ocean Arrival Post

The Ocean arrival post is located in the vicinity of Robbinsville, NJ and serves flights arriving from South America and the Caribbean. Flights arriving from the southeast make a right turn to align with Runway 4R and land. Runway 22L arrivals from the southeast make a right turn heading north from the post. These aircraft then are routed as previously described for the aircraft coming from the southwest to Runway 22L.

2.5.3.4 Future No Action Airspace Alternative - TEB Traffic Routing

Future No Action Airspace Alternative – TEB Departure Routing

The majority of departure traffic from TEB is conducted on Runways 1 or 24, depending on which flow (north or south) the Airport is operating in. There are four TEB departure gates: North, East, South, and West. Aircraft are routed to these gates based primarily on their final destination. The location and use of each gate, along with its associated air traffic, are discussed in the

following paragraphs. See **Figure 2.7** for a graphic display of flows out of TEB.

Future No Action Airspace Alternative - TEB North Departure Gate

The North departure gate is located 40 miles to the northwest of the Airport and extends from Sussex County, NJ, into Orange County, NY. This gate serves flights destined for the upper Midwest. Flights departing on Runway 1 make an initial right turn off the runway, then turn back to the west and proceed to the vicinity of Pompton Plains, NJ where they turn to the northwest and proceed directly to the North departure gate. At the gate, flights will diverge into three main flows. Flights departing Runway 24 will fly straight off the runway, turn to the west, proceed west of Caldwell, NJ, and then turn to the northeast and proceed directly to the gate.

Future No Action Airspace Alternative - TEB East Departure Gate

The East departure gate is located 50 miles to the northeast of TEB, south of HVN, and extends to the northwest. This gate serves flights heading to the northeastern U.S and Canada. Flights departing Runway 1 make an initial right turn off the runway, turn to the left and proceed in the vicinity of Monsey, NY. These flights then turn to the northeast and diverge into three flows prior to reaching the East departure gate, depending on their final destinations. Flights departing Runway 24 in a south flow proceed straight off of the runway, and then make a right turn to the northwest passing to the east of Caldwell, NJ. These aircraft continue out across the NJ/NY state line in the vicinity of Monsey, NY where they merge with Runway 1 departures and continue as previously described to the East departure gate.

Future No Action Airspace Alternative - TEB South Departure Gate

The South departure gate is located 30 to 35 miles to the south of the Airport in the vicinity of Colts Neck, NJ. This gate serves flights heading to the southeastern U.S., the Washington, D.C. Metropolitan Area, and South America. Flights departing Runway 1 make an initial right turn off the Runway, and then make a left turn, continuing to circle to the south. These flights remain west of EWR, and proceed directly to the gate where they diverge into two main flows. One flow continues south over central NJ, while the other proceeds out over the Atlantic Ocean. Flights departing Runway 24 fly straight after takeoff, then turn to the southwest five miles from the Airport, where they proceed as described above for Runway 1 west of EWR.

Future No Action Airspace Alternative - TEB West Departure Gate

The West departure gate is located approximately 50 miles to the west of the Airport. It extends for 30 miles along the NJ/PA state border. This gate serves flights destined for the west and southwest U.S. Flights departing on Runway 1 make an initial right turn off the Runway, turn back to the west five miles north of the Airport, and proceed in the vicinity of Caldwell, NJ. Departure flights then diverge into four distinct flows to the West departure gate. Flights departing Runway 24 fly straight, then turn to the west and proceed in the vicinity of MMU, where they diverge into four distinct flows before heading directly to the gate.

TEB Future No Action Airspace Alternative - Arrival Routing

The majority of arrival traffic to TEB is conducted on Runways 6 (north

configuration) or 19 (south configuration). There are four arrival posts into TEB that deliver flights to these runways: North, two South, and West. The location and use of each post, along with its associated air traffic, are discussed in the following paragraphs. In addition, an arrival flow not associated with a particular post is described. See **Figure 2.8** for a graphic display of flows into TEB.

Future No Action Airspace Alternative - TEB North Arrival Post

The North arrival post is located 40 miles to the northwest near Huguenot, NY. This post services all traffic arriving from the north and northeastern U.S. and Canada. These flights are made up of three distinct flows that converge on the arrival post. Flights landing Runway 6, coming from the east, will fly over the Hudson River, then over northwest Bergen County, NJ, to the southwest towards MMU. These flights then head southeast towards EWR and turn northeast to land on Runway 6. Flights landing Runway 19, coming from the east, fly over the Hudson River and turn towards the south in the vicinity of the Garden State Parkway, then proceed south to land. Flights landing Runway 6 coming from the north head south passing south and west of MMU, before turning left towards the northeast and aligning with Runway 6 for landing. Flights landing Runway 19 coming from the north diverge into two flows: one heads south, turn east and flies over Passaic and Bergen Counties, NJ, then turns south in the vicinity of the Garden State Parkway and aligns with Runway 19 to land; the other turns to the southeast and proceeds directly over TEB, then turns to the north and circles to the left to land on Runway 19.

Future No Action Airspace Alternative - TEB South Arrivals Posts

Flights arriving from the south use two arrival posts. The first is located 45 miles to the southwest of TEB, northwest of Yardley, PA. This post serves flights arriving from the southern U.S. The second post is located 45 miles to the south in the vicinity of Robbinsville, NJ, and serves flights arriving from the Atlantic Ocean.

Arrivals from the western South arrival post that are landing on Runway 6 typically proceed on course as they are aligned with the runway coming from this direction. Runway 19 arrivals typically fly northeast to the vicinity of MMU, and then turning to the south to align with Runway 19 to land.

Flights arriving via the Robbinsville, NJ post and landing Runway 6 will continue flying to the northwest past the post and finally turn to the northeast to align with Runway 6 for landing. Flights destined for Runway 19 will continue flying to the northwest and in the vicinity of MMU will continue as described in the preceding paragraph to land on Runway 19.

Future No Action Airspace Alternative - TEB West Arrival Post

The West arrival post is located approximately 45 miles northwest of the Airport in the vicinity of Stillwater, NJ. This post serves flights arriving from the western U.S. All flights arriving from the west converge at this post. This flow diverges either to the east, toward CDW, or to the southeast in the vicinity of MMU.

Runway 6 arrivals proceeding in the vicinity of CDW continue to the southeast, turn to the northeast in the vicinity of Rutherford, NJ, and align with Runway 6 to land. The flow that proceeds in the vicinity of MMU

continues toward EWR, turning to the northeast once aligned with Runway 6 to land.

Runway 19 arrivals that proceed to CDW continue direct to TEB where they pass over the Airport and make a left turn to the north, and circle to land on Runway 19.

Future No Action Airspace Alternative - TEB Other Arrival Flows

Flights arriving from various airports in New England are given a direct route to TEB, via eastern Westchester County, NY. This flow serves mostly turboprop aircraft that are being controlled by tower facilities. Direct routing to the Airport is possible, because this flow is generally below the major traffic patterns in the NY Metropolitan area.

2.5.3.5 Future No Action Airspace Alternative - PHL Traffic Routing

Future No Action Airspace Alternative - PHL Departure Routing

The majority of departure traffic from PHL is conducted on Runways 9L/R or 27L/R, depending on the configuration (west or east) in which the Airport is operating. There are four PHL departure gates: North, East, South, and West. Aircraft are routed to these gates based primarily on their final destination. The location and use of each gate, along with its associated air traffic, are discussed in the following paragraphs. See **Figure 2.9** for a graphic display of flows out of PHL.

Future No Action Airspace Alternative - PHL North Departure Gate

The North departure gate is located in the vicinity of Pottstown, PA, about 30 miles northwest of PHL. This gate serves flights with final destinations to the north through PA, to the Midwest, and flights continuing to the northwest. Flights departing Runways 9L/R initially fly straight from the runway then make a left turn to the northwest and proceed to the North departure gate. Flights departing Runways 27L/R initially make a left turn off the runway, and then turn back to the northwest before crossing into Delaware and proceeding to the gate.

Future No Action Airspace Alternative - PHL East Departure Gate

The East departure gate is located approximately 30 miles east of the Airport and serves flights destined for the northeastern U.S., eastern Canada, and Europe. Flights departing Runways 9L/R will make a slight right turn and proceed directly to the gate. Aircraft departing on Runways 27L/R will make an immediate left turn, continuing to the west, and proceed directly to the East departure gate. Once over the gate, the departure flow will diverge into two flows; one flow continues out to the east and then over the Atlantic Ocean, while the other will turn north at the gate and proceed north over central NJ. This divergence in departure flow occurs 20 to 30 miles from the Airport.

Future No Action Airspace Alternative - PHL South Departure Gate

The South departure gate is located approximately 15 miles south of the Airport, in the vicinity of Woodstown, NJ. It serves flights proceeding to the southeastern U.S., Caribbean, and South America. Flights departing Runways 9L/R will make a right turn within 10 miles of the Airport then proceed directly to the gate. Aircraft departing on Runways 27L/R will make a left turn off the Runway and proceed directly to the gate.

Future No Action Airspace Alternative - PHL West Departure Gate

The West departure gate is located approximately 25 miles west of the Airport. One end is located in the vicinity of Modena, PA, while the other end is located eight miles to the southwest, just north of Avondale, PA. Flights departing Runways 9L/R normally make a left turn and proceed directly to either the north or south ends of the gate depending on the final city destination. Flights departing Runways 27L/R will initially make a left turn, then turn back to the west and proceed to the West departure gate.

Future No Action Airspace Alternative - PHL Arrival Routing

The majority of arrival traffic to PHL is conducted on Runways 9L/R (east configuration) or 27L/R (west configuration). There are five arrival posts into PHL that deliver flights to these runways: North, East, South, Southwest, and West posts. These arrival posts are generally located in airspace that is not being used by the departure flows to help minimize mixing of arrival and departure traffic. The location and use of each post, along with its associated air traffic, are discussed in the following paragraphs. See **Figure 2.10** for a graphic display of flows into PHL.

Future No Action Airspace Alternative - PHL North Arrival Post

The North arrival post is located 40 miles northwest of the Airport and 10 miles southwest of Allentown, PA. It serves flights arriving from the north. Arriving flights converge in the vicinity of this post and then fly south to the Airport. When the aircraft get within 20 miles of the Airport, they are positioned to land on either Runways 9L/R or 27L/R depending on the current airport flows. Flights for both runways approach the Airport and turn either to the west or to the east, depending on which runway is being used to land aircraft. For Runways 9L/R, once the aircraft are flying to the west past the Airport, they are turned back to the east to land. For Runways 27L/R, aircraft are turned to the east; once past the Airport they are turned back to the west to land.

Future No Action Airspace Alternative - PHL East Arrival Post

The East arrival post is located 30 miles southeast of PHL and serves three major traffic arrival routes. Flights arriving from the northeastern U.S. and Europe, flights arriving from the southeastern U.S., and flights arriving from South America and the Caribbean converge at this post. Once flights pass through this post, they are sequenced into appropriate landing patterns, depending on which runway is in use. For Runways 27L/R, flights are directed to the north and turned to the west at various distances to land. For Runways 9L/R, flights are turned to the northwest initially and then back to the east at various distances from the Airport prior to landing.

Future No Action Airspace Alternative - PHL South Arrival Post

The South arrival post is located 35 miles to the southwest of PHL. This post serves flights arriving from the southern U.S. These flights will diverge into two flows 30 miles from the Airport, depending on which runway is in use. This flow will be blended with the Southwest post arrivals at this point and will fly the same close-in pattern as the southwest arrivals described in the preceding section.

Future No Action Airspace Alternative - PHL Southwest Arrival Post

The Southwest arrival post is located 40 miles to the southwest of PHL in the vicinity of the upper Chesapeake Bay. This gate serves flights arriving from the Washington, D.C. Metropolitan Area. Arrival flights will be split between 30 to 40 miles from the Airport, depending on which runway is in use. For Runways 9L/R, flights will continue to fly to the northeast and when aligned with the runway, turn to the east to land. Flights landing on Runways 27L/R will pass to the south of PHL heading east; once past the Airport, this traffic will turn back to the west to land.

Future No Action Airspace Alternative - PHL West Arrival Post

The West arrival post is located approximately 50 miles to the northwest of the Airport and serves flights arriving from the west. Once flights are past the post, they diverge into two flows, depending on their destination runway. Aircraft landing onto Runways 9L/R would either be turned to the south, and once in line with the Runway 10 to 15 miles from PHL, turn back to the east to land, or fly north of the Airport, turn back to the west, and finally turn back to the east to land. Aircraft arriving to Runways 27L/R would fly north of the Airport heading east and make a right turn to land, or continue east then turn back to the west to align with the Runway and land.

2.5.3.6 Future No Action Airspace Alternative – Summary

The Future No Action Airspace Alternative is the "do nothing" alternative. Therefore, the features (gates, posts, and flows) of this alternative represent the existing airspace structure including the Robbinsville-Yardley Flip-Flop and the Dual Modena Procedures. The Future No Action Airspace Alternative serves as the basis for discussion of the other airspace alternatives.

2.5.3.7 Future No Action Airspace Alternative - Purpose and Need Evaluation

Although the Future No Action Alternative does not meet the Purpose and Need, it is carried forward for further analysis as required by CEQ regulations.

2.5.4 Modifications to the 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. Note that all Modifications to Existing Airspace Alternative descriptions and graphics describe only those aspects of the alternative that are different, or have varied from the Future No Action Airspace Alternative. **Figures 2.11 through 2.14** identify major routing and flow changes associated with the Modifications to Existing Airspace Alternative.

2.5.4.1 Modifications to Existing Airspace Alternative - LGA Traffic Routing

Modifications to Existing Airspace Alternative – LGA Departure Routing

As with the Future No Action Airspace Alternative, LGA departure traffic is conducted on Runway 4 during north configuration and Runway 13 during south configuration. All of the departure gates remain the same as in the Future No Action Airspace Alternative, except the South departure gate. This gate would be shifted to the northwest resulting in south flows

moving to the west. In addition, flights departing from Runway 4 would operate with new departure headings as compared to the Future No Action Airspace Alternative. Both changes and associated flows will be discussed in detail in the following paragraphs. See **Figure 2.11** for a graphic display of flows out of LGA.

Modifications to Existing Airspace Alternative – LGA North Departure Gate

Flights departing off Runway 4 will turn to the left and proceed in a northerly heading over The Bronx, NY, and then turn to the northwest at approximately eight to 10 miles from the Airport to proceed directly to the North departure gate.

Modifications to Existing Airspace Alternative - LGA East Departure Gate

Flights departing Runway 4 will fly straight off of the runway, instead of making a slight turn to the right after takeoff, and then proceed directly to the East departure gate.

Modifications to Existing Airspace Alternative – LGA Shifted South Departure Gate

The shifted South departure gate would be shifted to the northwest from the Future No Action Airspace Alternative LGA South departure gate. This would result in south flows moving to the west from the Future No Action Airspace Alternative flows. All jet flights departing off of Runway 13 will fly the same departure headings as the Future No Action Airspace Alternative with the exception of propeller aircraft. Propeller aircraft will turn to the left departing the runway and turn a much tighter radius back around the Airport. Flights will then continue turning to the south, flying between LGA and TEB en route to the shifted South departure gate. This flow will start to diverge from the Future No Action Airspace Alternative flow as the flights cross over the northern NJ coastline south of Raritan Bay. As the flights continue over the State of NJ, they will be moved to the west of the Future No Action Airspace Alternative flow to an area located eight miles northwest of Lakehurst, NJ. A small percentage of flights departing Runway 13 will make a right turn, continue turning to the south flying between LGA and JFK, en route to the shifted gate. Flights departing Runway 4 will make an immediate turn to the northwest, continue circling to the southwest, and merge with Runway 13 flows west of LGA.

Modifications to Existing Airspace Alternative – LGA West Departure Gate

All flights departing off of Runway 13 will fly the same procedures as the Future No Action Airspace Alternative, with the exception of propeller aircraft. Propeller aircraft will turn to the left departing the runway and turn a much tighter radius back around the Airport, and then to the West gate. This tight loop to the left will only be used by propeller aircraft departing this runway.

LGA Modifications to Existing Airspace Alternative - Arrival Routing

There are no changes to LGA arrival routes in the Modifications to Existing Airspace Alternative, as compared to the Future No Action Airspace Alternative. All arrival posts and routing for LGA arrivals remain the same as in the Future No Action Airspace Alternative.

2.5.4.2 Modifications to Existing Airspace Alternative - EWR Traffic Routing

Modifications to Existing Airspace Alternative - EWR Departure Routing

All of the departure gates remain the same as in the Future No Action Airspace Alternative, except the South departure gate. This gate is shifted to the northwest resulting in south flows also moving to the west from the Future No Action Airspace Alternative. Flights departing from Runways 22R and 4L will operate with additional departure headings than in the Future No Action Airspace Alternative. Departure procedures off of Runway 4L will depend on TEB using the Runway 6 ILS. When the TEB Runway 6 ILS is in use, all flights will follow the same departure headings as the Future No Action Airspace Alternative. If the ILS is not being used, departing flights will use different procedures close to the Airport. Flights departing Runway 22R will depend on EWR Runway 11 use. The North, East, and West departure gates will all use the same initial departure procedure when Runway 11 is being used. When Runway 11 is not being used, flights departing to the North and East departure gates will use different procedures than the West departure gate. These procedural changes and associated flows will be discussed in detail in the following paragraphs. **Figure 2.12** shows flows out of EWR.

<u>Modifications to Existing Airspace Alternative – EWR North or East Departure Gates</u>

Flights departing Runway 22R to either the North or East gate will make a right turn after takeoff heading west from EWR, then turn to the north approximately five miles from the Airport. Once turned to the north, North departure gate traffic will continue directly to the North departure gate, while East departure gate traffic will continue turning to the east approximately 8 miles northwest of the Airport, and then proceed directly to the East departure gate. If EWR Runway 11 is in use, departing flights will turn to the right, more toward the southwest then previously described, before turning to the north and continuing as before to each respective gate.

Flights departing Runway 4L will make an initial right turn off the Runway if the TEB ILS to Runway 6 is being used, then make a turn to the left at approximately two to five miles from the Airport and proceed direct to the North Gate or they turn to the right and proceed direct to the East departure gate. If the TEB ILS to Runway 6 is not being used, flights will either turn to the left immediately after takeoff, proceeding to the northwest to the North departure gate, or they will make a right turn off of the runway, proceeding northeast, and then turn to the east to proceed to the East departure gate. This immediate left turn departure flow is dependent on the operations at TEB as previously described and will only be used a small fraction of the time. This is true for all left turns immediately off Runway 4L at EWR for this alternative.

<u>Modifications to Existing Airspace Alternative – EWR Shifted South Departure Gate</u>

Flights departing Runway 22R, will fly straight off of the runway following takeoff, make a left turn to the south and then proceed to the shifted South departure gate located eight miles northwest of Lakehurst, NJ. Flights departing Runway 4L will make an initial right turn off the runway, if TEB Runway 6 ILS is being used then a make a looping left turn to the south, preceding directly to the shifted South departure gate or, when Runway 6 ILS is not being used,

they will turn to the left after takeoff, heading southwest until past the Airport on the west side, then directly to the shifted South departure gate.

Modifications to Existing Airspace Alternative - EWR West Departure Gate

Flights departing Runway 22R will turn to the right following takeoff, maintain this direction until just north of Linden Airport, and then turn to the west to proceed to the gate. If TEB Runway 6 ILS is in use, flights departing Runway 4L will make an initial right turn off the Runway, then make a turn to the west five miles from the Airport, proceeding directly to the West departure gate or they will turn to the west immediately after takeoff if TEB Runway 6 ILS is not in use, and proceed directly to the gate.

Modifications to Existing Airspace Alternative - EWR Arrival Routing

There are no changes to EWR arrival routes in the Modifications to Existing Airspace Alternative, as compared to the Future No Action Airspace Alternative. All arrival posts and routing for EWR arrivals remain the same as in the Future No Action Airspace Alternative.

2.5.4.3 Modifications to Existing Airspace Alternative - TEB Traffic Routing

Modifications to Existing Airspace Alternative – TEB Departure Routing

All of the departure gates remain the same as in the Future No Action Airspace Alternative, except the South departure gate. This gate is shifted to the northwest resulting in south flows also moving to the west from the Future No Action Airspace Alternative. The location and use of this gate, along with its associated air traffic, are discussed in the following paragraph.

Modifications to Existing Airspace Alternative - TEB Shifted South Departure Gate

The shifted South departure gate is shifted to the northwest resulting in south flows also moving to the west from the Future No Action Airspace Alternative. All flights departing to the new South departure gate will fly the same route close-in to the Airport, but will diverge from the Future No Action Airspace Alternative once in the vicinity of Colt's Neck, NJ. Once past Colt's Neck, NJ, flights will turn to the southwest and proceed to the shifted South departure gate. This flow will be the same as the Future No Action Airspace Alternative flow once south of the gate. (See **Figure 2.13**)

Modifications to Existing Airspace Alternative - TEB Arrival Routing

There are no changes to TEB arrival routes in the Modifications to Existing Airspace Alternative, as compared to the Future No Action Airspace Alternative. All arrival posts and routing for TEB arrivals remain the same as in the Future No Action Airspace Alternative.

2.5.4.4 Modifications to Existing Airspace Alternative - PHL Traffic Routing

Modifications to Existing Airspace Alternative - PHL Departure Routing

All of the departure gates remain the same as in the Future No Action Alternative, except the East departure gate, which would be shifted to the east affecting flights destined for the northeastern U.S., Canada, and Europe. In addition, flights departing from Runways 9L/R and 27L/R will operate

with new departure headings as compared to the Future No Action Airspace Alternative. Both changes and associated flows will be discussed in detail in the following paragraphs. See **Figure 2.14** for a graphic display of flows out of PHL.

Modifications to Existing Airspace Alternative – PHL North Departure Gate

Flights departing Runways 9L/R will make an immediate turn to the northeast off the runway and continue turning back to the northwest, continuing as the Future No Action Airspace Alternative flow would at this point. This flow will then proceed direct to the North departure gate. Flights departing Runways 27L/R will make an immediate right turn to the north off of the runway and fly directly to the North departure gate, following the same path as the Future No Action Airspace Alternative flow would to the gate.

Modifications to Existing Airspace Alternative – PHL Shifted East Departure Gate

The shifted East departure gate is shifted further to the east than the PHL Future No Action Airspace Alternative East departure gate; affecting flights destined for the northeastern U.S., Canada, and Europe. Aircraft departing Runways 9L/R will make an immediate right turn and proceed to a point in the vicinity of Coyle, NJ. From this point, all flights will turn to the northeast and proceed in the vicinity of either EWR or JFK. Flights departing Runways 27L/R will make an immediate turn to the south, then turning back to the east, continuing to the vicinity of Coyle, NJ then proceed to the shifted East departure gate. These departure flows would be shifted further to the east to make room for the shifted South gate departure flows from the NY Metropolitan Area. Remaining airspace changes for this alternative take place close-in to the Airport with departing flights and are described in the following paragraphs.

Modifications to Existing Airspace Alternative – PHL South Departure Gate

Flights departing Runways 9L/R will make an immediate right turn to the south proceed directly to the South departure gate, merging with the Future No Action Airspace Alternative flows in the vicinity of the South departure gate. Flights departing Runways 27L/R will make an immediate turn to the southwest off the Runway and then proceed directly to the South gate, merging with the Future No Action Airspace Alternative flows near the Airport prior to reaching the South departure gate.

Modifications to Existing Airspace Alternative – PHL West Departure Gate

Flights departing Runways 9L/R will make an immediate turn to the northeast off of the runway. This flow will circle back to the west using a tighter radius than the North gate flights. Once the aircraft are heading west, these flights will merge with the Future No Action routing and proceed on the same route to the West gate. Flights departing Runways 27L/R will fly straight off the runway or make a slight turn to the right before proceeding to the West departure gate as in the Future No Action Airspace Alternative routing.

Modifications to Existing Airspace Alternative – PHL Arrival Routing

There are no changes to PHL arrival routes in the Modifications to Existing Airspace Alternative, as compared to the Future No Action Airspace Alternative. All arrival posts and routing for PHL arrivals remain the same as in the Future No Action Airspace Alternative.

2.5.4.5 Modifications to Existing Airspace Alternative - Summary

This alternative takes the current routes and procedures and modifies them to improve efficiency in the current airspace system. The differences between this alternative and the Future No Action Airspace Alternative include additional departure headings and shifting of the NY Metropolitan Area airports' South departure gate, as well as the PHL East departure gate.

New departure headings for LGA, EWR, and PHL would be implemented as part of this alternative. For example, in this alternative, a more direct LGA Ocean departure procedure would be added.

In this alternative, the NY/NJ Metropolitan Area South departure gate is shifted 10 miles to the west. Therefore, departures to the south originating from LGA, TEB, and EWR, would be shifted to the new South departure gate. In addition, the PHL East departure gate would be shifted to the east. Therefore, PHL departures to the east would have to continue farther east before tuning to the northeast.

Modifications to Existing Airspace Alternative arrivals would not be changed from today's configuration.

Table 2.1 presents a summary of the Modifications to Existing Airspace Alternative, as compared to the Future No Action Airspace Alternative.

2.5.4.6 Modifications to Existing Airspace Alternative - Purpose and Need Evaluation Criteria

The following paragraphs address how the Modifications to Existing Airspace Alternative meets the Purpose and Need evaluation criteria developed by the airspace design team.

Modifications to Existing Airspace Alternative - Reduce Complexity

This alternative reduces complexity by moving the PHL east departures bound for the northeastern U.S. farther to the east, thus segregating this flow from JFK departures in the vicinity of Robbinsville, NJ.

Modifications to Existing Airspace Alternative - Reduce Voice Communications

This alternative does not contain design features that lead explicitly to a decrease in either controller-pilot or controller-controller communications.

Modifications to Existing Airspace Alternative - Reduce Delay

New departure headings (i.e., divergent headings per FAA Order 7110.65P) allow more aircraft to depart in a given amount of time because the aircraft diverge from one another, thus reducing separation between successive departures and delay.

Modifications to Existing Airspace Alternative - Balance Controller Workload

This alternative does improve the balance of controller workload because modifications to departure headings allow aircraft to be more evenly distributed to multiple departure controllers.

Modifications to Existing Airspace Alternative - Meet System Demands

More efficient terminal airspace design has the capability to help controllers more

Table 2.1
Summary of Modifications to Existing Airspace Alternative

Airport	Changes from Future No Action
JFK	No Changes
LGA	South departure gate shifted to the northwest New departure headings for aircraft departing Runway 4 to the North departure gate New propeller aircraft procedures departing Runway 13 to West departure gate New departure headings for propeller aircraft departing Runway 13 to the South departure gate New distant procedures for aircraft departing Runways 4 and 13 to the South departure gate New departure headings for aircraft departing Runway 4 to the East departure gate
EWR	South departure gate shifted to the northwest New procedures for aircraft heading to new South departure gate New departure headings from all runways to all gates New departure headings off Runways 4L dependent on TEB Runway 6 New departure headings off Runways 22R dependent on TEB Runway 11
TEB	South departure gate shifted to the northwest New distant procedures for aircraft heading to shifted South departure gate
PHL	East departure gate shifted further east New procedures for aircraft heading to new East departure gate New departure headings for aircraft heading to the North, East, West, and South departure gates

effectively balance peak-hour arrival and departure demand. One way to make the airspace more efficient is to add departure gates and/or arrival posts. This alternative does not appreciably improve the ability to meet system demands because no additional departure gates or arrival posts were added.

Modifications to Existing Airspace Alternative - Improve User Access to System

This alternative does not appreciably improve user access to the System because there would be no additional departure gates, departure routes, arrival posts, or arrival routes.

Modifications to Existing Airspace Alternative - Expedite Arrivals and Departures

Additional departure headings allow air traffic to expedite departures at EWR, LGA, and PHL. In addition, moving PHL East departures destined for the northeastern U.S. to the east allows these flights unrestricted climbs out of the TRACON airspace, thus expediting departures. Benefits to arrival traffic are not expected for this alternative, because arrival procedures have not changed.

Modifications to Existing Airspace Alternative - Increase Flexibility in Routing

During severe weather, additional departure routes can be used to avoid localized weather activity. Thunderstorms may be highly localized, cutting off several routes while leaving adjacent routes open. The increase in departure routes means that controllers have additional flexibility in routing aircraft around severe weather. Since this alternative did not increase the number of departure gates or routes, it does not increase flexibility in routing.

Modifications to Existing Airspace Alternative - Maintain Airport Throughput

For this alternative, additional departure headings yield a minimal increase in maintaining airport throughput since additional departure gates or routes are not available. Benefits to arrival traffic are not expected for this alternative, because arrival procedures have not changed.

Summary

The Modifications to Existing Airspace Alternative enhances safety by reducing complexity. It improves efficiency by increasing flexibility, maintaining airport throughput, and expediting departures. Therefore, this is a reasonable alternative for meeting the Purpose and Need of the Airspace Redesign and is carried forward for environmental analysis.

2.5.5 Ocean Routing Airspace Alternative

The Ocean Routing Airspace Alternative is a proposal that was developed by the NJ Citizens for Environmental Research, Inc. (NJCER) at the request of the NJ Coalition Against Aircraft Noise (NJCAAN).[9]

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. Note that all Ocean Routing Airspace Alternative descriptions and graphics describe only those aspects of the alternative that are different from the Future No Action Airspace Alternative. There are no changes to arrival or departure routing for PHL and TEB associated with this alternative.

Figures 2.15 through 2.18 identify major routing changes associated with the Ocean Routing Airspace Alternative.

2.5.5.1 Ocean Routing Airspace Alternative - JFK Traffic Routing

Ocean Routing Airspace Alternative – JFK Departure Routing

As with the Future No Action Airspace Alternative, the majority of departure traffic from JFK uses parallel Runways 31L/R or 13L/R. The North and East gates are the same as the Future No Action Airspace Alternative, while the West gate is shifted and the Ocean gate is split. The location and use of these gates, along with their associated air traffic, are discussed in the following paragraphs. See **Figure 2.15** for a graphic display of flows out of JFK.

<u>Ocean Routing Airspace Alternative – JFK Split Ocean Departure Gate</u>

The Future No Action Ocean departure gate is split into the Ocean departure gate and the South departure gate. The flow that passed through the southern tip of the Future No Action Ocean departure gate is moved to the South departure gate. The South departure gate is located approximately 60 miles south of JFK, extending 30 miles to the east from a point in the vicinity of Barnegat Bay into the Atlantic Ocean. This gate serves flights heading to the southeastern U.S. and South America. Flights destined for this gate follow the same procedures as the shifted West departure gate flows until reaching Barnegat Bay, at which point they continue south down the coastline of NJ to the shifted South departure gate.

[9]Source: Development of Air Traffic Routings for the Mitigation of Aircraft Noise in New Jersey; Submitted to New Jersey Citizens for Environmental Research, Inc.; June 1993; Section 1.0 – Executive Summary, Page 1.

Ocean Routing Airspace Alternative – JFK Shifted West Departure Gate

The shifted West departure gate is oriented north and south, beginning in the vicinity of Yardley, PA, extending south 30 miles into Burlington County, NJ. This gate serves flights heading directly to the western U.S., the Washington, D.C. Metropolitan Area, and points south. This shifted departure gate shifts all JFK departures over central NJ. Aircraft departing Runways 31L/R and 13L/R would head south and east of the Airport over the Atlantic Ocean. This flow will diverge into two flows prior to turning west over the State of NJ. The first flow will turn west in the vicinity of Asbury Park, NJ, towards Robbinsville, NJ, then proceed to the north end of the new West departure gate. The other flow continues south along the NJ coastline, turning west in the vicinity of Barnegat Bay, NJ, then west toward Coyle, NJ, and proceeding to the south end of the shifted West departure gate.

Ocean Routing Airspace Alternative - JFK Arrival Routing

There are three arrival posts into JFK: the North, East, and South posts. The North and East arrival posts are the same as the Future No Action Airspace Alternative. The South arrival post is relocated farther to the east for the Ocean Routing Airspace Alternative. The location and use of this post is discussed in the following paragraphs. See **Figure 2.16** for a graphic display of these flows into JFK.

Ocean Routing Airspace Alternative – JFK North Arrival Post

Flights arriving from the North arrival post landing on Runways 31L/R would proceed over LGA and fly east where they will make a right turn, continuing to circle to the southwest in the vicinity of Deer Park, NY. These flights would maintain a southwest heading until aligned to land on Runways 31L/R.

Ocean Routing Airspace Alternative - JFK Shifted South Arrival Post

The South arrival post is moved to the east of the Future No Action Airspace Alternative post. Flights arriving over the Atlantic Ocean, the south, and southwest all converge on this arrival post similar to the Future No Action Alternative. Flights from the Atlantic arrive over the ocean to the arrival post, while flights from the south arrive in the vicinity of Sea Isle, NJ then proceed to the northeast over the Atlantic Ocean, before turning to the north and arriving at the shifted post. All final approach procedures once past the post remain the same as the Future No Action Airspace Alternative.

2.5.5.2 Ocean Routing Airspace Alternative - LGA Traffic Routing

Ocean Routing Airspace Alternative - LGA Departure Routing

As with the Future No Action Airspace Alternative, LGA departure traffic is conducted on Runway 4 during north configuration and Runway 13 during south configuration. All of the departure gates remain the same as in the Future No Action Airspace Alternative. The only substantial change is to the procedure for aircraft heading to the North departure gate. The change in this flow will be discussed in detail in the following paragraph. See **Figure 2.17** for a graphic display of flows out of LGA.

Ocean Routing Airspace Alternative – LGA North Departure Gate

The primary difference between the Future No Action Airspace Alternative and this alternative is related to departures through the North gate. All flights departing Runways 4 or 13 will fly the same departure headings as the Future No Action Airspace Alternative. Once these flows are five miles northwest they will then turn to the northeast staying east of the Hudson River until between 15 to 20 miles north of the Airport, where they would turn to the west and proceed directly to the gate. These flows in the Future No Action Airspace Alternative would cross the Hudson River much closer to the Airport.

Ocean Routing Airspace Alternative - LGA Arrival Routing

There are no changes to LGA arrival routes or arrival posts in the Ocean Routing Airspace Alternative, as compared to the Future No Action Airspace Alternative.

2.5.5.3 Ocean Routing Airspace Alternative - EWR Traffic Routing

Ocean Routing Airspace Alternative - EWR Departure Routing

The primary objective of the Ocean Routing Alternative is to move flights over various water bodies regardless of active runways or final flight destinations. The North and East departure gates are the same as the Future No Action Airspace Alternative, while the South and West departure gates will be moved. Flights departing both Runways 4L and 22R are affected by this design. Specific details of these procedures and associated flows are described in detail in the following sections. **Figure 2.18** shows flows out of EWR.

Ocean Routing Airspace Alternative - EWR North and East Departure Gates

The North departure gate serves flights to the upper Midwest and the East departure gate serves flights heading to the northeastern U.S and Canada. Flights departing Runways 22L/R fly the same initial procedures to the point five miles west of Sandy Hook, NJ. Flights destined for either gate turn northeast flying towards Long Island, passing south of JFK, where they cross the southern shore of Long Island in the vicinity of Jones Inlet, and head northwest. This flow diverges into three flows north of Jones Inlet. Two flows proceed directly to the East departure gate; the other proceeds back to the North departure gate northwest of EWR.

Ocean Routing Airspace Alternative – EWR Shifted South Departure Gate

This gate serves flights heading to the southeastern U.S., the Washington, D.C. Metropolitan Area, South America and the Caribbean. Flights departing Runways 22L/R destined for this gate follow the same procedures as the shifted West departure gate flows until reaching Barnegat Bay, at which point they either continue south down the coastline of NJ, or they turn to the east and proceed over the Atlantic Ocean.

Flights departing Runways 4L/R will make an initial right turn off the runway, heading to the northeast, and then turn back to the west at four miles and circle to the south staying to the west of EWR. Once past LDJ, these flights will turn back to the east over Raritan Bay and proceed past Sandy Hook, NJ, before turning to the southwest and paralleling the NJ coastline. From this point on, South gate flights will proceed as previously described in the Runways 22L/R flows.

Ocean Routing Airspace Alternative – EWR Shifted West Departure Gate

The shifted West departure gate serves flights departing to the western and southwestern U.S. Flights departing Runways 22L/R will make an immediate left turn heading to the south for two miles before turning back to the right and heading southwest where they fly east of I-95/New Jersey Turnpike near the Arthur Kill Channel. These flights will then turn left heading east in the vicinity of the Outer Bridge Crossing. They will then proceed over Raritan Bay to the vicinity of Sandy Hook, NJ. Aircraft continue on this east heading another four to five miles before turning right towards the southwest and paralleling the shoreline. This flow will then diverge into two flows prior to turning west over NJ. The first flow will turn west over NJ in the vicinity of Asbury Park, NJ, towards Robbinsville, then proceed to the north end of the shifted West departure gate. The other flow continues south along the NJ coastline, turning west in the vicinity of Barnegat Bay, NJ, then west toward Coyle, NJ, and proceeding to the south end of the shifted West departure gate.

Flights departing Runways 4L/R will make an initial right turn off the Runway, heading to the northeast, and then turn back to the west at four miles and circle to the south staying to the west of EWR. Once past LDJ, these flights will turn back to the east over Raritan Bay and proceed past Sandy Hook, NJ, before turning to the southwest and paralleling the NJ coastline. From this point on, West gate flights will proceed as previously described in the Runways 22L/R flows.

Ocean Routing Airspace Alternative - EWR Arrival Routing

There are no changes to EWR arrival routes and arrival posts in the Modifications to Existing Airspace Alternative, as compared to the Future No Action Airspace Alternative.

2.5.5.4 Ocean Routing Airspace Alternative - Summary

The Ocean Routing Airspace Alternative proposes to move EWR departures out over the Atlantic Ocean prior to turning them west to their final destinations. The Ocean Routing Airspace Alternative proposes significant changes to EWR and JFK departures. It also creates a new JFK arrival post which is located approximately 10 miles east of Mantoloking Shores, NJ. In addition, LGA departures flying to the North gate remain east of the Hudson River further than the Future No Action Airspace Alternative prior to turning to the North departure gate.

The Ocean Routing Airspace Alternative reduces the delay on the West departure gate out of the State of NY, as this gate is not available for EWR departures in the high capacity configuration. The downside is that delay increases at a point south of NY. The effective result of this trade is a small reduction in overall airspace delay, but with an associated large increase in airport departure delay. Another factor is the proposed routing for EWR and JFK passes just north of the main departure fix out of PHL, where EWR departures are delayed later in the day due to airspace capacity limits and conflict with the PHL evening departure push. The result of this trade-off is increased complexity in the en route airspace to the southwest of NY that is already a bottleneck in the en route airspace structure. **Table 2.2** provides a summary of

Table 2.2
Summary of Ocean Routing Airspace Alternative

Airport	Changes from Future No Action
JFK	Shifted West departure gate New procedures for aircraft heading to the West departure gate Split of the FNA Ocean departure gate into the Ocean and South departure gates New procedures for aircraft heading to the South departure gate South arrival post shifted to the east New procedures for aircraft arriving from the South arrival post New procedures for aircraft arriving from the North arrival post
LGA	New procedures for aircraft heading to the North departure gate
EWR	Shifted West departure gate New procedures for aircraft heading to the West departure gate Shifted South departure gate New procedures for aircraft heading to the South departure gate New procedures for aircraft departing Runways 22L/R to the North departure gate New procedures for aircraft departing Runways 22L/R to the East departure gate
TEB	No Changes
PHL	No Changes

the changes associated with the Ocean Routing Airspace Alternative compared to the Future No Action Airspace Alternative.

2.5.5.5 Ocean Routing Airspace Alternative - Purpose and Need Evaluation Criteria

The following paragraphs address how the Ocean Routing Airspace Alternative meets the Purpose and Need evaluation criteria developed by the airspace design team.

Ocean Routing Airspace Alternative - Reduce Complexity

The task of merging departures from EWR, LGA, and TEB over the West departure gate would be simplified by separating EWR traffic into a single flow away from LGA and TEB westbound departure traffic. However, moving the EWR departures closer to PHL where they would have to merge with PHL and JFK departures would cause an increase in the complexity of en route airspace.

Ocean Routing Airspace Alternative - Reduce Voice Communications

In this alternative, all EWR aircraft would fly the same departure procedure, thus reducing pilot-controller communications because vectoring and air traffic sequencing of aircraft to the Future No Action Airspace Alternative West departure gate would not be required. Both vectoring and sequencing require excessive pilot to controller communications.

Conversely, congestion on the single EWR departure route would require increased internal facility communications in order to manage traffic flow before departure.

Ocean Routing Airspace Alternative - Reduce Delay

This alternative would not reduce delay. When EWR flights are departing, all aircraft would have to stay in single file for at least 40 miles. This decreases the throughput of the airport because additional in-trail spacing would be required because of

differences in aircraft performance characteristics. This situation would substantially increase delay at EWR which can cause ripple effects throughout the NAS. According to a Government Accountability Office (GAO) Report, "The effect of delays can quickly spread beyond those airports where delays tend to occur most often, such as New York La Guardia, Chicago O'Hare, Newark International, and Atlanta Hartsfield. Delays at these airports can quickly create a "ripple" effect of delays that affects many airports across the country. For example, flights scheduled to take off from these airports may find themselves being held at the departing airport due to weather or limited airspace. Similarly, an aircraft late in leaving the airport where delays are occurring may be late in arriving at its destination, thus delaying the departure time for the aircraft's next flight."[10]

Ocean Routing Airspace Alternative - Balance Controller Workload

This alternative would negatively affect the balance of controller workload. The single controller handling flights arriving from the south to JFK would now have to handle EWR departures as well.

Ocean Routing Airspace Alternative - Meet System Demands

Demand for increased service to the NY Metropolitan Area airports would not be met by this alternative. EWR is a major hub airport in the NAS and included as one of 31 capacity benchmark airports that experience high levels of delay as measured by the FAA OPSNET (Operational Network) system. When EWR flights are departing, all aircraft would have to stay in single file for at least 40 miles, which would increase the necessary separation between departures. This results in departure delays. This, in turn, could affect EWR arrivals because of ground movement congestion and gate availability. In addition, this effect has the potential to ripple through other high-density airports that have aircraft bound for EWR, resulting in take-off delays at these airports.

Ocean Routing Airspace Alternative - Improve User Access to the System

User access would not be improved under this alternative. Some users would have to upgrade their aircraft to models that are capable of operating over water in order to continue flying to and from EWR. In addition, user access would be limited due to the increased EWR delays rippling through the System.

Ocean Routing Airspace Alternative - Expedite Arrivals and Departures

This alternative routing takes westbound EWR departure aircraft farther from their desired more direct routing. This routing penalizes aircraft operators and passengers in terms of longer flight time and longer overall miles flown.

Ocean Routing Airspace Alternative - Increase Flexibility in Routing

This alternative would remove a significant amount of the flexibility of route choice. This is due to the design implications of four EWR routes to the west that would be replaced by a single EWR route out of the terminal airspace.

Ocean Routing Airspace Alternative - Maintain Airport Throughput

Maintaining airport throughput, even at current aircraft traffic levels, would be

[10] GAO-05-755T, National Airspace System: Initiatives to Reduce Flight Delays and Enhance Capacity, May 26, 2005.

difficult under this alternative. This is due primarily to the increased departure delays at EWR resulting from this alternative.

Summary

As previously stated, the purpose of the Ocean Routing Airspace Alternative is to reduce noise impacts on the citizens of New Jersey. The purpose of the Proposed Action is to increase the efficiency and reliability of the entire NY/NJ/PHL Metropolitan Airspace. Therefore, because the Ocean Routing Airspace Alternative is focused on reducing noise in one specific area and not on increasing the efficiency and reliability of the entire NY/NJ/PHL Metropolitan Airspace, it was apparent that from its inception this alternative did not meet the Airspace Redesign Purpose and Need. The evaluation of the Purpose and Need Criteria reiterated this finding. The Ocean Routing Airspace Alternative would not: reduce delay, balance controller workload, meet system demand, improve user access, expedite arrivals and departures, increase flexibility, nor maintain airport throughput.

Although it was apparent that the Ocean Routing Airspace Alternative would not meet the Purpose and Need, the FAA elected to include this alternative for analysis due to the long standing concerns of the NJCAAN.

2.5.6 Integrated Airspace Alternative

The Integrated Airspace Alternative combines the New York TRACON airspace with portions of surrounding Centers' airspace to permit more seamless operations. The Integrated Airspace Alternative could be accomplished either with standalone (existing facilities) or consolidated facilities because the key component is a common automation platform.[11] Using the existing facilities, airspace would be reallocated among the facilities in order to facilitate a more seamless operation. The consolidated facility is called the Integrated Control Complex (ICC). The FAA is currently studying the ICC concept to determine whether it meets operational, safety, and budget requirements. The FAA has not yet decided whether to approve the ICC concept. Should the FAA determine that the ICC concept is feasible and seek to implement it in the Study Area, it will undertake the appropriate environmental review prior to any construction activities.

Because the FAA has not yet decided whether to approve the ICC concept, the Integrated Airspace Alternative was designed with two variations. The initial phase (2006) is the same for both variations because an ICC will not exist in 2006. It involves modifications to a departure gate as well as additional diverging departure headings; however, airspace facility boundaries would not change.

In the next phase (2011) the following variations appear:

- The first variation is the Integrated Airspace Alternative Variation without ICC; this variation will integrate the airspace to the extent possible with standalone facilities. It includes the same changes to the airspace structure from phase one with expanded use of terminal separation, reallocation of airspace sectors, and new technologies.

- The second variation, called the Integrated Airspace Alternative Variation

[11] A common automation platform includes shared displays on screens, radar data processing and presentation, and communications.

with ICC, involves full airspace integration (i.e. combining the TRACON and Center airspace). There would be modifications to multiple departure gates, additional arrival posts, and additional diverging departure headings.

Note that all Integrated Airspace Alternative descriptions and graphics describe only those aspects of the alternative that are different, or have varied from, the Future No Action Airspace Alternative.

2.5.7 Integrated Airspace Alternative Variation without ICC

The Integrated Airspace Alternative Variation without ICC involves modifications to the West departure gate as well as additional close-in procedures.

Figures 2.19 through 2.22 identify major routing and flow changes associated with the Integrated Airspace Alternative Variation without ICC.

2.5.7.1 Integrated Airspace without ICC - LGA Traffic Routing

Integrated Airspace Alternative Variation without ICC – LGA Departure Routing

As with the Future No Action Airspace Alternative, the majority of departure traffic from LGA uses Runways 4 and 13. The North, East, South, and Ocean departure gates remain the same. The West departure gate has been expanded. The use of these gates, along with their associated air traffic, is discussed in the following sections. **Figure 2.19** shows flows out of LGA.

<u>Integrated Airspace Alternative Variation without ICC - LGA North and East Departure Gates</u>

Both the North and East departure gates are the same as the Future No Action Airspace Alternative. All departure headings to the North and East departure gates are the same as the Modifications to Existing Airspace Alternative.

<u>Integrated Airspace Alternative Variation without ICC – LGA Expanded West Departure Gate</u>

The West departure gate is extended in both directions by the incorporation of an additional departure fix, resulting in access to an additional jet airway for departures. The expanded West departure gate is still oriented southeast to northwest and is shifted 10 miles closer to the Airport. This gate serves flights departing to the western and southwestern U.S. This results in changes to the departure flows to the gate. The departure headings are the same as the Modifications to Existing Airspace Alternative. How the aircraft transition to the expanded West departure gate will vary due to the movement of the gate. Flights departing Runway 4 will make an immediate turn to the north. These flights will then turn towards the west, north of Manhattan, and proceed to an area in the vicinity of TEB. Once past TEB, the main flow will begin to split up and proceed to either the south, central or northern areas of the expanded West departure gate. These aircraft will also be merged with the EWR and TEB West gate departure traffic at this point. Flights departing Runway 13 will make an immediate right turn off the runway, then circle back to the northeast staying clear of JFK traffic, and then continue back to the west, north of the Airport. This major flow will begin splitting into individual flows in the vicinity of TEB.

Integrated Airspace Alternative Variation without ICC - LGA Arrival Routing

There are no changes to LGA arrival routes and arrival posts in the Integrated Airspace Alternative Variation without ICC, as compared to the Future No Action Airspace Alternative.

2.5.7.2 Integrated Airspace Alternative Variation without ICC - EWR Traffic Routing

Integrated Airspace Alternative Variation without ICC - EWR Departure Routing

The majority of EWR departures are conducted on Runways 4L and 22R. Changes at EWR involve new departure headings and modification to the West departure gate. These procedures and the expanded West departure gate will be described in the following paragraphs. **Figure 2.20** shows flows out of EWR.

Integrated Airspace Alternative Variation without ICC - EWR South Departure Gate

Flights departing Runways 4L and 22R will fly the same departure headings as in the Modifications to Existing Airspace Alternative. Once flights are southwest of the Airport, they will follow the same path as the Future No Action Airspace Alternative flows.

Integrated Airspace Alternative Variation without ICC – EWR Expanded West Departure Gate

The West departure gate would be extended in both directions by the incorporation of an additional departure fix, resulting in access to an additional jet airway for departures. The expanded West departure gate would also be shifted closer to the Airport. This gate serves flights destined for the western and southwestern U.S.

Flights departing Runway 22R will turn to the southwest following takeoff; this flow will then split into three main flows less than 10 miles from the Airport, and then split into five flows prior to reaching the gate.

If TEB is using the ILS to Runway 6, Flights departing Runway 4L will make an initial right turn off the runway, and then make a turn to the west within five miles from the Airport. This flow will then merge back with the three previously mentioned flows. If TEB is not using the ILS to Runway 6, flights will make an immediate left turn to the west after takeoff within five miles and then begin to diverge five miles to the west of EWR.

Integrated Airspace Alternative Variation without ICC - EWR North or East Departure Gates

If EWR is not using Runway 11, flights departing Runway 22R will make an initial right turn after taking off heading due west, then turn to the north five miles from the Airport. Once turned to the north, these flights will continue directly to the North departure gate, while East departure gate flights will continue turning to the east eight miles northwest of the Airport, and then proceed direct to the East departure gate. If Runway 11 is being used, the initial turn off the Runway will be to the southwest, then proceeding as described above.

If TEB is not using the ILS to Runway 6, flights departing Runway 4L destined for the North departure gate will make an immediate left turn to the northwest, and then proceed direct to the gate. This immediate left turn off Runway 4L is dependent on the operations at TEB as mentioned above and will only be used a small fraction of the time. Flights destined for the East departure gate will fly the same procedures as the Future No Action

Airspace Alternative. If TEB is using ILS to Runway 6, flights departing from Runway 4L destined for the North and East departure gates will fly the same procedures as the Future No Action Airspace Alternative.

Integrated Airspace Alternative Variation without ICC - EWR Arrival Routing

There are no changes to EWR arrival routes and arrival posts in the Integrated Airspace without ICC Alternative, as compared to the Future No Action Airspace Alternative.

2.5.7.3 Integrated Airspace Alternative Variation without ICC - TEB Traffic Routing

Integrated Airspace Alternative Variation without ICC - TEB Departure Routing

All departure headings are the same as the Future No Action Airspace Alternative. As with the Future No Action Airspace Alternative, the majority of departures are conducted on Runways 1 and 24. The primary difference between this variation and the Future No Action Airspace Alternative is extension of the West departure gate and modification of its associated flows. See **Figure 2.21**.

<u>Integrated Airspace Alternative Variation without ICC – TEB Expanded West Departure Gate</u>

The West departure gate would be extended in both directions by the incorporation of an additional departure fix, resulting in access to an additional jet airway for departures. The expanded West departure gate would also be shifted closer to the Airport. This gate serves flights destined for the western and southwestern U.S.

Flights departing Runway 1 make a left turn of off the runway. Once in the vicinity of CDW, these flights will diverge into five distinct flows heading to different locations of the gate depending on final airport destinations. The aircraft flying to the southern tip of the expanded West departure gate will not turn directly to the gate until clear of the Runway 6 ILS flights arriving from the southwest of the Airport.

Flights departing Runway 24 turn immediately to the west continuing west to the vicinity of MMU. Once past of MMU, this flow diverges into five distinct flows heading to different locations of the gate depending on final airport destinations.

Integrated Airspace Alternative Variation without ICC - TEB Arrival Routing

Turboprop aircraft arriving from the northeast will be moved further to the north of TEB than in the Future No Action Airspace Alternative. This flow will then fly further to the west of the Airport in the vicinity of Sparta, NJ, before turning back to the Airport to land. The remainder of the arrival procedures will stay the same as in the Future No Action Airspace Alternative. **Figure 2.22** shows flows into TEB.

2.5.7.4 Integrated Airspace Alternative Variation without ICC - PHL Traffic Routing

Integrated Airspace Alternative Variation without ICC - PHL Departure Routing

All of the departure gates remain the same as in the Future No Action Airspace Alternative (See Figure 2.9). As with the Future No Action Airspace Alternative, the majority of departure flights would be conducted on Runways 9L/R and 27L/R. All departures from PHL will fly the same departure headings as the Modifications to Existing Airspace Alternative (see Airport Vicinity graphic on Figure 2.14). As the flights proceed away from the Airport, they

will proceed as previously described for the Future No Action Airspace Alternative flows and continue on to each respective gate.

Integrated Airspace Alternative Variation without ICC - PHL Arrival Routing

There are no changes to PHL arrival routes and arrival posts in the Integrated Airspace Alternative Variation without ICC, as compared to the Future No Action Airspace Alternative.

2.5.7.5 Integrated Airspace Alternative Variation without ICC - Summary

The major changes associated with this variation versus the Future No Action Airspace Alternative involve departures to the West gate by EWR, TEB, and LGA flights. The West gate has been extended. This variation also involves changes to departure headings at EWR and LGA. The departure headings are the same as the Modifications to Existing Airspace Alternative, but how the aircraft transition to the expanded West departure gate will vary due to the movement of the gate. In addition, a new turboprop arrival route to TEB would be established as part of this variation. Departure headings for PHL would also change. No major changes would be made to JFK arrival or departure routing as a result of this variation. **Table 2.3** provides a summary of the Integrated Airspace Alternative Variation without ICC.

2.5.7.6 Integrated Airspace Alternative Variation without ICC - Purpose and Need Evaluation Criteria

The following paragraphs address how the Integrated Airspace Alternative Variation without ICC meets the Purpose and Need evaluation criteria developed by the airspace design team.

Table 2.3
Summary of Integrated Airspace Alternative Variation without ICC

Airport	Changes from Future No Action
JFK	No Changes
LGA	West departure gate extended to the north and to the south New procedures for aircraft heading to the West departure gate New departure headings for aircraft departing Runway 4 to the North departure gate New departure headings for aircraft departing Runway 4 to the East departure gate
EWR	New departure headings for all runways and all gates Procedures off Runway 4L dependent on TEB Runway 6 to West departure gates New procedures for aircraft heading to the West departure gate Procedures off Runway 4L dependent on TEB Runway 6 to North and East departure gates Procedures off Runway 22R dependent on EWR Runway 11 use Expanded West departure gate
TEB	West departure gate extended to the north and to the south New procedures for aircraft heading to the West departure gate New procedures for turboprop aircraft arriving from the northeast
PHL	New departure headings for aircraft heading to the North, East, West, and South departure gates

Integrated Airspace Alternative Variation without ICC - Reduce Complexity

When TRACONs are able to hand-off aircraft to the Centers over a larger departure gate, the task of vectoring aircraft to achieve the spacing needed in the en route airspace as they climb to reach their cruise altitudes becomes less complex. Additionally, by adding an arrival route into TEB, some turboprop traffic is separated from jet traffic. This reduces the need to sequence slower prop traffic in with faster jet traffic leading to reduced complexity. Conversely, adding an additional departure route into the already congested West departure gate area would slightly increase complexity.

Integrated Airspace Alternative Variation without ICC - Reduce Voice Communications

This variation does not contain design features that lead explicitly to a decrease in either controller-pilot or controller-controller communications. Some reduction in controller-pilot communications might be achieved as a consequence of the reduced vectoring needed to separate aircraft because there is an additional departure route.

Integrated Airspace Alternative Variation without ICC - Reduce Delay

New departure headings (i.e., divergent headings per FAA Order 7110.65P) allow more aircraft to depart in a given amount of time because the aircraft diverge from one another, reducing delay by minimizing separation between successive departures.

The expanded West departure gate and additional arrival route would allow more flights into or out of the airspace system, thus reducing delays.

Integrated Airspace Alternative Variation without ICC - Balance Controller Workload

This variation does improve the balance of controller workload because additional departure headings allow aircraft to be more evenly distributed to multiple departure controllers. Conversely, adding an additional departure route into the West gate departure controller's area would increase his/her workload.

Integrated Airspace Alternative Variation without ICC - Meet System Demands

A more efficient terminal airspace design will help balance hourly arrival and departure demand, making the most out of any existing peak hour airfield capacity limitations.

Having an expanded West departure gate and the associated departure flow will allow more aircraft to depart the area more quickly; therefore, this variation improves the ability to meet system demands.

Integrated Airspace Alternative Variation without ICC - Improve User Access to the System

Access to TEB is improved by having a separate new turboprop arrival route; therefore, this variation improves user access to the System.

Integrated Airspace Alternative Variation without ICC - Expedite Arrivals and Departures

This variation of the Integrated Airspace Alternative will not materially affect arrivals.

When aircraft from several airports have departed, and are expected to arrive at the same departure gate at the same time,

controllers must vector one or more of these aircraft away from their direct routing to maintain safe separation. This would result in aircraft flying longer routes prior to leaving the metropolitan airspace, however, the expanded West departure gate will decrease the frequency of this non-direct vectoring for departure aircraft and departures will be expedited.

Additional departure headings would allow air traffic to expedite departures at EWR, LGA, and PHL. These departure headings allow more aircraft to depart in a given amount of time, thus expediting departures.

Integrated Airspace Alternative Variation without ICC - Increase Flexibility in Routing

During severe weather, additional departure routes can be used to avoid localized weather activity. Thunderstorms may be highly localized, cutting off several routes while leaving adjacent routes open. The increase in departure routes means that controllers have additional flexibility in routing aircraft around severe weather. Since this variation added only one departure flow, there would be minimal increase in flexibility of routing.

Integrated Airspace Alternative Variation without ICC - Maintain Airport Throughput

Additional departure headings as well as expansion of the West departure gate will show an increase in airport throughput especially at EWR. EWR receives the most benefit because of its disproportionately high use of the expanded West departure gate.

Summary

The Integrated Airspace Alternative Variation without ICC enhances safety by reducing complexity and voice communications. It improves efficiency by:

- Reducing delay,
- Balancing controller workload,
- Meeting system demands,
- Improving user access to the system,
- Expediting departures,
- Increasing flexibility in the West gate area, and
- Maintaining airport throughput primarily by increasing throughput at EWR.

Therefore, this is a reasonable alternative for meeting the Purpose and Need of the Airspace Redesign and will be carried forward for environmental analysis.

2.5.8 Integrated Airspace Alternative Variation with ICC

As described above, the Integrated Airspace Alternative in the year 2011 has two variations: without an ICC and with an ICC. 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 departure headings. The second variation is called the Integrated Airspace Alternative Variation with ICC.

This variation represents a full airspace consolidation and is a new approach to the redesign of airspace from NY 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.[12] The ICC airspace would be comprised of the majority of current NY TRACON 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, see **Figure 2.23**. **Figures 2.24 through 2.33** identify major routing and flow changes associated with the Plan.

2.5.8.1 Integrated Airspace Alternative Variation with ICC - JFK Traffic Routing

Integrated Airspace Alternative Variation with ICC – JFK Departure Routing

The majority of departure traffic from JFK is conducted on parallel Runways 31L/R or 13L/R. The following departure gates for the Integrated Airspace Alternative Variation with ICC have been modified from those for the Future No Action Airspace Alternative: North, West, and Ocean departure gates. The North departure gate would be shifted to the north. The West gate, which JFK flights could not access in the Future No Action Airspace Alternative, would be expanded and accessible. The Future No Action Ocean departure gate is split into an Ocean departure gate and a South departure gate. Additional diverging departure headings would be implemented for flights departing Runways 13L/R to the West Departure Gate. The location and use of these new gates, along with associated air traffic, are discussed in the following paragraphs. See **Figure 2.24** for a graphic display of flows out of JFK.

Integrated Airspace Alternative Variation with ICC – JFK Shifted North Departure Gate

The North departure gate would be shifted to the northeast approximately 15 miles making room for new arrival flows into EWR and LGA. This gate serves flights destined to Canada, the Upper Midwest, and the Pacific Northwest. The close-in flight patterns will remain the same as the Future No Action Airspace Alternative. Once the flights are northwest of the Airport and north of TEB they will begin to diverge into three distinct flows and proceed directly to the shifted North departure gate.

Integrated Airspace Alternative Variation with ICC – JFK Expanded West Departure Gate

One of the primary redesign changes associated with this variation is the expansion of the West departure gate. This gate starts in the vicinity of Princeton, NJ and extends to the north in the vicinity of Hardwick, NJ. The expanded West departure gate would include six departure points and provides greater access to the west for JFK departures. This gate serves flights destined for the western U.S. Flights departing both primary runways make an initial left turn, circling to the north of the Airport before turning to the west. The flights diverge into six distinct flows over central NJ and proceed to different points over the gate depending on their final destinations. JFK flights destined to the west no longer fly in the vicinity of Robbinsville, NJ.

[12]Many air traffic control altitudes are given in flight levels representing altitude above mean sea level (MSL) in increments of 1,000 feet (i.e., flight level 230 equates to 23,000 feet above MSL).

Integrated Airspace Alternative Variation with ICC - JFK Split Ocean Departure Gate

The Future No Action Airspace Alternative Ocean departure gate is split into the Ocean and South departure gates. One of the primary flight paths over the ocean that was used to define the Ocean departure gate in the Future No Action Airspace Alternative has been moved over eastern NJ and to the South gate. This will cause the Ocean departure gate to be shifted to the northeast and it will no longer serve flights destined for Florida over the Atlantic Ocean. This gate will serve flights destined to South America, the Caribbean, and Europe. Departure headings remain the same as those for Future No Action Airspace Alternative. Flights departing both primary runways will proceed to the new Ocean departure gate on a more northerly route than in the Future No Action Airspace Alternative.

The South departure gate begins at the intersection of the Garden State Parkway and Highway 70 and extends 10 miles to the northwest in the vicinity of Cassville, NJ. This gate serves flights heading only to the Washington Metropolitan Area or further south. Flights departing from JFK to the western U.S. will no longer use this gate. Flights departing either primary runway will fly the same close-in patterns in the process of turning toward NJ. When these flights are 10 miles southwest of the Airport, they will be split into two main flows, depending on their final destination and proceed directly to the South departure gate. One flow will be concentrated on the northwest tip of the gate and the other on the southeastern tip.

Integrated Airspace Alternative Variation with ICC - JFK Arrival Routing

The primary arrival runways to JFK are 13L and 31L/R. There are three new arrival posts into JFK in the Integrated Airspace Alternative Variation with ICC. These are the North, East, and South posts. The location and use of each post is discussed in the following paragraphs. See **Figure 2.25** for a graphic display of these flows into JFK.

Integrated Airspace Alternative Variation with ICC – JFK Shifted North Arrival Post

The shifted North arrival post is shifted approximately five miles to the southeast in the vicinity of TEB. This arrival post serves flights from the western U.S. Flights that formerly arrived from the north through NY in the Future No Action Airspace Alternative now arrive from the vicinity of Wilkes Barre, PA. The flights then proceed directly to the shifted North arrival post. Once past the arrival post these flights will fly the same close-in arrival procedures as in the Future No Action Airspace Alternative.

Integrated Airspace Alternative Variation with ICC – JFK Shifted East Arrival Post

The shifted East arrival post is shifted slightly to the northwest in the vicinity of ISP. This arrival post serves flights arriving from Europe, the northeastern U.S., and the Pacific Rim via Canada. All flights arrive over the Long Island Sound and then proceed directly to the arrival post. Once past the arrival post flights destined for Runways 13L and 31L/R continue heading southwest back over the Atlantic Ocean. Once aligned with Runways 31L/R, flights landing on Runways 31L/R will turn right and land. Flights landing on Runway 13L will continue to the south of the Airport, then circle to land on Runway 13L.

Integrated Airspace Alternative Variation with ICC – JFK Shifted South Arrival Post

The shifted South arrival post is shifted approximately 30 miles to the northeast. This arrival post serves flights arriving from the Caribbean, South America, and the southern U.S. These flights arrive over the Atlantic Ocean and proceed directly to the new arrival post. Flights landing on Runways 31L/R continue flying to the northwest, then make a right turn to the north and once aligned with the runway turn back to the northwest to land. Flights destined to land on Runway 13L continue to the northwest to the vicinity of Sandyhook, NJ. Once past Sandyhook, these flights will turn to the northeast and proceed to the vicinity of Canarsie, NY. Once aligned with the runway, they will turn to the southeast and land.

2.5.8.2 Integrated Airspace Alternative Variation with ICC - LGA Traffic Routing

Integrated Airspace Alternative Variation with ICC- LGA Departure Routing

The majority of departure traffic from LGA is conducted on Runways 4 or 13. The following departure gates for the Integrated Airspace Alternative Variation with ICC have been modified from those of the Future No Action Airspace Alternative: North, East, West, and South departure gates. The new East departure gate is shifted to the east. The new North, South, and West, departure gates are the same as described for the JFK Integrated Airspace Alternative Variation with ICC.

The location and use of each redesigned departure gate and its associated air traffic procedures are discussed in the following paragraphs. All departure headings are the same as in the Integrated Airspace Alternative Variation without ICC. See **Figure 2.26** for a graphic display of flows out of LGA.

Integrated Airspace Alternative Variation with ICC – LGA Shifted North Departure Gate

The shifted North departure gate is the same gate that is described in the JFK departure routing (see Section 2.5.8.1). This gate serves flights destined to the Upper Midwest. Flights departing the primary runways at LGA will fly the same departure headings as in the Integrated Airspace without ICC Alternative. The difference will be that they will fly further to the north before turning to the west, proceeding to the shifted North departure gate, and diverging into two flows. This movement to the north will allow EWR more arrival airspace.

Integrated Airspace Alternative Variation with ICC – LGA Shifted East Departure Gate

The shifted East departure gate is shifted to the east for this variation, to make room for the north arrivals into LGA. The gate extends from a point in the vicinity of Waterbury, CT to the southeast ending at HVN. This gate serves transatlantic flights and flights heading to Canada and the northeastern U.S. Flights departing the primary runways will follow the same departure headings as the Integrated Airspace Alternative Variation without ICC. Once northeast of the Airport, these flights will proceed directly to the new East departure gate.

Integrated Airspace Alternative Variation with ICC – LGA Expanded South Departure Gate

The expanded South departure gate is the same as the JFK departure gate described in

Section 2.5.8.1. This gate serves flights destined to southeastern U.S. Departure headings are the same as those in the Integrated Airspace Alternative Variation without ICC. Once south of the Airport, these flights will diverge into two distinct flows, one heading to the northwestern tip of the gate and the other proceeding to the southeastern tip depending on their final destinations.

Integrated Airspace Alternative Variation with ICC – LGA Expanded West Departure Gate

The expanded West departure gate is also the same gate described in the JFK departure routing section (see Section 2.5.8.1). Departure headings will be the same as the Integrated Airspace without ICC Alternative. Once these flights are past TEB, they will begin to diverge into six distinct flows while proceeding directly to the expanded West departure gate. The predominant difference between this variation and the Future No Action Airspace Alternative is the new departure route heading to the northern end of the gate.

Integrated Airspace Alternative Variation with ICC - LGA Arrival Routing

The differences between this variation arrival routing and the Future No Action Airspace Alternative, concern the shifting of both the North and West arrival posts. These posts are shifted to make room for the redesigned EWR arrival procedures as part of this variation. In addition the arrival flow from the west is split into two separate arrival flows with one proceeding to the new North gate and the other proceeding to the new West gate. See **Figure 2.27.**

Integrated Airspace Alternative Variation with ICC – LGA Shifted North Arrival Post

The entire North post and associated flows are shifted 30 miles to the east of the Future No Action Airspace Alternative location. The midpoint of the post is located eight miles northeast of Danbury, CT. This arrival post serves the same flights as the Future No Action Airspace Alternative. Three major flows still converge on this post, then proceed due south toward the Airport, and follow the same close-in landing procedures as described in the Future No Action Airspace Alternative.

Integrated Airspace Alternative Variation with ICC – LGA Shifted West Arrival Post

The West arrival post has been moved to coincide with the Future No Action Airspace Alternative South arrival post. All flights arriving from the west heading to the southeast will fly a route that is located to the south and parallel to the Future No Action Airspace Alternative route. These flights will proceed directly to the south post, then turn to the north and proceed directly to LGA, following the same close-in flows as described in the Future No Action Airspace Alternative.

2.5.8.3 Integrated Airspace Alternative Variation with ICC - EWR Traffic Routing

Integrated Airspace Alternative Variation with ICC - EWR Departure Routing

The primary departure runways are Runways 4L and 22R. Compared to the Future No Action Airspace Alternative, the East and the North gates are shifted, and the West and South gates are expanded and shifted. In addition, this variation incorporates a new Ocean departure gate. The location and use of these gates, along

with their associated air traffic, are described in the following sections. See **Figure 2.28** for a graphic display of flows out of EWR.

Integrated Airspace Alternative Variation with ICC – EWR Shifted North Departure Gate

The North departure gate is shifted to a location in the vicinity of Knights Eddy, NY, along the NJ State line, and extends 20 miles to the northeast near Monticello, NY. This gate serves flights to the upper Midwest. Flights departing the Airport follow the same departure headings as the Integrated Airspace Alternative Variation without ICC. These flight paths will converge in the vicinity of MMU then proceed to the northwest. Once past MMU, these flights will turn to the north and diverge into three distinct flows while proceeding directly to the shifted North departure gate.

Integrated Airspace Alternative Variation with ICC – EWR Shifted East Departure Gate

The East departure gate is shifted to the east for this variation, to make room for the north arrivals into LGA. The gate extends from a point west of Waterbury, CT to the southeast ending at HVN. This gate serves flights destined for the northeastern U.S., Canada, and Europe. All flights departing the Airport will follow the same departure headings as in the Integrated Airspace without ICC Alternative. Once the flights are past HPN, they will diverge into three distinct flows and proceed directly to the shifted East departure gate. Once past the gate, two of the flows will follow the same path as the Future No Action Airspace Alternative, while the third flow will turn north at a location east of the Future No Action Airspace Alternative flow.

Integrated Airspace Alternative Variation with ICC – EWR Expanded South Departure Gate

The expanded South departure gate begins at the intersection of the Garden State Parkway and Highway 70 and extends 10 miles to the northwest in the vicinity of Cassville, NJ. This gate serves flights heading to the eastern U.S., the Washington, D.C. Metropolitan Area, the Caribbean, and South America. All flights departing the Airport will follow the same departure headings as the Integrated Airspace Alternative Variation without ICC. Once these flights are south of LDJ, they will continue flying to the southwest and will not turn toward Colts Neck, NJ as was the case in the Future No Action Airspace Alternative. Once these flights are west of Colts Neck, NJ, they will diverge into two distinct flows depending on their final destinations and then proceed to either end of the expanded South departure gate.

Integrated Airspace Alternative Variation with ICC - EWR Expanded West Departure Gate

The expanded West departure gate starts in the vicinity of Princeton, NJ and extends to the north in the vicinity of Hardwick, NJ. The West departure gate now includes six departure points. This gate serves flights destined for the western and southwestern U.S. All flights departing the Airport fly the same departure headings as in the Integrated Airspace Alternative Variation without ICC. Once the flights are past MMU, the flights will diverge into six distinct flows. The predominant difference from the Future No Action Airspace Alternative is that the two most northerly flows fly to the expanded portion of the West departure gate.

Integrated Airspace Alternative Variation with ICC – EWR New Ocean Departure Gate

The new Ocean departure gate is located approximately 10 miles south of Fire Island, NY, and extends approximately 16 miles to the south. This gate serves flights destined for Europe, South America, and the Caribbean. These flights will depart to the north of the Airport turning to the south over LGA and then proceed to the southeast over the ocean. This will give EWR more efficient access to ocean routes.

Integrated Airspace Alternative Variation with ICC - EWR Arrival Routing

The primary EWR arrival runways are Runways 4R and 22L. The North arrival post is shifted from its location in the Future No Action Airspace Alternative. Flights arriving from the west are split into two flows. The northerly flow proceeds to the shifted West arrival post. The southerly flow proceeds to the Future No Action Airspace Alternative South arrival post. The location and use of each post, along with its associated air traffic, are discussed in the following paragraphs. See **Figure 2.29** for a graphic display of flows into EWR.

Integrated Airspace Alternative Variation with ICC – EWR Shifted North Arrival Post

The shifted North arrival post is located 50 miles north of EWR and five miles south of SWF. This post serves flights arriving from the northeastern and northwestern U.S. Canada, Europe, and the Pacific Rim. Three main traffic flows converge at the new North arrival post. Flights destined for Runway 22L turn to the southeast heading toward TEB. These flights will turn to the southwest to align with the runway and land. Flights destined for Runway 4R will turn to the southwest and proceed to the vicinity of Sparta, NJ. Once past Sparta, NJ, these flights will turn to the southeast, continue circling, heading to the northeast, and once aligned with the runway, finally land. Flights destined for Runways 4R will fly further to the west of the Airport as compared to the Future No Action Alternative.

Integrated Airspace Alternative Variation with ICC – EWR South Arrival Post

The South arrival post is located in same location as the Future No Action Airspace Alternative South arrival post in the vicinity of Yardley, PA. This post serves flights also arriving from the western U.S. Flights arriving through the South arrival post and destined to land on Runways 22L will turn to the northeast, fly west of EWR, turn to the east, continue to circle to the southwest, and once aligned with the runway, finally land. Flights landing 4R will proceed to fly to the east and once past the post turning to the northeast to align with the runway and land.

Integrated Airspace Alternative Variation with ICC – EWR Shifted West Arrival Post

The West arrival post is shifted to the vicinity of Greenville, NY, just north of the NJ state line. This post serves flights arriving from the western U.S. Flights arriving through this post and destined to land on Runways 22L will continue east past the post, turning to the southeast north of TEB, and finally aligning with the runway to land. Flights landing Runways 4R will make an immediate turn at the arrival post to the south, passing to the west of MMU, before turning back to the northeast to align with the Runway and land.

2.5.8.4 Integrated Airspace Alternative Variation with ICC - TEB Traffic Routing

Integrated Airspace Alternative Variation with ICC - TEB Departure Routing

All of the departure gates are the same as gates described for EWR with the Integrated Airspace Alternative Variation with ICC. The following sections will describe how flights will access these gates compared to the Future No Action Airspace Alternative. See **Figure 2.30** for a graphic display of these flows out of TEB.

Integrated Airspace Alternative Variation with ICC – TEB Shifted North Departure Gate

The North departure gate would be shifted to the north of the Future No Action Airspace Alternative location as described for EWR Integrated Airspace Alternative Variation with ICC. This gate serves flights destined for the upper Midwest. Flights will fly the same departure headings as the Future No Action Airspace Alternative; once north of MMU, these flights will diverge into three distinct flows. The predominant difference between this variation and the Future No Action Airspace Alternative is the new departure route heading to the northern end of the gate.

Integrated Airspace Alternative Variation with ICC – TEB Expanded South Departure Gate

The expanded South departure gate is the same as the EWR Integrated Airspace Alternative Variation with ICC South departure gate. This gate serves flights destined for the southeastern U.S., the Washington, D.C. Metropolitan Area, and South America. Flights departing to the south will fly the same departure headings as in the Future No Action Airspace Alternative. These flights will continue flying to the south remaining west of EWR. Once past EWR, they will turn to the southeast and proceed to an area west of Colts Neck, NJ, where they will diverge into two distinct flows heading toward the expanded South departure gate.

Integrated Airspace Alternative Variation with ICC – TEB Expanded West Departure Gate

The expanded West departure gate will be the same as the EWR Integrated Airspace Alternative Variation with ICC West departure gate. This gate serves flights destined for western and southwestern U.S. Flights departing to the west will fly the same departure headings as the Future No Action Airspace Alternative. Once these flights are in the vicinity of MMU, they will diverge into six distinct flows depending on their final destination and continue to the expanded West departure gate. The northernmost flow will branch into two separate flows prior to reaching the gate. The predominant difference between this variation and the Future No Action Airspace Alternative is that flights departing Runway 1 head farther north to the expanded West departure gate.

Integrated Airspace Alternative Variation with ICC - TEB Arrival Routing

The majority of arrival traffic to TEB is conducted on Runways 6 (north configuration) or 19 (south configuration). There are two primary differences between this variation and the Future No Action Airspace Alternative: the westerly South post is shifted to the southwest and the West post is shifted to the south. The location and use of each post, along with its associated air traffic, are discussed in the following

paragraphs. See **Figure 2.31** for a graphic display of flows into TEB.

Integrated Airspace Alternative Variation with ICC – TEB Shifted Westerly South Arrival Post

The shifted Westerly South arrival post is now located west of Philadelphia. Flights arriving to this post will turn to the north and fly to the vicinity of Hackettstown, NJ. From this point on the flights will fly the same path as the flights arriving from the new West arrival post.

Integrated Airspace Alternative Variation with ICC – TEB Shifted West Arrival Post

The West arrival post is shifted approximately 15 miles south to the vicinity of Hackettstown, NJ. This arrival post serves flights arriving from the western U.S. Three flows arriving from the west converge at this post. Flights destined for Runway 6 proceed east in the vicinity of MMU, continue to the east until northwest of EWR, and then turn to the northeast and align with the runway to land. Flights destined to land on Runway 19 will follow one of two paths. Either aircraft will fly to the northeast over CDW continuing to TEB then turn to the northwest and circle to land, or aircraft will fly to the northeast, then turn to the south and align with the runway and land.

2.5.8.5 Integrated Airspace Alternative Variation with ICC - PHL Traffic Routing

Integrated Airspace Alternative Variation with ICC - PHL Departure Routing

The primary changes from the Future No Action Airspace Alternative concern both the East and West gates. The West gate is expanded to the northwest and the East departure gate is moved further to the east. The primary departure runways are 9L/R and 27L/R. See **Figure 2.32** for a graphic display of flows out of PHL.

Integrated Airspace Alternative Variation with ICC – PHL Shifted East Departure Gate

The East departure gate is moved approximately 25 miles to the east from the Future No Action Airspace Alternative East departure gate. All flights departing to the northeastern U.S. or eastern Canada via this gate will not be able to turn to the northeast until they are almost over the NJ shoreline. Once over the Atlantic Ocean, these flights will turn toward JFK and diverge into two distinct flows upon reaching JFK.

Integrated Airspace Alternative Variation with ICC – PHL Expanded West Departure Gate

The expanded West departure gate now provides access to three jet routes. This gate serves flights destined for the western and southwestern U.S. Flights departing PHL will follow the same departure headings as the Integrated Airspace without ICC Alternative. Once west of the Airport, the aircraft will diverge into three distinct flows, depending on their final destinations. The predominant difference between this variation and the Future No Action Airspace Alternative, resulting from the expansion of the West departure gate, is the new departure route heading to the northern end of the gate.

Integrated Airspace Alternative Variation with ICC - PHL Arrival Routing

The primary PHL arrival runways are Runways 9R/L and 27L/R. The West arrival post is shifted to the northeast to make room for the expanded PHL West departure gate. In addition, a new arrival route has been

added to the North arrival post. The location and use of each post, along with its associated air traffic, is discussed in the following paragraphs. See **Figure 2.33** for a graphic display of flows into PHL.

Integrated Airspace Alternative Variation with ICC - PHL North Arrival Post

The North arrival post is in approximately the same location as the Future No Action Airspace Alternative North arrival post. The post serves the same flights as the Future No Action Airspace Alternative with one addition: a route for flights arriving from the Great Lakes region has been added. Once the flights are south of the post, they will follow the same close-in flows to land as in the Future No Action Airspace Alternative.

Integrated Airspace Alternative Variation with ICC – PHL Shifted West Arrival Post

The West arrival post would be shifted approximately 10 miles to the northeast and is now located in the vicinity of Scarlets Mill, PA. This post still serves the same flights as the Future No Action Airspace Alternative. Flights arriving from the west will be on a path parallel and north of the Future No Action Airspace Alternative path. Once past the post, they will fly the same close-in flows to land as in the Future No Action Airspace Alternative.

2.5.8.6 Integrated Airspace Alternative Variation with ICC - Summary

This variation of the Integrated Airspace Alternative is unique in that it includes the expansion of the terminal airspace and associated procedures, thereby allowing for the following:

- Reduction in aircraft spacing from five to three miles due to application of terminal separation rules.
- Use of terminal holding rules in a larger area.
- Incorporation of expanded departure gates, allowing more efficient flows out of the NY/NJ/PHL Metropolitan Area.
- Separation of arrival and departure flows into and out of the design area, providing increased efficiency.

The main specific arrival and departure changes described for the NY Metropolitan Area airports and PHL are summarized in **Table 2.4**.

Table 2.4
Summary of Integrated Airspace Alternative Variation with ICC

Airport	Changes from Future No Action
JFK	North departure gate shifted 15 miles northeast
	New distant procedures for aircraft heading to the North departure gate
	West departure gate extended to the north and to the south
	New procedures for aircraft heading to the West departure gate
	Future No Action Ocean departure gate split into Ocean and South departure gates
	New distant procedures for aircraft heading to the Ocean departure gate
	New procedures for aircraft heading to the South departure gate
	North arrival post shifted five miles southeast
	New distant procedures for aircraft arriving from the North arrival post
	East arrival post shifted northwest
	New procedures for aircraft arriving from the East arrival post
	South arrival post shifted to the northeast
	New procedures for aircraft arriving from the South arrival post

Table 2.4 (continued)
Summary of Integrated Airspace Alternative Variation with ICC

Airport	Changes from Future No Action
LGA	East departure gate shifted east North departure gate shifted 15 miles northeast New procedures for aircraft heading to the North departure gate West departure gate extended to the north and to the south New procedures for aircraft heading to the West departure gate South departure gate shifted to the northwest New procedures for aircraft heading to the South departure gate North arrival post shifted 30 miles east New procedures for aircraft arriving from the North arrival post West arrival posts shifts to coincide with Future No Action South arrival post New procedures for aircraft arriving from the west to coincide with the South arrival post West arrival flow split into two arrival flows, one to the north and one to the south New departure headings for aircraft departing Runway 4 to the North departure gate New departure headings for aircraft departing Runway 4 to the East departure gate
EWR	New departure headings for all runways and all gates East departure gate shifted to the east New procedures for aircraft heading to the East departure gate North departure gate shifted to the northeast New procedures for aircraft heading to the North departure gate West departure gate expanded to the north and south New procedures for aircraft heading to the West departure gate South departure gate shifted to the southwest New procedures for aircraft heading to the South departure gate New Ocean departure gate New procedures for aircraft heading to the Ocean departure gate North arrival post moved to 50 miles north of EWR New procedures for aircraft arriving from the North arrival post West arrival post shifted to be near Greenville, NY West arrival flow split into two arrival flows, one to the north and one to the south New procedures for aircraft arriving from the South arrival post Use of both parallel runways for arrivals
TEB	Departure gates match those of EWR Integrated Airspace with ICC New distant procedures for aircraft heading to the North departure gate New distant procedures for aircraft heading to the West departure gate New distant procedures for aircraft heading to the South departure gate West arrival post shifted 15 miles south New procedures for aircraft arriving from the West arrival post New procedures for aircraft arriving from the West arrival post from the vicinity of Yardley, PA
PHL	West departure gate expanded to the northwest New procedures for aircraft heading to the West departure gate East departure gate is shifted to the east New procedures for aircraft heading to the East departure gate West arrival post shifts to the northeast New distant procedures for aircraft arriving from the West arrival post New departure headings for aircraft heading to the North, East, West, Southwest, and South departure gates Additional route added to North arrival post

2.5.8.7 Integrated Airspace Alternative Variation with ICC - Purpose and Need Evaluation Criteria

The following paragraphs address how the Integrated Airspace Alternative Variation with ICC meets the Purpose and Need evaluation criteria.

Integrated Airspace Alternative Variation with ICC - Reduce Complexity

The Integrated Airspace Alternative Variation with ICC has several features which reduce complexity. These include expanded gates, route changes and full integration of the airspace.

When TRACONs are able to hand-off aircraft to the Centers over a larger departure gate, the task of vectoring aircraft to achieve the spacing needed in the en route airspace as they climb to reach their cruise altitudes becomes less complex. Since this variation includes the expansion of both the West and South departure gates, it reduces airspace complexity.

Adding a departure route into the already congested West departure gate area would slightly increase complexity. Route changes can reduce or increase complexity depending on their new location. However, the split of EWR arrivals from the west into two flows will reduce complexity by allowing for the sequencing of aircraft farther from the airports.

The full integration of the airspace would allow the complex crossing of traffic flows to be moved from en route airspace to terminal airspace where the procedure is easier and complexity would be reduced. The full integration of the airspace would also allow for the implementation of terminal holding procedures in a larger volume of airspace. This would in turn reduce en route holding and the associated Traffic Management Initiatives.

Integrated Airspace Alternative Variation with ICC - Reduce Voice Communications

Communications between ATC facilities and pilot-to-controller communications would be greatly reduced under the Integrated Airspace Alternative with ICC. Integrated airspace, which puts key controllers on a common automation platform, would reduce coordination among these key ATC entities. For example, this makes approval of reroutes much faster because key decision makers are able to coordinate in “real time.” Furthermore, pilot-to-controller communications may be reduced as well because an aircraft would spend the last 100-200 miles of its flight under the control of the same ATC facility.

Integrated Airspace Alternative Variation with ICC - Reduce Delay

This variation includes changes to departure gates and departure routes which reduce delays. The expanded NY Metropolitan West and South departure gates, as well as the expanded PHL West departure gate, and a segregated ocean departure route for EWR would allow more flights into or out of the airspace system, thus reducing delays. New departure headings (i.e., divergent headings per FAA Order 7110.65P) allow more aircraft to depart in a given amount of time because the aircraft diverge from one another, thus reducing separation between successive departures and delay.

The full integration of the airspace allows for the use of the less restrictive terminal rules and procedures in a larger volume of airspace. The use of terminal rules and procedures leads to reduction in delays in several ways:

- Terminal ATC facility minimum separation criteria, under which aircraft need to maintain three miles of separation instead of five miles in en route airspace. This reduction in en route separation would allow controllers to put more aircraft into the expanded terminal airspace per given time, thus reducing delays.

- Because of coordination requirements, aircraft transitioning from terminal to en route require in-trail separation. With an integrated airspace, terminal separation may be used on both sides of the departure gate, reducing the need for in-trail separation between flights at different altitudes. This adds more available airspace for departures, thus reducing delays. When the airspace can accommodate two separate layers of departures, it also reduces the frequency with which high traffic at one airport causes delays at another.

- Inefficiencies due to the procedures for holding under en route ATC holding procedures would no longer apply, as terminal ATC holding procedures would be used. Holding under terminal ATC procedures provides greater flexibility in the timing of when and from where an aircraft could be pulled from the holding "stack." This capability would allow controllers greater latitude (i.e., more options) for keeping a consistent steady stream of aircraft heading towards active runways, thereby reducing overall delay.

Integrated Airspace Alternative Variation with ICC - Balance Controller Workload

This variation does result in a net improvement to the balance of controller workload.

Route changes have the potential to increase or decrease controller workload in a balanced or not so balanced manner.

Changes in departure routes include modifications to departure headings and addition of departures routes to the North, South and Ocean gates. Modifications to departure headings allow aircraft to be more evenly distributed to multiple departure controllers. Conversely, additional departure routes to the North, South, and Ocean gates controllers' departure areas will increase their workloads

One change to arrivals improves the balance of controller workload. JFK arrivals from the Pacific Rim via Canada would no longer be routed over the top of New York City. Rather, they would arrive from the east. As a result, the North arrival post would no longer be merging two arrival streams. This means JFK would be able to send traffic more direct to the West gate, as opposed to routing flights to the south in the vicinity of Robbinsville, NJ. This relocation of the arrival stream to the East arrival post would better balance the controller workload for arriving JFK traffic.

Integrated Airspace Alternative Variation with ICC - Meet System Demands

A more efficient terminal airspace design will help balance hourly arrival and departure demand, making the most out of any existing peak hour airfield capacity limitations.

A new ocean departure route for EWR would allow more direct routing for transatlantic flights. JFK departures would be able to send traffic more direct to the West gate, as opposed to routing flights to the south in the vicinity of Robbinsville, NJ.

Expanded gates and added departure routes will allow the airspace to meet increased system demands. The expansion of the West and South gates and addition of the associated departure flows will allow more aircraft to depart the NY/NJ/PHL Metropolitan Area in a given amount of time.

Integrated Airspace Alternative Variation with ICC - Improve User Access to System

This variation's design improves user access to the airspace system by providing more direct routing and implementing terminal separation rules.

A new ocean departure route for EWR would allow more direct routing for transatlantic flights. JFK departures would be able to send traffic more direct to the West gate, as opposed to routing flights to the south in the vicinity of Robbinsville, NJ.

When two aircraft going to the same route are separated by altitude the requirements for safe separation have been strictly met according to ATC rules. As a practical matter, some in-trail separation may also be necessary in going from the required three mile to five mile horizontal separation from terminal to en route airspace, or the traffic would eventually overload the first en route sector.

With an integrated airspace, terminal separation may be used on both sides of the departure gate, reducing the need for in-trail separation between flights at different altitudes. This adds more available airspace for departures, thus reducing delays. When the airspace can accommodate two separate layers of departures, it also reduces the frequency with which high traffic at one airport causes delays at another.

Integrated Airspace Alternative Variation with ICC - Expedite Arrivals and Departures

This variation includes added expanded final controller airspace[13], departure headings, changed routes, an expanded west gate and fully integrated airspace, all of which expedite arrivals or departures.

Expanding the final controller's airspace at EWR expedites arrivals because this permits the use of both parallel runways for arrivals at EWR.

Additional departure headings would allow air traffic to expedite departures at EWR, LGA, and PHL. These departure headings allow more aircraft to depart in a given amount of time thus expediting departures.

This variation includes several changes to routes which expedite arrivals or departures. The splitting of the EWR and LGA west arrival flows allows sequencing to occur earlier, which results in less vectoring close-in to the airport allowing the arrival aircraft to proceed more directly to their arrival runway. A new ocean departure route for EWR would allow more direct routing for transatlantic flights. JFK departures would be able to send traffic more direct to the West gate, as opposed to routing flights to the south in the vicinity of Robbinsville, NJ.

The expanded West departure gate would decrease the frequency of non-direct vectoring for departure aircraft. When aircraft from several airports have departed, and are expected to arrive at the same departure gate at the same time, controllers must vector one or more of these aircraft away from their direct routing to maintain safe separation. This would result in aircraft

[13] Sector that sequences arrivals on final approach to the runway.

flying longer routes prior to leaving the metropolitan airspace. Expanding the West departure gate allows the controllers to direct air traffic over an additional fix within the gate and therefore, the need for non-direct routing is decreased.

One of the benefits of the full integration of the airspace is that departures may be stacked at more departure gates; i.e. in trail separation is not required at the departures gates. Stacked departure aircraft over departure gates would effectively reduce the need for vectoring to provide adequate spacing along a departure jet airway. This approach would serve to expedite departures.

The full integration of the airspace also allows for the use of the less restrictive terminal holding rules and procedures in a larger volume of airspace. Aircraft may be taken out of the holding pattern at any time and in any order thus capitalizing on any gaps in arrival airspace and expediting arrivals and departures.

Integrated Airspace Alternative Variation with ICC - Increase Flexibility in Routing

Flexibility in routing improves efficiency during abnormal operating conditions such as severe weather. During severe weather, additional departure routes can be used to avoid localized weather activity. Thunderstorms may be highly localized, cutting off several routes while leaving adjacent routes open. The increase in departure routes means that controllers have additional flexibility in routing aircraft around severe weather. Since this variation expanded the West and South departure gates, and added an additional Ocean departure gate for EWR, controllers now have increased flexibility in routing. Likewise, the split of the EWR West arrival routes, increases controller flexibility for arrival routing.

Integrated Airspace Alternative Variation with ICC - Maintain Airport Throughput

This variation includes changes in routes and gates as well as the full integration of the airspace. These design features would allow for an increase in airport throughput. Additional departure headings as well as expansion of the new West departure gate will show an increase in airport throughput especially at EWR. EWR receives the most benefit because of its high use of the expanded West departure gate. Airport arrival throughput is increased by expanding the final controller's airspace and allowing EWR to use both parallel runways for arrivals.

Since this variation includes the full integration of the airspace, terminal holding procedures may be used in a larger volume of airspace. Aircraft may be taken out of the holding pattern at any time and in any order thus capitalizing on any gaps in arrival airspace, and maintaining airport throughput.

Summary

The Integrated Airspace Alternative Variation with ICC would enhance safety by reducing overall airspace complexity and voice communications. It improves efficiency by:

- Reducing delay,
- Balancing controller workload,
- Meeting system demands,
- Improving user access to the system,
- Expediting arrivals and departures,

- Increasing flexibility in routing, and
- Maintaining airport throughput.

Therefore, this is a reasonable alternative for meeting the Purpose and Need of the Airspace Redesign and will be carried forward for environmental analysis.

2.5.9 Summary of Evaluation of Detailed Airspace Redesign Alternatives

Table 2.5 provides a summary of major route and gate/post changes associated with each of the Airspace Redesign Alternatives as compared to the Future No Action Airspace Alternative.

2.6 COMPARISONS OF AIRSPACE REDESIGN ALTERNATIVES

The Future No Action Airspace Alternative was carried forward as required by CEQ Regulations to provide a benchmark, enabling decision makers to compare the magnitude of environmental effects of the other alternatives. Two airspace redesign alternatives meet the Purpose and Need for the Airspace Redesign: Modifications to Existing Airspace and Integrated Airspace. These alternatives were carried forward for detailed environmental analysis. Although the Ocean Routing Airspace Alternative did not meet the Purpose and Need, it was carried forward for environmental analysis to address long standing public concerns.

In this section, each Airspace Redesign Alternative is qualitatively and quantitatively evaluated and compared based on the Purpose and Need Evaluation Criteria. The results of this analysis will be used by the decision makers as a means of comparing the alternatives to assist in selecting a preferred alternative.

The qualitative analysis is based on the expected results of a particular change relative to the to the existing airspace structure. For example, when a departure gate is added it is expected that the ability of that alternative to meet system demands will improve. The existing airspace structure is equivalent to that of the Future No Action Airspace Alternative; therefore, all qualitative discussions relate changes to an alternatives' airspace design to the Future No Action Airspace.

The quantitative analysis is based on operational metrics obtained through the use of computer modeling of the Alternatives. Flight paths for each alternative are modeled using the Total Airspace and Airport Modeler (TAAM) fast-time simulation tool, which is used to calculate metrics. These metrics provide a basis for comparison of the Alternatives.

A written and tabular summary of the evaluation of the Airspace Redesign Alternatives in terms of the Purpose and Need Criteria and potential noise impacts is provided at the end of this chapter.

2.6.1 Reduce Complexity

Airspace complexity is a function of the degree to which aircraft routes are intermingled, with more route crossings resulting in more complex airspace. Complexity is also related to the number of aircraft, types of aircraft, and duration of a flight in a particular volume of airspace.

2.6.1.1 Qualitative Comparison

Complex airspace impacts both the controllers of the airspace and the users of the airspace. For the qualitative assessment, the Airspace Alternatives are analyzed to determine features that tend to increase or

Table 2.5
Summary of Airspace Alternatives Details

Alternative	Airport	Changes from Future No Action
Modifications to Existing Airspace Alternative		
	JFK	No Changes
	LGA	South departure gate shifted to the northwest New departure headings for aircraft departing Runway 4 to the North departure gate New propeller aircraft procedures departing Runway 13 to West departure gate New departure headings for propeller aircraft departing Runway 13 to the South departure gate New distant procedures for aircraft departing Runways 4 and 13 to the South departure gate New departure headings for aircraft departing Runway 4 to the East departure gate
	EWR	South departure gate shifted to the northwest New procedures for aircraft heading to new South departure gate New departure headings from all runways to all gates New departure headings off Runway 4L dependent on TEB Runway 6 New departure headings off Runway 22R dependent on TEB Runway 11
	TEB	South departure gate shifted to the northwest New distant procedures for aircraft heading to shifted South departure gate
	PHL	East departure gate shifted further east New procedures for aircraft heading to new East departure gate New departure headings for aircraft heading to the North, East, West, and South departure gates
Ocean Routing Airspace Alternative		
	JFK	Shifted West departure gate New procedures for aircraft heading to the West departure gate Split of the FNA Ocean departure gate into the Ocean and South departure gates New procedures for aircraft heading to the South departure gate South arrival post shifted to the east New procedures for aircraft arriving from the South arrival post New procedures for aircraft arriving from the North arrival post
	LGA	New procedures for aircraft heading to the North departure gate
	EWR	Shifted West departure gate New procedures for aircraft heading to the West departure gate Shifted South departure gate New procedures for aircraft heading to the South departure gate New procedures for aircraft departing Runways 22L/R to the North departure gate New procedures for aircraft departing Runways 22L/R to the East departure gate
	TEB	No Changes
	PHL	No Changes

Table 2.5 (continued)
Summary of Airspace Alternatives Details

Alternative		Airport	Changes from Future No Action
Integrated Airspace Alternative			
	Variation without ICC	JFK	No Changes
		LGA	West departure gate extended to the north and to the south New procedures for aircraft heading to the West departure gate New departure headings for aircraft departing Runway 4 to the North departure gate New departure headings for aircraft departing Runway 4 to the East departure gate
		EWR	New departure headings for all runways and all gates Procedures off Runway 4L dependent on TEB Runway 6 to West departure gates New procedures for aircraft heading to the West departure gate Procedures off Runway 4L dependent on TEB Runway 6 to North and East departure gates Procedures off Runway 22R dependent on EWR Runway 11 use Expanded West departure gate
		TEB	West departure gate extended to the north and to the south New procedures for aircraft heading to the West departure gate New procedures for turboprop aircraft arriving from the northeast
		PHL	New departure headings for aircraft heading to the North, East, West, Southwest, and South departure gates
	Variation with ICC	JFK	North departure gate shifted 15 miles northeast New distant procedures for aircraft heading to the North departure gate West departure gate extended to the north and to the south New procedures for aircraft heading to the West departure gate Future No Action Ocean departure gate split into Ocean and South departure gates New distant procedures for aircraft heading to the Ocean departure gate South departure gate shifted to the southeast New procedures for aircraft heading to the South departure gate North arrival post shifted five miles southeast New distant procedures for aircraft arriving from the North arrival post East arrival post shifted northwest New procedures for aircraft arriving from the East arrival post South arrival post shifted to the northeast New procedures for aircraft arriving from the South arrival post
		LGA	East departure gate shifted east North departure gate shifted 15 miles northeast New procedures for aircraft heading to the North departure gate West departure gate extended to the north and to the south New procedures for aircraft heading to the West departure gate South departure gate shifted to the northwest New procedures for aircraft heading to the South departure gate North arrival post shifted 30 miles east New procedures for aircraft arriving from the North arrival post West arrival posts shifts to coincide with Future No Action South arrival post New procedures for aircraft arriving from the west to coincide with the South arrival post

Table 2.5 (continued)
Summary of Airspace Alternatives Details

Alternative		Airport	Changes from Future No Action
Integrated Airspace Alternative (continued)			
	Variation with ICC (continued)	LGA (continued)	West arrival flow split into two arrival flows, one to the north and one to the south New departure headings for aircraft departing Runway 4 to the North departure gate New departure headings for aircraft departing Runway 4 to the East departure gate
		EWR	New departure headings for all runways and all gates East departure gate shifted to the east New procedures for aircraft heading to the East departure gate North departure gate shifted to the northeast New procedures for aircraft heading to the North departure gate West departure gate expanded to the north and south New procedures for aircraft heading to the West departure gate South departure gate shifted to the southwest New procedures for aircraft heading to the South departure gate New Ocean departure gate New procedures for aircraft heading to the Ocean departure gate North arrival post moved to 50 miles north of EWR New procedures for aircraft arriving from the North arrival post West arrival post shifted to be near Greenville, NY West arrival flow split into two arrival flows, one to the north and one to the south New procedures for aircraft arriving from the South arrival post Use of both parallel runways for arrivals
		TEB	Departure gates match those of EWR Integrated Airspace with ICC New distant procedures for aircraft heading to the North departure gate New distant procedures for aircraft heading to the West departure gate New distant procedures for aircraft heading to the South departure gate West arrival post shifted 15 miles south New procedures for aircraft arriving from the West arrival post New procedures for aircraft arriving from the West arrival post from the vicinity of Yardley, PA
		PHL	West departure gate expanded to the northwest New procedures for aircraft heading to the West departure gate East departure gate is shifted to the east New procedures for aircraft heading to the East departure gate West arrival post shifts to the northeast New distant procedures for aircraft arriving from the West arrival post New departure headings for aircraft heading to the North, East, West, Southwest, and South departure gates Additional route added to North arrival post

decrease controller complexity in comparison to the Future No Action Alternative.

The Modifications to Existing Airspace Alternative reduces complexity by segregating PHL departures bound for the northeastern U.S. from both the south bound NY/NJ Metropolitan Area and JFK West Gate departures. This is accomplished by moving the PHL departures further to the east, and the south gate NY departures further to the west.

Similarly, the Ocean Routing Airspace Alternative reduces complexity by separating the EWR departures from the LGA and TEB westbound departures. However, this change results in increased complexity by intermingling EWR departures with the PHL and JFK departures.

The Integrated Airspace Alternative Variation without ICC includes features that reduce complexity: an expanded West departure gate and an additional arrival route into TEB. The expansion of the departure gate reduces complexity because the associated area in which to vector aircraft to achieve the appropriate separation expands. The addition of the arrival route into TEB allows for the separation of the slower prop-driven aircraft from the faster jet traffic leading to less complexity. Both of these design features help to reduce the complexity of the airspace in limited areas.

The Integrated Airspace Alternative Variation with ICC has several features which reduce complexity: expansion of the departure gates, additional routes, and fully integrated airspace. The expansion of the South and West gates and addition of the associated departure routes allows for separation of flows and more orderly, expeditious routing in the terminal and en route airspace. However, due to the congestion in the West gate area the departure route could slightly increase complexity. In addition to the additional departure routes to serve the expanded gates, routes to the northwest and direct departure routes over the ocean are added. This variation does not include similar changes to the arrival posts however it does include a change to an arrival flow. The EWR and LGA arrivals from the west are split into two flows which permits sequencing of aircraft to take place farther from the airports thereby reducing complexity. As a result of the changes in departure and arrival routes, this variation un-tangles the departure routes from the arrival routes and results in a reduction in airspace complexity. Lastly, the expanded terminal airspace resulting from the airspace integration allows holding procedures to take place in the terminal environment. This in turn reduces en route holding and the use of Traffic Management Initiatives. Therefore, less interaction between FAA terminal and en route control facilities is required and this reduces complexity. Overall, the many features of the Integrated Airspace Alternative Variation with ICC combine to reduce airspace complexity to a larger extent than the features of the other alternatives.

2.6.1.2 Quantitative Comparison

For the quantitative comparison, complexity is identified through its impact on the users of the airspace. To a first approximation, complexity is the result of merging aircraft from several flows into one. When the number of aircraft to be merged exceeds some hypothetical threshold, aircraft are separated by more than the minimum separation, resulting in delays that are measurable. Even when an aircraft is not delayed, it may be directed onto a longer path than optimum conditions might otherwise dictate. For this reason, time and

distance are included separately in the calculation of complexity's impact. Therefore, the reduction in complexity is measured using two metrics: (1) *jet route delays plus time below 18,000 feet*, and (2) *arrival distance below 18,000 feet*.

The *jet route delays plus time below 18,000 feet* metric is used to calculate changes in complexity associated with departures. *Jet route delay* is the average delay per operation over a 24 hour period. In this case the jet delay equals the difference between arrival times at various jet airway fixes of unimpeded aircraft and the modeled Alternatives' aircraft. These delay times are then summed and averaged over all of the operations in the area. The second part of this metric is the *time below 18,000 feet*. This is the average time from take-off until the aircraft reaches 18,000 feet per aircraft over a 24 hour period. This metric reflects the intertwining and dependency of the arrival and departure routes. Ideally an aircraft is allowed to climb to 18,000 feet as soon as possible. However, as the complexity of the airspace increases aircraft may be held at lower altitudes to avoid other traffic flows.

The jet route delays and time below 18,000 feet are added together for each of the Alternatives. The value calculated for the Future No Action Airspace, Modifications to Existing Airspace and the Ocean Routing Airspace Alternatives is 12 minutes. In comparison the values calculated for the Integrated Airspace Alternative Variation without ICC and Integrated Airspace Alternative Variation with ICC are 11 minutes and 10 minutes, respectively. These results support the qualitative analysis in that the Integrated Airspace Alternative Variation with ICC provides the most reduction in complexity.

The *arrival distance below 18,000 feet* is the metric used to calculate changes in complexity associated with arrivals. This metric is the average distance flown by the arriving aircraft flying from 18,000 feet to landing. This metric, similar to the *time below 18,000 feet* metric, reflects the intertwining and dependency of the arrival and departure routes. The value calculated for the Future No Action Airspace Alternative and Integrated Airspace Alternative Variation without ICC is 96 nautical miles. The Modifications to Existing Airspace is slightly better with a value of 95 nautical miles. The Ocean Routing Airspace Alternative has a value of 99 nautical miles. The increased distance for the Ocean Routing Airspace Alternative is the result of this alternative's adverse impacts to JFK arrivals. The Integrated Airspace Alternative Variation with ICC has the largest value, 102 nautical miles. Although this variation reduces complexity overall, it does increase some arrival distances.

2.6.2 Reduce Voice Communications

Voice communications include both controller to controller, and controller to pilot communications. Controller–to-controller communications are required to transfer responsibility for a particular aircraft. Controller-to-pilot communications are required to provide instructions to pilots. Improved airspace design can minimize the number of communications required.

2.6.2.1 Qualitative Comparison

The Modifications to Existing Airspace and Integrated Airspace without ICC Alternatives do not include design features that lead explicitly to a reduction in controller-pilot or controller-controller communications. There is a small reduction in controller-pilot communications resulting

from the reduced vectoring associated with the expanded West departure gate.

In the Ocean Routing Airspace Alternative, all EWR aircraft fly the same departure procedure thus reducing pilot-controller communications because vectoring and sequencing of aircraft to the Future No Action West gate is not required. Conversely, congestion on the single EWR departure route requires increased internal facility communications in order to manage departure traffic flows.

Lastly, the implementation of Integrated Airspace Alternative Variation with ICC greatly reduces the amount of communication required between ATC facilities and between pilots and controllers. Fewer communications are required because this variation allows controllers to use a common automation platform and there are fewer airspace boundaries for aircraft to cross.

2.6.2.2 Quantitative Comparison

The difference in the number of voice communications between the Airspace Alternatives is the focus of this analysis. In many instances the number of communications does not change between the Alternatives. Basically, only two types of communications are likely impacted as a result of the Airspace Redesign: those required to provide congestion related vector and altitude change instructions, and those required to hand off aircraft to another facility. The former types of communications are generally related to delay and therefore are not calculated because delay metrics are calculated for other Purpose and Need Criteria. The number of communications required to hand off aircraft is calculated using the *maximum inter-facility handoffs per hour* metric. This metric is defined as the number of controller-to-controller communications in an hour to transfer the responsibility for an aircraft from a controller in one facility to a controller in another facility. The *maximum inter-facility handoffs per hour* for the Future No Action, Modifications to Existing Airspace, and Ocean Routing Airspace Alternatives, and the Integrated Airspace Alternative Variation without ICC ranges from 521 to 529. At 382 *maximum inter-facility handoffs per hour* the Integrated Airspace Alternative Variation with ICC is the only design that significantly reduces communications. This analysis supports the qualitative analysis because the only design that includes significant design features pertaining to Reduced Voice Communications is the Integrated Airspace Alternative Variation with ICC.

2.6.3 Reduce Delay

Delay is the primary measure of the operational efficiency of the airspace system. Delays in the airspace system are the result of congestion and severe weather. Airspace redesign may mitigate delay by adding and/or changing routes, departure gates, arrival posts and the structure of the airspace boundaries.

2.6.3.1 Qualitative Comparison

The Ocean Routing Airspace Alternative does not result in a reduction in delay. In fact delays substantially increase at EWR because all flights departing EWR remain in single file until they are at least 40 miles from the Airport. This limits the airport's ability to release aircraft one after the other during peak hours of operation, since aircraft following directly behind one another must be held on the runway until the departing aircraft has traveled a specific distance from the airport.

The Modifications to Existing Airspace, the Integrated Airspace Alternative Variation without ICC, and the Integrated Airspace Alternative Variation with ICC have a common feature which leads to reduced departure delays: additional departure headings. These procedures allow more aircraft to depart in a given amount of time because the aircraft diverge from one another, which permits reduced time between successive departures.

The Integrated Airspace Alternative Variation without ICC includes two additional attributes that further reduce delay: an expanded West departure gate and an additional arrival route.

The Integrated Airspace Alternative Variation with ICC surpasses all the other designs in terms of reduced delay because not only does it include expanded gates and new routes, it also includes changes in the airspace facility boundaries. This change allows for use of terminal separation standards as opposed to the en route separation standard in a much larger volume of airspace. In addition, terminal holding procedures are used in this expanded airspace. Terminal holding procedures allow for aircraft to be taken out of the holding pattern at any time and in any order thus capitalizing on any gaps in arrival airspace, and resulting in more efficient terminal holding and reduced arrival delays.

2.6.3.2 Quantitative Comparison

Two metrics are used to compare how well each Alternative reduces delay: *Traffic Weighted Arrival Delay 2011* and *Traffic Weighted Departure Delay 2011*. *Traffic Weighted Arrival Delay 2011* is the weighted[14] average arrival delay per operation in a 24-hour period. The arrival delay is the difference between the arrival time for a specific Alternative's operations and the arrival time for unimpeded operations. Similarly, the departure delay is the difference between the departure time for a specific Alternative's operations and the departure time for unimpeded operations. These delay metrics are best used as a comparison tool and do not in themselves represent an actual delay an air traveler encounters on a given day.

The metrics show that the Ocean Routing Airspace Alternative results in the greatest arrival and departure delay: 23.6 and 29.5 minutes, respectively. The Ocean Routing Airspace Alternative delays are even greater than those for the Future No Action Airspace Alternative which results in arrival delay of 22.9 minutes and departure delay of 23.3 minutes. The Modifications to Existing Airspace and the Integrated Airspace Alternative Variation without ICC result in similar values for arrival delay, 22.6 and 22.8 minutes respectfully, and departure delay, 20.9 and 20.8 minutes respectively. Finally, the Integrated Airspace Alternative Variation with ICC results in 19.9 minutes of arrival delay and 19.2 minutes of departure delay. When compared to the Future No Action Airspace Alternative, the Integrated Airspace Alternative Variation with ICC produces the greatest reduction in delay.

[14] A weighted average was used to calculate a single metric for each alternative. The airports operate in many configurations depending on wind direction and runway orientation. The predominant configurations were modeled in TAAM and delays were calculated for each of these configurations. To combine the results, the delay numbers were weighted based on the percent of operations handled in a certain configuration. See Appendix C for more information.

2.6.4 Balance Controller Workload

Controller workload impacts the efficiency of the airspace. If traffic loads served by a particular controller exceed safety related limits, restrictions are imposed on the airspace. For example, restrictions could include increasing the separation of aircraft. Thus, safety is maintained while efficiency is reduced. If implementation of an Airspace Alternative results in a more balanced controller workload, efficiency of the airspace would likewise improve.

2.6.4.1 Qualitative Comparison

The qualitative comparison focused on the balance of controller workload between the various gates. The Ocean Routing Airspace Alternative negatively impacts the balance of controller workload because the single controller who previously handled flights arriving from the south to JFK now also handles EWR departures.

The Modifications to Airspace Alternative, Integrated Airspace Alternative Variation without the ICC, and Integrated Airspace Alternative Variation with ICC all include changes to departure headings which allow operations to be more evenly distributed among the departure controllers.

The Integrated Airspace Alternative Variation with ICC has an additional feature which balances controller workload: the relocation of a JFK arrival stream from the North arrival post to the East arrival post. Conversely, the additional departure routes included in the Integrated Airspace Alternative Variation without ICC and the Integrated Airspace Alternative Variation with ICC increase the workload for the controller responsible for the affected departure fix.

2.6.4.2 Quantitative Comparison

The quantitative comparison of the Balance Controller Workload Criterion focuses on balance of workload at each fix. Therefore, the metric that measures the effectiveness of each Alternative in terms of balancing controller workload is *Equity of West Gate Fix Traffic Counts*. The metric, *Equity of West Gate Fix Traffic Counts*, measures the balance of traffic among the departure fixes in a particular departure gate. Departure fix loading is measured because, in the case of this Airspace Redesign, the changes to controller workload result primarily from changes to departures. The metric is calculated per departure gate because controller workload is not necessarily balanced if the imbalance is simply moved to another gate. The West gate is evaluated because it is the gate most impacted by the various Airspace Alternatives. The numeric value representing *Equity of West Gate Fix Traffic Counts* ranges from zero to one. A value of zero indicates a perfect balance among the traffic using each of the fixes that make up the West gate. A value of one indicates that one fix within the West gate serves all the traffic departing through the gate.

The *Equity of West Gate Fix Traffic Counts* for the Future No Action Airspace, Modifications to Existing Airspace and the Ocean Routing Airspace Alternatives are all 0.37 because these alternatives do not add fixes to the West Gate. The *Equity of West Gate Fix Traffic Counts* for the Integrated Airspace without ICC and the Integrated Airspace with ICC are 0.34 and 0.30 respectively. The additional West Gate fix for both of these alternatives result in a better balance of air traffic at the gate. These results are slightly different than expected from the qualitative analysis, which focused on the balance of workload between the gates; the quantitative analysis

considers the balance of workload among the fixes that make up the West Gate.

2.6.5 Meet System Demands and Improve User Access to System

As discussed in Chapter One, the number of air traffic operations in the NY/NJ/PHL Metropolitan Airspace will continue to grow. One of the reasons the NY/NJ/PHL Metropolitan Airspace Redesign project was initiated was to accommodate increasing operations while improving user access.

2.6.5.1 Qualitative Comparison

In general, adding and/or expanding gates or posts and adding arrival and/or departure routes results in an airspace system that better meets system demands and improves user access. Intuitively, it makes sense that adding these features allows for additional operations within a given time period. However, substantial benefits to the airspace in terms of meeting system demand and user access really only occur with the full integration of the airspace system.

Therefore, since the Modifications to Existing Airspace and Ocean Routing Airspace Alternatives do not include any of these features, they do not improve user access or the ability of the airspace to accommodate increased system demand. Furthermore the Ocean Routing Airspace Alternative actually has the potential to reduce both user access and the ability to meet system demands. EWR departures must fly over the ocean and therefore aircraft must be upgraded to meet the associated equipment requirements for operations over water. This could result in limiting user access to the airspace system associated with EWR departures if aircraft are not upgraded. Additionally, aircraft departing EWR must remain in a single file line for 40 miles, which in turn increases the necessary separation between departures causing delays that could ripple through the system and reduce the ability of the airspace to meet the EWR system departure demands. These delays also affect arrival access, because of an increase in ground movement congestion and reduction in gate availability.

The Integrated Airspace Alternative Variation without ICC does not substantially improve user access or the ability to accommodate increased demand because it includes only one expanded gate and one new arrival route.

The Integrated Airspace Alternative Variation ICC is the only design that results in appreciable improvements in user access and the ability to meet increased demand. This variation offers new routes and expanded gates but most importantly it allows for the full integration of the airspace. The full integration of the airspace allows for reduced separation of aircraft in the terminal area and, thus, sets this design apart.

2.6.5.2 Quantitative Comparison

The metric, *End of Day's Last Arrival Push*, is used to compare the extent to which each alternative meets system demand and improved user access. The *End of Day's Last Arrival Push* is the time when the final bank of scheduled flights for all of the modeled airports enters the TRACON system. The later at night this occurs, the more likely that users are discouraged from scheduling additional flights. Thus, this metric indirectly measures the ability of the airspace system to meet system demand and improve user access.

The time, 23:54, of the *End of Day's Last Arrival Push* is the same for the Modifications to Existing Airspace, Ocean

Routing Airspace and Integrated Airspace without the ICC Alternatives. Only the Integrated Airspace Alternative with the ICC results in a substantially earlier *End of Day's Last Arrival Push* with a time of 23:00. Overall, the quantitative analysis supports the qualitative analysis in that the only appreciable improvement to user access and the ability to accommodate increased demand is the result of integrating the airspace.

2.6.6 Expedite Arrivals and Departures

Expediting arrivals and departures increases the efficiency of the airspace. In the New York and PHL TRACON environments there are three problems that can impede arrivals and departures: large volume of aircraft, longer routing distances, and altitude restrictions. Large volumes of air traffic can lead to delay, procedural separation of flows result in longer routes, and altitude restrictions force aircraft to fly at lower altitudes where speeds are limited. In the en route airspace, longer routes can also impede expeditious arrivals and departures.

2.6.6.1 Qualitative Comparison

The design features of the Ocean Routing Airspace Alternative do not result in expedited arrivals or departures. In fact the EWR westbound departures fly farther because they must initially proceed over the ocean.

The Modifications to Existing Airspace Alternative, Integrated Airspace Alternative Variation without ICC, and the Integrated Airspace Alternative Variation with ICC all include additional departure headings for EWR, LGA, and PHL. These additional departure headings expedite departures from EWR, LGA, and PHL. Each of these designs have additional features which expedite arrivals and departures. In the Modifications to Existing Airspace Alternative, PHL east departures destined to northeastern U.S. move farther to the east and therefore these departures are allowed to climb out of terminal airspace without altitude restrictions. The Integrated Airspace Alternative Variation without ICC and the Integrated Airspace Alternative Variation with ICC included an expanded West gate. The larger West gate allows for the separation of routes and reduces the need to vector aircraft on non-direct routes. The Integrated Airspace Alternative Variation with ICC includes several other features to expedite arrivals and departures: the ability to stack departure aircraft over departure gates, the use of terminal airspace rules to hold aircraft, the split of the EWR and LGA west arrival flows, and the use of both EWR parallel runways for arrivals. Non-direct vectoring of flights is reduced by stacking departure aircraft over the departure gates and splitting the EWR and LGA west arrival flows. Gaps in arrival airspace are filled because in terminal airspace, unlike en route airspace, aircraft may be taken out of the holding pattern at any time and in any order. Lastly, arrivals are also expedited by using both EWR parallel runways for arrivals.

2.6.6.2 Quantitative Comparison

Three metrics are used to compare the Airspace Alternatives in regard to the Expedite Arrivals and Departures Criteria: *Time Below 18,000 Feet*, *Change in Route Length per Flight*, and *Change in Block Time*.

Time Below 18,000 Feet is the average time spent descending (arrivals) and climbing (departures) per operation in a 24-hour period. Since aircraft at lower altitudes must fly at lower speeds than those at higher altitudes, *Time Below 18,000 Feet* is one way to measure of how well an alternative

expedites arrivals and departures. The model reports a value of 18.2 minutes for the Modifications to Existing Airspace and the Integrated Airspace without ICC Alternatives. This time is less than the value of 18.5 minutes calculated for the Future No Action Airspace Alternative. The reduction in the *Time Below 18,000 Feet* reflected the benefits of the additional departure headings included in both the Modifications to Existing Airspace Alternative and the Integrated Airspace Alternative Variation without ICC. Although the Integrated Airspace Alternative Variation with ICC also includes the additional departure headings, it results in a greater *Time Below 18,000 Feet* of 18.6 minutes. Another feature of the Integrated Airspace Alternative Variation with ICC is the ability to hold aircraft in terminal airspace at a lower altitude. This feature is beneficial in terms of delay however; it does increase the *Time Below 18,000 Feet.* The Ocean Routing Airspace Alternative had the largest *Time Below 18,000 Feet* of 18.8 minutes because the JFK arrivals and the EWR departures are competing for airspace.

Change in Route Length Per Flight is the difference between the distance flown for the Future No Action Airspace Alternative and each of the other Alternatives. *Change in Route Length Per Flight* is used to compare the Alternatives' ability to expedite arrivals and departures because shorter routes expedite arrivals and departures and conversely longer routes slow down arrivals and departures. The "distance flown" is the two-dimensional distance flown over the ground from takeoff to landing per flight in nautical miles. The *Change in Route Length Per Flight* calculated for the Modifications to Airspace Alternative is zero nautical miles which indicates that as many routes are shortened as are lengthened, compared to the Future No Action Airspace Alternative. The Integrated Airspace Alternative Variation without ICC results in a slight reduction in route length of 1.2 nautical miles while the Integrated Airspace Alternative Variation with ICC results in an increase in route length of 3.7 nautical miles. The air traffic in the Integrated Airspace Alternative Variation with ICC is rerouted from the Future No Action Airspace Alternative routes to reduce delays at the major airport. The existing airspace design, which is the design used in the Future No Action Airspace Alternative, appears to have been designed to minimize route length. Therefore, the route changes to reduce delay included in the Integrated Airspace Alternative Variation with ICC result in longer route lengths. The Ocean Routing Airspace Alternative results in the largest increase to route length of 4.5 nautical miles. This reflects the increased distances EWR arrivals and departures must fly.

Change in Block Time is the final metric used to compare the alternatives in terms of their ability to expedite arrivals and departures. "Block time" is the average time a flight takes to fly from gate to gate in a 24 hour period. *The Change in Block Time* is the difference between the block time for the Future No Action Airspace Alternative and each of the other Alternatives. The *Change in Block Time* accounts for both changes in delay and route length. The Modifications of Airspace and Integrated Airspace Alternative Variation without ICC results in similar reductions in block time of 0.9 and 1.0 minutes respectively. The largest reduction in block time, 1.4 minutes, is the result of the Integrated Airspace Alternative Variation with ICC. This reduction in block time shows that in terms of time, the changes made to reduce delay outweigh the increase in route length. The Ocean Routing Airspace Alternative is the only alternative that results in an increase in block time when compared to the Future No Action

Airspace Alternative. Longer route lengths and increased delays combine to produce the increase in block time.

2.6.7 Increase Flexibility in Routing

"Flexibility" is generally defined as the ability of the system to respond to changes in user preferences. Flexibility in routing improves efficiency during abnormal operations such as severe weather conditions en route, seasonal variations in route preference, or special-event conditions.

For the qualitative analysis, the flexibility of the alternatives are compared by evaluating the change in the options for aircraft arriving and departing the NY/NJ/PHL Metropolitan Area to and from all directions. The quantitative analysis focuses on how each alternative's design accommodates one particular weather event. The most common weather related abnormal operation is a westbound route closure due to thunderstorms, which occurs approximately 30 times a year. Therefore, the quantitative analysis reflects how flexible the alternatives are in responding to closure of westbound routes.

2.6.7.1 Qualitative Comparison

Normally adding or expanding gates and/or posts and adding routes increased the flexibility of an airspace alternative. Since the Modifications to Existing Airspace Alternative does not include addition of gates or routes, it does not have an effect on airspace flexibility. The Ocean Routing Airspace Alternative design results in a reduction in airspace flexibility because all routes to the west from EWR are removed. The Integrated Airspace Alternative Variation without ICC provides a slight improvement in flexibility because it includes an expanded West gate. The Integrated Airspace Alternative Variation with ICC provides the largest increase in flexibility because the West and South gates are expanded, an Ocean gate is added for EWR and a single arrival route for EWR is split into two.

2.6.7.2 Quantitative Comparison

Flexibility in routing is measured by assuming that flights must respond to a route closure in one of two ways: either they must find an alternate route, or they must wait until the route reopens. The amount of delay resulting from the disruption becomes a measurement of flexibility. (Note that this is delay on a day of disrupted operations, which is in addition to the traffic-volume delay in Section 2.1.3.) Weather is by far the most common disruption to the flow of traffic. The metric *Minutes of Delay Saved per Flight per Day* was calculated by dividing the total modeled delay due to a typical weather event, lasting about four hours, by the number of flights in the average annual day. According to the quantitative analysis, flexibility in routing is not improved by the Modifications to Existing Airspace Alternative, Integrated Airspace Alternative Variation without ICC, or Ocean Routing Airspace Alternative. The Integrated Airspace Alternative Variation ICC Alternative provides a benefit of 12.6 minutes per flight. The quantitative results are slightly different than the qualitative results because the quantitative analysis evaluated only the ability for each alternative to accommodate one specific weather scenario.

2.6.8 Maintain Airport Throughput

The terminal airspace provides arrival and departure routes to and from the runways. In some cases the number or locations of these routes limit the number of takeoffs and landings (i.e., throughput) of an airport. It is important that the airspace does not

constrain the airport throughput and rather maximizes the use of the airport infrastructure. Therefore the Airspace Alternatives are compared on how well they maximize airport throughput.

2.6.8.1 Qualitative Comparison

The Ocean Routing Airspace Alternative decreases throughput, due to the separation requirements for the single flow of departures out of EWR. The Modifications to Existing Airspace Alternative, Integrated Airspace Alternative Variation without ICC and Integrated Airspace Alternative Variation with ICC all include close-in procedures at LGA, EWR and PHL. This feature allows for increased departure throughput particularly at EWR. The Integrated Airspace Alternative Variation without ICC also included the extension of the west gate which allows for additional departures especially at EWR. The largest increase in departure throughput is with the Integrated Airspace Alternative Variation with ICC. This design adds additional routes and expands departure gates, allowing airports to push more aircraft into the airspace system per hour. In addition, JFK is given direct access to the expanded west gate.

The Integrated Airspace Alternative Variation with ICC provides the only enhancements to arrival traffic flows. Splitting the arrivals flows to EWR allows the airport to operate in a more efficient dual approach configuration. In addition, expanding the airspace available for terminal holding procedures allows ATC to more efficiently fill arrival gaps, thereby improving the arrival throughput.

2.6.8.2 Quantitative Comparison

Maximum sustainable airport throughput (i.e., takeoffs or landings per hour) is the metric used to compare the Airspace Alternatives in regard to maintaining airport throughput. Maximum sustainable throughput is perhaps the most important metric regarding airspace efficiency because it translates directly into increased activity for users of the airports and airspace.

The *Maximum Sustainable Throughput* is the sum of the weighted average of the peak traffic count for JFK, LGA, EWR, TEB, and PHL. It is designed to exclude short spikes of throughput that might give an erroneous impression of the efficiency of a design.

The arrival *Maximum Sustainable Throughput* for the Future No Action Airspace, Modifications to Existing Airspace, Ocean Routing Airspace Alternative, and Integrated Airspace without ICC is 223 operations. The only design that shows an increase in the arrival *Maximum Sustainable Throughput* is the Integrated Airspace Alternative Variation with ICC with 238 operations. These results support the qualitative comparison, since the Integrated Airspace Alternative Variation with ICC is the only design that includes enhancements to arrivals.

The Ocean Routing Airspace Alternative has the lowest departure *Maximum Sustainable Throughput* at 221 operations. The Ocean Routing Alternative allows for only one departure stream out of EWR and this appreciably reduces the EWR throughput. The departure *Maximum Sustainable Throughputs* for the Future No Action Airspace Alternative, Modifications to Existing Airspace Alternative and Integrated Airspace Alternative Variation without ICC have similar values of 238, 239 and 240 operations, respectively. The Modifications to Existing Airspace Alternative and Integrated Airspace Alternative Variation without ICC had only minor improvements when compared to the Future No Action

Airspace Alternative. The Integrated Airspace Alternative Variation with ICC had the highest departure *Maximum Sustainable Throughput* of 245 operations. This design has the most beneficial features in regard to improving throughput including expanded gates and use of those gates.

2.6.9 Summary of Comparisons of Airspace Redesign Alternatives

A summary of the quantitative evaluation of the Airspace Redesign Alternatives in terms of the Purpose and Need Criteria is presented in **Table 2.6**. The following paragraphs summarize the qualitative discussions of each of the Proposed Action Alternatives.

The Modifications to Existing Airspace Alternative increases departure efficiency to the west by fanned headings and by splitting the major westbound airway (J80) into two independent airways. This alternative has small benefits.

Table 2.6
Operational Comparison of Alternatives
(The most advantageous operational metric has been shaded and boldfaced)

Purpose & Need Evaluation Criteria	How Measured	Alternative				
		Future No Action	Modifications to Existing Airspace	Ocean Routing Airspace	Integrated Airspace	
					without ICC	with ICC
Reduce Complexity	Jet route Delays + time below 18,000 feet (minutes)	12	12	12	11	**10**
	Arrival Distance below 18,000 feet (nautical miles)	96	**95**	99	96	102
Reduce Voice Communications	Maximum Inter-facility handoffs per hour	525	525	521	529	**382**
Reduce Delay	Traffic weighted arrival delay 2011 (minutes)	22.9	22.6	23.6	22.8	**19.9**
	Traffic weighted departure delay 2011 (minutes)	23.3	20.9	29.5	20.8	**19.2**
Balance Controller Workload	Equity of West gate fix traffic counts	0.37	0.37	0.37	0.34	**0.30**
Meet System Demands & Improve User Access to System	End of day's last arrival push (time)	23:54	23:54	23:54	23:54	**23:00**
Expedite Arrivals and Departures	Time below 18,000 ft (minutes)	18.5	**18.2**	18.8	18.2	18.6
	Change in route length per flight (nautical miles) (1)	0.0	0.0	4.5	**-1.2**	3.7

Table 2.6 (continued)

Operational Comparison of Alternatives

(The most advantageous operational metric has been shaded and boldfaced)

Purpose & Need Evaluation Criteria	How Measured	Alternative				
		Future No Action	Modifications to Existing Airspace	Ocean Routing Airspace	Integrated Airspace	
					without ICC	with ICC
Expedite Arrivals and Departures (continued)	Change in block time (minutes per flight) (1)	0.0	-0.9	3.9	-1.0	**-1.4**
Flexibility in Routing	Delay saved per flight per day (minutes)	0	0	0	0	**12.6**
Maintain Airport Throughput	Arrival Maximum Sustainable Throughputs	223	223	223	223	**238**
	Departure Maximum Sustainable Throughputs	238	239	221	240	**245**

Notes:

(1) A negative value indicates a net decrease in the category.

Source: Operational Analysis of NY/NJ/PHL Metropolitan Area Airspace Redesign Alternatives, (MITRE Technical Report - MTR 05W0000025, March 2005, Table ES-1. Summary of Operational Impacts, p. ix.)

The Ocean Routing Airspace Alternative will increase route distance and flying time for EWR, LGA, and JFK. Departure efficiency at EWR is greatly reduced. JFK arrivals and departures share one part of the airspace, thereby increasing complexity. The reroute of departures from EWR and JFK increases airspace complexity above PHL which is already a bottleneck in the en route system. These drawbacks are not offset by operational benefits.

Like the Modifications to Existing Airspace Alternative, the Integrated Airspace Alternative Variation without ICC increases departure efficiency to the west by fanned headings and by splitting the major westbound airway (J80) into two independent airways. In addition, this variation reduces congestion on the South departure gate. This variation shows a slight increase in required interfacility voice communications.

The Integrated Airspace Alternative Variation with ICC provides the most significant operational benefit of any of the designs. It is a wholesale restructuring of arrival and departure routes. Efficiency is increased by more use of available runways and departure headings. Airspace delays are virtually eliminated and route flexibility is enhanced. Flying distances are increased for many flights, but the delay reductions are large enough to make this a net benefit to traffic.

Chapter Three
AFFECTED ENVIRONMENT

This chapter identifies the character of the environment and the potentially affected environment for the Proposed Airspace Redesign Project. Characteristics of the surrounding area are given to familiarize the reader with the airspace configuration, geography, land use, demography, and general environmental conditions potentially affected by the proposed project.

As discussed in previous chapters, this document focuses on the decision to modify existing ATC procedures in the NY/NJ/PHL Metropolitan Area. The following sections provide baseline conditions for the natural and social environment to be evaluated for potential impacts of the Proposed Airspace Redesign Project alternatives addressed in the previous chapters.

The following factors describe the affected environment:

- Study Area Environment
- Airport Facilities
- Land Use
- Population and Demographics
- Noise
- Parks, Forests, and Wildlife Refuges
- Historic, Archaeological, Architectural, and Cultural Resources
- Air Quality
- Energy Supply and Natural Resources
- Light Emissions and Visual Impacts
- Coastal Resources
- Wild and Scenic Rivers
- Endangered and Threatened Species
- Other Resource Categories

3.1 STUDY AREA ENVIRONMENT

The following sections describe the geographic character of the NY/NJ/PHL Study Area. The sections give an inventory of the project area including states, counties, cities, and airports considered by the Proposed Airspace Redesign Project that are within the Study Area.

3.1.1 Study Area Setting and Location

The study area is defined as the geographic area potentially environmentally impacted by the proposed action. The Proposed Airspace Redesign Project Study Area includes a portion of the northeastern region of the United States, illustrated in Figure 1.1. Criterion from FAA Order 1050.1E was used to determine the Study Area for the Proposed Airspace Redesign. According to FAA Order 1050.1E, the altitude ceiling for environmental considerations regarding airspace studies is 10,000 feet above ground level AGL.[1] The highest point in the Study Area is 4,000 feet MSL at Hunter Mountain, New York, making the overall altitude

[1] FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*, June 8, 2004.

ceiling of the Study Area 14,000 feet MSL (resulting in 10,000 feet AGL). Thus, using input from the Airspace Redesign Team, the Study Area was created to encompass the geographic areas where proposed changes to aircraft routes occurred below 14,000 MSL. This Study Area is then the basis for the analysis of the alternatives and their potential impacts associated with alternative routings for aircraft flying IFR at altitudes up to 14,000 feet MSL.

The initial Study Area was later refined based on community concerns and comments received during the scoping process. For example, comments received at a meeting held in Kingston, NY revealed that the community was very concerned about the potential impacts to the Catskill State Park. In response, the Study Area was adjusted to include the Catskill Mountains to ensure the potential for environmental impacts to this area would be studied.

The Study Area comprises the entire state of New Jersey and portions of four other states —Connecticut, Delaware, New York, and Pennsylvania. This area includes the City of New York and the City of Philadelphia. The Study Area is comprised of approximately 31,180 square miles and encompasses all or portions of 64 counties, 490 independent cities, as well as other municipal areas. **Table 3.1** identifies the counties located in the Study Area.

The Study Area lies between the Atlantic Ocean to the east and portions of the Catskill and Pocono Mountains to the west. The Study Area crosses six physiographic (geographically distinct) regions as shown in **Figure 3.1**. Southeastern New York, northern New Jersey, and Connecticut all lay within the densely populated and urbanized Southern New England physiographic area. Non-urban areas of the region are characterized by fragmented deciduous forests, maritime marshes and dunes, and relict grasslands. Portions of southwestern New York and northern Pennsylvania lie in the Allegheny Plateau Area, which is deeply forested, and is characterized by rounded hills and narrow to broad valleys. The Study Area contains portions of the Northern Ridge and Valley physiographic area in southeastern New York, northwestern New Jersey, and southeastern Pennsylvania. This region is distinguished by flowing ridges and ravines. The Delaware and Hudson Rivers are also located in the Northern Ridge and Valley region. Southeastern Pennsylvania and northern New Jersey are located in the Mid-Atlantic Piedmont region, which consists of low rolling hills and mountains, and numerous stream systems. Approximately half of this region is forested; the other half of the region consists of agricultural grasslands and scrub barrens. Rapid urbanization is occurring around the Philadelphia area of the Mid-Atlantic Piedmont Region. Northeastern Connecticut falls in the Northern New England physiographic area, which consists of rolling hills and small mountains, with large areas of farmland. The final physiographic region in the Study Area is the Mid-Atlantic Coastal Plain. This region begins at the southern tip of Long Island, New York, and continues through eastern New Jersey and all of Delaware. This region is characterized by flat plains, marsh land, and forested wetlands.[2]

Portions of two key waterway systems, the Hudson River and the Delaware River, are situated in the middle of the Study Area and are known for their historical value to the area. These rivers serve as important transportation corridors to and from the

[2] Partners In Flight, *Map of PIF Physiographic Areas*. http://www.blm.gov/wildlife/pifplans.htm.

Table 3.1
Counties Located in the Study Area

Connecticut	Delaware	New Jersey	New York	Pennsylvania
Fairfield	New Castle*	Atlantic	Albany*	Berks*
Hartford*		Bergen	Bronx (The Bronx)	Bucks
Litchfield*		Burlington	Columbia*	Carbon*
Middlesex		Camden	Delaware*	Chester*
New Haven		Cape May	Dutchess	Delaware
New London*		Cumberland	Greene*	Lackawanna*
Tolland*		Essex	Kings (Brooklyn)	Lancaster*
		Gloucester	Nassau	Lehigh*
		Hudson	New York (Manhattan)	Monroe*
		Hunterdon	Orange	Montgomery
		Mercer	Otsego*	Northampton
		Middlesex	Putnam	Philadelphia
		Monmouth	Queens	Pike
		Morris	Richmond (Staten Island)	Schuylkill*
		Ocean	Rockland	Wayne*
		Passaic	Schoharie*	
		Salem	Suffolk	
		Somerset	Sullivan	
		Sussex	Ulster	
		Union	Westchester	
		Warren		

* Portions of these counties are located outside of the Study Area.

Source: HNTB Corporation, 2004.

Atlantic Ocean for both recreational and commercial purposes. The Delaware River, which flows south through New Jersey and Pennsylvania to the Delaware Bay, provides a vital role in supporting a unique ecosystem and source of employment for the fishing industry. In addition, Long Island Sound, located between the south shoreline of Connecticut and the north shoreline of Long Island, serves as a sanctuary for various marine life and provides recreational and commercial uses. See Section 3.7, *Department of Transportation Act: Section 4(f)*, Section 3.12, *Coastal Resources*, Section 3.13, *Wild and Scenic Rivers*, and Section 3.15, *Other Resource Categories*, for a discussion of additional aquatic resources in the Study Area.

3.2 AIRPORT FACILITIES

There are numerous public and private airports located in the Study Area; however, this chapter of the Draft EIS principally focuses on the eight airports which will likely be most affected by the Proposed Airspace Redesign Project. Thirteen satellite airports are also examined to a lesser degree. Figure 1.7 illustrates the airports in the NY/NJ/PHL Study Area that were examined in this Draft EIS. The eight airports that will likely be most affected are LaGuardia, John F. Kennedy International, Newark Liberty International, Teterboro, Philadelphia International, Morristown Municipal, Islip Long Island MacArthur, and White Plains/Westchester County.

The remaining 13 satellite airports examined are as follows:

- Allentown/Lehigh Valley International Airport
- Atlantic City International Airport
- Bridgeport/Igor I. Sikorsky Memorial Airport
- Caldwell/Essex County Airport
- Westhampton Beach/The Francis S. Gabreski Airport
- Linden Airport
- McGuire Air Force Base
- Newburgh/Stewart International Airport
- New Haven/Tweed-New Haven Airport
- Northeast Philadelphia Airport
- Republic Airport
- Trenton/Mercer County Airport
- Wilmington/New Castle County Airport

The five major airports in the Study Area that have the most air traffic are:

- John F. Kennedy International Airport,
- LaGuardia Airport,
- Newark Liberty International Airport,
- Teterboro Airport, and
- Philadelphia International Airport

These airports are described below, and are depicted in figures following each discussion.

3.2.1 John F. Kennedy International Airport

John F. Kennedy International Airport (JFK) is located on 4,930 acres in southeastern Queens County, New York, on Jamaica Bay. JFK has nine airline terminals with approximately 175 aircraft gate positions serving the terminals. The Airport has four runways, the longest of which is over 14,500 feet long. Like LGA, JFK has been operated under lease from the City of New York by the PANYNJ since 1947. Sixty-nine scheduled domestic and international airlines serve the Airport, including five all-cargo carriers.[3] In 2004, approximately 318,568 operations were conducted at the Airport.[4] **Figure 3.2** depicts the Airport.

3.2.2 LaGuardia Airport

LaGuardia Airport (LGA) is located in northern Queens County, New York, eight miles east of midtown Manhattan. LGA is bordered by Flushing Bay and Bowery Bay. Under lease from New York City, the Airport has been operated by the Port Authority of New York and New Jersey (PANYNJ) since 1947. In 1984, PANYNJ instituted a formal 1,500-mile perimeter rule, which prohibited non-stop arrival and departure flights exceeding 1,500 miles. The purpose of this rule was to help alleviate congestion at LGA.[5] The 680 acre airport has two 7,000 foot runways and 72 aircraft gates. LGA is served by 15 scheduled airlines.[6] In 2004, approximately 398,579

[3] The Port Authority of New York and New Jersey (PANYNJ). <http://www.panynj.gov/>.

[4] FAA Terminal Area Forecast (TAF), January 2005.

[5] Western Air Lines, Inc. v. Port Authority of New York and New Jersey, 658 F. Supp. 952 (S.D.N.Y. 1986), aff'd 817 F.2d 222 (2d Cir. 1987).

[6] The Port Authority of New York and New Jersey (PANYNJ). <http://www.panynj.gov/>.

operations were conducted at the Airport.[7] **Figure 3.3** depicts the Airport.

3.2.3 Newark Liberty International Airport

Newark Liberty International Airport (EWR) is located on 2,027 acres in Essex and Union Counties, New Jersey. The City of Newark has leased EWR to the PANYNJ since 1948. The Airport has three runways, the longest of which is 11,000 feet. Thirty-five scheduled international and domestic airlines serve the Airport.[8] In 2004, approximately 434,097 operations were conducted at the Airport.[9] **Figure 3.4** depicts the Airport.

3.2.4 Teterboro Airport

Teterboro Airport (TEB) is located in Bergen County, New Jersey. Operating since 1919, TEB is the oldest operating airport in the New York/New Jersey metropolitan area. The Airport consists of 827 acres and has two runways, the longest of which is 7,000 feet. TEB, a reliever airport,[10] does not have scheduled air carrier operations and its utilization is comprised of a broad range of GA activities. TEB is owned and operated by the PANYNJ.[11] In 2004, approximately 220,912 operations were conducted at the Airport.[12] **Figure 3.5** depicts the Airport.

3.2.5 Philadelphia International Airport

Philadelphia International Airport (PHL) is located approximately seven miles southwest of downtown Philadelphia in Philadelphia County and Delaware County, Pennsylvania. PHL is owned by the City of Philadelphia and operated by the Department of Commerce's Division of Aviation. PHL is situated on 2,302 acres and includes seven terminals, 120 gates, and four runways. Approximately 26 scheduled carriers and non-scheduled carriers serve the Airport, including six all-cargo airlines.[13] In 2004, approximately 455,561 operations were conducted at the Airport.[14] **Figure 3.6** depicts the Airport.

3.2.6 Remaining Airports in the Study Area

Three other airports, Morristown Municipal, Islip Long Island MacArthur, and White Plains/Westchester County, are focused on in this chapter because they are likely to be most affected by the Proposed Airspace Redesign Project. This is due to runway size which would accommodate air carrier operations or business jet aircraft, proximity to metropolitan areas, and the potential to serve as reliever airports. Traffic levels at these other airports were also considered. These airports are described in **Table 3.2**.

The remaining thirteen airports in the Study Area are depicted in **Table 3.3**.

3.2.7 Airport Emergency Services

Because of the general concern about aircraft accidents, airport emergency

[7] FAA Terminal Area Forecast (TAF), January 2005.

[8] The Port Authority of New York and New Jersey (PANYNJ). <http://www.panynj.gov/>.

[9] FAA Terminal Area Forecast (TAF), January 2005.

[10] *Reliever airports* are airports designated by the FAA to relieve congestion at commercial service airports.

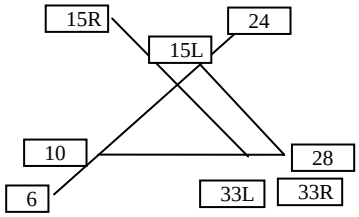
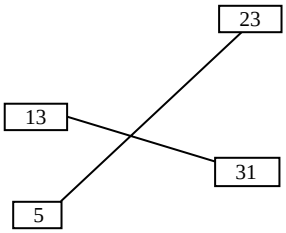
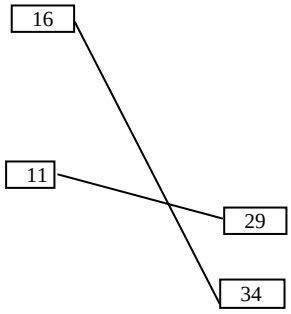
[11] The Port Authority of New York and New Jersey (PANYNJ). <http://www.panynj.gov/>.

[12] FAA Terminal Area Forecast (TAF), January 2005.

[13] Philadelphia International Airport. <http://www.phl.org/>.

[14] FAA Terminal Area Forecast (TAF), January 2005.

Table 3.2
Other Airports Likely to be Affected by the Proposed Airspace Redesign

Airport (Code)	Description	Runway Diagram
Islip Long Island MacArthur Airport (ISP)	ISP, a commercial service airport, is located in Suffolk County, New York and is approximately 50 miles east of Manhattan. ISP is owned and operated by the Town of Islip. In 2004 there were approximately 177,946 operations with seven scheduled passenger carriers. Runway 6-24 is 7,002', Runway 15R-33L is 5,186', Runway 10-28 is 5,036', and Runway 15L-33R is 3,212'.	
Morristown Municipal Airport (MMU)	MMU, a reliever airport, is located in Morris County, New Jersey and is approximately three miles east of Morristown. MMU does not have and is not certificated for regularly scheduled air carrier or freight service. MMU is used by corporate jets and helicopters as an alternative to EWR and also serves as a valuable site for the medical community. Many hospitals use MMU to transport patients, medical samples, and vital human organs to various locations around the country. In 2004, approximately 211,514 operations were conducted at MMU. Runway 5-23 is 5,999' and Runway 13-31 is 3,998'.	
White Plains/Westchester County Airport (HPN)	HPN, a primary airport, is located in Westchester County, New York, and is approximately six miles from White Plains on the Connecticut border. The 703-acre facility is owned and operated by Westchester County. The Airport serves eight commercial service operators and over 400 based aircraft including helicopters. Passengers from New York and Connecticut frequent the Airport for its non-stop commercial services to 10 major cities. Eight scheduled passenger carriers serve HPN. In 2004, approximately 192,362 operations were conducted at HPN. Runway 16-34 is 6,548' and Runway 11-29 is 4,451'.	

Note: All annual operations figures are 2004 estimates from the 2005 Terminal Area Forecast.
Based aircraft are active aircraft permanently stationed at an airport.
Commercial Service airports are publicly owned airports that have at least 2,500 passenger boardings each calendar year and receive scheduled passenger service.[15]
Reliever airports are airports designated by the FAA to relieve congestion at commercial service airports.[16]
General aviation airports serve civilian aircraft operating for purposes other than commercial transport, including personal, business, and instructional flying.
Primary airports are commercial service airports that have more than 10,000 passenger boardings each year.[17]

Sources: Federal Aviation Administration Terminal Area Forecast, issued January 2005.
www.fltplan.com, June 10, 2004.

[15] Airport Improvement Program Handbook, FAA Order 5100.38B, Change 1. January 8, 2004, page 5.

[16] Ibid.

[17] Ibid.

Table 3.3
Thirteen Remaining Airports in the Study Area

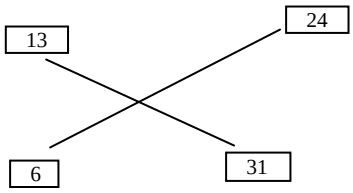
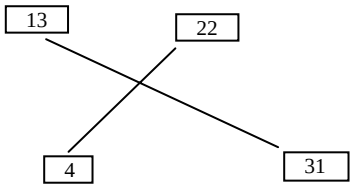
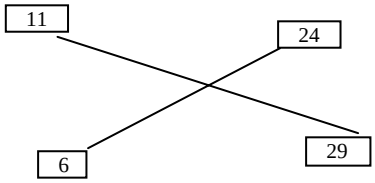
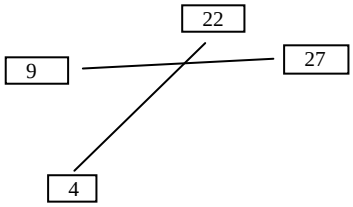
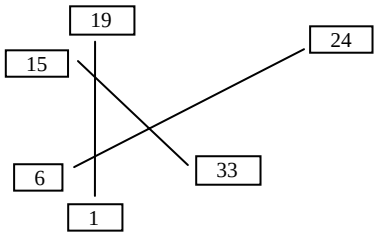
Airport (Code)	Description	Runway Diagram
Allentown/Lehigh Valley International Airport (ABE)	ABE is a primary airport located in Lehigh County, Pennsylvania between Allentown and Bethlehem. ABE is owned and operated by the Lehigh-Northampton Airport Authority. ABE has 126 based aircraft, of which 70 are single engine, 22 are multi-engine, 31 are jets, and three are helicopters. The Airport is served by eight scheduled passenger carriers. In 2004, there were approximately 133,830 operations. Runway 6-24 is 7,600' and Runway 13-31 is 5,797'.	
Atlantic City International Airport (ACY)	ACY is a primary airport located in Atlantic County, New Jersey and is owned and operated by the South Jersey Transportation Authority. ACY has 72 based aircraft, of which 31 are single engine, eight are multi-engine, 11 are jets, seven are helicopters, and 15 are military aircraft. In 2004, there were approximately 118,520 operations. Two scheduled passenger carriers serve ACY. Runway 4-22 is 6,144' and Runway 13-31 is 10,000'.	
Bridgeport/Igor I. Sikorsky Memorial Airport (BDR)	BDR is a GA airport located three miles Southeast of Bridgeport, Connecticut in Fairfield County. BDR has 244 based aircraft, of which 185 are single engine, 25 are multi-engine, 32 are jets, one is a helicopter, and one is an ultralight. In 2004, there were approximately 82,514 GA operations. Runway 6-24 is 4,677' and Runway 11-29 is 4,761'.	
Caldwell/Essex County Airport (CDW)	CDW is a reliever airport located two miles North of Caldwell, New Jersey in Essex County. CDW has 405 based aircraft, of which 314 are single engine, 79 are multi engine, and 12 are helicopters. In 2004, there were approximately 107,078 annual GA operations. Runway 4-22 is 4,553' and Runway 9-27 is 3,721'.	
Westhampton Beach/The Francis S. Gabreski Airport (FOK)	FOK, a GA airport, is located three miles North of Westhampton Beach, New York in Suffolk County. FOK has 119 based aircraft, of which 80 are single engine, 20 are multi-engine, three are jets, two are helicopters, nine are military aircraft, and five are gliders. In 2004, approximately 83,049 operations were conducted at FOK. Runway 1-19 is 5,000', Runway 6-24 is 9,000' and Runway 15-33 is 5,000'.	

Table 3.3 (continued)
Thirteen Remaining Airports in the Study Area

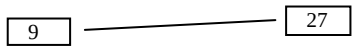
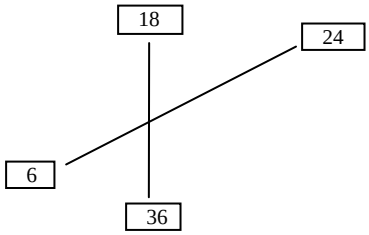
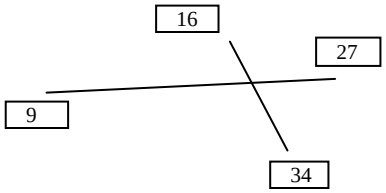
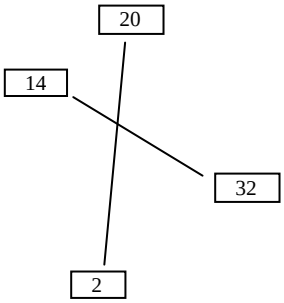
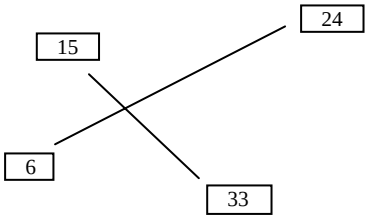
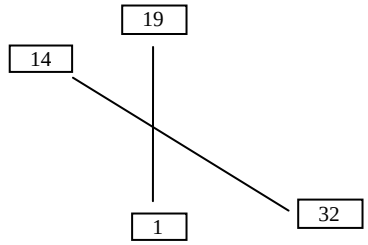
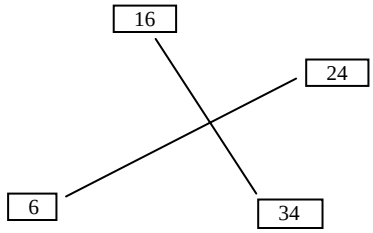
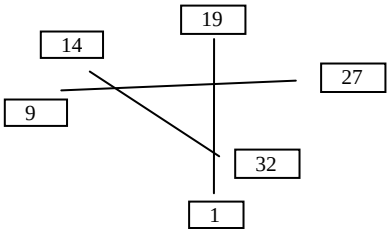
Airport	Description	Runway Diagram
Linden Airport (LDJ)	LDJ, a reliever airport, is located one mile Southeast of Linden, New Jersey in Union County. LDJ has 128 based aircraft, of which 116 are single engine, nine are multi-engine, and three are helicopters. In 2004, there were approximately 69,499 GA operations. Runway 9-27 is 4,137'.	
McGuire Air Force Base (WRI)	Located two miles Southeast of Wrightstown, New Jersey in Burlington County. WRI is a facility owned by the United States Air Force. Runway 6-24 is 10,001' and Runway 18-36 is 7,124'.	
Newburgh/Stewart International Airport (SWF)	SWF is a primary airport, located three miles Northwest of Newburgh, New York in Orange County. SWF has 81 based aircraft, of which seven are single engine, nine are multi-engine, 27 are jets, seven are helicopters, and 32 are military aircraft. In 2004, there were approximately 103,481 annual operations. Four scheduled passenger carriers provide service to and from SWF. Runway 9-27 is 11,818' and Runway 16-34 is 6,006'.	
New Haven/Tweed-New Haven Airport (HVN)	HVN, a primary airport is located three miles Southeast of New Haven, Connecticut in New Haven County. HVN has 77 based aircraft, of which 63 are single engine, 11 are multi-engine, and three are jets. HVN is served by two scheduled passenger carriers. In 2004, there were approximately 65,585 operations. Runway 2-20 is 5,600' and Runway 14-32 is 3,630'.	
Northeast Philadelphia Airport (PNE)	PNE, a reliever airport, is located 10 miles Northeast of Philadelphia, Pennsylvania in Philadelphia County. PNE has 220 based aircraft, of which 141 are single engine, 57 are multi-engine, 12 are jets, and 10 are helicopters. In 2004, there were approximately 111,434 operations. Runway 6-24 is 7,000' and Runway 15-33 is 5,000'.	

Table 3.3 (continued)
Thirteen Remaining Airports in the Study Area

Airport	Description	Runway Diagram
Republic Airport (FRG)	FRG, a reliever airport, is located one mile East of Farmingdale, New York in Suffolk County. FRG has 510 based aircraft, of which 377 are single engine, 83 are multi-engine, 29 are jets, and 21 are helicopters. In 2004, there were approximately 199,530 operations. Runway 1-19 is 5,516' and Runway 14-32 is 6,827'.	
Trenton/Mercer County Airport (TTN)	TTN is a primary airport located four miles Northwest of Trenton, New Jersey in Mercer County. One scheduled passenger carrier serves the Airport. TTN has 162 based aircraft, of which 80 are single engine, 18 are multi-engine, 20 are jets, 14 are helicopters, and 30 are military aircraft. In 2004, there were approximately 115,850 operations. Runway 6-24 is 6,006' and Runway 16-34 is 4,800'.	
Wilmington/New Castle County Airport (ILG)	ILG is a GA airport located four miles South of Wilmington, Delaware in New Castle County. ILG has 308 based aircraft, of which 171 are single engine, 24 are multi-engine, 63 are jets, 21 are helicopters, and 29 are military aircraft. In 2004, there were approximately 118,216 operations. Runway 1-19 is 7,012', Runway 9-27 is 7,181' and Runway 14-32 is 4,603'.	

Note: All annual operations figures are 2004 estimates from the 2005 Terminal Area Forecast.
Based aircraft are active aircraft permanently stationed at an airport.
Commercial Service airports are publicly owned airports that have at least 2,500 passenger boardings each calendar year and receive scheduled passenger service.[18]
Reliever airports are airports designated by the FAA to relieve congestion at commercial service airports.[19]
General aviation airports serve civilian aircraft operating for purposes other than commercial transport, including personal, business, and instructional flying.
Primary airports are commercial service airports that have more than 10,000 passenger boardings each year.[20]

Source: Federal Aviation Administration Terminal Area Forecast, issued January 2005.
www.fltplan.com, June 10, 2004.

services are described in the following paragraphs. This discussion is focused on the airport emergency services provided at the eight airports which will likely be most affected by the Proposed Airspace Redesign Project. Although not discussed here, it is noted that each local community around these airports also has its own emergency response plan.

Airports certified under 14 CFR Part 139, Certification and Operations: Land Airports

[18] Ibid.

[19] Ibid.

[20] Ibid.

Serving Certain Air Carriers, updated June 2004, must comply with specific Airport Rescue and Fire Fighting (ARFF) operational requirements. Part 139 certification is required of airports that serve scheduled and unscheduled air carrier aircraft with more than 30 seats and airports that serve scheduled air carrier operations in aircraft with between nine and 31 seats. Part 139 certificates are issued to ensure safety in air transportation. Airports are classified I-IV based on their scheduled and unscheduled operations. The two primary considerations in determining compliance with Part 139 ARFF-related criteria are response time requirements and equipment and agent requirements. These criteria were developed through research conducted by the FAA and the ICAO Rescue and Firefighting Panel. There are five airport classes, A-E, referred to as indexes, with index E having the most stringent requirements, which correspond to ARFF equipment requirements. The applicable airport index is determined by the type of aircraft operated by air carriers with an average of five scheduled departures per day (computed on an annual basis).

All airports, regardless of their Index classification, are required to have readily available either (1) 500 pounds of sodium-based dry chemical, halon 1211, or clean agent; or (2) 450 pounds of potassium-based dry chemical in addition to water and commensurate quantity (three to six percent) of aqueous film forming foam agent (AFFF) requirements. AFFF is a liquid concentrate which provides a barrier against air and oxygen and creates an aqueous film on the fuel surface which suppresses fuel vapors.

In addition, all Part 139 certified airports have required response times. The first ARFF response vehicle must reach the mid-point of the furthest runway with all onboard personnel in full protective gear in three minutes. Additionally, the ARFF vehicles must be available 15 minutes prior to and after the arrival of any air carrier aircraft.

There are three Part 139 Class I certified ARFF Index E airports in the Study Area: JFK, EWR, and PHL. These airports are required to have three ARFF vehicles with a combined capacity to carry at least 6,000 gallons of water and AFFF for foam production. LGA, a Class I, Index D airport, is also required to have three ARFF vehicles but is only required to have a 4,000 gallon carrying capacity for water with a commensurate quantity of AFFF.

Index A airports, including Class IV TEB, are only required to have one ARFF vehicle with the capability to transport the aforementioned amount of their chosen dry chemical extinguishing agent with a total of 100 gallons of water with a commensurate quantity of AFFF. HPN and ISP, which are classified Index B and C airports respectively, are both Part 139 Class I certified. Index B airports may have either one or two vehicles as long as at least 1,500 gallons of water and the commensurate amount of AFFF are carried. Index C airports must have either (1) three vehicles, with one carrying the specified amount of extinguishing agents and two carrying water and the commensurate quantity of AFFF to total at least 3,000 gallons of water for foam production, or (2) two vehicles with a capacity equal to that of the three vehicles with one vehicle carrying the extinguishing agents and one carrying the AFFF and water. Though not certified under Part 139, Morristown has obtained agents and equipment to meet Index B ARFF requirements on its own accord.

PANYNJ provides emergency services to four of the major airports in the Study Area: LGA, EWR, JFK, and TEB. The Port Authority Police Force is responsible for

providing police, fire fighting, and crash emergency services, as well as responding to all other aircraft emergency incidents. PANYNJ operates its own Police Academy, Aircraft Rescue, and Firefighting Fuel Spill Trainer Facility. Its Criminal Investigations Bureau works with the FBI Joint Terrorist Task Force to prevent terrorist activities. PANYNJ also has a highly specialized K-9 Unit for detections of narcotics and explosives, as well as an Emergency Services Unit which specializes in responding to emergency and rescue situations and aviation accidents.[21]

Philadelphia's Aircraft Rescue Firefighting Unit provides emergency services to PHL. In medical emergencies, this unit is aided by the Airport's Medic Unit. It has the capability to respond to situations ranging from day to day on-site medical treatment and transportation to mass casualty incidents. Construction was recently completed on the Airport's state-of-the-art Aircraft Fire Fighting Training facility, which has been operational since the fall of 2002.[22]

The three smaller airports likely to be affected by the airspace redesign, MMU, ISP, and HPN, rely on local firefighting and rescue providers for services at their airports. In response to public concerns, HPN has developed an emergency response plan because of the proximity of the Airport to Indian Point Energy Center, a nuclear power facility.[23] At MMU, a 24-hour Aircraft Rescue Station provides immediate emergency services in response to aircraft emergencies. The Airport meets the FAA's requirements for response equipment and fire extinguishing agents of an Index B airport.[24]

3.3 LAND USE

This section describes the methodology for ascertaining the land use within the Study Area. This discussion is followed by a broad description of the existing land use for the entire study area and a more detailed description of the land use surrounding each of the five major airports: JFK, LGA, EWR, TEB, and PHL. Finally, future land use is discussed.

3.3.1 Methodology

Digital land use data was obtained from the US Geological Survey's (USGS) National Land Cover Dataset (NLCD). The NLCD, released in 2000, used satellite imagery collected in the mid-1990s. For this study, the NLCD imagery was merged with local data to come up with 22 land use classifications. The local land use data was added to improve the quality of the data in the areas most likely to be impacted by the airspace changes. Local land use information was obtained for the following areas: New York City (NYC Dept. of City Planning Land Use Data – 8/2004), Westchester County (Westchester County Generalized Land Use – 1996), City of Philadelphia (Delaware Valley Regional Planning Commission GIS Land Use – 2000), and New Jersey (New Jersey Dept. of Environmental Protection Land Use – 1995/97).

[21] The Port Authority of New York and New Jersey (PANYNJ). <http://www.panynj.gov/>

[22] Philadelphia Fire Department. June 27, 2003. <http://www.mfrconsultants.com/pfd/index.shtml>

[23] Indian Point Emergency Planning. <http://www.westchestergov.com/discemergplan/>

[24] Morristown Municipal Airport. 2000. <http://www.mmuair.com/aircraftrescuesvs.htm>

3.3.2 Generalized Land Use

Figure 3.7 illustrates generalized land use located within the Study Area. The majority of the concentrated urbanized areas are located in central Connecticut, northern New Jersey, and the New York City and Philadelphia metropolitan areas.

Non-urban areas are located primarily in the following portions of the Study Area: southern portions and coastal areas of New Jersey, northern and western portions of New York State, northeast portions of Pennsylvania, and northwest and southeast portions of Connecticut. These areas are primarily forested with sporadic low density residential areas.

3.3.3 Detailed Land Use

The following sections include a more detailed description of the land use surrounding the five major airports in the Study Area. These areas were selected because they are subject to the most air traffic operations.

3.3.3.1 John F. Kennedy International Airport

JFK is located in New York City, New York, on Jamaica Bay. Neighborhoods adjacent to the Airport include Rosedale, Springfield Gardens South, South Ozone Park, Old Howard Beach, and Broad Channel. The majority of land use to the north of the Airport is single family residential. Industrial and recreational land use can be found adjacent to the Airport to the northeast, including Idlewild Park. Gateway National Recreation Area is located in Jamaica Bay just southwest of JFK. **Figure 3.8** illustrates the existing land use.

3.3.3.2 LaGuardia Airport

LGA is located in New York City, New York, and is bordered by Bowery Bay to the west and Flushing Bay to the east. Riker's Island lies just north of the Airport. Neighborhoods adjacent to the Airport include East Elmhurst, Jackson Heights, and Ditmars-Steinway. Land use to the south of LGA is predominantly single family residential. Flushing Meadows Park is located southeast of the Airport between the Grand Central Parkway and Route 678. Kissena Park is located south and east of LGA, adjacent to Flushing Meadows Park. **Figure 3.9** illustrates the existing land use.

3.3.3.3 Newark Liberty International Airport

EWR is located just west of Newark Bay between the Cities of Newark and Elizabeth. Port Newark and Port Elizabeth border EWR to the east. Land use adjacent to the Airport is predominantly industrial. Beyond these industrial areas, multi-family residential land use predominates. Weequahic Park is located approximately one mile west of the Airport. **Figure 3.10** illustrates the existing land use.

3.3.3.4 Teterboro Airport

TEB is located in Teterboro, New Jersey, between Hasbrouck Heights, NJ, and Little Ferry, NJ. Wetlands are located adjacent to TEB to the west, south, and east. Land to the south of TEB is predominantly industrial and wetlands. The Meadowlands Sports Complex is located approximately two miles south of the Airport. To the east, single family residential and commercial lands are the predominant land use. To the west, beyond the industrial facilities located adjacent to the Airport, land use is multi-family residential. Areas north of TEB are

industrial. **Figure 3.11** illustrates the existing land use.

3.3.3.5 Philadelphia International Airport

PHL is located in Philadelphia, just east of Essington, Pennsylvania. PHL is bordered by Penn Central Railroad and the Delaware River to the south, Darby Creek to the north and west, and Schuylkill River and Mingo Creek to the east. Land use in the immediate vicinity of PHL is primarily industrial. An area of industrial activity extends to the north and east of the Airport, following the Schuylkill River, and to south of the Airport into Gloucester County, New Jersey. Fort Mifflin and a U.S. Naval Shipyard and business center are located directly east of the Airport. John Heinz National Wildlife Refuge at Tinicum is located north of the Airport. Governor Printz State Park is located directly west of PHL. North and west of the Airport, low-density residential land use prevails. Some high-density residential communities are located to the northwest, closer to the Airport. To the south, across the Delaware River in Gloucester County, New Jersey, land use is heavily industrial, primarily related to oil production, surrounded by agricultural and wooded land, and some low-density residential areas. **Figure 3.12** illustrates the existing land use.

3.3.4 Future Land Use

At this time, there are no known significant planned changes in land use around the five major airports in the Study Area. No indicators of potential changes in future land use around EWR, TEB, or PHL are known. The following paragraphs summarize recent zoning changes around JFK and LGA.

Eight neighborhoods were recently rezoned (between September 2004 and September 2005) in Queens County, NY, under a new lower-density rezoning initiative. In practice, this rezoning allows neighborhoods to maintain their existing character by ensuring that new development fits the scale and prevailing character of the existing developed areas. The Richmond Hill and Kew Gardens neighborhoods were also recently rezoned (March 2005) to protect the existing character of interior residential blocks and to encourage mixed use development along Jamaica Avenue and housing production on wide streets near mass transit.[25] Zoning designates permitted uses of land and guides development and redevelopment of areas; therefore, zoning can indicate potential changes in land use. However, as previously described, rezoning in Queens County has primarily focused on maintaining the existing character of the neighborhoods around JFK and LGA. Therefore, there are no known significant planned changes in land use around these airports.

3.4 POPULATION AND DEMOGRAPHICS

This section describes the population, and demographics within the Study Area based on the data obtained from the U.S. Census Bureau, Census 2000. Statistics are provided for population, income, employment, aviation employment, minority and poverty populations with focus on the areas most likely to be affected by the Proposed Airspace Redesign Project. The areas most likely to be affected are those surrounding eight airports; JFK, LGA, EWR, TEB, PHL, MMU, ISP, and HPN. Therefore, the population and demographic

[25] New York City Department of City Planning, Queens Project, Studies and Proposals, November 2005. <http://www.nyc.gov/html/dcp/html/subcats/queens.shtml>.

information is provided on a county level for all counties in which the eight airports are located. The eight airports are located in eight counties within New York, New Jersey, and Pennsylvania. JFK and LGA reside in Queens County, NY; EWR is located in Essex and Union Counties, NJ; TEB is located in Bergen County, NJ; PHL is located in Philadelphia and Delaware Counties, PA; MMU is in Morris County, NJ; ISP is in Suffolk County, NY; and HPN is located in Westchester County, NY.

The future population is discussed in detail at the end of this section. In order to support noise impact analysis in the Draft EIS, future year population projections are required for the entire Study Area.

3.4.1 Population

Population data obtained from the U.S. Census Bureau, Census 2000, for the subject counties is listed in **Table 3.4**. **Figure 3.13** shows the population density in the Study Area.

3.4.2 Income

Income data obtained from Census 2000 is presented in **Table 3.5** for each of the counties in which the eight affected airports are located. The reported per capita income for each county, as well as the median household and family income is also provided. A household is defined by the Census Bureau as, "all people who occupy a housing unit regardless of relationship. A household may consist of a person living alone or multiple unrelated individuals or families living together." A family is defined by the Census Bureau as, "two or more people, one of whom is the householder, related by birth, marriage, or adoption and residing in the same housing unit."

3.4.3 Employment

Census 2000 data provides information on the population in the county that is eligible for employment and those that are employed in the civilian labor force. **Table 3.6** presents the employment statistics.

3.4.4 Aviation Employment

Employment opportunities created by the airport are provided both on and off-airport and by indirectly related business. The service and retail industries are major generators of business-related aviation activity. **Table 3.7** provides aviation employment statistics.

Table 3.4
Population Statistics

Airport	County (State)	2000 Population by County
JFK LGA	Queens (New York)	2,229,379
EWR	Essex (New Jersey) Union (New Jersey)	793,633 522,541
TEB	Bergen (New Jersey)	884,118
PHL	Philadelphia (Pennsylvania)	1,517,550
	Delaware (Pennsylvania)	550,864
MMU	Morris (New Jersey)	470,212
ISP	Suffolk (New York)	1,419,369
HPN	Westchester (New York)	923,459

Source: U.S. Bureau of the Census, Census 2000.

Table 3.5
Income Statistics

Airport	County (State)	Per Capita Income (dollars)	Median Household Income (dollars)	Median Family Income (dollars)
JFK LGA	Queens (New York)	19,222	42,439	48,608
EWR	Essex (New Jersey) Union (New Jersey)	24,943 26,992	44,944 55,339	54,818 65,234
TEB	Bergen (New Jersey)	33,638	65,241	78,079
PHL	Philadelphia (Pennsylvania)	16,509	30,746	37,036
	Delaware (Pennsylvania)	25,040	50,092	61,590
MMU	Morris (New Jersey)	36,964	77,340	89,773
ISP	Suffolk (New York)	26,577	65,288	72,112
HPN	Westchester (New York)	36,726	63,582	79,881

Source: U.S. Bureau of the Census, Census 2000.

Table 3.6
Employment Statistics

Airport	County (State)	Population eligible for employment	Employment in civilian labor force	Employment in Armed Forces	Unemployment in civilian labor force	Population not in labor force
JFK LGA	Queens (New York)	1,775,449	956,784	343	80,111	738,211
EWR	Essex (New Jersey) Union (New Jersey)	608,592 405,859	336,390 244,197	129 75	34,420 14,369	237,653 147,218
TEB	Bergen (New Jersey)	702,617	435,277	95	18,402	248,843
PHL	Philadelphia (Pennsylvania)	1,174,798	584,957	396	71,582	517,863
	Delaware (Pennsylvania)	429,983	258,782	176	13,310	157,715
MMU	Morris (New Jersey)	365,030	243,783	189	8,920	112,138
ISP	Suffolk (New York)	1,086,848	683,062	599	27,964	375,223
HPN	Westchester (New York)	716,252	432,600	100	19,817	263,735

Source: U.S. Bureau of the Census, Census 2000.

Table 3.7
Aviation Employment Statistics

Airport	County (State)	Employment at Airport	Economic Impact on Region	Retail Industry Employment(3)	Service Industry Employment(3)
JFK	Queens (New York)	35,000(1)	$22 billion(1)	10.1%	46.2%
LGA	Queens (New York)	9,000(1)	$6.1 billion(1)		
EWR	Essex (New Jersey)	24,000(1)	$11.3 billion(1)	9.7%	45.0%
	Union (New Jersey)			10.2%	39.7%
TEB	Bergen (New Jersey)	1,000(1)	--	11.8%	42.6%
PHL	Philadelphia (Pennsylvania)	21,000(2)	$7.2 billion(2)	10.4%	49.8%
	Delaware (Pennsylvania)			11.2%	48.3%
MMU	Morris (New Jersey)	--	--	10.2%	41.9%
ISP	Suffolk (New York)	--	--	12.1%	42.8%
HPN	Westchester (New York)	1,500(2)	$0.6 billion(2)	9.2%	50.1%

Source: (1) 2002 Airport Traffic Report, The Port Authority of NY & NJ.
(2) Individual Airport Statistics.
(3) U.S. Bureau of the Census, Census 2000.

3.4.5 Minority and Low-Income Population

The Department of Transportation Order on Environmental Justice defines minority as:

- Black (a person having origins in any of the black racial groups of Africa);
- Hispanic (a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race);
- Asian American (a person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands); or
- American Indian and Alaskan Native (a person having origins in any of the original people of North America and who maintains cultural identification through tribal affiliation or community recognition).[26]

The Department of Transportation Order on Environmental Justice defines poverty as:

- A person's household income is at or below the poverty level.[27]

The definition of poverty as defined by the Census Bureau is as follows:

- Following the Office of Management and Budget's Directive 14, the Census Bureau uses a set of money income thresholds that vary by family size and composition to detect who is considered poor. If the total income for a family or unrelated individual falls below the relevant poverty threshold, then the family or unrelated individual is classified as being "below the poverty level." Poverty level income was based on the 2005 HHS Poverty Guideline median annual income (family of four) of $19,350.[28]

Table 3.8 provides statistics on minority populations within the Study Area and includes a comparison to statewide and nationwide statistics.

Table 3.9 provides statistics on poverty populations within the Study Area and includes a comparison to statewide and nationwide statistics.

Minority and low-income population data is required to evaluate the potential for disproportionate impacts on these communities. There are minority and low-income communities located throughout the large Study Area. It would be unproductive to discuss every one of these communities in this chapter because the entire Study Area is not likely impacted by the Proposed Action. Therefore, a more refined study area is established once the potential environmental impacts are evaluated. Minority and low-income population statistics for these refined study areas are discussed in Section 4.2, *Environmental Justice*.

3.4.6 Future Population

In accordance with FAA Order 1050.1E, the noise analysis for the Proposed Action will focus on the change in noise levels as compared to population throughout the Study Area. The number of people exposed to various changes in noise levels is

[26] DOT Order 5610.2, Environmental Justice in Minority and Low-Income Populations, April 15, 1997, see Appendix, pg 18,380.

[27] Ibid.

[28] The 2005 HHS Poverty Guidelines, United Sates Department of Health & Human Services, http://aspe.hhs.gov/poverty/05poverty.shtml.

Table 3.8
Minority Population Statistics

Airport	County (State)	Minority Population	% of Total County Population	Comparison to State(1)	Comparison to Nation
JFK LGA	Queens (New York)	1,246,654	55.9	+23.9%	+31.1%
EWR	Essex (New Jersey)	440,774	55.5	+28.1%	+30.7%
	Union (New Jersey)	180,239	34.5	+7.0%	+9.6%
TEB	Bergen (New Jersey)	190,882	21.6	-5.9%	-3.3%
PHL	Philadelphia (Pennsylvania)	834,283	55.0	+40.3%	+30.1%
	Delaware (Pennsylvania)	101,859	18.7	+4.0%	-6.2%
MMU	Morris (New Jersey)	60,170	12.8	-14.7%	-12.1%
ISP	Suffolk (New York)	218,614	15.4	-16.7%	-9.5%
HPN	Westchester (New York)	264,601	28.7	-3.4%	+3.8%

(1) A plus sign indicates that the noted County has a higher minority population compared to the state or the nation, whereas a minus sign indicated a lower minority population.

Source: U.S. Bureau of the Census, Census 2000.

Table 3.9
Poverty Population Statistics

Airport	County (State)	Poverty Population	% of Total County Population	Comparison to State(1)	Comparison to Nation
JFK LGA	Queens (New York)	321,102	14.4	+0.2%	+2.4%
EWR	Essex (New Jersey)	120,006	15.1	+6.8%	+3.1%
	Union (New Jersey)	43,319	8.3	0.0%	-3.8%
TEB	Bergen (New Jersey)	43,417	4.9	-3.4%	-7.1%
PHL	Philadelphia (Pennsylvania)	336,177	22.2	+11.5%	+10.1%
	Delaware (Pennsylvania)	42,411	8.0	-2.7%	+4.1%
MMU	Morris (New Jersey)	17,872	3.8	-4.5%	-8.2%
ISP	Suffolk (New York)	83,171	5.9	-8.3%	-6.2%
HPN	Westchester (New York)	78,967	8.6	-5.6%	-3.5%

(1) A plus sign indicates that the noted County has a higher population at or below the poverty level as compared to the state or the nation, whereas a minus sign indicated a lower population at or below the state or national poverty level.

Source: U.S. Bureau of the Census, Census 2000.

estimated based on the number of people residing in the census block corresponding to the centroid (center of the census block) where noise is being evaluated. The Census Bureau defines a census block as, "An area bounded on all sides by visible and/or nonvisible features shown on a map prepared by the Census Bureau. A block is the smallest geographic entity for which the Census Bureau tabulates decennial census[29] data."[30] The noise analysis includes determination of change in aircraft noise exposure in the years 2006 and 2011; therefore, the population must be projected for those same years. Population projections are available at the block group (BG) level. The Census Bureau defines a block group as, "A statistical subdivision of a census

[29] The census of population and housing, taken by the Census Bureau in each year ending in zero.

[30] Census 2000 Basics, U.S. Census Bureau, http://www.census.gov/mso/www/c2000basics/chapter4.htm.

tract,"[31] and, "BGs generally contain between 300 and 3,000 people, with an optimum size of 1,500 people."[32] Therefore, analysis is required to distribute future population from the BG level to the census block level. The previously discussed land use information was the basis for the dispersion of the BG population. **Appendix H** details the population forecast analysis and results. Subsequently, population information obtained at the BG level was dispersed down to the census blocks located within each BG. This analysis provided census block forecasted population information for all census blocks (approximated 324,000 populated census blocks) in the study area for years 2006 and 2011. The population data will be used in the evaluation of potential noise impacts in Chapter 4.

3.5 NOISE

Aircraft noise is often the most noticeable environmental effect associated with any aviation project. This section evaluates the Baseline 2000 noise conditions for the Study Area.

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.
- 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). 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. Traffic levels in 2000 are therefore representative of those in 2005.

Consequently, 2000 was and is appropriately used as the base line year.

Noise modeling analysis and results for the future conditions and alternatives are presented in Chapter 4, *Environmental Consequences*, **Appendix D**, *Noise Measurement*, and **Appendix E**, *Noise Modeling Technical Report*.

The following sub-sections discuss the guidance and regulations set by FAA for noise analyses, background noise measurements, and baseline (2000) aircraft noise analysis and results.

3.5.1 Noise Basics

Sound is a complex vibration transmitted through the air which, upon reaching our ears, may be perceived as undesirable or unwanted. It is this unwanted sound which people normally refer to as noise. Aircraft noise is unwanted sound caused by aircraft take-offs, landings, overflights and/or aircraft engines running on the ground. Noise and sound are thus physically the same, the difference being in the subjective opinion of the receiver.

[31] A small, relatively permanent statistical subdivision of a county or statistically equivalent entity. Census tracts generally contain between 1,000 and 8,000 people. Census tract boundaries are delineated with the intention of being stable over many decades, so they generally follow relatively permanent visible features. However, they may follow governmental unit boundaries and other invisible features in some instances; the boundary of a state or county is always a census tract boundary. Census 2000 Basics, U.S. Census Bureau, http://www.census.gov/mso/www/c2000basics/chapter4.htm.

[32] Census 2000 Basics, U.S. Census Bureau, http://www.census.gov/mso/www/c2000basics/chapter4.htm.

Sound can be defined in terms of three components:

- Loudness (amplitude)
- Pitch (frequency)
- Duration (time pattern)

While the pitch and duration of a sound are readily understood, the loudness and its measure are often found to be confusing. The most common measuring unit of sound pressure is the decibel (dB). The human ear has an extremely wide range of response to sound amplitude and because the waves of sound typically heard by the human ear may vary through a wide range from 1 to 100 trillion units (bels), a logarithmic scale (decibels) is used to compress the scale to make the number more manageable. Thus, the decibel scale allows people to describe loudness using numbers ranging from zero to about 140. Most everyday sounds range from zero to 120 dB.

The use of the logarithmic decibel scale requires different arithmetic than is used with linear scales. The sound pressures of two separate sounds are not directly arithmetically additive. For example, if a sound of 80 dB is added to another sound of 74 dB, the total is a one decibel increase to 81 dB, not an addition to 154. If two equally loud noise events occur simultaneously, the sound pressure level from the combined events is only three dB higher than the level produced by either event alone. The key result of logarithmic addition is the greater weight it gives to higher noise levels compared to quieter levels. Similarly, when averaging sound levels, the loudest sound levels are the dominant influence in the averaging process. For example, two sound levels of equal duration are averaged; one is 100 dB, the other is 50 dB. Using linear arithmetic, the result would be 75 dB. The logarithmic result is 97 dB because 100 dB contains 100,000 times the sound energy of 50 dB.

In terms of human perception, a 10 dB increase in sound energy over a given frequency is perceived as a doubling of loudness. Similarly, a 10 dB decrease seems only half as loud. A three dB increase in loudness, which is equivalent to a doubling of sound energy, is detected by the ear as a barely perceptible increase in loudness in an outdoor environment.

3.5.2 Guidance and Regulations for Noise Analysis

The FAA has developed specific guidance and requirements for the assessment of aircraft noise in order to comply with NEPA requirements. This guidance, specified in FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*, requires that aircraft noise be analyzed in terms of the yearly Day-Night Average Sound Level (DNL) metric. In practice, this requirement means that DNL noise levels are computed for the Average Annual Day (AAD) of operations for the year of interest.

The DNL metric is a single value of sound level for a 24-hour period. This value includes all of the time-varying sound energy within the period. To represent the greater annoyance caused by a noise event at night, the DNL metric includes an added 10 dB weighting for noise events occurring between 10:00 P.M. and 7:00 A.M. (nighttime). This extra nighttime event weighting helps to account for the annoyance caused by noise during time periods when people are trying to sleep and ambient noise levels are lower. The weighting, in essence, equates one night flight to 10 day flights. In this document, for ease of reference, the format 45 DNL is used to represent a noise exposure level of

DNL 45 dB. Additional detail relating to the physics of sound, the effect of noise on people, and the emergence of DNL as the metric of choice by FAA is available in Appendix E.

In addition to requiring the use of the DNL metric, the FAA also requires that aircraft noise be evaluated using one of several authorized computer noise models. Specifically, for air traffic actions such as the Proposed Airspace Redesign Project, the Noise Integrated Routing System (NIRS) model is to be used.

The NIRS model was initially developed in 1995 by the FAA's 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. NIRS has the following major capabilities:

- Provides automated quantitative comparison of noise impacts across alternative airspace designs.
- Imports and displays track and operation data from airspace models, and population and community data from other sources.
- Enables user to specify air traffic control altitudes, and automatically calculates required aircraft thrusts and speeds necessary for noise using the same up-to-date database used for the FAA's Integrated Noise Model (INM).
- Calculates estimated noise levels and impacts at all 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 maps 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.
- Provides data for quantification of mitigation goals and identification of mitigation opportunities.
- Assembles tables and exhibits for noise-impact data analysis and report generation.
- Applies multiple layers of data checking and quality control.

NIRS was validated by the FAA Office of Environment and Energy against INM in 1997. This process involved providing both the NIRS model and FAA's long-standing INM with identical inputs and performing a detailed comparison of the resulting outputs for representative jet, turboprop, and piston-prop 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.

3.5.3 Background Noise Measurements

A sampling of field noise measurements was included in this Draft EIS effort. Although the FAA guidelines require that the evaluation of aircraft noise be conducted based on approved computer noise model calculations, it can be helpful to consider the noise modeling results in the context of the local ambient noise environment. FAA's

Order 1050.1E specifically addresses the use of noise measurement data as follows:

> "Noise monitoring data may be included in an EA or EIS at the discretion of the responsible FAA official. Noise monitoring is not required and should not be used to calibrate the noise model."

While it is clearly not appropriate to use noise measurement data for computer model calibration, field noise measurements provide important data. Background and cumulative noise levels are measured to provide a context with which to consider the modeled noise exposure change resulting from an airspace alteration. The measurement samples also afford a supplemental method to noise modeling that considers all aircraft traffic (including both VFR and IFR traffic). Thus, stake holders, FAA decision makers, and the general public have a context to consider the relevant contributions of project-related noise exposure in relation to noise produced without project-related changes.

The primary focus of the measurement program was to collect and calculate a sample of day/night average noise levels (DNL) at each specific site. The noise measurements contain all noise recorded at a site including aircraft and non-aircraft events.

In addition to the total DNL at each monitoring site, several other metrics were also computed from the measured data as supplemental information. These include the following:

- L_{50} – Sound level at which 50 percent of the measured one-second samples are above and 50 percent are below. This is generally considered to be an estimation of background noise levels by the FAA.
- Aircraft DNL – The DNL value of only the noise events that were correlated with aircraft overflights based on the radar flight track data.
- Non-Aircraft DNL – The DNL value of noise resulting from the subtraction of the Aircraft DNL value from the Total DNL measured at each site.
- Aircraft Lmax – Range of maximum sound level associated with correlated aircraft events.

While there is no end to the number of potential noise measurement sites, issues such as accessibility, cost, and time often create a practical limit to the scope of any noise measurement program. Accordingly, this noise measurement program focused on collecting a sample of data within strategic areas that were directly related to both the range of alternatives evaluated and the local land uses within the Study Area. Key components used in evaluating site locations included:

- Areas that could potentially be over-flown by new procedures proposed by any alternative airspace configuration;
- Areas that have existing overflights, but where the traffic volume may change based on operation mode or utilization;
- Noise sensitive and/or 4(f)/historic sites that may be identified within the two previous areas indicated;
- Representative traffic patterns flown by uncontrolled-VFR aircraft to/from local airports (typically low-traffic facilities) within the Study Area;
- Areas located throughout the Study Area to provide a more comprehensive analysis of the Study Area; and

- Other public/FAA input.

The field noise measurements were conducted in two phases, each consisting of the same (or nearly the same) 16 sites throughout the Study Area. The phases were selected to provide some notion of seasonality for the measurement samples. The initial phase of the program provided a winter season sample and began on December 3, 2001 and continued for three weeks through December 21, 2001. Noise was measured at 16 sites for continuous periods of approximately three to four days at each site. The second phase provided a summertime sample of measurements and was conducted from August 12, 2002 through August 30, 2002. Where possible, the exact same sites were used from the first phase of winter measurements. However, there were two sites that were not possible to visit during the summer measurement period. In those cases, similar sites were chosen in the same general vicinity as the original wintertime site.

For each of the measurement sites, personnel were also in the field for portions of each day recording a log of observations. These observations involved noting both aircraft and non-aircraft events that were audible. The observer logged the time in hours, minutes, and seconds, and when each event started and ended. If aircraft events were detected, the observer attempted to visually site the aircraft and provided any characteristics of the aircraft event (i.e., aircraft type, operation mode, direction of flight, etc.). The time stamps were taken from either the monitor clock or a personal watch that was calibrated to the U.S. Naval Observatory Master Clock. In addition to the observer logs, radar flight tracks in the vicinity of each site were also collected from the nearest FAA radar site during the measurement program. These flight tracks were then computer-correlated to noise events recorded at each site based on the proximity of the aircraft to the measurement site and the time values recorded in the noise measurement data and the radar data.

Table 3.10 offers a brief description of the 18 measurement locations chosen for this program along with their general land use type. **Figure 3.14** illustrates the locations of all the sites on a map of the area. Appendix D includes a detailed description of each of the sites. These individual descriptions include more information regarding location, Study Area position, and land use type. A number of the measurement results statistics are also provided.

Table 3.11 provides a summary of the noise levels recorded during the measurement period for each site. The data for each site is presented in terms of the average DNL values for each phase of the measurement program, as well as the cumulative DNL value for the entire measurement duration at the site. Similarly, the L50 values for each site are also presented.

Table 3.12 presents a summary of the noise levels associated with the correlated aircraft radar track events for each measurement site. The number of days correlated, the average number of aircraft events correlated, and the range of the maximum aircraft noise levels are presented along with the DNL noise values. The time and duration of each correlated aircraft event was used to separate out the aircraft noise from other noise recorded during each observation period. This allowed for the calculation of the DNL noise levels associated with only the aircraft events for comparison against the DNL levels from other sources during the observation periods.

The measurement data provides a general insight into the ambient noise levels for various land use types in the Study Area.

While this measurement data is available only for these specific noise measurement locations, when combined with the modeled noise values for each alternative, it does provide some understanding of each alternative's contribution to the total noise in the area. Accordingly, aircraft noise from modeled aircraft operations, as well as VFR and other operations, can be considered. This analysis is detailed in Appendix E.

3.5.4 Baseline (2000) Aircraft Noise Analysis

This subsection presents a brief overview of the noise modeling conducted for the Baseline 2000 conditions. This Baseline modeling is the foundation upon which the noise modeling for the future conditions and alternatives are built.

Table 3.10
Noise Measurement Site Locations

Site	Name	Location	Latitude	Longitude	Land Use	Dates Measured Phase I	Dates Measured Phase II
Site 1a	Saugerties Residence	Saugerties, NY	42.0766	-74.0617	Residential	12/3/01 - 12/7/01	N/A
Site 1b	Stone Ridge Residence	Stone Ridge, NY	41.8554	-74.1552	Residential	N/A	8/19/02 - 8/23/02
Site 2	Oliverea Residence	Oliverea, NY	42.0130	-74.4154	Park	12/3/01 - 12/7/01	8/20/02 - 8/23/02
Site 3	Beaver Dam Sanctuary	Katonah, NY	41.2469	-73.6661	Park	12/3/01 - 12/7/01	8/19/02 - 8/23/02
Site 4	Stamford Residence	Stamford, CT	41.0533	-73.5047	Residential	12/3/01 - 12/7/01	N/A
Site 5	Robert Moses State Park	Fire Island, NY	40.6292	-73.2283	Park	12/18/01 - 12/21/01	8/12/02 - 8/15/02
Site 6	Harbor Island Park	Mamaroneck, NY	40.9446	-73.7324	Park	12/3/01 - 12/7/01	8/19/02 - 8/23/02
Site 7a	Staten Island Residence(a)	Staten Island, NY	40.6385	-74.1662	Residential	12/17/01 - 12/21/01	N/A
Site 7b	Staten Island Residence(b)	Staten Island, NY	40.6394	-74.1686	Residential	N/A	8/12/02 - 8/16/02
Site 8	Carteret Residence	Carteret, NJ	40.5873	-74.2299	Residential	N/A	8/12/02 - 8/16/02
Site 9	Tourne Park	Boonton, NJ	40.9084	-74.4353	Park	12/10/01 - 12/14/01	8/26/02 - 8/30/02
Site 10	Morristown Nat. Hist. Park	Morristown, NJ	40.7618	-74.5436	Park	12/10/01 - 12/14/01	8/26/02 - 8/30/02
Site 11	BWZ VOR	Schooley's Mtn, NJ	40.7985	-74.8233	Open Space	12/11/01 - 12/14/01	8/26/02 - 8/30/02
Site 12	Twin Lights Historic Site	Highlands, NJ	40.3968	-73.9854	Park	12/10/01 - 12/14/01	8/26/02 - 8/30/02
Site 13	Brandywine Battlefield Park	Chadds Ford, PA	39.8750	-75.5713	Park	12/18/01 - 12/21/01	8/14/02 - 8/16/02
Site 14	Colts Neck Residence	Colts Neck, NJ	40.3113	-74.1990	Residential	12/10/01 - 12/14/01	8/26/02 - 8/30/02
Site 15	Ardencroft Residence	Ardencroft, DE	39.8043	-75.4840	Residential	12/17/01 - 12/21/01	8/13/02 - 8/16/02
Site 16	Garden City Residence	Garden City, NY	40.7182	-73.6750	Residential	12/17/01 - 12/21/01	8/12/02 - 8/16/02

Table 3.11
Noise Measurement Summary

	Measured DNL			Measured L_{50}		
Site	**Phase I**	**Phase II**	**Average**	**Phase I**	**Phase II**	**Average**
1a	40.5	N/A	40.5	31.0	N/A	31.0
1b	N/A	62.7	62.7	N/A	47.0	47.0
2	44.1	48.2	46.6	34.0	35.0	34.5
3	60.5	58.8	59.7	53.0	49.0	51.0
4	54.2	N/A	54.2	46.0	N/A	46.0
5	68.9	64.8	67.3	63.0	55.0	59.0
6	56.9	57.7	57.3	49.5	45.0	47.3
7a	67.6	N/A	67.6	52.0	N/A	52.0
7b	N/A	64.1	64.1	N/A	51.0	51.0
8	N/A	66.1	66.1	N/A	52.0	52.0
9	50.5	63.9	61.0	40.0	47.5	43.8
10	50.7	60.4	57.8	41.0	46.0	43.5
11	50.7	63.5	60.7	41.5	53.0	47.3
12	57.4	64.5	62.2	51.0	54.0	52.5
13	57.1	67.0	64.4	51.0	60.0	55.5
14	47.1	62.0	59.2	39.0	47.0	43.0
15	55.4	63.3	60.9	47.5	55.0	51.3
16	56.1	60.7	59.0	45.0	53.0	49.0

Source: Landrum & Brown Analysis, 2002-05.

Table 3.12
Aircraft Event Noise Correlation

Site	Days Correlated	Average Aircraft Correlated per Day	Aircraft LAMAX Range (dBA)	Aircraft DNL	Non Aircraft DNL	Total Site DNL
1a	4	15	37.6-67.1	25.5	40.3	40.5
1b	2	5	54.3-64.8	26.9	62.7	62.7
2	6	3	44.3-65.4	23.2	46.6	46.6
3	7	39	50.6 - 72.0	46.2	59.5	59.7
4	3	22	53.7 - 72.8	44.1	53.7	54.2
5	5	12	53.3 - 73.4	45.1	67.3	67.3
6	7	71	48.1 - 81.4	47.8	56.8	57.3
7a	2	308	57.3 - 88.0	66.3	61.5	67.6
7b	3	244	59.9 - 86.6	62.7	58.7	64.1
8	2	149	55.1 - 83.1	57.5	65.4	66.1
9	6	124	39.2 - 79.1	48.5	60.8	61.0
10	5	126	44.8 - 76.0	47.4	57.4	57.8
11	5	54	46.8 - 75.6	42.3	60.7	60.7
12	7	126	49.8 - 93.3	52.7	61.7	62.2
13	5	31	50.9 - 75.6	53.2	64.1	64.4
14	7	79	41.0 - 75.0	43.0	59.1	59.2
15	6	57	50.5 - 86.1	49.4	60.6	60.9
16	6	61	43.0 - 82.6	52.6	57.8	59.0

Source: Landrum & Brown Analysis, 2002-05.

Noise exposure contours typically used in aircraft noise analysis near a specific airport are not calculated for this study. The FAA's Integrated Noise Model (INM), which was not used for this study, produces noise exposure contours to describe noise impacts of arrivals and departures operating within the immediate vicinity (three to five miles) of the study airport. NIRS is an analysis tool used to evaluate the effects of airspace changes from the ground level to 10,000 feet AGL on noise sensitive areas within a large study area containing multiple airports, and is the required model for this type of airspace analysis.[33]

For this Draft EIS, a detailed analysis of future noise from aircraft operating between the surface and 14,000 feet above MSL was conducted in the 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 DNL metric. 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). NIRS produces change of exposure tables and maps at population centroids. 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. **Figure 3.15** illustrates the centroid locations with a population greater than zero as well as the population density for 2000.

The following section provides a brief summary of the noise model input and the resulting Baseline noise levels for the year 2000. Appendix E provides detailed information related to 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. Appendix E also provides background information on noise metrics, aircraft noise analysis, and aircraft noise effects on human beings.

A total of 21 airports within the Study Area were evaluated in this analysis. In addition, IFR overflight traffic transiting the Study Area below 14,000 feet MSL was also included in the modeling.

3.5.4.1 Input Data

The NIRS model requires a variety of user-supplied input including local environment data (e.g., temperature, humidity, and runway layout), aircraft operations, runway use, and flight tracks. The following paragraphs define each type of input and describe how the input was developed.

Local Environment

In order to calculate noise levels specific to the conditions in the Study Area, the NIRS model utilizes several local environmental variables. These include runway layout, temperature, atmospheric pressure, humidity, airport average headwind, airport elevation, and terrain.

Airport layouts within the Study Area are used as the source for runway descriptions. **Table 3.13** presents a listing of the 21 airports modeled in the NIRS noise analysis

[33] FAA Order 1050.1E, 14.5e.

Table 3.13
Modeled Airports and Runways

Identifier	Airport	Modeled Runways
LGA	LaGuardia	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 Air Force Base	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

Source: Landrum & Brown Analysis, 2001.

along with the runways modeled for each airport.

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 percent. 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 the effects that variations in terrain will have on noise. 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 MSL.

Aircraft Operations

Aircraft operations data including day/night distribution, mix of different aircraft types (fleet mix), and airspace segment and stage length (trip length) are based on the design-day flight schedules. Design-day flight schedules contain information about the following: the type of flight (scheduled and nonscheduled commercial passenger, air cargo, GA, or military); type of aircraft; arrival and departure times; the origin and destination of the flight (domestic or international); and the operator of the flight.

The Baseline 2000 operational levels were determined for the Study Area overflights and each of the 21 airports as part of the operational forecasting effort. The 2000 annual IFR operations levels were divided by 365 to identify the Average Annual Day (AAD) operations for each airport. Design-day flight schedules for 2000 were then developed based largely on radar track information. 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. See Appendices B and E for details regarding the development of design-day aircraft operations.

One key component of the design-day is the day and night distribution of operations. Correctly identifying the number of nighttime operations is important because the DNL noise metric weights nighttime noise levels by 10 dB. In essence, one nighttime flight equates to 10 daytime flights. The day and night distribution of operations at each airport was developed from the sample of radar data. The day/night distribution of the sample data was applied to the AAD operational levels at each of the 21 airports. **Table 3.14** presents the Baseline AAD IFR operations that were noise 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 resulting from data distribution are often modeled. The noise model readily accepts this type of input and computes the noise energy from fractional events and whole events alike.

Table 3.14
2000 Average Daily Operations and Time-of-Day for Noise Modeling

Identifier	Airport	AAD Operations	Day-%	Night-%
LGA	LaGuardia	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%
	Total	**5,849**	**85.7%**	**14.3%**

Source: 2/00, 4/00, 7/00 Radar data & Landrum & Brown Analysis, 2001.

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.

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 (See Appendix B). 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:

- H – Heavy Jet (turbo-jet aircraft weighing 255,000 pounds or more)
- M – Medium Jet (turbo-jet aircraft weighing between 75,000 and 255,000 pounds)
- R – Regional Jet (turbo-jet aircraft weighing under 75,000 pounds used for regional air service)
- L – Stage 3 Light Jet (noise certified Stage 3 jets weighing under 75,000 pounds)
- K – Stage 2 Light Jet (noise certified Stage 2 jets weighing under 75,000 pounds)[34]
- T – Turbo Propeller
- P – Piston Propeller

These categories were used to assist in identifying traffic flows that may be used primarily by unique aircraft type. **Table 3.15** 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.

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: whether taxiing aircraft must cross active runways, 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.

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 Definitions) for each airport. A detailed

[34] All medium and heavy jet aircraft currently in operation meet the Stage 3 noise requirements. 14 C.F.R. Part 91, subpart I.

Table 3.15
General Fleet Mix - Baseline 2000

Identifier	Airport	Jets	Turboprops	Props
LGA	LaGuardia	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 & Landrum & Brown Analysis, 2001.

discussion of the runway use percentage development can be found in Appendix E.

Flight Track

To determine projected noise levels on the ground, it is necessary to determine not only how many aircraft are present, but also the altitude and 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).

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 over 425,000 radar flight tracks for analysis. **Figure 3.16** illustrates a single day of radar flight 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 day's overflights of the area.

The Airspace Design Tool (ADT)[35] was used for the detailed analysis of the radar

[35] Developed by Metron Aviation, Inc.

data for each of the 21 airports in the study. ADT separated arrival and departure data for each airport. The design tool isolated groups of tracks with similar altitude and climb or descent profiles to create backbone tracks. Backbone tracks are primary flight tracks. The system also accounts for flight track dispersion through subtracks along the primary flight corridor based on the distribution of radar tracks. Statistical distribution of radar tracks along the backbone tracks determines the spacing between the subtracks. Dispersion along the primary flight tracks typically results from, among other things, wind, weather, and pilot technique. Appendix E provides further detail.

The radar data analysis resulted in the development of over 7,000 individual backbone flight tracks with approximately 15,000 associated sub-tracks. Thus, over 22,000 unique NIRS tracks were developed for model input. **Figure 3.17** 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 yellow tracks indicating the subtracks.

The radar sample was analyzed in detail for the overflights and each of the 21 airports in the study. 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 three-month sample of radar data. This detailed information also allowed for the development of an extensive database of fleet mix and time-of-day for the Baseline 2000 condition noise modeling effort.

For further information see Appendix E which includes a detailed description of the following:

- Noise Modeling Assumptions
- Methodology
- Input Data
- Locational Impact Analysis (Population Centroids and Grid Points)
- DNL Levels

3.5.4.2 Baseline 2000 Results

The results for Year 2000 Existing Conditions are presented for the population centroid locations in the Study Area. The purpose of baseline data is to provide a reader the opportunity to relate 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.

Figure 3.18 provides a graphical representation of the Year 2000 Existing Conditions noise exposure levels for the entire Study Area. 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. **Figure 3.19** provides a closer view showing areas such as JFK, LGA, EWR, TEB, and PHL where most population centroids 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.

Around JFK, the 60 DNL or more noise pattern mostly stays south of the Southern Parkway and is largely over Jamaica Bay. To the northeast, the noise pattern extends beyond the Southern Parkway into the residential area in the Valley Stream vicinity. To the southeast, the noise pattern extends east and south 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 extends along the river over residential areas in Tinicum Township and Essington.

As evidenced by **Table 3.16**, the majority (51 percent) of people residing within the Study Area were exposed to less than 45 DNL. Approximately 197,458 people (0.7 percent of the Study Area population) experience 65 DNL or more within the Study Area under current conditions. Table 3.16 presents the population count for each DNL range.

Table 3.16
Baseline 2000 Maximum Population Exposed to Aircraft Noise

DNL Range (dB)	Population	Percentage of Total
Less than 45	15,237,221	51.47%
45 to less than 50	7,289,219	24.62%
50 to less than 55	4,288,003	14.49%
55 to less than 60	2,068,090	6.99%
60 to less than 65	522,442	1.76%
65 to less than 70	159,665	0.54%
70 to less than 75	37,487	0.12%
Greater than or equal to 75	306	0.01%
Total	29,602,433	100.00%

Source: Landrum & Brown/Metron Inc. Analysis, 2002.

3.6 WEATHER AND CLIMATE

Weather and climate are important factors in aviation operations. Wind, temperature, precipitation, and storms affect how aircraft operate and how air traffic is managed. In addition, weather and climate affect the dissipation of noise and air pollutants. The Study Area is located in the middle latitudes, where the general atmospheric flow is from west to east. This area favors a continental climate with four well-defined seasons. This section describes typical weather patterns for the Study Area.

The Study Area's western boundary is located just west of the Catskill and Pocono Mountains. Both the Catskill and Pocono Mountain ranges rise to about 4,000 feet above MSL. Portions of the Delaware Bay and the entire Long Island Sound are located within the Study Area. Easterly winds from the Atlantic Ocean can cause an upsloping effect within the Study Area. This effect forces air to ascend to higher terrain, cooling as it rises. When the air cools to its dew point as it rises, it can condense and form clouds and precipitation even when there is not a substantial amount of moisture in the air.

Aircraft generally takeoff and land into the wind (known as a headwind) whenever possible. Headwinds reduce an aircraft's takeoff and landing distance, and increase climb rate. Aircraft can operate with considerable crosswinds (a wind blowing at the side of the aircraft), up to about 20 knots for a typical air carrier aircraft. Aircraft can operate with limited tailwinds (a wind blowing on the rear of the aircraft), up to 10 knots for a typical air carrier aircraft. Tailwinds require longer takeoff and landing distances. Winds in excess of crosswind and tailwind limits force aircraft to use a different runway. Accordingly, wind speed and direction dictate the orientation of runways at an airport and the use of specific runway configurations. The annual mean surface wind speed in the Study Area ranges from 8.6 to 12.9 miles per hour, or 7.5 to 11.2 knots. Prevailing winds are from the south during most of the year. During the winter months they are typically from the northwest. The windiest period is late winter and early spring. Winds are generally weakest during the night and early morning hours, increasing to a high in the afternoon. Winds may reach 50 to 60 miles per hour or even higher during severe summer thunderstorms, hurricanes, and winter storms. Tornadoes, which infrequently occur, have resulted in significant damage. Severe hailstorms have occurred in the spring months.

Temperature is an important factor in aircraft performance. High temperatures decrease the density of air, which increases aircraft takeoff distance and reduces climb performance. This generally results in increased noise exposure during hot temperatures, as compared to colder temperatures. Generally pleasant weather with mild temperatures often occurs in the spring and fall seasons. Average summertime (June, July, August, and September) temperatures (Fahrenheit) in this area range from the upper 80s to the low 90s; average temperatures for the winter months (December, January, and February) usually average in the low to mid-20s.[36]

In general, precipitation is associated with storm events and reduced visibility. These factors can result in increased airport delays. Precipitation is rather evenly distributed throughout the year in the Study Area. Summers are warm and generally humid and winters are generally mild with moderate snowfalls. Snowfalls usually average around 25 inches annually,[37] but can vary greatly from year to year. Annual precipitation has ranged from approximately 35 inches to more than 50 inches. Rainfalls of over 10 inches in a 24-hour period have been recorded during the passage of tropical storms.[38] Tropical storms can bring heavy rain, high winds, and flooding, but extensive damage from wind and tidal flooding is rare. Thunderstorms can occur at any time, but are most frequent during the late spring and summer months. The storms are most often accompanied by downpours and gusty winds, but are not usually severe.

Major flooding of both the Delaware and the Lower Hudson Rivers can occasionally result from heavy rains over the basin augmented by snowmelt and above-normal tides associated with hurricanes or severe storms along the coast.[39] Flooding may also occur after a cold winter when both the Delaware and the Lower Hudson may be blocked by ice.

Severe weather, such as thunderstorms, can result in increased aircraft delay. Severe weather is most common in the summer months. During the summers of 1999 and 2000, air passengers saw unprecedented levels of delay partially due to severe weather. In order to mitigate disruption to air traffic, the FAA has developed Severe Weather Avoidance Plans (SWAPs). According to FAA Order 7210.3, *Facility Operation and Administration*, "SWAPs are formalized programs that are of considerable value in areas that are particularly susceptible to severe weather. Plans that are properly developed, coordinated, and implemented can reduce coordination and traffic management associated with rerouting aircraft around areas of severe weather; therefore, resulting in better utilization of available airspace." The National Playbook[40] is a collection of commonly used SWAP routes. The appropriate Air Route Traffic Control Centers (ARTCC) will use these routes to mitigate the potential impacts to the air space system in the event of severe weather.

[36] NOAA National Climatic Data Center. Comparative Climatic Data of the United States.

[37] Ibid.

[38] Ibid.

[39] National Weather Service, Northeast and Mid-Atlantic River Forecast Centers, 2002.

[40] FAA Order 7210.3, Facility Operation and Administration. Section 21: National Playbook. Effective February 19, 2004, last updated February 17, 2005. Available online at <http://www.faa.gov/atpubs/FAC/Ch17/s1721.html>.

3.7 DEPARTMENT OF TRANSPORTATION ACT SECTION 4(f), AND LAND AND WATER CONSERVATION FUND ACT SECTION 6(f)

Section 303(c), Title 49 USC, commonly referred to as Section 4(f) of the DOT Act,[41] states that the "…Secretary of Transportation will not approve a project that requires the use of any publicly-owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance or land from a historic site of national, state, or local significance as determined by the officials having jurisdiction thereof, unless there is no feasible and prudent alternative to the use of such land…and [unless] the project includes all possible planning to minimize harm resulting from the use."[42] The term "use" encompasses both physical use of the property as well as constructive uses. Indirect adverse impacts, such as noise, that prevent the use of Section 4(f) properties for their intended purpose are considered as constituting a "constructive use."

FAA Order 1050.1E includes guidance on how to determine whether increases in noise constitute a constructive use, The Order states, "The land use compatibility guidelines in 14 CFR Part 150 (Part 150) may be relied upon to determine whether there is a constructive use under Section 4 (f) where the land uses specified in the Part 150 guidelines are relevant to the value, significance, enjoyment of the 4(f) land in question."[43] Careful evaluation of the applicability of the Part 150 guidelines is necessary when the Section 4(f) property is located in a quiet setting and the setting is a generally recognized attribute of the site's significance.[44]

Many lands are also subject to the Land and Water Conservation Fund (LWCF) Act Section 6(f). Section 6(f) states that no public outdoor recreation areas acquired or developed with any LWCF assistance can be converted to non-recreation uses without the approval of the Secretary of the Interior. The Secretary of the Interior may only approve conversions if they are in accordance with the comprehensive statewide outdoor recreation plan and if the converted areas will be replaced with other recreation lands of reasonably equivalent usefulness and location.

The Study Area includes numerous city, county, state, and national parks, wildlife refuges, and historic sites. The following sections provide information regarding National Parks, the National Forest System, National Wildlife Refuge System, and State Parks/Forests within the Study Area. More information on historic sites may be found in Section 3.8.

3.7.1 National Parks and Service Lands

National parks are intended to, "conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."[45] The first national park was Yellowstone National Park created in 1872. Today, the national park system

[41] Department of Transportation Act of 1966, § 4(f) [recodified at 49 USC 303 (c)].

[42] FAA Order 1050.1E, Appendix A, page A-19.

[43] FAA Order 1050.1E, Appendix A, page A-20.

[44] FAA Order 1050.1E, Appendix A, page A-21.

[45] 16 USC Section 1.

includes more than 388 units including seashores, monuments, and preserves among others.[46] Over 30 national park service lands are found in the Study Area. **Table 3.17** provides a list and **Figure 3.20** illustrates the national park service lands identified in the Study Area.

3.7.2 National Forest System

The United States Department of Agriculture (USDA) Forest Service is responsible for managing the lands and resources of the National Forest System, which includes 192 million acres of land in 42 states, the Virgin Islands, and Puerto Rico. The system is composed of 155 national forests, 20 national grasslands, and various other lands under the jurisdiction of the Secretary of Agriculture. Section 4(f) applies to only those areas in a National Forest that are historic sites or designated by statute or management plans as a park, recreation area, or wildlife and waterfowl refuge.[47] There are no National Forests within the Study Area.

3.7.3 National Wildlife Refuge System

The United States Department of the Interior Fish & Wildlife Service is responsible for the administration of the National Wildlife Refuge System which now comprises more than 632 units and encompasses over 96 million acres of valuable wildlife habitat.[48] Wildlife refuge areas are a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Table 3.18 provides a list and Figure 3.20 illustrates the National Wildlife Refuge Areas identified in the Study Area.

3.7.4 State Parks, Forests, and Other Areas of Significance

Within the Study Area there exist approximately 203 public parks and open space areas, including forest preserves. **Table 3.19** provides a list and Figure 3.20 illustrates the state parks, forests and other areas of state significance identified in the Study Area.

There are over 2,300 national parks and service lands, national forests, national wildlife refuges, and state parks and forests in the Study Area. Of those, three are exposed to noise levels greater than 65 DNL in Year 2000 Existing conditions.

3.8 HISTORICAL, ARCHAEOLOGICAL, ARCHITECTURAL, AND CULTURAL RESOURCES

A number of federal laws and regulations address protection of the country's cultural resources. The statute specifically devoted to cultural resource issues is the National Historic Preservation Act of 1966,[49] as amended, which contains two provisions that are pertinent to changes in aircraft routing. Section 106 of the statute requires federal agencies to consider the effect of federally funded or licensed projects on

[46] Draft 2006 NPS Management Policies, National Park Service, October 2005, p. 4 http://parkplanning.nps.gov/document.cfm?projectId=13746&documentID=12825.

[47] Section 4(f) Policy Paper, FHWA, Office of Planning, Environment and Realty Project Development and Environmental Review, March 2005, http://environment.fhwa.dot.gov/projdev/4fpolicy.htm#6.

[48] National Wildlife Refuge System Fact Sheet – 2004, U.S. Fish & Wildlife Service

[49] 16 U.S.C. 470

Table 3.17
National Parks and Service Lands

Name	County/Location	Acreage
Connecticut		
Weir Farm National Historic Site	Ridgefield & Wilton	74
Appalachian National Scenic Trail	Litchfield	51.6 miles
New Jersey		
Appalachian National Scenic Trail	Warren & Sussex	72.4 miles
Delaware Water Gap National Recreation Area	Along Delaware Bay	70,000
Edison National Historic Site	West Orange	21
Ellis Island National Monument	New York & New Jersey	27.5
Gateway National Recreation Area	Monmouth	26,607
Morristown National Historical Park	Morristown	1,707
New Jersey Pinelands National Reserve	Cape May, Cumberland, Atlantic, Gloucester, Camden, Burlington and Ocean	1,000,000
New York		
Appalachian National Scenic Trail	Orange, Rockland, Westchester, Putnam and Dutchess	88.5 miles
Castle Clinton National Monument	New York	Not Available
Eleanor Roosevelt National Historic Site	Hyde Park	181
Ellis Island National Monument	New York & New Jersey	27.5
Federal Hall National Memorial	New York	Not Available
Fire Island National Seashore	Patchogue	19,579
Gateway National Recreation Area	Brooklyn, Queens & Staten Island, New York and Monmouth County, New Jersey	26,607
General Grant National Memorial	New York	Not Available
Governors Island National Monument	New York	172
Hamilton Grange National Memorial	New York	32
Home of Franklin D. Roosevelt National Historic Site	Hyde Park	800
Lower East Side Tenement Museum NHS	Manhattan	Not Available
Sagamore Hill National Historic Site	Oyster Bay	83
Saint Paul's Church National Historic Site	Mount Vernon	6
Statue Of Liberty National Monument	New York	58
Theodore Roosevelt Birthplace National Historic Site	New York	Not Available
Vanderbilt Mansion National Historic Site	Hyde Park	212
Pennsylvania		
Appalachian National Scenic Trail	Carbon, Northampton and Monroe Counties	145.2 miles
Delaware Water Gap National Recreation Area	Pike and Wayne	70,000
Delaware and Lehigh National Heritage Corridor	Bucks, Lehigh, Northampton, Monroe and Carbon Counties	150 miles
Edgar Allan Poe National Historic Site	Philadelphia	Not Available
Gloria Dei Church National Historic Site	Philadelphia	Not Available
Hopewell Furnace National Historic Site	Elverson	848
Independence National Historical Park, including Liberty Bell, Independence Hall, and Congress Hall	Philadelphia	45
Thaddeus Kosciuszko National Memorial	Philadelphia	Not Available
Upper Delaware Scenic & Recreational River	Pike and Wayne (PA) and Delaware, Orange and Sullivan (NY) counties along the Delaware River, NY, PA, NJ	75,000
Valley Forge National Historical Park	Valley Forge	3,466

Source: US Department of the Interior, National Park Service

Table 3.18
National Wildlife Refuges

Name	County	Acreage
Connecticut		
Stewart B. McKinney National Wildlife Refuge	Fairfield, New Haven and Middlesex	800
New Jersey		
Cape May National Wildlife Refuge	Cape May	11,000
Edwin B. Forsythe National Wildlife Refuge	Atlantic, Burlington, Ocean	46,000
Great Swamp National Wildlife Refuge	Morris	7,500
Supawna Meadows National Wildlife Refuge	Salem	2,800
Walkill River National Wildlife Refuge	Sussex	4,800
New York		
Amagansett National Wildlife Refuge	Suffolk	36
Conscience Point National Wildlife Refuge	Suffolk	60
Elizabeth A. Morton National Wildlife Refuge	Suffolk	187
Oyster Bay National Wildlife Refuge	Nassau	3,117
Seatuck National Wildlife Refuge	Suffolk	196
Shawangunk Grasslands National Wildlife Refuge	Ulster	565
Target Rock National Wildlife Refuge	Nassau	80
Wertheim National Wildlife Refuge	Suffolk	2,400
Pennsylvania		
John Heinz National Wildlife Refuge at Tinicum	Philadelphia, Delaware	1,200

Sources: US Department of the Interior, U.S. Fish & Wildlife Service

Table 3.19
State Parks and Forests

Name	County	Acreage
Connecticut		
American Legion State Forest	Litchfield	782
Black Rock State Park	Litchfield	443
Bluff Point State Park	New London	806
Burr Pond State Park	Litchfield	436
Chatfield Hollow State Park	Middlesex	355
Cockaponset State Forest	Middlesex	15,652
Collis Huntington State Park	Fairfield	883
Connecticut Valley Railroad	Middlesex	300
Day Pond State Park	New London	180
Dennis Hill State Park	Litchfield	240
Devil's Hopyard State Park	Middlesex	860
Dinosaur State Park	Hartford	60
Fort Griswold Battlefield State Park	New London	16
Fort Trumbull State Park	New London	Not Available
Gillette Castle State Park	Middlesex	184
Haddam Meadows State Park	Middlesex	175
Haley Farm State Park	New London	198
Hammonasset Beach and State Park	New Haven	919
Harkness Memorial State Park	New London	230
Haystack Mountain State Park	Litchfield	224

Table 3.19 (continued)
State Parks and Forests

Name	County	Acreage
Housatonic Meadows State Park	Litchfield	451
Hurd State Park	Middlesex	884
Indian Well State Park	Fairfield	153
James L. Goodwin State Forest	Middlesex	2,171
John A. Minetto State Park	Litchfield	678
Kent Falls State Park	Litchfield	295
Kettletown State Park	New Haven	605
Lake Waramaug State Park	Litchfield	95
Macedonia Brook State Park	Litchfield	2,300
Miller Pond State Park	Middlesex	Not Available
Mohawk State Forest	Litchfield	3,351
Mount Tom State Park	Litchfield	232
Nehantic State Forest	New London	Not Available
Osborne Homestead Museum	New Haven	3
Osborndale State Park	New Haven	350
Penwood State Park	Hartford	787
Peoples State Forest	Litchfield	2,954
Putnam Memorial State Park	Fairfield	183
Rocky Neck State Park	New London	708
Salmon River State Forest	Hartford	6,115
Selden Neck State Park	New London	528
Seth Low Pierrepont State Park	Fairfield	305
Sherwood Island State Park	Fairfield	234
Silver Sands State Park	New Haven	Not Available
Sleeping Giant State Park	New Haven	234
Southford Falls State Park	New Haven	120
Squantz Pond State Park	Fairfield	172
Stratton Brook State Park	Hartford	148
Talcott Mountain State Park	Hartford	557
Topsmead State Forest	Litchfield	514
Wadsworth Falls State Park	Middlesex	285
West Rock Ridge State Park	New Haven	1,688
Wharton Brook State Park	New Haven	96
Delaware		
Augustine Wildlife Area	New Castle	Not Available
Bellevue State Park	New Castle	328
Brandywine Creek State Park	New Castle	933
Brandywine Zoo	New Castle	12
Chesapeake & Delaware Canal Wildlife Area	New Castle	Not Available
Fort Delaware State Park	New Castle	Not Available
Fort Dupont and the Port Penn Interpretive Center	New Castle	322
Fox Point State Park	New Castle	Not Available
Lums Pond State Park	New Castle	1,790
Ommelanden Hunter Education Training Center	New Castle	Not Available
White Clay Creek State Park	New Castle	3,384
Wilmington State Parks	New Castle	Not Available
New Jersey		
Abram S. Hewitt State Forest	Passaic	2,001
Allaire State Park	Monmouth	3,086
Allamuchy Mountain State Park	Warren	7,770
Barnegat Lighthouse State Park	Ocean	32
Bass River State Forest	Burlington & Ocean	26,764
Belleplain State Forest	Cape May & Cumberland	20,749

Table 3.19 (continued)
State Parks and Forests

Name	County	Acreage
Bull's Island Recreation Area	Hunterdon	80
Cape May Point State Park	Cape May	235
Cheesequake State Park	Monmouth & Middlesex	1,292
Corson's Inlet State Park	Cape May	Not Available
Delaware and Raritan Canal State Park	Burlington, Hunterdon, Mercer, Middlesex and Somerset	4,470
Double Trouble State Park	Ocean	7,337
Farny State Park	Morris	3,951
Forked River State Marina	Ocean	Not Available
Fortescue State marina	Cumberland	Not Available
Fort Mott State Park	Salem	104
Hacklebarney State Park	Morris	977
High Point State Park	Sussex	15,328
Hopatcong State Park	Morris	107
Island Beach State Park	Ocean	3,002
Liberty State Park	Hudson	1,212
Jenny Jump State Forest	Warren	4,239
Kittatinny Valley State Park	Sussex	3,407
Brendan T. Byrne State Forest	Burlington & Ocean	34,725
Leonardo State Marina	Monmouth	Not Available
Liberty Landing Marina	Hudson	Not Available
Long Pond Ironworks State Park	Passaic	2,591
Monmouth Battlefield State Park	Monmouth	2,366
Norvin Green State Forest	Passaic	4,365
Parvin State Park	Salem	1309
Penn State Forest	Burlington	3,366
Princeton Battlefield State Park	Mercer	681
Ramapo Mountain State Forest	Bergen	4,200
Rancocas State Park	Burlington	1,252
Ringwood State Park	Bergen & Passaic	4,034
Round Valley Recreation Area	Burlington	3,639
Senator Frank Farley State Marina	Atlantic	Not Available
Spruce Run Recreation Area	Hunterdon	2,012
Stokes State Forest	Sussex	15,947
Stephens State Park	Warren	805
Swartswood State Park	Sussex	2,266
Voorhees State Park	Hunterdon	632
Washington Crossing State Park	Mercer	1,773
Washington Rock State Park	Union	52
Wawayanda State Park	Sussex	17,541
Wharton State Forest	Atlantic, Burlington & Camden	114,557
Worthington State Forest Park	Warren	6,233
New York		
Armlin Hill State Forest	Schoharie	515
Arnold Lake State Forest	Otsego	1,265
Artic China State Forest	Delaware	2,959
Ashland Pinnacle State Forest	Greene	945
Balsam Mountain Wild Forest	Ulster	Not Available
Barbour Brook State Forest	Delaware	768
Barcelona Neck State Natural Resource Management Area	Suffolk	Not Available
Bashakill State Wildlife Management Area	Sullivan	Not Available
Basswood Pond State Forest	Otsego	711

Table 3.19 (continued)
State Parks and Forests

Name	County	Acreage
Bayard Cutting Arboretum State Park	Suffolk	Not Available
Bayswater Point State Park	Queens	12
Beals Pond State Forest	Delaware	Not Available
Bear Mountain State Park	Orange	Not Available
Bear Spring Mountain State Wildlife Management Area	Delaware	Not Available
Bear Swamp State Forest	Otsego	1,759
Bearpen Mountain State Forest	Delaware & Greene	Not Available
Belmont Lake State Park	Suffolk	459
Bethpage State Park	Nassau	Not Available
Big Buck Mountain State Forest	Putman	Not Available
Big Indian Wilderness	Ulster	Not Available
Blackhead Range Wild Forest	Greene	Not Available
Blauvelt State Park	Rockland	Not Available
Blenheim Hill State Forest	Schoharie	783
Bluestone Wild Forest	Ulster	Not Available
Bog Brook State Unique Area	Putman	Not Available
Bristol Beach State Park	Ulster	Not Available
Brookhaven State Park	Suffolk	2,377
Burnt-Rossman Hills State Forest	Schoharie	9,944
Caleb Smith State Park	Suffolk	543
Calhoun Creek State Forest	Otsego	730
California Hill State Forest	Putnam	Not Available
Captree State Park	Suffolk	298
Castle Rock State Unique Area	Putnam	Not Available
Castleton Island State Park	Columbia	Not Available
Catskill Forest Preserve	Ulster	600,000
Caumsett State Historic Park	Suffolk	1,750
Cherry Island State Wildlife Management Area	Orange	Not Available
Cheery Ridge Wild Forest	Delaware	Not Available
Cherry Valley State Forest	Otsego	1,566
Clapper Hollow State Forest	Schoharie	820
Clarence Fahnestock State Park	Putnam	Not Available
Clausland Mountain State Park	Rockland	50
Clay Pit Ponds State Park Preserve	Richmond	260
Clermont State Park	Dutchess	Not Available
Cole Hill State Forest	Albany	874
Colgate Lake Wild Forest	Greene	Not Available
Columbia Lake State Forest	Delaware	700
Connetquot State Park	Suffolk	3,400
Cotton Hill State Forest	Schoharie	503
Cranberry Mountain State Wildlife Management Area	Putman	Not Available
Croton Gorge State Unique Area	Westchester	Not Available
Crumhorn Mountain State Wildlife Management Area	Otsego	Not Available
Currans Road Pond State Wildlife Management Area	Suffolk	Not Available
David A. Sarnoff Pine State Barrens Preserve	Suffolk	Not Available
Decatur State Forest	Otsego	582
Depot Hill State Forest	Dutchess	Not Available
Dry Brook Ridge Wild Forest	Ulster	Not Available
Dry Brook Wild Forest	Delaware	Not Available
Dutch Settlement State Forest	Schoharie	1,051
Dutton Ridge State Forest	Schoharie	1,249
Empire-Fulton Ferry State Park	Kings	9
Exeter State Forest	Otsego	1,957

Table 3.19 (continued)
State Parks and Forests

Name	County	Acreage
Franklin D. Roosevelt State Park	Westchester	Not Available
Franklinton Vlaie State Wildlife Management Area	Schoharie	Not Available
Franklinton Vly State Forest	Schoharie	Not Available
Gilbert Lake State Park	Otsego	Not Available
Glimmerglass State Park	Otsego	Not Available
Gilgo State Park	Suffolk	Not Available
Goosepond State Park	Orange	Not Available
Great Vly Wildlife Management Area	Ulster	Not Available
Halcott Mountain Wild Forest	Greene	Not Available
Harbor Hurons State Wildlife Management Area	Richmond	Not Available
Harriman State Park	Orange	Not Available
Hartwick State Forest	Otsego	Not Available
Harvey Mountain State Forest	Columbia	1,583
Haverstraw Beach State Park	Rockland	Not Available
Heckscher State Park	Suffolk	1,657
Hemlock Ridge State Forest	Ulster	Not Available
Hempstead Lake State Park	Nassau	Not Available
Hickok Brook State Forest	Sullivan	Not Available
High Knob State Forest	Schoharie	1,344
High State Three State Forest	Schoharie	Not Available
High Tor State Park	Rockland	Not Available
Highland Lakes State Park	Orange	3,000
Hither Hills State Park	Suffolk	Not Available
Honey Hill State Forest	Otsego and Schoharie	1,017
Hook Mountain State Park	Rockland	Not Available
Hooker Hill State Forest	Otsego	Not Available
Hooker Mountain State Wildlife Management Area	Otsego	Not Available
Hudson Highlands State Park	Putnam	Not Available
Huddon River Islands State Park	Columbia	Not Available
Hunter Mountain Wild Forest	Greene	Not Available
Huntersfield State Forest	Greene	1,325
Indian Head Wilderness	Greene & Ulster	Not Available
James Baird State Park	Dutchess	Not Available
John Lennox State Demonstration Forest	Delaware	Not Available
Jones Beach State Park	Nassau	Not Available
Kaaterskill Wild Forest	Greene	Not Available
Kerryville State Forest	Delaware	696
Keyserville State Forest	Schoharie	1,163
Kings Park State Natural Resource Management Area	Suffolk	Not Available
Kowawese State Unique Area	Orange	Not Available
Lafayetteville State Forest	Dutchess	Not Available
Lake Superior State Park	Sullivan	Not Available
Lake Taghkanic State Park	Columbia	Not Available
Leonard Hill State Forest	Schoharie	1,617
Long Island Environmental Interpretive Center	Suffolk	Not Available
Long Island State Pine Barrens Preserve	Suffolk	Not Available
Lutheranville State Forest	Schoharie	1,819
Mallet Pond State Forest	Schoharie	2,526
Manorkill State Forest	Schoharie	Not Available
Manorville State Pine Barrens Preserve	Suffolk	Not Available
Maple Valley State Forest	Otsego	801
Margaret Lewis Norrie State Park	Dutchess	Not Available
Max V. Shaul State Park	Schoharie	Not Available

Table 3.19 (continued)
State Parks and Forests

Name	County	Acreage
Michigan Hill State Forest	Delaware	619
Middle Island State Environmental Education Center	Suffolk	Not Available
Middle Mountain Wild Forest	Delaware and Sullivan	Not Available
Milford State Forest	Otsego	512
Mine Kill State Park	Schoharie	Not Available
Minnewska State Park Preserve	Ulster	Not Available
Mongaup Valley State Wildlife Management Area	Sullivan	Not Available
Montauk Downs State Park	Suffolk	Not Available
Montauk Point State Park	Suffolk	Not Available
Mount Loretto Unique Area	Richmond	Not Available
Mount Pisgah State Forest	Greene	544
Murphy Hill State Forest	Delaware	642
Napeague State Park	Suffolk	1,200
Neversink River State Unique Area	Sullivan	Not Available
New Forge State Forest	Columbia	612
Nimham Mountain State Forest	Putman	Not Available
Nutton Hook State Unique Area	Columbia	Not Available
Nyack Beach State Park	Rockland	61
Oak Brush Plains State Preserve	Suffolk	Not Available
Oak Ridge State Forest	Ulster	Not Available
Odgen and Ruth Mills Memorial State Park	Dutchess	Not Available
Oil City State Forest	Otsego and Schoharie	180
Orient Beach State Park	Suffolk	Not Available
Otis Pike State Wildlife Preserve	Suffolk	Not Available
Overlook Mountain Wild Forest	Ulster	Not Available
Painter Hill State Forest	Sullivan	Not Available
Palisades State Park	Rockland	Not Available
Patria State Forest	Schoharie	2,161
Petersburg Pass State Forest	Schoharie	1,094
Phoenicia Wild Forest	Greene and Ulster	Not Available
Plainfield State Forest	Otsego	1,403
Planting Fields Arboretum State Park	Nassau	Not Available
Plattekill State Forest	Delaware	1,757
Pudding Street State Forest	Putman	Not Available
Quoque State Wildlife Refuge	Suffolk	Not Available
R. Milton Hick Memorial State Forest	Otsego	1,293
Relay State Forest	Delaware	Not Available
Rensselaerville State Forest	Albany and Schoharie	2,818
Riverbank State Park	New York	28
Robert Moses State Park	Suffolk	Not Available
Roberto Clemente State Park	Bronx	25
Rockefeller State Park Preserve	Westchester	Not Available
Rockland Lake State Park	Rockland	Not Available
Rockwood Hall State Park	Rockland	Not Available
Rocky Point State Natural Resource Management Area	Suffolk	Not Available
Roeliff Jansen Kill State Forest	Dutchess	Not Available
Rogers Island State Wildlife Management Area	Columbia	281
Roseboom State Forest	Otsego	630
Sag Harbor State Park	Suffolk	Not Available
Sanctuary State Park	Holbrook Island	Not Available
Scott Patent State Forest	Albany and Schoharie	1,463
Shandaken Wild Forest	Greene and Ulster	Not Available
Shawangunk Ridge State Forest	Ulster	Not Available

Table 3.19 (continued)
State Parks and Forests

Name	County	Acreage
Shawangunk State Forest	Ulster	Not Available
Slide Mountain Wilderness	Ulster	Not Available
South Hill State Forest	Delaware and Otsego	Not Available
State Pine Barrens Preserve	Suffolk	Not Available
Steam Mill State Forest	Delaware	5,618
Sterling Forest State Park	Orange	Not Available
Stewart State Forest	Orange	Not Available
Stissing Mountain State Forest	Dutchess	Not Available
Stony Kill State Environmental Education Center	Dutchess	576
Storm King State Park	Orange	Not Available
Sundown Wild Forest	Sullivan and Ulster	Not Available
Sunken Meadow State Park	Suffolk	Not Available
Susquehanna State Forest	Otsego	422
Taconic State Park	Columbia and Dutchess	Not Available
Tallman Mountain State Park	Rockland	Not Available
Texas School House State Forest	Otsego	1,245
Tivoli Bay State Unique Area	Dutchess	1,722
Tomannex State Forest	Delaware	Not Available
Turkey Point State Forest	Ulster	Not Available
Valley Stream State Park	Nassau and Suffolk	Not Available
Vinegar Hill State Wildlife Management Area	Greene	394
Wagner Farm State Forest	Otsego	458
Wassaic State Forest	Dutchess	Not Available
West Kill Mountain Wilderness	Greene and Ulster	Not Available
West Mountain State Forest	Dutchess	Not Available
While Pond State Forest	Putnam	Not Available
Wildwood State Park	Suffolk	600
Willowemoc Wild Forest	Sullivan and Ulster	Not Available
Windham High Peak Wild Forest	Greene	Not Available
Wolf Brook State Forest	Sullivan	Not Available
Wolf Hollow State Wildlife Management Area	Delaware	Not Available
Wurtsboro Ridge State Forest	Sullivan	Not Available
Pennsylvania		
Beltzville Lake State Park	Carbon	2,972
Benjamin Rush State Park	Philadelphia	Not Available
Big Pocono State Park	Monroe	1,306
Delaware Canal State Park	Bucks	Not Available
Delaware State Forest	Pike	80,056
Evansburg State Park	Montgomery	3,349
Fort Washington State Park	Montgomery	493
French Creek State Park	Berks and Chester	Not Available
Gouldsboro State Park	Monroe and Wayne	2,800
Hickory Run State Park	Carbon	15,500
Jacobsburg Environmental Education Center	Northampton	1,168
Lackawanna State Forest	Lackawanna	6,711
Marsh Creek Lake State Park	Chester	1,705
Neshaminy State Park	Bucks	330
Nockamixon State Park	Bucks	5,283
Nolde Forest Environmental Education Center.	Berks	665
Norristown Farm Park	Montgomery	Not Available
Promised Land State Park	Pike	3,000
Prompton State Park	Wayne	Not Available
Ralph Stover State Park	Bucks	45

Table 3.19 (continued)
State Parks and Forests

Name	County	Acreage
Ridley Creek State Park	Delaware	2,606
Tobyhanna State Park	Monroe and Wayne	5,440
Tyler State Park	Bucks	1,711
Varden Conservation Area	Wayne	343
Valley Forge State Forest	Berks, Bucks, Chester, Lehigh, Delaware, Lancaster, Montgomery, and Philadelphia	912
White Clay Creek Preserve	Chester	1,255

Sources: Connecticut Department of Environmental Protection
Delaware Department of Natural Resources and Environmental Control
New Jersey Division of Parks and Forestry
New York State Office of Parks, Recreation, and Historic Preservation
Pennsylvania Department of Conservation and Natural Resources

properties and districts listed, or eligible for listing, in the National Register of Historic Places (NRHP).[50] National Historic Landmarks, a designation bestowed on a very limited number of particularly significant cultural resources, are afforded special protection under Section 110 of the National Historic Preservation Act.[51] NRHP has established standards by which individual resources (both archaeological and architectural) are evaluated to determine their eligibility for listing. Resources may include buildings, sites, objects, and structures which are placed on the NRHP in reference to their: (1) association with events that have made a significant contribution to the broad patterns of American History; (2) association with the lives of person significant in our past; (3) architectural or archaeological significance; and/or (4) ability to yield information important in prehistory or history.[52]

Although implementation of the Proposed Action would not result in a direct impact (i.e., destruction or alteration) to any cultural resource, the Proposed Action may result in an indirect impact to cultural resources. Potentially adverse impacts such as noise may be considered an indirect impact. Therefore, cultural resources in the Study Area have been identified and will be examined for potential impacts in the next chapter. In Year 2000 Existing Conditions, 17 of the over 14,800 historic sites in the Study Area are exposed to noise levels of 65 DNL or greater. **Figure 3.21** shows the locations of cultural resources within the Study Area and a comprehensive list of historic resource sites is included in **Appendix F**.

Potential impacts to Tribal lands must also be assessed when evaluating impacts to cultural resources. Therefore, the Native American Lands located within the Study Area are discussed in the following paragraphs.

The Study Area encompasses over 1,195 acres of Native American Lands, including five Indian Reservations and two State Designated American Indian Statistical Areas (SDAISA). SDAISAs are assigned by designated state officials to state recognized Native American Tribes without land bases. These areas generally

[50] Regulations related to the Section 106 process are outlined in 36 CFR Part 800, "Protection of Historic Properties".

[51] 16 USC 470, promulgated under 36 CFR Part 800.10.

[52] National Register of Historic Places, 36 CFR Part 60.

encompass a compact and contiguous area that contains a concentration of individuals who identify with a state recognized American Indian tribe and in which there is structured or organized tribal activity.[53] These lands can be found throughout the Study Area in Connecticut, New York, and New Jersey. Figure 3.20 illustrates the Native American Lands within the Study Area. There are no Native American lands in the portions of Pennsylvania and Delaware that are in the Study Area. The Native American lands within each state are described in the following sections.

3.8.1 Connecticut Native American Lands

There are two state recognized reservations in the Study Area in Connecticut. The Schaghticoke Reservation is located in Litchfield County in western Connecticut. A total of 10 people reside on the 278 acre Reservation. The second reservation, Golden Hill of the Paugeesukq Nation, is comprised of 107.26 acres. It is divided into two parcels, the largest of which is located in Colchester, in central Connecticut. The other parcel, the original Golden Hill Reservation, is located at Trumbull, in southwestern Connecticut. Fewer than six people were residing on either tract in the early 1990's. However, approximately 60 percent of the tribe's 120 members live in the area. The Paugeesukq Nation is developing a bingo hall and fishing pond, and is currently involved in wood cutting and selling at the Colchester parcel. The Colchester parcel also provides an area where tribe members can relax, pray, and congregate.[54]

3.8.2 New York Native American Lands

Two reservations in Suffolk County, New York fall within the Study Area boundary: the federally recognized Poospatuck Reservation and the state recognized Shinnecock Reservation. The Poospatuck Reservation of the Unkechaug Nation is comprised of 52 acres and is home to approximately 250 members.[55] The 400 acre Shinnecock Reservation is located east of the Poospatuck, in the town of Southampton. It has a population of 164 people and its economy is based on the income it receives from charging admission to the Shinnecock Labor Day Weekend Pow Wow. [56]

3.8.3 New Jersey Native American Lands

The Powhatan-Renape Nation, the Ramapough Mountain Indians, and the Nanticoke Lenni-Lenape Indians of New Jersey are all state recognized tribes in the Study Area in New Jersey. The Powhatan-Renape Nation is located at Rankokus Indian Reservation in Burlington County in southern New Jersey. It consists of 350 acres and is home to a museum, art gallery, and nature trails. The reservation is also recognized as a non-profit entity. The Ramapough Mountain Indian lands are located in northern New Jersey, along the border with New York. The Ramapough Mountain Indian SDAISA has a population of 892. The Nanticoke Lenni-Lenape Indians of New Jersey can be found in Cumberland County in far southern New

[53] US Census, American Fact Finder Glossary, *S.* <www.factfinder.census.gov>.

[54] *American Indian Reservations and Indian Trust Areas,* US Department of Commerce Economic Development Administration. 1996, pages 317-320. http://www.eda.gov/

[55] Encyclopedia of North American Indians, "Poospatuck (Unkechaug Nation)". Houghton Mifflin. http://college.hmco.com/history/readerscomp/naind/html/na_030300_poosepatuck.htm

[56] *American Indian Reservations and Indian Trust Areas,* US Department of Commerce Economic Development Administration. 1996, pages 473-481. http://www.eda.gov/

Jersey. The Nanticoke Lenni-Lenape SDAISA has a population of 12,316.[57]

3.9 AIR QUALITY

This section describes the existing air quality conditions within the Study Area, and relevant provisions of the State Implementation Plans (SIP) of Connecticut, Delaware, New Jersey, New York, and Pennsylvania.

The U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for ambient (outdoor) concentrations of the following criteria pollutants: Carbon Monoxide (CO), Nitrogen Dioxide (NO_2), Ozone (ground-level O_3), Sulfur Dioxide (SO_2), Lead (Pb), and particulate matter with a diameter of 10 microns or less (PM_{10} and $PM_{2.5}$).[58] Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

States must identify geographic areas that do not meet the NAAQS for each criteria pollutant. These areas are then identified as non-attainment areas for the applicable criteria pollutant(s). Non-attainment areas for O_3 and PM_{10} are further classified based on the severity of non-attainment (i.e., marginal, moderate, serious, severe, and extreme for O_3 non-attainment areas, and moderate and severe for PM_{10} non-attainment areas). States must develop a State Implementation Plan (SIP) for non-attainment areas that includes a variety of emission control measures that the state deems necessary to produce attainment of the applicable standard(s) in the future. If a SIP already exists, it must be revised if an area becomes non-attainment for a criteria pollutant, or if the severity of non-attainment changes.

An area previously designated non-attainment pursuant to the Clean Air Act (CAA) Amendments of 1990, and subsequently re-designated as attainment, is termed a *maintenance area*. A maintenance area must have a maintenance plan in a revision to the SIP to ensure attainment of the air quality standards is maintained.

In summary:

- An attainment area is any area that meets the national primary or secondary ambient air quality standard for a given pollutant,
- A non-attainment area is any area that does not meet the national primary or secondary ambient air quality standard for a given pollutant,
- A maintenance area is any geographic area previously designated non-attainment and subsequently re-designated as attainment.

3.9.1 Carbon Monoxide (CO)

Carbon Monoxide is a colorless, odorless, and poisonous gas produced by incompletely burned carbon in fuels. The majority of CO emissions are from transportation sources, with the largest from highway motor vehicles. Molecules of CO survive in the atmosphere for a period of approximately one month, but eventually react with oxygen to form carbon dioxide. Levels of CO found in ambient air may

[57] Ibid, page 433.

[58] Clean Air Act, US EPA, 40 CFR Parts 50-99.

reduce the oxygen carrying capacity of the blood. Health threats from CO are most serious for those with angina or peripheral vascular disease. Exposure to elevated CO levels can cause impairment of visual perception, manual dexterity, learning ability, and performance of complex tasks. There are no areas within the Study Area designated non-attainment for CO, however there are several areas designated as maintenance areas for CO. Areas designated as maintenance areas for CO are listed in **Table 3.20** and are depicted in **Figure 3.22**.

3.9.2 Nitrogen Dioxide (NO_2)

Nitrogen Dioxide is a brownish, highly reactive gas that is present in all urban atmospheres. This pollutant can irritate the lungs, cause bronchitis and pneumonia, and lower resistance to respiratory infections. Nitrogen oxides are an important precursor to both to O_3 and acid rain, and may affect both terrestrial and aquatic ecosystems. The major mechanism for the formation of NO_2 in the atmosphere is the oxidation of the primary air pollutant nitric oxide (NO). Nitrogen oxides, including NO_2, play a major role, together with volatile organic

Table 3.20
CO Maintenance Areas in the Study Area

State	County/Cities
Connecticut	Fairfield County
	Hartford County
	Litchfield County
	Middlesex County
	New Haven County
	Tolland County
New Jersey	Atlantic County (The city of Atlantic City)
	Bergen County
	Burlington County (The city of Burlington)
	Camden County
	Essex County
	Hudson County
	Mercer County (City of Trenton)
	Middlesex County (City of Perth Amboy)
	Monmouth County (Borough of Freehold)
	Morris County (City of Morristown)
	Ocean County (City of Toms River)
	Passaic County
	Salem County
	Somerset County (Borough of Somerville)
	Union County
New York	Bronx County
	Kings County
	Nassau County
	New York County
	Queens County
	Richmond County
	Westchester County
Pennsylvania	Philadelphia County

Source: US EPA Office of Air Quality Planning & Standards. Pollutant status as of April 11, 2005.

compounds (VOCs), in the atmospheric reactions that produce O_3. Nitrogen oxides form when fuel is burned at high temperatures. The two major emissions sources are transportation and stationary fuel combustion sources, such as electric utility and industrial boilers. There are no areas within the Study Area designated non-attainment for NO_2.

3.9.3 Ozone (O_3)

Ozone is a colorless gas composed of three atoms of oxygen, one more than the oxygen molecule that we need to breathe. The additional oxygen atom makes ozone extremely reactive and irritating to tissue in the respiratory system. Ozone exists naturally in the stratosphere, the Earth's upper atmosphere, where it shields the Earth from the sun's ultraviolet rays. However, ozone found close to the Earth's surface, called ground-level O_3, is considered an air pollutant.

Ozone is formed by a complex series of chemical reactions between VOCs and oxides of nitrogen in the presence of sunlight during hot, stagnant summer days.

The primary manmade sources of VOCs and nitrogen oxides (NO_x) are industrial and automobile emissions. Other sources of VOCs include aircraft, airport ground support equipment, lawn and garden equipment, and consumer products such as paints, insecticides, and cleaners. Ozone concentrations can reach unhealthy levels when the weather is hot and sunny with little or no wind. High ozone levels usually occur between 1 p.m. and 7 p.m. from May through September. High concentrations of ozone may cause inflammation and irritation of the respiratory tract, particularly during heavy physical activity. Not only are there negative health effects for humans, but there is clear evidence that ground-level O_3 harms vegetation and forests.

On April 15, 2004, the EPA issued the final designations for areas across the country for the eight-hour ozone standard. Designations and classifications took effect on June 15, 2004. Basic non-attainment areas (i.e., Subpart 1) are areas in attainment for one-hour ozone at the time of designation. Areas categorized as basic non-attainment will have to comply with the more general non-attainment requirements of the CAA (i.e., attainment deadlines five to 10 years after designation). Subpart 2 non-attainment areas are areas in non-attainment for one-hour ozone. Depending on the severity of their eight-hour ozone concentrations, Subpart 2 areas have attainment dates between 2007 and 2021. Marginal non-attainment areas must achieve attainment status within three years of designation. Moderate non-attainment areas must achieve attainment status within six years. The EPA has issued the first phase of the final implementation rule which addresses two key implementation issues: 1) classifications for the eight-hour standard and 2) transitioning from the one-hour to the eight-hour standard. This action outlines the first steps areas will have to take to maintain or improve their air quality. The EPA will issue the second phase of the final eight-hour ozone implementation rule which will address many of the planning and control obligations that will apply for purposes of implementing the eight-hour ozone NAAQS. To meet the requirements of the CAA, the states will be required to develop a SIP by April 2007.

There are several areas located within the Study Area that have been classified by the EPA as being in non-attainment for the eight-hour ozone standards. **Table 3.21** identifies the eight-hour ozone non-attainment areas. **Figure 3.23** depicts the

Table 3.21
Ozone Non-Attainment Areas in the Study Area

State/District	County/Cities	Classification Standard
Connecticut	Fairfield County	Moderate
	Hartford County	Moderate
	Litchfield County	Moderate
	Middlesex County	Moderate
	New Haven County	Moderate
	New London County	Moderate
	Tolland County	Moderate
Delaware	New Castle County	Moderate
New Jersey	Atlantic County	Moderate
	Bergen County	Moderate
	Burlington County	Moderate
	Camden County	Moderate
	Cape May County	Moderate
	Cumberland County	Moderate
	Essex County	Moderate
	Gloucester County	Moderate
	Hudson County	Moderate
	Hunterdon County	Moderate
	Mercer County	Moderate
	Middlesex County	Moderate
	Monmouth County	Moderate
	Morris County	Moderate
	Ocean County	Moderate
	Passaic County	Moderate
	Salem County	Moderate
	Somerset County	Moderate
	Sussex County	Moderate
	Union County	Moderate
	Warren County	Moderate
New York	Albany County	Basic
	Bronx County	Moderate
	Dutchess County	Moderate
	Greene County	Basic
	Kings County	Moderate
	Nassau County	Moderate
	New York County	Moderate
	Orange County	Moderate
	Putnam County	Moderate
	Queens County	Moderate
	Richmond County	Moderate
	Rockland County	Moderate
	Schoharie County	Basic
	Suffolk County	Moderate
	Westchester County	Moderate
Pennsylvania	Berks County	Basic
	Bucks County	Moderate
	Carbon County	Basic
	Chester County	Moderate
	Delaware County	Moderate
	Lackawanna County	Basic
	Lancaster County	Marginal
	Lehigh County	Basic

Table 3.21 (continued)
Ozone Non-Attainment Areas in the Study Area

State/District	County/Cities	Classification Standard
	Monroe County	Basic
	Montgomery County	Moderate
	Northampton County	Basic
	Philadelphia County	Moderate

Source: US EPA Office of Air Quality Planning & Standards. Pollutant status as of April 11, 2005.

locations within the Study Area that are in non-attainment for eight-hour ozone.

3.9.4 Sulfur Dioxide (SO_2)

Sulfur dioxide results largely from stationary sources such as coal and oil combustion, steel mills, refineries, and pulp and paper mills. When a sulfur bearing fuel is combusted, the sulfur is oxidized to form SO_2. Natural sources of SO_2 include releases from volcanoes, oceans, biological decay, and forest fires. The most important man-made sources of SO_2 are fossil fuel combustion, smelting, and manufacturing of sulfuric acid, conversion of wood pulp to paper, incineration of refuse, and production of elemental sulfur. High concentrations of SO_2 affect breathing and may aggravate existing respiratory and cardiovascular disease. Sulfur dioxide is also a primary contributor to acid rain, which causes acidification of lakes and streams. In addition, sulfur compounds in the air contribute to visibility impairment in large parts of the country. Warren County, New Jersey is the only county located within the Study Area that has been classified by the EPA as being in non-attainment for both the primary and secondary SO_2 standards. Figure 3.22 shows this SO_2 non-attainment area.

3.9.5 Lead

The majority of atmospheric lead comes from lead gasoline additives, non-ferrous smelters, and batter plants. Exposure to lead can cause seizures and contribute to mental retardation and behavioral disorders. Due to several EPA pollution control programs, lead levels in humans have dramatically declined in recent decades. Beginning in the 1970s, the EPA lowered the amount of lead allowed in gasoline, and facilitated the switch to unleaded gasoline as the primary fuel for highway vehicles. This switch virtually eliminated lead violations in urban areas with no point sources.[59] Consequently, no counties in the Study Area are in non-attainment or maintenance areas for lead.

3.9.6 Particulate Matter (PM)

Air pollutants considered as PM include dust, dirt, soot, smoke, and liquid droplets directly emitted into the air by sources such as factories, power plants, cars, construction activities, fires, and natural windblown dust. Particles formed in the atmosphere by condensation or the transformation of emitted gases such as SO_2 and VOCs are also considered particulate matter. Based on studies of human populations exposed to high concentrations of particles and laboratory studies of animals and humans, there are major effects of concern for human health. These include effects on breathing and respiratory symptoms, alterations in the body's defense systems against foreign materials, damage to lung tissue, carcinogens, and premature death.

59 EPA Air Quality Planning & Standards, Lead – How Lead Affects the Way We Live & Breathe, November 2000, available at www.epa.gov/air/urbanair/lead/index.html.

Particulate matter also soils and damages materials, and is a major cause of visibility impairment.

Since July 1, 1987, the EPA has used the indicator PM_{10}, which includes only those particles with aerodynamic diameter smaller than 10 micrometers. These smaller particles are likely responsible for most of the adverse health effects of particulate matter because of their ability to reach the thoracic or lower regions of the respiratory tract.

The PM spectrum includes both coarse and fine particles. While the main distinction between coarse and fine particles is the process by which they are produced, EPA and epidemiologists who study the health effects of particulate pollution identify coarse and fine particles through rough approximations of those particles' diameters. Coarse particles, which become airborne usually from the crushing and grinding of solids, generally have diameters between two and a half and 10 micrometers and can thus be identified by the indicator $PM_{10\text{-}2.5}$. Fine particles, indicated by $PM_{2.5}$, come mainly from combustion of gases and generally have diameters of two and a half micrometers or less.

The EPA has developed $PM_{2.5}$ air quality standards. However, the proposed rulemaking to amend the conformity regulations to specifically include $PM_{2.5}$ as a criteria pollutant subject to transportation conformity and to outline the specific conformity requirements that would apply in newly designated $PM_{2.5}$ non-attainment areas is still being negotiated.

Under the current PM_{10} standards, New Haven County, Connecticut and New York County, New York are the only two counties designated non-attainment. $PM_{2.5}$ non-attainment areas were identified in December 2004 and modified in April 2005. **Table 3.22** identifies the PM_{10} and $PM_{2.5}$ non-attainment areas within the Study Area. **Figure 3.24** depicts the locations within the Study Area that are designated non-attainment for PM_{10} and $PM_{2.5}$.

3.10 ENERGY SUPPLY AND NATURAL RESOURCES

According to FAA Order 1050.1E, an EIS should ensure that energy use, its conservation, and energy efficient alternatives are considered along with other pertinent factors in planning, detailed design, and in the decision making process leading to an action. In addition, the potential to change demands on stationary facilities, local energy supplies, and natural resources, other than fuel, is also considered.

The proposed changes in air traffic procedures are intended to improve air traffic flow, mitigate delays, and enhance the safe operation of aircraft within the airspace structure. As stated previously in Chapter One, *Purpose and Need*, aircraft operational activity is expected to experience normal growth with or without the proposed air traffic procedural changes. Furthermore, none of the alternatives considered would result in the construction of facilities that would potentially impact known sources of minerals or energy.

The potential impacts to energy supply and natural resources, as a result of the Proposed Action, are discussed in Chapter Four, Environmental Consequences.

3.11 LIGHT EMISSIONS AND VISUAL IMPACTS

According to FAA Order 1050.1E, a description of potential impacts due to light emissions and visual impacts associated with a Federal action may be required.

Table 3.22

PM_{10} and $PM_{2.5}$ Non-Attainment Areas

Pollutant	State/District	County/Cities	Classification Standard
PM_{10}	Connecticut	New Haven County	Moderate
	New York	New York County	Moderate
$PM_{2.5}$	Connecticut	Fairfield County	Non-Attainment
		New Haven County	Non-Attainment
	Delaware	New Castle County	Non-Attainment
	New Jersey	Bergen County	Non-Attainment
		Essex County	Non-Attainment
		Hudson County	Non-Attainment
		Mercer County	Non-Attainment
		Middlesex County	Non-Attainment
		Monmouth County	Non-Attainment
		Morris County	Non-Attainment
		Passaic County	Non-Attainment
		Somerset County	Non-Attainment
		Union County	Non-Attainment
		Burlington County	Non-Attainment
		Camden County	Non-Attainment
		Gloucester County	Non-Attainment
	New York	Bronx County	Non-Attainment
		Kings County	Non-Attainment
		Nassau County	Non-Attainment
		New York County	Non-Attainment
		Orange County	Non-Attainment
		Queens County	Non-Attainment
		Richmond County	Non-Attainment
		Rockland County	Non-Attainment
		Suffolk County	Non-Attainment
		Westchester County	Non-Attainment
	Pennsylvania	Lancaster County	Non-Attainment
		Bucks County	Non-Attainment
		Chester County	Non-Attainment
		Delaware County	Non-Attainment
		Montgomery County	Non-Attainment
		Philadelphia County	Non-Attainment
		Berks County	Non-Attainment

Source: US EPA Office of Air Quality Planning & Standards. Pollutant status as of April 11, 2005.

3.11.1 Light Emissions

As stated in FAA Order 5050.4A, "Only in unusual circumstances, as, for example, when high intensity strobe lights would shine directly into individual's homes, would the impact of light emissions be considered sufficient to warrant a special study or a more detailed examination of alternatives in an EIS."

In the case of the Proposed Action, no new airport lighting will be installed. The proposed airspace changes do not require construction of any infrastructure. Changes in light emissions will only be associated with changes in aircraft routes. Analysis of the potential changes in light emissions resulting from the Proposed Action is discussed in Chapter Four, *Environmental Consequences*.

3.11.2 Visual Impacts

Visual, or aesthetic, impacts are more difficult to identify than lighting impacts because of the subjectivity involved. Aesthetic impacts deal more broadly with the extent that the development contrasts with the existing environment and whether the governing agency considers this contrast objectionable.

Visual impacts are normally related to the disturbance of the aesthetic integrity of an area caused by development, construction, or demolition. The Proposed Action includes airspace changes only and does not require any construction or demolition. Potential visual impacts in the case of the airspace redesign relate to changes in aircraft routes which result in changes in the visibility of aircraft. Therefore, the potential for the changes in aircraft routes to result in intrusive visual impacts will be addressed in Chapter Four.

3.12 COASTAL RESOURCES

The Coastal Zone Management Act (CZMA) of 1972[60] insures effective management, beneficial use, protection and development of the coastal zone. Coastal Zone Management Programs, prepared by states according to guidelines issued by the National Oceanic and Atmospheric Administration (NOAA), are designed to address issues affecting coastal areas.

The Coastal Barriers Resources Act of 1982[61] prohibits federal financing for development within the Coastal Barrier Resources System, which consists of undeveloped coastal barriers along the Atlantic and Gulf coasts. The legislation was amended by the Coastal Barrier Improvement Act in 1990 to include undeveloped coastal barriers along the shores of the Great Lakes, including Lake Superior in St. Louis County.

The Connecticut Coastal Management Program received federal approval in September 1980 to protect, manage, and restore coastal resources, and ensure their availability and accessibility to the public, to foster water-dependent uses of the shorefront and to oversee the State's public trust responsibilities for tidelands. The Office of Long Island Sound Programs administers and coordinates programs within the Department of Environmental Protection which have an impact on Long Island Sound and related coastal lands and waters. The Office undertakes long-range planning for Long Island Sound and is directly responsible for the implementation, oversight, and enforcement of the state's coastal management and coastal permit

[60] 15 CFR Part 930, subparts C and D, and 15 CFR Part 923.

[61] 57 FR 52730, November 5, 1992.

authorities and provides technical and financial assistance to state and local government agencies. Counties included within Connecticut's Coastal Area are Fairfield, New Haven, Middlesex, and New London.[62]

The Delaware Coastal Management Program (DCMP), established in 1979, works to protect, develop, and where possible enhance the coastal resources of the State. It does this through the review of federal and state projects to ensure that they are consistent with State coastal policies, special area management planning, assistance to state and local governments for local land use planning, and other special on-the-ground projects related to Delaware's coastal resources. The Delaware Coastal Programs are housed within the Delaware Department of Natural Resources and Environmental Control's Division of Soil and Water Conservation (DNREC/DSWC). Since the entire state of Delaware is located in the coastal zone, the Delaware Coastal Zone Management Plan is a key component of the State's environmental process.[63]

In response to the 1972 passage of the Federal Coastal Zone Management Act, New Jersey developed and gained federal approval of the New Jersey Coastal Management Program, which addresses the complex coastal ecosystem as a whole, integrating goals and standards for protection and enhancement of natural resources, for appropriate land use and development and for public access to and use of coastal resources. The program was first approved in 1978. The Coastal Management Program is comprised of a network of offices within the New Jersey Department of Environmental Protection that serve distinct functions yet share responsibilities that influence New Jersey's coast. Through the Coastal Management Program, the Department manages the state's diverse coastal area that includes portions of eight counties and 126 municipalities. These counties are Atlantic, Burlington, Cape May, Cumberland, Middlesex, Monmouth, Salem, and Ocean. A central component of New Jersey's Coastal Management Program is the Coastal Management Office, which is part of the Commissioner's Office of Policy, Planning, and Science. The Coastal Management Office administers the planning and enhancement aspects of New Jersey's federally-approved Coastal Management Program.[64]

Consistency with waterfront policies is a key requirement of the Coastal Management Program established in New York State's Waterfront Revitalization and Coastal Resource Act of 1981. The state program contains 44 coastal policies and provides for local implementation when a municipality adopts a local waterfront revitalization program. The New York State Department of State Division of Coastal Resources, administers the state's coastal management program, and is responsible for determining whether federal actions are consistent with the coastal policies. Counties within the Study Area that contain areas within the New York State Coastal Areas are Bronx, Columbia, Dutchess, Greene, Kings, Nassau, New York, Orange, Putnam, Queens,

[62] Connecticut Department of Environmental Protection, Office of Long Island Sound Programs. Feb. 24, 2005, http://dep.state.ct.us/olisp/index.htm.

[63] Delaware Department of Natural Resources Division of Soil & Water Conservation. 2002, http://www.dnrec.state.de.us/DNREC2000/Divisions/Soil/Soil.htm.

[64] New Jersey Department of Environmental Protection, Coastal Management Program. June 23, 2005, http://www.state.nj.us/dep/cmp/.

Richmond, Rockland, Suffolk, Ulster, and Westchester.[65]

Pennsylvania Coastal Zone Management, a program of the Department of Environmental Protection's Office for River Basin Cooperation, seeks to protect and enhance these fragile natural resources, while reducing conflict between competing land and water uses. The U.S. Department of Commerce approved Pennsylvania's Coastal Zone Management Plan in September 1980. The Commonwealth has two widely separated coastal areas. The 57-mile stretch of coastline along the Delaware Estuary lies within three counties in the Study Area: Bucks, Philadelphia, and Delaware. This coastal zone varies from one-eighth-mile wide in urban areas like Philadelphia to over three and one-half miles in Bucks County and extends to the boundary with New Jersey in the middle of Delaware. The second coastal area is located on the opposite side of the State and outside the Study Area.[66]

3.13 WILD AND SCENIC RIVERS

The Wild and Scenic River Act defines river areas eligible for protection under the legislation as those that are free flowing and have "outstanding remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, and similar values."[67] River segments that qualify for inclusion in the National Wild and Scenic River System are listed on the National Inventory, compiled by the U.S. Department of the Interior.[68] Rivers and river segments included in this discussion are limited to those classified as Wild and Scenic.

The State of Connecticut has one river designated as a National Wild and Scenic River as listed by the National Park Service. The Farmington Wild and Scenic River segment runs from the base of the Goodwin Dam in Hartland to the downstream border of Canton and New Hartford in Litchfield and Hartford counties. The 14-mile segment was designated on August 26, 1994 and classified as recreational.

Located in New Castle County, Delaware and Chester County, Pennsylvania, White Clay Creek and its tributaries were designated as a National Wild and Scenic River on October 24, 2000. The White Clay Creek watershed is one of only a few relatively intact, unspoiled and ecologically functioning river systems remaining in the highly congested and developed corridor linking Philadelphia, Pennsylvania, with Newark, Delaware. The segment has 24 miles classified as scenic and 166 miles classified as recreational.

The State of New Jersey has two rivers designated as National Wild and Scenic Rivers located solely within the State. The first river is the Great Egg Harbor River, which was designated October 27, 1992. It starts as a trickle near Berlin, NJ, and gradually widens as it picks up the waters of 17 tributaries on its way to Great Egg Harbor and the Atlantic Ocean. Nearly all of this 129-mile river system, of which 30.6 miles are designated as scenic and the remaining 98.4 miles are designated as recreational, rests within the Pinelands National Reserve and spans four counties

[65] New York State Department of State, Division of Coastal Resources. 2004, http://www.state.nj.us/dep/cmp/.

[66] Pennsylvania Department of Environmental Protection, Pennsylvania's Coastal Zone Management Program. http://www.dep.state.pa.us/river/czmp.htm.

[67] 16 U.S.C. 1271-1287, as amended.

[68] National Wild & Scenic Rivers System. Jan. 7, 2005, http://www.nps.gov/rivers.

(Atlantic, Gloucester, Camden, and Cape May). The second river is the segment of the Maurice River from the Route 670 Bridge at Mauricetown to the south side of the Millville sewage treatment plant in Cumberland County, New Jersey and two of its tributaries. The tributaries designated include: Menantico Creek from its confluence with the Maurice River to the base of the Impoundment at Menantico Lake; and the Manumuskin River from its confluence with the Maurice to the Pennsylvania Reading Seashore Line Railroad Bridge. Designated as a National Wild and Scenic River on December 1, 1993, 28.9 miles of this segment are classified as scenic and six and one-half miles are classified as recreational. The Maurice River corridor is an unusually pristine Atlantic Coastal river with national and internationally important resources and is also a critical link between the Pinelands National Reserve and the Delaware Estuary.

The Delaware River begins as two separate branches, the East Branch and the West Branch, which both begin in New York State and meet in Hancock, New York. From this point, the Delaware, flowing southeast, continues on the New York-Pennsylvania boundary as far as Port Jervis, New York. There it becomes the boundary between Pennsylvania and New Jersey, following a generally southern course to its outlet in Delaware Bay. The lower Delaware forms the boundary between New Jersey and Delaware for a few miles. Three sections of the Delaware River have been designated as a National Wild and Scenic River. Designated on November 10, 1978, the Upper Delaware Scenic and Recreational River stretches 73.4 miles along the New York-Pennsylvania border. The Upper Delaware River segment begins at the confluence of the East and West Branches and continues downstream to Milrift, Pennsylvania. This section contains 23.1 miles classified as scenic and 50.3 miles classified as recreational. Also designated on November 10, 1978, the Middle Delaware National Scenic River stretches 35 miles from the point where the river crosses the northern boundary of the Delaware Water Gap National Recreation Area to the point where the river crosses the southern boundary. All 35 miles of this segment are classified as scenic. On November 1, 2000, a section of the Lower Delaware River was added to the National Wild and Scenic Rivers System. This 67.3-miles stretch has 25.4 miles classified as scenic and 41.9 miles classified as recreational. The segment begins at the southern boundary of the Delaware Water Gap National Recreation Area and continues to Washington Crossing, PA, just upstream of Trenton, NJ.

In summary, there are five rivers in the Study Area with segments that are classified Wild and Scenic. These segments are eligible for protection under the Wild and Scenic River Act. These sections may also be subject to the requirements of Sections 4(f) and 6(f). If a Wild and Scenic River corridor includes historic sites or is designated as a park, recreation area, or wildlife and waterfowl refuge, then Section 4(f) criteria apply. Similarly, if the Wild and Scenic River corridor was acquired or developed with assistance from the LWCF, then Section 6(f) criteria apply.

3.14 WILDLIFE

This section describes the affected environment related to threatened and endangered species and migratory bird patterns in the Study Area. The focus is on avian species because they are the most likely species to be impacted by changes in aircraft routing.

3.14.1 Threatened and Endangered Species

This section describes the threatened and endangered species located within the Study Area.

Section 7 of the Endangered Species Act of 1973 provides protection to any plants or animals designated as threatened or endangered species. In compliance with this law, as amended, federal agencies are required to ensure developments and improvements will not jeopardize the continued existence of threatened or endangered species, or result in the destruction or adverse modification of the critical habitat of such species. Endangered species are defined as those in danger of extinction throughout all or a significant portion of its range. Threatened species are defined as any species that is likely to become an endangered species, within the foreseeable future, throughout all or a significant portion of its range.

A comprehensive list of state- and federally-recognized Threatened and Endangered species in the Study Area may be found in **Appendix G**.

3.14.2 Migratory birds

Migratory birds are protected by the Migratory Bird Treaty Act (MBTA). The MBTA prohibits the intentional take (pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting) of migratory birds, their eggs, or nests unless a special DOI permit is issued. Changes in where aircraft fly may occur in areas that are traditionally used as migration routes or flyways by migratory birds. Therefore, the predominant flyway within the Study Area and its associated habitats are described in the following paragraphs.

A diverse assemblage of migratory birds frequents the Atlantic Flyway. The Atlantic Flyway is one of four major migratory bird flyways traversing the United States. The Atlantic Flyway begins in northeastern Canada and western Greenland then crosses through the Study Area, following the Atlantic coast of the United States down towards the Caribbean Islands. Migratory birds traveling the Atlantic Flyway use a diverse range of habitat types, including habitat contained in some five physiographic areas of this Study Area within the lower northeast United States. **Figure 3.25** depicts the migratory bird ecological regions in the Study Area. Figure 3.1 shows the physiographic regions in the Study Area. The following discussion offers a generalized characterization of the habitat attributes of these physiographic divisions and their importance to migratory birds.

3.14.2.1 Migratory Bird Habitat within Southern New England Area

This region (Figure 3.1) is comprised of southeastern New York (including Long Island), northern New Jersey, the majority of Connecticut, all of Rhode Island, most of eastern Massachusetts, the southeastern corner of New Hampshire, and south-coastal Maine. It contains some of the most densely populated and urbanized areas in the country, which enhances the value of remaining habitat, especially maritime marshes and dunes, mature deciduous forests, and relict grasslands. Unlike most areas of the northeast, forest fragmentation is a problem in this area and a severe factor threatening forest bird populations. The remaining forests in the area are predominantly a mixture of oak-hickory and other hardwoods, white pine-red pine forests, pine-oak mixtures, and barrens.

Table 3.23 lists the priority species[69] for these habitat types.

3.14.2.2 Migratory Bird Habitat within Allegheny Plateau Area

The Allegheny Plateau Area (Figure 3.1) comprises much of west-central Pennsylvania; the southern tier of New York to the base of the Adirondack Mountains and a portion of northeast Ohio. These deeply forested areas are predominantly upland oak-hickory forest types in the south and beech-maple forests in the north. At somewhat higher elevations, fragments of spruce-fir, white pine, and hemlock occur. The typically rounded hills and narrow to broad valleys are a result of both natural weathering by water and wind and the effects of glacial erosion and deposition. Valley bottoms commonly contain vast deposits of glacial till, sand, and gravel. Among other unique features of this physiographic region are peat bogs and swamps. Important bird habitat types include grasslands, scrub-shrub (disturbed areas), deciduous and mixed forests, and the mountaintop coniferous forests. **Table 3.24** lists the priority species for these habitat types.

3.14.2.3 Migratory Bird Habitat within Northern Ridge and Valley

This component of the Study Area begins in southeastern New York below the Adirondack Mountains and continues through northwestern New Jersey to southeastern Pennsylvania (Figure 3.1). The unique sinuous ridges of this area are a result of the erosion of tightly buckled sedimentary rocks during the last era of extreme geologic formation. Subsequently, its flora and fauna also reflect a distinct uniqueness. Ridges at high elevations covered in oak-hickory forests change into more varied hardwood forests to the north.

Pine-oak woodlands and barrens are an important ecological element as well. Ravine forests are present with the majority of cover provided by hemlock. Valleys display a variety of bottomland and/or riparian forests. Portions of two major river valleys are also included: the Delaware and Hudson, providing riparian habitat. **Table 3.25** lists the priority species for these habitat types.

3.14.2.4 Migratory Bird Habitat within Mid-Atlantic Piedmont

This physiographic area (Figure 3.1) is bordered on the east by a geologic formation known as the Fall Line. This is a remnant volcanic rock escarpment which delineates the dominant sandy clay geologic composition of the coastal plain from the low, rolling hills and mountains of southeast Pennsylvania and northern New Jersey. The Mid-Atlantic Piedmont is arbitrarily separated from the Southern Piedmont at the North Carolina-Virginia line and extends north through Virginia, Maryland, and Pennsylvania before terminating in northern New Jersey. Extensive oak-hickory hardwood forests and some pine-oak forests dominate some 45 percent of this area. Scrub-shrub barrens and agricultural grasslands comprise another 45 percent. Numerous stream systems, some in relatively pristine condition are also present in the region. However, the remainder is experiencing rapid urbanization, particularly in the vicinity of Washington, D.C. and Philadelphia. **Table 3.26** lists the priority species for these habitat types.

[69] Priority species are species that are priorities for conservation action. Priority species are inclusive of species on federal or state endangered, threatened, or special concern lists. Partners in Flight Mid-Atlantic Coastal Plain, Bird Conservation Plan (Physiographic Area #44) Version 1.0, April 1999.

Table 3.23
Priority Bird Populations and Habitats for the Southern New England Area

Habitat Type	Migratory Bird Populations
Maritime (salt) Marsh	salt-marsh sharp-tailed sparrow; seaside sparrow; black rail; American black duck
Mature Deciduous Forest	Cerulean warbler; wood thrush; worm-eating warbler; Kentucky warbler; Louisiana waterthrush
Scrub-shrub (disturbed and Barrens (incl. pine)	golden-winged warbler; American woodcock; prairie warbler; blue-winged warbler
Grasslands (incl. pasture)	Henslow's sparrow; upland sandpiper

Source: Partners in Flight, Bird Conservation Plan for Southern New England Website, http://www.blm.gov/wildlife/pl_09sum.htm, November 2005.

Table 3.24
Priority Bird Populations and Habitats in the Allegheny Plateau Area

Habitat Type	Migratory Bird Populations
Mixed Upland Deciduous	Cerulean warbler, wood thrush; worm-eating warbler; Louisiana waterthrush; Canada warbler; black-throated blue warbler
Scrub-shrub (disturbed and Barrens (incl. pine)	golden-winged warbler; American woodcock
Grasslands	Henslow's sparrow; upland sandpiper
Mountaintop coniferous forest	Bicknell's thrush

Source: Partners in Flight, Bird Conservation Plan for Allegheny Plateau Website, http://www.blm.gov/wildlife/pl_24sum.htm, November 2005.

Table 3.25
Priority Bird Populations and Habitats in the Northern Ridge and Valley Area

Habitat Type	Migratory Bird Populations
Hardwood Forest	Cerulean warbler; worm-eating warbler; Louisiana waterthrush
Scrub-shrub (disturbed and Barrens incl. pine)	golden-winged warbler
Grasslands (incl. pasture)	Henslow's sparrow; upland sandpiper; bobolink

Source: Partners in Flight, Bird Conservation Plan for Northern Ridge and Valley Area Website, http://www.blm.gov/wildlife/pl_17sum.htm, November 2005.

Table 3.26
Priority Bird Populations and Habitats in the Mid-Atlantic Piedmont Area

Habitat Type	Migratory Bird Populations
Mixed Upland Deciduous	Cerulean Warbler, wood thrush; Kentucky warbler; Louisiana waterthrush; wood thrush
Scrub-shrub (disturbed and Barrens (incl. pine)	American woodcock; prairie warbler; field sparrow; whip-poor-will; northern bobwhite
Grasslands (incl. pasture)	Henslow's sparrow; grasshopper sparrow

Source: Partners in Flight, Bird Conservation Plan for Mid-Atlantic Piedmont Area Website, http://www.blm.gov/wildlife/pl_10sum.htm, November 2005.

3.14.2.5 Migratory Bird Habitat within Mid-Atlantic Coastal Plain

Beginning at the southern tip of Long Island, the mid-Atlantic coastal plain extends westward to the Fall Line and comprises the relatively flat plain below the Piedmont through central and all of southern New Jersey (Figure 3.1). Dynamic forces of erosion and deposition from shifting sea levels over thousands of years played one major role in the formation of this region. In addition, stream systems to the west contributed alluvial deposits forming first estuaries and then land. This interaction of water and transported materials continues today, albeit with some interference from man. The area is diverse, transitioning from one dynamic land formation to another. Bays contain marshland within their estuaries and barrier island fringes. Forested wetlands occur in the floodplains of the riparian systems. The eastern plains exhibit pine savannah forests, which then transition into hardwood forests further to the west. However, it should be noted that the natural landscape has been altered by progressive human habitation for the last four centuries and is home to some 11 million people. Yet, this area still contains habitat that is distinctly important to migratory bird populations. **Table 3.27** lists the priority species for these habitat types.

This large region has a variance in elevation from a maximum of approximately 300 feet along the Fall Line to sea level along the eastern shores. The Fall Line is an escarpment located as far as 60 miles west of the southeast New Jersey coast to near-shore further north near Long Island. This region is underlain by unconsolidated sediments that have formed permeable sections of aquifers composed of thick layers of sand and others of gravel. These are further mixed with areas of silt and clay. The large majority of stream flow in this area is from ground-water discharge. Such permeability affects the chemical makeup of water discharged into subsequent bays and estuaries providing an array of water chemistry dependent upon differing soluble minerals through which the water traveled. The estuaries in this region are derived, as previously mentioned, from both the deposition of riverine alluvial sediments and accretion by deposition of sand through forces of tides, storms, and oceanic currents.

The Atlantic Flyway aligns itself strongly with the coastal plain along its entire route. It is this physiographic region, with its profound diversity, which is most important to the support of migratory birds traveling along this major migration route. Particularly important are the estuarine habitat areas, which provide nesting, feeding, and resting habitat for all types of migratory fowl. These ecosystems are considered the most productive of all naturally occurring biological systems on

Table 3.27
Priority Bird Populations and Habitats in the Mid-Atlantic Coastal Plain Area

Habitat Type	Migratory Bird Populations
Pine Savannah	Red-cockaded woodpecker; prairie warbler; Bachman's sparrow
Maritime (salt) Marsh	Henslow's sparrow (dry edges); salt-marsh sharp-tailed sparrow; black rail; seaside sparrow; American black duck
Forrested Wetlands	Cerulean warbler; Swainson's warbler; Prothonotary warbler; Acadian flycatcher
Mixed Upland Forests	Wood thrush; worm-eating warbler; Kentucky warbler

Source: Partners in Flight, Bird Conservation Plan for the Mid-Atlantic Coastal Plain Website, http://www.blm.gov/wildlife/pl_44sum.htm, November, 2005.

earth. Within this region lie millions of acres of estuarine habitat, including portions of two major ecological regions containing large acreages of this habitat: New York Bight and Delaware Bay, which are discussed later in this section.

Estuarine Ecosystems

Estuarine Ecosystems are directly involved in the dynamics of migratory birds not only in this geographic region, but most of the western hemisphere. Estuaries are an equally important resource in the life cycles of land-based mammals as well as marine mammals and ocean-dwelling fishes. The diversity of organisms utilizing the habitat is contingent on the diversity of physical, as well as chemical, conditions in any location. Water depth can vary from exposed tidal flats and creeks in Delaware Bay to hundreds of feet in eastern Long Island Sound. As mentioned, water chemistry is determined largely on the influx of fresh water delivered by local waterways and in addition, the effects of tidal movements of the water column itself. These dynamics constantly affect the salinity of these estuarine waters, which in turn, affects the wildlife and also the living habitat (e.g., grasses, submerged vegetation) upon which these organisms depend.

Types of Estuarine Ecosystems

Four types of Estuarine Ecosystems are described in the following paragraphs: islands and inlands, littoral, freshwater tributaries, and open water.

Islands and Inlands

Islands and inlands near water sources support a full range of species, from insects, amphibians, and reptiles to birds and mammals. Stream banks, floodplains, and wetlands, or any transition from water to land, are particularly productive habitats. Forested uplands and forested wetlands are particularly important nesting and resting habitat for both neo-tropical migrant birds and colonial water birds. Surrounded by water and cut off from most large predators, bay islands are a haven for colonial water birds, waterfowl, and raptors.

Littoral

Littoral (shallow water) areas provide suitable habitat for many life stages of invertebrates, fish, and other aquatic species. Waterfowl, colonial wading birds, and raptors forage for food in these habitats.

Freshwater Tributaries

Freshwater tributaries of major rivers and the hundreds of thousands of creeks and streams that feed into these tributaries provide nutrients important to the productivity of the Bay ecosystem.

Open Water

The open water areas provide the microscopic plants and animal life (plankton) that are the primary food source for shellfish, invertebrates, and fish that populate the bays. Hundreds of thousands of wintering ducks, particularly sea ducks like scoters, oldsquaw, and mergansers, depend on open water areas for their winter food sources.

3.14.2.6 Population Centers for Migratory Birds

There are two ecological regions within the Study area that are population centers for migratory birds: New York Bight and Delaware Bay.

New York Bight

The largest single ecological region in this Study Area with respect to migratory birds is the New York Bight (Figure 3.25). A bight is a general term for a bend or curve in the shoreline of an open coast. In the New York region it refers to the great expanse of shallow ocean between Long Island (to the north and east) and the New Jersey Coast (to the south and west). Since Long Island is oriented generally east to west in relation to mainland of New Jersey, it creates a right angle with the Atlantic coastline. This area includes the Hudson River Estuary. The lower Hudson River and valley between New York City and Troy is known as the Hudson River Estuary. The estuary is covered by marshes wooded swamps, and mud flats. The entire region, as illustrated in Figure 3.25, represents an immense expanse of upland waterways and drainages, which nourish a multitude of wetland habitats crucial to migratory birds including Atlantic brant, black ducks, snow geese, Canada geese, bufflehead, mute swans, mallards, and scaup. The upland waterways and drainages are both freshwater and saline in composition and are found in various types of ecosystems, including freshwater marshes and riparian areas. In addition, saline conditions exist in saltwater marshes, tidal flats, and coastal shores. Outlying this is the Atlantic Ocean, which in this case, would include an area offshore of Long Island, south to lower New Jersey, and further east to the continental shelf lying about 100 miles away.

The watershed involved in this bight is bordered in part by the Adirondacks, Catskills and New York-New Jersey Highlands. Also influential are the Hudson River Valley and coastal flatlands of New Jersey and southern Long Island. This watershed covers an estimated 20 million acres. Approximately 13.5 million of these acres are considered marine and estuarine waters.

Delaware Bay

Second to the New York Bight in influence is Delaware Bay (Figure 3.25). What this area may lack in size to the New York Bight, it makes up for in sheer numbers of migratory birds throughout the year. In fact, according to surveys, Delaware Bay ranks second in numbers of visiting shorebirds in the entire Western Hemisphere. This bay alone may attract approximately 300,000 to possibly over a million shorebirds during the northern spring migration. The estuarine limits are vast when considering freshwater influences. This ecosystem actually begins at the falls of the Delaware River in Trenton, New Jersey and extends seaward to the mouth of the Delaware Bay approximately 133 miles later.

3.15 OTHER RESOURCE CATEGORIES

The following sections describe the remaining resource categories required to be addressed per FAA Order 1050.1E. This project does not include construction of any infrastructure and, therefore, there are no anticipated impacts to these categories.

3.15.1 Construction

The following presents a summary of the impacts that may be expected to result from typical construction activities:

- Increased noise from construction operations;
- Temporary increase in air pollutant emissions;
- Temporary increases in water turbidity; and

- Disposal and management of solid and hazardous wastes.

The implementation of changes to air traffic procedures does not involve any construction activity. Any ICC facility that may be newly constructed would have independent utility and would be subject to a separate environmental review. Therefore, further analysis of construction impacts within the Study Area is not warranted.

3.15.2 Farmlands

The Farmland Protection Policy Acts (FPPA) of 1980 and 1995 require identification of proposed projects that would affect any soils classified as prime and/or unique. Prime farmland contains soil that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is available for these uses. Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops.

Therefore, further analysis of prime and/or unique farmland soils within the Study Area is not warranted.

3.15.3 Floodplains

Executive Order No. 11988, *Floodplain Management*, was issued in order to avoid, to the extent possible, the long and short-term adverse impacts associated with the occupancy and modification of floodplains, and to avoid direct and indirect support of floodplain development wherever there is a practical alternative. The order was issued in furtherance of NEPA, the National Flood Insurance Act of 1968, and the Flood Disaster Protection Act of 1973.

The Proposed Action would not result in construction. Therefore, none of the alternatives considered would encroach upon area designated as a 100-year flood event area as described by the Federal Emergency Management Agency (FEMA).

3.15.4 Hazardous Materials and Solid Waste

In accordance with FAA Order 1050.1E, FAA actions to fund, approve, or conduct an activity may require consideration of hazardous materials and solid waste impacts.

Hazardous materials impacts involve the potential to generate or disturb materials identified as a substance that has been determined to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce.[70] This includes hazardous substances[71] and hazardous wastes.[72]

Solid waste impacts are those associated with the potential long-term generation of municipal solid waste (MSW).

The Proposed Action would not result in any physical disturbances to the ground. In addition, as stated previously in Chapter One, *Project Background and Purpose and Need for the Action*, aircraft operational activity is expected to experience normal growth with or without the proposed air traffic procedural changes. Measures are currently in place at each airport to handle

[70] 49 CFR Part 172, Table 172.101.

71 Hazardous Substance – any element, compound, mixture, solution, or substance defined as a hazardous substance under the Comprehensive Environmental Response, Compensation, Liability Act (CERCLA) and listed in 40 CFR Part 302. If released into the environment, hazardous substances may pose substantial harm to human health or the environment.

72 Hazardous Waste – under the Resource Conservation and Recovery Act (RCRA) a waste is considered hazardous if it is listed in, or meets the characteristics described in 40 CFR Part 261, including ignitability, corrosiveness, reactivity, or extraction procedure toxicity.

the natural growth of air traffic and its associated hazardous materials and solid waste, regardless of the Airspace Redesign Project. Therefore, further discussion of generation or disruption of hazardous materials, or generation of solid waste within the Study Area is not warranted.

3.15.5 Water Quality

Water quality impacts are determined in accordance with the Federal Water Pollution Control Act, as amended (commonly referred to as the Clean Water Act). The Proposed Action involves air traffic procedural changes, would not require the construction of facilities, and therefore does not impact water resources.

3.15.6 Wetlands

Executive Order 11990, *Protection of Wetlands*, was enacted to avoid, to the extent possible, adverse impacts associated with the destruction or modification of wetlands, and to avoid direct or indirect new destruction of wetlands.

Section 404 of the Clean Water Act (CWA), as amended, regulates the discharges of dredged or fill material into navigable waters of the United States through the Section 404 Permit program. The United States Army Corps of Engineers (USACE) has primary responsibility for implementing, permitting, and enforcing the provisions of Section 404. Wetlands are defined by the USACE as: "Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."[73]

The Proposed Action would not result in the construction of facilities. Therefore, no wetlands impacts are anticipated and further analysis of wetlands within the Study Area is not warranted.

[73] 33 CFR 328.3(b) (1996).

Chapter Four
ENVIRONMENTAL CONSEQUENCES

This chapter describes the potential environmental consequences of each of the alternatives selected for detailed consideration in accordance with FAA Order 1050.1E. A total of 19 impact categories are addressed.

The potential impacts of the Proposed Action Airspace Redesign alternatives (Modifications to Existing Airspace, Ocean Routing Airspace, and Integrated Airspace) are determined by comparing the projected future conditions of the affected environment due to the Proposed Action Airspace Redesign alternatives with the corresponding future conditions of the affected environment due to the No Action Airspace Alternative. The Future No Action Alternative serves as a basis of comparison with the Proposed Action alternatives.

4.1 NOISE/COMPATIBLE LAND USE

The sound generated by aircraft is often the most noticeable environmental effect associated with aviation projects. If this sound is sufficiently loud, or frequent in occurrence, it may interfere with various human activities or be considered objectionable (noise). Detailed descriptions of the physics of sound, noise metrics, and the effects of noise on people are included in Appendix E.1.

Noise increases resulting from the implementation of the Proposed Action may affect the quality of the human environment and are analyzed in this Draft EIS. Noise impacts are analyzed by predicting the community exposure to aircraft noise attributable to each of the Proposed Action Airspace Redesign alternatives. The analysis 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 in 2006 and 2011. The change in aircraft noise is compared to the noise impact criteria to determine the level of potential noise impacts.

The results of the noise analysis are also used to determine whether the existing and planned land use is compatible with the change in noise exposure. The existing and future land use within the Study Area and land use surrounding the affected airports is presented in Chapter Three, *Affected Environment*, Section 3.3, *Land Use*. The potential compatible land use impacts resulting from the alternatives are assessed in accordance with FAA Order 1050.1E.

4.1.1 Noise/Compatible Land Use Impact Criteria

The FAA has established 65 DNL as the threshold above which aircraft noise is considered to be incompatible with residential areas. In addition, the FAA has 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 when compared to the No Action alternative for the same time frame.[1]

In 1992, the Federal Interagency Committee on Noise (FICON)[2] recommended that in

[1] FAA Order 1050.1E; FAR 150.21(a)(2)(d).

[2] FICON 1992, Pp. 3-5.

cases where increases in noise of 1.5 DNL occur within the area exposed to 65 DNL, further evaluation should be completed to assess whether or not noise increases of 3 DNL or more occur at noise-sensitive locations within the area exposed to 60-65 DNL. Increases of this magnitude below 65 DNL are not significant impacts, but they should be examined for possible mitigation options. The FAA adopted FICON's recommendation into FAA Order 1050.1E.

For the purpose of this Draft 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 needs to be considered because "even distant ambient noise sources and natural sounds such as wind in trees can easily exceed this [45 DNL] value."[3] **Table 4.1** summarizes the criteria used to assess the level of change in noise exposure attributable to the Proposed Action Airspace Redesign alternatives, as compared to the Future No Action Airspace Alternative, evaluated for this Draft EIS.

The criteria used to determine whether there are potential compatible land use impacts with respect to residential areas are the same as those used to determine potential noise impacts. Noise-sensitive land uses other than residential are also considered when evaluating compatible land use impacts. Noise-sensitive land uses within the Study Area include schools, hospitals, places of worship, parks, and historic sites. Potential compatible land use impacts to these noise-sensitive areas were evaluated based on the noise levels designated as compatible in FAA's Part 150 land use compatibility table.[4]

4.1.2 Noise/Compatible Land Use Analysis

In order to disclose potential noise impacts 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.

As discussed in the noise section of Chapter 3, the principal noise analysis for this Draft EIS was conducted using NIRS. NIRS is the model specified and required in FAA's Order 1050.1E for major airspace redesign studies. The NIRS model is briefly discussed in Chapter Three *Affected Environment*, Section 3.5, *Noise* and a detailed description of the model is included in **Appendix E**.

The noise modeling effort undertaken for this Draft EIS was unique. Many factors including the large number of modeled airports and the size of the Study Area contributed to the complexity of the modeling effort. The noise modeling was customized to accommodate and reflect the uniqueness of this airspace redesign. Two examples of this customized approach are:

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

[4] 14 CFR Part 150, Appendix A, Table 1.

Table 4.1
Criteria for Determining Impact of Increases in Aircraft Noise

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.

- development of tailored computer algorithms to translate radar data into NIRS input, and

- extensive coordination between the noise modelers, airspace modelers, and Airspace Design Team.

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. As with the Baseline 2000 noise analysis, aircraft operations between the surface and 14,000 feet above MSL were modeled. 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 actual noise analysis and results focus on the noise conditions for specific locations at the population centroids (centers of census blocks). The number of people exposed to various noise levels is estimated based on the number of people residing in the census block corresponding to the centroid being evaluated. Future population at each centroid was forecasted for 2006 and 2011 from the 2000 census data. **Appendix H** details the population forecast analysis and results. The location and number of persons that are estimated to experience noise level changes based on the FAA's evaluation criterion are identified for each proposed alternative and each future year of analysis.

The change in noise exposure is also the basis for determining the potential for land use compatibility impacts. In terms of residences, the same analysis used for determining the level of noise impacts is appropriate. Therefore, if there is a significant noise impact resulting from the implementation of an alternative, then there is likewise a significant impact to compatible land use. For noise-sensitive sites other than residential areas the analysis is slightly different. Two methods were used to evaluate noise impacts to noise-sensitive sites. The first method was to input location data (latitudes and longitudes) for noise-sensitive sites within the Study Area into the noise model and calculate noise values at the specific locations. Location data was only available for some 4(f) sites and historic sites. The remaining noise-sensitive sites were evaluated using the second method; identifying the noise-sensitive sites located within the significantly impacted census blocks by using the GIS land use data. Each site was assigned the noise exposure level computed for the census block in which it resided. Finally, noise exposure levels for all

identified noise-sensitive areas were compared with the noise levels designated as compatible using the FAA's Part 150 land use compatibility table.

The next sub-section describes the noise exposure analysis of the Future No Action Airspace Alternative for the years 2006 and 2011. This analysis is the basis for the evaluation of the potential noise and land use compatibility impacts resulting from each of the Proposed Action Airspace Redesign alternatives. The remaining sub-sections provide the results of the noise and compatible land use analysis for each of the Proposed Action Airspace Redesign alternatives investigated for 2006 and 2011. The sections begin with a brief summary of the major design elements of each alternative and its changes as compared to the Future No Action Alternative. The results of the noise analysis are then presented for both future years in graphical and tabular form. The noise exposure changes from the Future No Action Airspace Alternative are presented for each Proposed Action Airspace Redesign alternative by year in total and by area of change (change zone). Brief explanations of the causes associated with each change zone are presented. Lastly, the potential noise and compatible land use impacts are discussed.

For further reference, Appendix E contains a detailed description of the following:

- Noise Modeling Assumptions;
- Methodology;
- Input Data;
- Locational Impact Analysis (Population Centroids/Census Blocks and Grid Points); and
- DNL Levels.

Appendix C also contains a detailed description of the operational modeling analysis, including:

- Airspace design criteria;
- Airspace modeling methodology; and
- TAAM results.

4.1.3 Future Noise Exposure – Future No Action Airspace Alternative

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

4.1.3.1 Noise Modeling Input

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 operations at the 21 airports evaluated in this study. The detailed NIRS modeling data developed for the baseline conditions served as a foundation for building the NIRS model input for the future conditions. The runways and local environmental variables used for the Baseline 2000 modeling were also used in the Future No Action Airspace Alternative modeling.

The Baseline 2000 model was modified to reflect the future operational levels that were forecast for 2006 and 2011. 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. **Table 4.2** presents a summary of the average annual day (AAD) operations and nighttime percentage for each airport for the future conditions.

The mix of aircraft types expected to operate at the study airports was also developed in the forecasting effort. **Table 4.3** presents a generalized summary of the future fleet mix modeled for each of the 21 airports.

In general, runway use modeled at each airport for the Baseline 2000 conditions was held constant when modeling noise for the Future No Action Airspace Alternative. Some slight variations occurred due to changes in the future fleet mix as some categories of aircraft operate more or less prevalently on specific runways.

Table 4.2
Future Average Daily Operations and Time-of-Day Summary

Identifier	Airport	2006		2011	
		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%

Note: *Forecast operations are expected to remain constant at some airports in future years. Operations at LGA are currently near maximum levels. Some smaller airports remain flat for IFR traffic because they are primarily VFR general aviation facilities. See Appendix B for further information.

Source: Landrum & Brown, 2001.

Table 4.3
Generalized Fleet Mix Summary – Future 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%

Source: Landrum & Brown Analysis 2001.

With a couple of exceptions, the modeled flight tracks and dispersion for the Future No Action Airspace Alternative were also held constant from the Baseline 2000 modeling input. The exceptions are those routes or procedures changed after 2000 and subsequently implemented or expected to be implemented by 2006. Thus, the Robbinsville-Yardley "Flip-Flop" Procedure and the Dual Modena Procedure, discussed in Chapter One, *Project Background and Purpose and Need for the Action*, Section 1.2.6.4, *Other Initiatives*, were incorporated into the baseline flight tracks for modeling the future conditions. The only other change considered for inclusion in the Future No Action Alternative was the PHL Runway 17-35 extension. 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 the Baseline 2000 model. However, a qualitative evaluation of the results presented in the PHL Runway 17-35 Extension Project Final EIS was undertaken. According to the Final EIS, the PHL 17-35

runway extension was not expected to be complete until 2007, thus the 2006 noise modeling for this airspace redesign Draft EIS would not be affected by the runway extension. The 2015 noise analysis for the PHL Runway 17-35 Extension Project Final EIS was reviewed to consider the long-term potential effects of the runway extension on the 2011 noise evaluation for this Draft EIS. This review revealed that the Runway 17-35 extension was expected to result in only a very minimal change in the noise pattern around PHL. Since these minimal noise effects of the PHL Runway 17-35 extension would apply to both the No Action and each airspace alternative evaluated in this Draft EIS, the 2011 noise change analysis results presented in this section would not be affected. Therefore, it was not necessary to modify the Baseline 2000 model. Appendix E provides additional detail regarding the noise model input developed for the Future No Action Airspace Alternative conditions.

4.1.3.2 Noise Exposure

The NIRS noise analysis focuses on aircraft noise exposure in areas exposed to noise levels of 45 DNL and greater. NIRS calculates the noise levels at each population census block in the Study Area and computes the potential population exposed to noise based on the criteria presented in Table 4.1. **Figure 4.1** presents the estimated DNL noise exposure pattern for the 2006 Future No Action Airspace Alternative conditions throughout the Study Area. Similarly, **Figures 4.2 through 4.3** present enlarged views of the 2006 Future No Action Airspace Alternative DNL noise exposure at the population centroids.

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 close-in 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.

Figure 4.4 presents the estimated DNL aircraft noise patterns for the 2011 Future No Action Airspace Alternative for the entire Study Area and **Figures 4.5 through 4.6** present enlarged views. The noise patterns for 2011 are very similar in size and shape to those indicated for 2006. Only slight growth in noise exposure 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.

Table 4.4 presents the maximum potential population exposed to aircraft noise by DNL ranges for the Future No Action Airspace Alternative. As shown in Table 4.4, 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 208,000 and 206,000 persons, or about 0.7 percent of the Study Area population, are expected to be exposed to aircraft noise in the 60 to 65

Table 4.4
Future No Action Airspace Alternative - Estimated Population within DNL Ranges

	Year	
DNL Range	**2006**	**2011**
45-60 DNL	11,630,407	11,556,501
60-65 DNL	208,157	206,374
65+ DNL	70,679	74,519
Total Population in Study Area	30,401,564	31,156,051

DNL range for 2006 and 2011, respectively. The population within the 45 to 60 DNL range in 2006 and 2011 is expected to be 37 and 38 percent of the Study Area population, or 11,630,407 persons and 11,556,501 persons, respectively.

It is expected that approximately 11.91 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 approximately 11.84 million persons. However, the number of persons exposed to noise of 65 DNL and greater is expected to increase 5.4 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.

4.1.4 Future Noise Impacts – Modifications to Existing Airspace Alternative

The Modifications to Existing Airspace Alternative includes minor modifications to existing airspace and routing and improving operations as much as possible within the limitations of current ATC facility boundaries. This alternative builds on the Future No Action Airspace Alternative. The following sections present the noise modeling and impacts of the Modifications to Existing Airspace Alternative for the years 2006 and 2011.

4.1.4.1 Noise Modeling Input

The NIRS modeling for the Modifications 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 different from the Future No Action Airspace Alternative procedures or design were modified for the NIRS modeling.

As with the Future No Action Airspace Alternative analysis, noise modeling was developed for IFR overflights and the projected IFR operations at the 21 airports evaluated in this study. The runways, local environmental variables, operations levels, and fleet mix used for modeling the Future No Action Airspace Alternative were also used to model the Modifications to Existing Airspace Alternative. In general, the runway use proportions modeled at each airport for the Future No Action Airspace Alternative were held constant for modeling this alternative.

Similarly, the majority of the modeled flight tracks and dispersion about these tracks for modeling the Future No Action Airspace Alternative were held constant for the Modifications to Existing Airspace Alternative modeling input. Only the flight tracks associated with the design element of the Modifications to Existing Airspace Alternative were adjusted to represent those

known changes for the alternative. The noise model changes made to the Future No Action Airspace Alternative input data in order to model this alternative are summarized as follows:

- New departure 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 Modifications to Existing Airspace Alternative. Flight track adjustments generally 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. Chapter Two, *Alternatives*, provides a detailed discussion of the design changes associated with this alternative. Detailed information regarding the noise model input for this alternative is found in **Appendix E.**

4.1.4.2 Noise Impacts

The following paragraphs describe the noise exposure changes and the potential noise impacts resulting from the implementation of the Modifications to Existing Airspace Alternative.

Exposure

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 76,900 persons in 2006, or 8.8 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 74,519 with the Future No Action Airspace Alternative to 72,011 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 208,157 with No Action to 247,566 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 206,374 persons with No Action to 245,186 persons with the Modifications to Existing Airspace Alternative.

This alternative would result in a 1.6 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 2.8 percent over the Future No Action Airspace Alternative conditions, to approximately 11.8 million persons.

Table 4.5 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. The table presents the population exposure for the airspace alternative in the columns and the No Action condition in the rows. By considering a specific row corresponding to a certain noise exposure range under the No Action scenario, one can see how the distribution of population would change under the alternative scenario. For example, the table indicates that in 2006 there would be 4,889 persons who would be exposed to

Table 4.5

Potential Population Change - Modifications to Existing Airspace Alternative

Increase | No Change | Decrease

		2006 Modifications to Existing Airspace Alternative		
	DNL	**45-60**	**60-65**	**>65**
2006 Future No Action Airspace Alternative	**45-60**	11,382,379	51,250	4,889
	60-65	10,490	192,650	5,017
	>65	20	3,666	66,993

		2011 Modifications to Existing Airspace Alternative		
	DNL	**45-60**	**60-65**	**>65**
2011 Future No Action Airspace Alternative	**45-60**	11,360,933	40,397	373
	60-65	4,297	201,070	1,007
	>65	169	3,719	70,631

Source: NIRS Analysis, Landrum & Brown/Metron Aviation, Inc. 2005.

noise levels from 45 to 60 DNL in the No Action condition who would be exposed to noise levels greater than 65 DNL as a result of the alternative. The areas of the table that are shaded in grey indicate population that would experience a decrease in noise exposure range resulting from the alternative while the red shaded areas represent population that will experience increases in noise. The unshaded areas represent population that would stay in the same noise range resulting from the alternative scenario.

Change

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. **Figures 4.7 and 4.8** 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.

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 4.6 summarizes the estimated change in population exposed to aircraft noise levels that meet the FAA criteria resulting from the

Table 4.6
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	8,068	36,803	142,559
2011	1,010	33,280	109,482
Noise Decreases			
2006	5,970	1	36,628
2011	5,094	22	8,440

Source: NIRS Analysis, Landrum & Brown/Metron Aviation Inc. 2005.

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.

Based on the NIRS analysis it is estimated that 8,068 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 36,803 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 33,280 persons by 2011. There would 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 142,559 persons in 2006. This potential impact is expected to be reduced in 2011 by approximately 23 percent to 109,482 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, 36,628 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 8,440 persons.

In order to provide a better understanding of these potential noise impacts, the areas of change within the Study Area were divided into small zones of change. These zones are generally associated with a specific airport and are identified with a unique code name. Figures are provided with enlarged views of the various change zones along with the name of each zone. For these graphics, the entire census block associated with the population centroid where noise change

values were computed is color-shaded by noise change level. The following paragraphs discuss the potential change in noise impact along with the cause of the change for each zone. Note that the "PM" used to define change zones in this section is not related to particulate matter (PM) discussed in Chapter Three.

Figures 4.9 and 4.10 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 (Figure 4.9): The estimated increases in noise occurring west of Interstate 95 and over the Elizabeth 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, 5,480 persons, represented by 40 census blocks, are expected to experience an increase in noise of greater than or equal to 1.5 DNL above 65 DNL. Similarly, 35,345 persons, represented by 202 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, 29,864 persons, represented by 131 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 (Figure 4.9): The estimated reductions in noise occurring east of Interstate 95 and south of Newark Bay 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 decrease in noise of greater than or equal to 3.0 DNL between 60 and 65 DNL and 7,925 persons, represented by 39 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 (Figure 4.10): The estimated increases in noise occurring west of Interstate 95 and over the Elizabeth 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, 30,379 persons, represented by 183 census blocks, would receive an increase in noise of greater than or equal to 3.0 DNL between 60 and 65 DNL, and additionally 34,373 persons, represented by 148 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 (Figure 4.10): The estimated reductions in noise occurring east of Interstate 95 and south of Newark Bay 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 8325 person, represented by 39 census blocks, would receive a decrease in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

Figures 4.11 and 4.12 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 (Figure 4.11): 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-452. Communities within this region include Essington, Crum Lynne, Woodlyn, Wallingford, Rose Valley, Parkside, and Brookhaven. 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 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 1,458 persons represented by 28 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 73,589 persons represented by 991 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 (Figure 4.11): 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, 36,603 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.

PM-06PHL-C (Figure 4.11): 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 28,196 persons represented by 363 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 (Figure 4.11): 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 heading 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 2,500 persons represented by 62 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 (Figure 4.11): 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 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.

PM-11PHL-A (Figure 4.12): 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 2,900 persons represented by 60 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 68,260 persons represented by 946 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 (Figure 4.12): 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 3,980 persons represented by 43 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 (Figure 4.12): 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 (Figure 4.12): 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 115 persons represented by seven census blocks are expected to experience a reduction in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

4.1.4.3 Compatible Land Use Impacts

Based on the NIRS analysis, the Modifications to Existing Airspace Alternative would potentially result in significant noise impacts to residents located both south of EWR (PM-06-EWR-A and PM-11EWR-A) and west of PHL (PM-06PHL-A and PM-11PHL-A). Residential land use is considered noise-sensitive. Therefore, the significant noise impacts to noise-sensitive areas would also be considered a significant impact in terms of land use compatibility.

Other noise-sensitive land uses within the Study Area such as schools, hospitals, places of worship, parks, and historic sites were also analyzed. Noise-sensitive areas were

identified by using land use data for the significantly impacted census blocks. Noise levels for these noise-sensitive areas were compared with the noise levels designated as compatible using the FAA's Part 150 land use compatibility table.

NIRS results showed that two historic sites near PHL, the Lazaretto and the Printzhof sites, were within significantly impacted census blocks (i.e., census blocks where noise exposure would potentially increase by 1.5 DNL or greater resulting in noise exposure of 65 DNL or greater). Based on analysis in Section 4.5, *Historical, Architectural, Archaeological, and Cultural Resources*, it was determined that this level of noise would be compatible with these particular sites. No other noise-sensitive areas were identified within the significantly impacted census blocks.

The implementation of the Modifications to Existing Airspace Alternative would potentially result in significant land use compatibility impacts to residential areas. Mitigation of these significant impacts will be considered. See Section 4.21, *Mitigation*, for information regarding potential mitigation measures.

4.1.5 Future Noise Impacts – Ocean Routing Airspace 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 noise modeling and impacts of the Ocean Routing Airspace Alternative for the years 2006 and 2011. See Chapter Two, Section 2.4.1.3, *Ocean Routing Concept*, for additional details with respect to the Ocean Routing Airspace Alternative.

4.1.5.1 Noise Modeling Input

The NIRS modeling for the future Ocean Routing 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 Future No Action Airspace Alternative procedures or design were modified for the NIRS modeling.

As with the Future No Action Airspace Alternative 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. The runways, local environmental variables, operations levels, and fleet mix used for the Future No Action Airspace Alternative modeling were also used in the future Ocean Routing Airspace Alternative modeling. In general, the runway use proportions modeled at each airport for the Future No Action Airspace Alternative conditions were held constant for modeling this alternative.

Similarly, the majority of the modeled flight tracks and dispersion about these tracks for the Future No Action Airspace Alternative was held constant for the Ocean Routing Airspace Alternative modeling input. Only the flight tracks associated with the design element of the Ocean Routing Alternative were adjusted to represent those known changes for the alternative. The noise model changes made to the Future No Action Alternative input data in order to model the Ocean Routing Airspace Alternative are summarized as follows:

- EWR and JFK departures are rerouted over the Atlantic Ocean per NJCER design;
- LGA departures climb to a specified altitude before crossing the Hudson River per NJCER design;
- LGA south arrivals increase altitude over Raritan Bay; and
- JFK south arrivals are shifted to the east, while 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 Ocean Routing Alternative. Flight track adjustments generally 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. Chapter Two provides a detailed discussion of the design changes associated with this alternative. Detailed information regarding the noise model input for this alternative can be found in Appendix E.

4.1.5.2 Noise Impacts

The following paragraphs describe the noise exposure changes and the potential noise impacts resulting from implementation of the Ocean Routing Airspace Alternative.

Exposure

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 approximately 67,500 persons in 2006, or 4.5 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 74,519 in the Future No Action Airspace Alternative to 72,312 with the Ocean Routing Airspace Alternative.

The number of persons that would be exposed to 60-65 DNL is expected to increase from 208,157 persons with No Action to 209,172 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 206,374 with the Future No Action Airspace Alternative to 210,863 persons with the Ocean Routing Airspace Alternative.

This alternative would result in a 3.5 percent decrease in the number of persons expected to be exposed to noise levels between 45 and 60 DNL in 2006 to approximately 11.2 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 11.3 million persons.

Table 4.7 presents a summary of the population likely to be exposed to noise levels for the Ocean Routing Airspace Alternative as compared to the Future No Action Airspace Alternative for both future years. This table highlights the areas where the alternative caused increases and decreases in population exposure for the specific DNL ranges.

Change

In order to determine the significance of the changes in noise exposure associated with the Ocean Routing Airspace Alternative, an analysis of the changes relative to the FAA's noise impact criteria was completed. **Figures 4.13 and 4.14** present a map of the

Table 4.7
Maximum Potential Population Change – Ocean Routing Airspace Alternative

Increase | No Change | Decrease

		2006 Alternative		
	DNL	**45-60**	**60-65**	**>65**
2006 Future No Action Airspace Alternative	**45-60**	10,991,555	5,494	0
	60-65	7,658	200,220	279
	>65	0	3,458	67,221

		2011 Alternative		
	DNL	**45-60**	**60-65**	**>65**
2011 Future No Action Airspace Alternative	**45-60**	11,093,976	6,036	0
	60-65	4,024	201,956	394
	>65	0	2,601	71,918

Source: NIRS Analysis, Landrum & Brown/Metron Aviation, Inc. 2005.

Ocean Routing Airspace Alternative noise changes at the population census blocks for both 2006 and 2011. Only census blocks that meet the noise exposure criteria discussed in Section 4.1 and that are populated are shown. 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 figures 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.

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 4.8** presents a summary for the estimated change in population exposed to aircraft noise levels that meet the FAA criteria resulting from the Ocean Routing Airspace Alternative. 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.

Based on the NIRS analysis, it is estimated that the Ocean Routing Airspace Alternative provides a noise reduction of 1.5 DNL or more in areas exposed to 65 DNL or more. In 2006, this level of noise reduction would be experienced by 180 persons but would decrease in 2011 to zero persons. This alternative also provides Slight to Moderate impact relief at lower noise levels. In the 60 to 65 DNL range it is expected that 1,600 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.

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 7,504 persons in 2006.

Table 4.8
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	7,504
2011	0	0	18,633
Noise Decreases			
2006	180	1,600	117,988
2011	0	0	16,166

Source: NIRS Analysis, Landrum & Brown/Metron Aviation Inc. 2005.

This impact is expected to increase in 2011 by approximately 150 percent to 18,633 persons. There is also a potential reduction in noise exposure at these lower noise levels with this alternative. Approximately 118,000 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 16,200 persons.

In order to provide a better understanding of these potential noise impacts, the areas of change within the Study Area were divided into small zones of change. These zones are generally associated with a specific airport and are identified with a unique code name. Figures are provided with enlarged views of the various change zones along with the name of each zone. The following paragraphs discuss the potential change in noise impact along with the cause of the change for each zone.

Figures 4.15 and 4.16 present an enlarged view of the noise changes at the population census blocks and change zones associated with EWR for 2006 and 2011, respectively. Each change zone shown on the figures is discussed in the following paragraphs.

PD-06EWR-A (Figure 4.15): The estimated reductions in noise occur over three areas: east of the Garden State Parkway and over the village of Linden and Winfield, over the area of Westfield, and then further west to Madison. 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 117,988 persons represented by 1,588 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 (Figure 4.15): The estimated reductions in noise occurring north of EWR and over the village of Harrison 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 180 persons represented by one census block are expected to experience a decrease in noise of greater than or equal to 1.5 DNL within 65 DNL. Similarly, 1,600 persons represented by 12 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 (Figure 4.15): The estimated increases in noise occurring northeast of EWR and over the village of Hoboken 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, 6,396 persons represented by 27 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 (Figure 4.15): The estimated increases in noise occurring south of EWR and over Staten Island 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, 1,108 persons represented by 13 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 (Figure 4.16): The estimated reductions in noise occurring west of Interstate 95 and over the village of Linden 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, 16,166 persons represented by 216 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 (Figure 4.16): The estimated increases in noise occurring northeast of EWR and between Interstate 95 and the village of Hoboken 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, 4,926 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 (Figure 4.16): The estimated increases in noise occurring south of EWR and over Staten Island 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, 13,707 persons represented by 122 census blocks are expected to experience an increase in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

4.1.5.3 Compatible Land Use Impacts

Based on the NIRS analysis, the Ocean Routing Airspace Alternative would not result in significant noise impacts to residents located in the Study Area. Therefore, there would not be a significant impact to residential areas in terms of land use compatibility.

Other noise-sensitive land uses within the Study Area such as schools, hospitals, places of worship, parks, and historic sites were also analyzed. Noise-sensitive areas were identified by using land use data for the significantly impacted census blocks. Noise levels for these noise-sensitive areas were compared with the noise levels designated as compatible using the FAA's Part 150 land use compatibility table.

One noise-sensitive site, the Frank M. Charles Memorial Park, was identified for further analysis. The Frank M. Charles Memorial Park is part of the Gateway National Recreation Area located in the heart of the New York Metropolitan Area. As a result of the implementation of the Ocean Routing Airspace Alternative (2006), the noise exposure at this park increased to 65.0 DNL. According to the Part 150 land use compatibility table, parks are compatible with noise exposure of up to 75 DNL. However, if a park's features include an amphitheatre, a lower level of noise exposure is considered when determining compatible land use. Noise exposure of less than 65 DNL is considered compatible with an amphitheatre. There is not an amphitheatre within Frank M. Charles Memorial Park. Therefore, 65 DNL would be compatible with the activities occurring at this park. No other noise-sensitive areas were identified within the significantly impacted census blocks.

Because the implementation of the Ocean Routing Airspace Alternative would not likely result in significant land use compatibility impacts to residential or other noise-sensitive areas, no further analysis is required.

4.1.6 Future Noise Impacts – Integrated Airspace Alternative Variation without ICC

The Integrated Airspace Alternative combines the New York TRACON airspace with portions of surrounding Centers' airspace to permit more seamless operations. The Integrated Airspace Alternative could be accomplished either with standalone (existing facilities) or consolidated facilities (ICC) because the key component is a common automation platform. Because the FAA has not yet decided whether to approve the ICC concept, the Integrated Airspace Alternative was designed with two variations. The initial phase (2006) is the same for both variations because an ICC will not exist in 2006. It involves modifications to a departure gate as well as additional diverging departure headings; however, airspace facility boundaries would not change.

In the next phase (2011), the following variations appear:

- The first variation will integrate the airspace to the extent possible with standalone facilities. It includes the same changes to the airspace structure from phase one with expanded use of terminal separation, reallocation of airspace sectors, and new technologies.

- The second variation involves full airspace integration (i.e., combining the TRACON and Center airspace). There would be modifications to multiple departure gates, additional arrival posts, and additional diverging departure headings.

Both the initial phase (2006) and the first variation of the second phase are called the Integrated Airspace Alternative Variation without Integrated Control Complex (ICC) because an ICC would not exist. The second variation will be called the Integrated Airspace Alternative Variation with ICC. This section presents the noise modeling and impacts of the Integrated Airspace Alternative Variation without ICC in the years 2006 and 2011.

4.1.6.1 Noise Modeling Input

The NIRS modeling for the future Integrated Airspace Alternative Variation without ICC 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 Future No Action Airspace Alternative procedures or design were modified for the NIRS modeling.

As with the Future No Action Airspace Alternative 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. The runways, local environmental variables, operations levels, and fleet mix used for the Future No Action Airspace Alternative modeling were also used in the Integrated Airspace Alternative Variation without ICC modeling. In general, the runway use proportions modeled at each airport for the Future No Action Airspace Alternative conditions were held constant for this variation's noise modeling.

Similarly, the majority of the modeled flight tracks and dispersion about these tracks for the Future No Action Airspace Alternative modeling were held constant for the Integrated Airspace Alternative Variation without ICC 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 noise model changes made to the No Action input data in order to model the alternative are summarized as follows:

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

- New departure headings added (LGA, EWR, PHL);

- South departure route added (ISP only); and

- HPN Arrivals from the south turn closer to HPN.

Each of these items represents a group of flight track adjustments that were required in order to model the alternative design. Flight track adjustments generally 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. Chapter Two provides a detailed discussion of the design changes associated with this variation. Detailed

information regarding the noise model input for this variation can be found in Appendix E.

4.1.6.2 Noise Impacts

The following paragraphs describe the noise exposure changes and the potential noise impacts resulting from implementation of the Integrated Airspace Alternative Variation without ICC.

Exposure

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 76,700 persons in 2006, or 8.5 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 74,519 with the Future No Action Airspace Alternative to 71,880 with the Integrated Airspace Alternative Variation without ICC.

In the 60 to 65 DNL range the population is expected to increase from 208,157 persons with the Future No Action Airspace Alternative to 246,485 persons with the Integrated Airspace Alternative Variation without ICC in 2006. A similar shift is expected in 2011 with 206,374 persons in the Future No Action Airspace Alternative increasing to 244,704 persons with the Integrated Airspace Alternative Variation without ICC.

This variation would result in a very small percentage increase in the number of persons expected to be exposed to noise levels between 45 and 60 DNL in 2006 from 11.63 million to 11.64 million persons. Similarly, in 2011 this variation would increase the estimated persons exposed to aircraft noise between 45 and 60 DNL by about 1.6 percent from approximately 11.56 million to 11.74 million persons.

Table 4.9 presents a summary of the potential population exposed to noise levels for the Integrated Airspace Alternative Variation without ICC as compared to the Future No Action Airspace Alternative for both future years. The table highlights the areas where this variation would potentially cause increases and decreases in population exposure for the specific DNL ranges.

Change

In order to determine the significance of the changes in noise exposure associated with the Integrated Airspace Alternative Variation without ICC, an analysis of the changes relative to FAA's noise impact criteria was completed. **Figures 4.17 and 4.18** present a map of the Integrated Airspace Alternative Variation without ICC noise changes at the population census block centroids for both 2006 and 2011. Only populated census blocks that meet the noise exposure criteria in Section 4.1 are discussed. Both increases and decreases in noise levels meeting the criteria are shown. The census block centroids are color-coded to identify the criterion that they meet and whether the noise increased or decreased.

As the figures indicate, the changes associated with this variation 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 the other airports modeled in the analysis.

Table 4.9

Maximum Potential Population Change - Integrated Airspace Alternative Variation without ICC

Increase | No Change | Decrease

		2006 Alternative		
	DNL	**45-60**	**60-65**	**>65**
2006 No Action	**45-60**	11,211,611	50,496	4,889
	60-65	11,030	192,323	4,804
	>65	20	3,666	66,993

		2011 Alternative		
	DNL	**45-60**	**60-65**	**>65**
2011 No Action	**45-60**	11,212,654	40,615	373
	60-65	5,128	200,225	1,021
	>65	169	3,864	70,519

Source: NIRS Analysis, Landrum & Brown/Metron Aviation, Inc. 2005.

Table 4.10 summarizes the estimated change in population exposed to aircraft noise levels that meet the FAA criteria resulting from the Integrated Airspace Alternative Variation without ICC 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 of the noise change.

Based on the NIRS analysis, it is estimated that 16,290 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 13,584 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 36,828 persons would experience an increase in noise levels of 3.0 DNL or more in 2006. This number is expected to decrease slightly to 33,212 persons by 2011. There are no decreases of 3.0 DNL at noise levels of 60 to 65 DNL expected as a result of this variation in either 2006 or 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 138,840 persons in 2006. This impact is expected to be reduced in 2011 by approximately 21 percent to 109,803 persons. There is also a potential reduction in noise exposure at these lower noise levels with this variation. Approximately 37,120 persons are estimated to experience a 5.0 DNL reduction in noise levels between 45 and 60 DNL in 2006. By 2011, the noise

Table 4.10
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	16,290*	36,828	138,840
2011	13,584**	33,212	109,803
Noise Decreases			
2006	5,970	1	37,120
2011	5,094	22	8,695

*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. 2005.

reduction at these levels is expected to be experienced by 8,695 persons.

In order to provide a better understanding of these potential noise impacts, the areas of change within the Study Area were divided into smaller zones of change. These zones are generally associated with a specific airport and are identified with a unique code name. Figures are provided with enlarged views of the various change zones along with the name of each zone. The following paragraphs discuss the potential change in noise impact along with the cause of the change for each zone.

Figures 4.19 and 4.20 present an enlarged view of the noise changes at the population census blocks and change zones associated with LGA and EWR for 2006 and 2011. Each change zone shown on the figures is discussed in the following paragraphs.

PINB-06LGA-A (Figure 4.19): 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 three 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 (Figure 4.20): 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 (Figure 4.19): The estimated increases in noise occurring west of Interstate 95 and over the Elizabeth 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, 5,480 persons represented by 40 census blocks are expected to experience an increase in noise of greater than or equal to 1.5 DNL above 65 DNL. Additionally, 35,345 persons represented by 202 census blocks are expected to receive an increase in noise of greater than or equal to 3.0 DNL between 60 and 65 DNL, and 30,088 persons represented by 132 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 (Figure 4.19): The estimated reductions in noise occurring east of Interstate 95 and south of Newark Bay 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 6,000 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 8,512 persons represented by 42 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 (Figure 4.20): The estimated increases in noise occurring west of Interstate 95 and over the Elizabeth 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, 496 persons represented by seven census blocks are expected to experience an increase in noise of greater than or equal to 1.5 DNL above 65 DNL. Additionally, 30,346 persons represented by 183 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 34,009 persons represented by 144 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 (Figure 4.20): The estimated reductions in noise occurring east of Interstate 95 and south of Newark Bay 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 5,100 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 two 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 8,580 persons represented by 41 census blocks are expected to experience a decrease in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

Figures 4.21 and 4.22 present an enlarged view of the noise changes at the census blocks and change zones associated with PHL for 2006 and 2011, respectively. Each change zone shown on the figures is discussed in the following paragraphs.

PINB-06PHL-A (Figure 4.21): 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-452. Communities within this region include: Essington, Crum Lynne, Woodlyn, Wallingford, Rose Valley, Parkside, and Brookhaven. 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 1,458 persons represented by 28 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 73,600 persons represented by 991 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 (Figure 4.21): 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 Schuykill 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 the north gate and 030 and 050° for the west gate. Approximately 32,700 persons represented by 388 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 (Figure 4.21): 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 28,100 persons, represented by 359 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 (Figure 4.21): 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 (Figure 4.21): 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 (Figure 4.22): 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 2,900 persons representing 60 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 68,100 persons represented by 944 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 (Figure 4.22): 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 4,300 persons represented by 49 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 (Figure 4.22): 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 71 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 (Figure 4.22): 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 120 persons represented by seven census blocks are expected to experience a reduction in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

4.1.6.3 Compatible Land Use Impacts

Based on the NIRS analysis, the Integrated Airspace Alternative Variation without ICC would potentially result in significant noise impacts to residents located north of LGA (PINB-06LGA-A and PINB-11LGA-A), south of EWR (PINB-06-EWR-A and PINB-11EWR-A), and west of PHL (PINB-

06PHL-A and PINB-11PHL-A). Residential land use is considered noise-sensitive. Therefore, significant noise impacts to noise-sensitive areas would also be considered a significant impact in terms of land-use compatibility.

Other noise-sensitive land uses within the Study Area such as schools, hospitals, places of worship, parks, and historic sites were also analyzed. Noise-sensitive areas were identified by using land use data for the significantly census blocks. Noise levels for these noise-sensitive areas were compared with the noise levels designated as compatible using the FAA's Part 150 land use compatibility table.

NIRS results showed that two historic sites near PHL, the Lazaretto and the Printzhof sites, were within significantly impacted census blocks (i.e., census blocks where noise exposure would potentially increase by 1.5 DNL or greater resulting in noise exposure of 65 DNL or greater). Based on analysis in Section 4.5, *Historical, Architectural, Archaeological, and Cultural Resources*, it was determined that this level of noise would be compatible with these particular sites. No other noise-sensitive areas were identified (other than residential) within the significantly impacted census blocks.

The implementation of the Integrated Airspace Alternative Variation without ICC would potentially result in significant land use compatibility impacts to residential areas. Mitigation of these significant impacts will be considered. See, Section 4.21, Mitigation, for information regarding potential mitigation measures.

4.1.7 Future Noise Impacts – Integrated Airspace Alternative Variation with ICC

The second variation of the Integrated Airspace Alternative involves full airspace integration (i.e., combining the TRACON and Center airspace). In addition, there would be modifications to multiple departure gates, additional arrival posts, and additional diverging departure headings.

The Integrated Airspace Alternative Variation with ICC represents a full airspace consolidation and is a 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.[5] The ICC airspace would be comprised of the majority of current NY TRACON 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 noise modeling and impacts of the Integrated Airspace Alternative Variation with ICC for the forecasted 2011 conditions.

4.1.7.1 Noise Modeling Input

The NIRS modeling for the future Integrated Airspace Alternative Variation with ICC is directly based on the Future No Action Airspace Alternative noise modeling input. Only the elements of the variation's design that are expected to be different from the No

[5]Many air traffic control altitudes are given in flight levels representing altitude above mean sea level (MSL) in increments of 1,000 feet (i.e., flight level 230 equates to 23,000 feet above MSL).

Action procedures or design were modified for the NIRS modeling.

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

The majority of the modeled flight tracks and dispersion about these tracks for the Future No Action Airspace Alternative modeling was held constant for the Integrated Airspace Alternative Variation with ICC modeling input. Only the flight tracks associated with the design elements of the Integrated Airspace Alternative Variation with ICC were adjusted to represent those known changes for this variation. The noise model changes made to the Future No Action Airspace Alternative input data are summarized as follows:

- West departure gates shifted and Expanded – Two jet airways added (all airports);
- New departure 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 this variation. Flight track adjustments generally involved moving 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. Chapter Two provides a detailed discussion of the design changes associated with this variation. Detailed information regarding the noise model input for this variation can be found in Appendix E.

4.1.7.2 Noise Impacts

The following paragraphs describe the noise exposure changes and the potential noise impacts resulting from implementation of the Integrated Airspace Alternative Variation with ICC.

Exposure

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 73,824 persons in 2011.

The number of persons that would be exposed to 60-65 DNL is expected to increase from 206,374 persons with the Future No Action Airspace Alternative to 249,068 persons with the Integrated Airspace Alternative Variation with ICC in 2011.

This variation would result in a 4.1 percent increase in the number of persons expected to be exposed to noise levels between 45 and 60 DNL in 2011 from 11.56 million persons to 12.04 million persons.

Table 4.11 presents a summary of the potential population exposed to noise levels for the Integrated Airspace Alternative Variation with ICC as compared to the Future No Action Airspace Alternative for the forecast 2011 conditions. The table highlights the areas where this variation is expected to cause increases and decreases in population exposure for the specific DNL ranges.

Change

In order to determine the significance of the changes in noise exposure associated with the Integrated Airspace Alternative Variation with ICC, an analysis of the changes relative to FAA's noise impact criteria was completed. **Figure 4.23** is a map of the Integrated Airspace Alternative Variation with ICC noise changes at the census blocks centroids for the 2011 future conditions. Only populated census blocks that meet the noise threshold criteria discussed in Section 4.1 are shown. 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 figures indicate, the changes associated with this variation are evident both close-in to the airports, as well as farther 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 farther 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 4.11

Maximum Potential Population Change - Integrated Airspace Alternative Variation without ICC

Increase | No Change | Decrease

		2011 Alternative		
	DNL	**45-60**	**60-65**	**>65**
2011 Future No Action Airspace Alternative	**45-60**	10,483,304	53,332	373
	60-65	11,379	190,805	4,190
	>65	327	4,931	69,261

Source: NIRS Analysis, Landrum & Brown/Metron Aviation, Inc. 2005.

Table 4.12 summarizes the estimated change in population exposed to aircraft noise levels that meet the FAA criteria resulting from the Integrated Airspace Alternative Variation with ICC 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.

Based on the NIRS analysis, it is estimated that 15,538 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 34,705 persons would experience an increase in noise levels of 3.0 DNL or more in 2011. There would be no decreases of 3.0 DNL at noise levels of 60 to 65 DNL expected in either 2006 or 2011. 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 281,884 persons in 2011. A reduction in noise exposure at these lower noise levels is also evident from the variation's design. Approximately 60,600 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 these potential noise impacts, the areas of change within the Study Area were divided into small zones of change. These zones are generally associated with a specific airport and are identified with a unique code name. Figures are provided with enlarged views of the various change zones along with the name of each zone.

Figure 4.24 presents an enlarged view of the noise changes at the census blocks and change zones associated with the NY/NJ Metropolitan Area for the 2011 conditions. Each change zone shown on the figures is discussed in the following paragraphs.

PIWB-11LGA-A (Figure 4.24): 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.

Table 4.12
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	15,538*	34,705	281,884
Noise Decreases			
2011	6,984	22	60,591

*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., 2005.

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 three 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-11EWR-A (Figure 4.24): The estimated increases in noise occurring west of Interstate 95 and over the Elizabeth 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, 2,441 persons represented by 16 census blocks are expected to experience an increase in noise of greater than or equal to 1.5 DNL above 65 DNL. Similarly, 31,042 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 32,087 persons represented by 139 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 (Figure 4.24): The estimated reductions in noise occurring east of Interstate 95 and south of Newark Bay 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 7,000 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 two 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 18,221 persons represented by 89 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-C (Figure 4.24): The estimated reduction in noise occurring west of EWR and over the counties of Warren NJ, Northampton PA, and Monroe PA is caused by the removal of the arrival route through PENNS. This traffic would be split between two new fixes. All jet traffic would flow to the north through IEAW2 and all turbo prop traffic would flow through IASTW to the south. As a result, 19,804 persons represented by 520 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 (Figure 4.24): The estimated increase in noise occurring west of EWR and over the counties of Morris NJ, Passaic 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, 40,596 persons represented by 499 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 (Figure 4.24): The estimated increases and reductions in noise occurring north of EWR and over the villages of Glen Ridge (reductions), Rutherford (increases) and Fair Lawn (increases) are caused by the eastward shift and extension of the base leg and final approach to Runways 22L/R. As a result, 16,145 persons represented by 194 census blocks are expected to experience a decrease in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL for the alternative. Additionally, 98,714 persons represented by 1,582 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 (Figure 4.24): The estimated increases in noise occurring southwest of EWR and over the village of Plainsboro, were caused by the extension of the base leg and final approach to Runways 4L/R. As a result, 1,523 persons represented by 13 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 (Figure 4.24): The estimated reductions in noise occurring southwest of EWR and over the village of Princeton were caused by the extension of the base leg and final approach to Runways 4L/R. As a result, 5,058 persons represented by 47 census blocks are expected to experience a decrease in noise of greater than or equal to 5.0 DNL between 45 and 60 DNL.

Figures 4.25 present an enlarged view of the noise changes at the census blocks and change zones associated with PHL for 2011. Each change zone shown on the figures is discussed in the following paragraphs.

PIWB-11PHL-A (Figure 4.25): 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 85,100 persons represented by 1,261 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-B (Figure 4.25): 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 Schuykill 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 20,100 persons represented by 157 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 (Figure 4.25): 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 3,200 persons represented by 54 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 (Figure 4.25): 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 160 persons represented by 10 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 (Figure 4.25): 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 520 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.

4.1.7.3 Compatible Land Use Impacts

Based on the NIRS analysis, the Integrated Airspace Alternative Variation with ICC would potentially result in significant noise impacts to residents located north of LGA (PIWB-11LGA-A), south of EWR (PIWB-11EWR-A), and west of PHL (PIWB-11PHL-A). Residential land use is considered noise-sensitive. Therefore, the significant noise impacts to noise-sensitive areas would also be considered a significant impact in terms of land use compatibility.

Other noise-sensitive land uses within the Study Area such as schools, hospitals, places of worship, parks, and historic sites were also analyzed. Noise-sensitive areas were identified by using land use data for the significantly census blocks. Noise levels for these noise-sensitive areas were compared with the noise levels designated as compatible using the FAA's Part 150 land use compatibility table. No noise-sensitive areas (other than residential land use) were identified within the significantly impacted census blocks.

The implementation of the Integrated Airspace Alternative Variation with ICC would potentially result in significant land use compatibility impacts to residential areas. Mitigation of these significant impacts will be considered. See, Section 4.21, *Mitigation*, for information regarding potential mitigation measures.

4.1.8 Noise/Compatible Land Use Impacts– Summary

A summary of the 2006 population impacts for each alternative in terms of the FAA threshold criteria is presented in **Table 4.13**. The table is color-coded based on the census block mapping scheme presented in the figures that accompany this section.

A similar comparison for the 2011 conditions is presented in **Table 4.14**. The analysis indicates that each of the alternatives creates changes where noise increases or decreases meet one of the FAA criterion thresholds.

Table 4.13
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	8,068	36,803	142,559
Ocean Routing Airspace	0	0	7,504
Integrated Airspace Variation without ICC	16,290*	36,828	138,840
Noise Decreases			
Modifications to Existing Airspace	5,970	1	36,628
Ocean Routing Airspace	180	1,600	117,988
Integrated Airspace Variation without ICC	5,970	1	37,120

*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. 2005.

Table 4.14
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	33,280	109,482
Ocean Routing	0	0	18,633
Integrated without ICC	13,584*	33,212	109,803
Integrated with ICC	15,538*	34,705	281,884
Noise Decreases			
Modifications to Existing Airspace	5,094	22	8,440
Ocean Routing	0	0	16,166
Integrated without ICC	5,094	22	8,695
Integrated with ICC	6,984	22	60,591

*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. 2005.

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 airspace alternative is expected to generate significant noise impacts in the future. This is largely due to the fact that the Modifications to Existing Airspace and the Integrated Airspace Alternatives include departure heading changes at the major airports while the Ocean Routing Airspace Alternative uses the current headings. The Modifications to Existing Airspace Alternative tends to create the fewest significant impacts and has the best aggregate significant impact totals. The Integrated Airspace Alternative Variations both generate similar levels of significant impacts in the future.

Therefore, it may be concluded that the implementation of the Modifications to Existing Airspace or the Integrated Airspace Alternatives would result in significant noise impacts. These significant noise impacts to noise-sensitive areas would also be considered a significant impact in terms of land use compatibility. Mitigation measures to avoid, minimize, rectify, reduce, eliminate, or compensate for these significant impacts will be considered. Section 4.21, *Mitigation*, provides information regarding potential mitigation measures.

In accordance with FAA Order 1050.1E, noise analysis was also completed for slight to moderate noise impacts. In the slight to moderate noise impact range of ±3.0 DNL between the 60 and 65 DNL levels, the impacts from the Modifications to Existing Airspace Alternative and the Integrated Airspace Alternative Variation without ICC are very similar. The Integrated Airspace Alternative Variation 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.

In the slight to moderate noise impact range of ±5.0 DNL between the 45 and 60 DNL levels, a somewhat similar relationship among alternative is seen with the Modifications to Existing Airspace Alternative and the Integrated Airspace Alternative Variation without ICC having very similar impact levels. However, the Integrated Airspace Alternative Variation 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.

4.2 SOCIOECONOMIC IMPACTS AND ENVIRONMENTAL JUSTICE

All Airspace Redesign alternatives were evaluated to assess the potential for associated socioeconomic and environmental justice (EJ) impacts.

4.2.1 Socioeconomic Impacts

According to FAA Order 1050.1E, the proposed changes in air traffic procedures should be evaluated for their potential to result in the relocation of residences and businesses; alter surface transportation patterns; divide established communities; disrupt orderly; planned development; or to create an appreciable change in employment.

The proposed alternatives would not result in the construction of facilities. Therefore, the alternatives considered would not result in a direct impact causing the relocation of residences or businesses; alteration of surface transportation patterns; division of established communities; disruption of orderly planned development; or creation of an appreciable change in employment.

Although direct socioeconomic impacts would not be expected, there is the potential for indirect impacts because all of the Proposed Action Airspace Redesign alternatives except the Ocean Routing Airspace Alternative would potentially result in significant noise impacts. All of the significantly impacted census blocks are located in the vicinity of LGA, EWR, and PHL. These areas are already exposed to extensive aviation noise. In addition, because of their urban setting ambient noise is also high in these areas. For example, the noise levels recorded at noise measurement sites near EWR ranged from 64 to 68 DNL (See Section 3.3.2, *Background Noise Measurement*). Therefore, it would be unlikely that residences or business would relocate, surface transportation patterns would be altered, established communities would be divided, planned development would be disrupted or employment levels would be changed as a result of any of the Airspace Redesign Alternatives.

4.2.2 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations,* and the accompanying Presidential Memorandum and Order DOT 5610.2, *Environmental Justice in Minority and Low-Income Populations*, require the FAA to identify and address disproportionately high and adverse human health or environmental impacts on low-income and minority populations in the communities potentially impacted by the Proposed Action. In order to comply with Order DOT 5610.2, the FAA must conduct meaningful public involvement with minority and low-income populations and analyze the potential for disproportionate impacts to these communities. The following paragraphs describe the public involvement program, and the environmental justice analysis.

4.2.2.1 Public Involvement Program

Public involvement included informal pre-scoping meetings and formal scoping meetings. Pre-Scoping meetings were held from September 1999 to May 2000. Scoping meetings were held between January and June 2001. FAA presentations at these meetings included project information such as the need for the Proposed Action, potential alternatives to accomplish the Proposed Action and the environmental process. During the pre-scoping and scoping meetings, the public was encouraged to comment on issues regarding the Draft EIS.

All these meetings were designed with sensitivity to low-income and minority populations. To conduct meaningful public involvement, the FAA considered the special needs of the low-income and minority communities. Special needs were accommodated by holding meetings in locations accessible by public transit, providing translators, advertising meetings in specialized local foreign language media, and contacting community and church leaders. Examples of such activities follow:

- FAA provided quarterly briefings to Congress regarding the Project and closely coordinated with Congressional staffers regarding any of their special-needs constituents. Some members of Congress provided guidance on meeting locations that would best suit their constituents. Three representatives in particular strongly recommended meeting locations to accommodate the needs of their minority populations. Representative Menendez recommended that a meeting be held in Carteret, NJ. Representative Serrano and Assemblyman Diaz conferred with community leaders to recommend a meeting location in the Soundview neighborhood in the Bronx. After receiving comments from Representative Nadler's office regarding the inadequacy of one of the meeting locations with respect to proximity to mass transit and train stations, a more accessible site, the Marriott Marquis in Times Square, very close to trains/transit was selected for a second meeting. A second meeting was held to provide an additional opportunity for low-income and minority populations to learn about the project. The scoping meeting was held at the Marriott Marquis for the same reason.

- The Notice of Intent was published in numerous newspapers, including El Diario (large circulation to Spanish-speaking population) and The Village Voice (a popular and well-read local NY paper). Notices of the public workshops were widely advertised, including in local Manhattan papers (Downtown Express, The Westsider, Westside Spirit, and Our Town) and community bulletin boards. Public service announcements were released over local radio (including the Spanish station WPAT 93.1) and cable TV stations.

- Spanish translators were provided at several of the meetings where it was expected that a large minority population may be in attendance (LaGuardia Queens/Elmhurst NY, The Bronx, NY, Newark, NJ, Elizabeth, NJ, and Carteret NJ).

In summary, the FAA conducted meaningful public involvement by reaching out to minority and low-income communities using the strategies described in the preceding paragraphs.

4.2.2.2 Environmental Justice Analysis

The following paragraphs describe the methodology and results of the environmental justice analysis.

Methodology

The Proposed Action Airspace Alternatives would potentially result in significant noise and land use compatibility impacts. Therefore, the areas significantly impacted by noise were examined for disproportionate impacts to low-income and minority communities. Disproportionate impacts occur when the impacts on the minority or low-income communities are appreciably greater than the impacts on the general community.

In order to determine whether these EJ populations were impacted disproportionately, the FAA relied upon guidance from both DOT and Council on Environmental Quality (CEQ) to define low-income and minority populations.

Order DOT 5610.2 defines the terms low-income population and minority population as follows:

- Low-Income means a person whose median household income is at or below the Department of Health and Human Services poverty guidelines.[6]

- Low-Income Population means any readily identifiable group of low-income persons who live in geographic proximity, and, if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who will be similarly affected by a proposed DOT program, policy or activity.[7]

- Minority Population means any readily identifiable groups of minority persons who live in geographic proximity, and if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who will be similarly affected by a proposed DOT program, policy or activity.[8]

Because the Order DOT 5610.2 definition of a minority population is broad, the Council on Environmental Quality (CEQ)'s definition was also used:

- Minority: Individual(s) who are members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic.[9]

- Minority population: Minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or

[6] Order DOT 5610.2, Environmental Justice in Minority Populations and Low-Income Populations, U.S. Department of Transportation, April 1997, page 1.

[7] Ibid, page 2.

[8] Order DOT 5610.2, Environmental Justice in Minority Populations and Low-Income Populations, U.S. Department of Transportation, April 1997, page 2.

[9] Environmental Justice, Guidance Under the National Environmental Policy Act, Council on Environmental Quality, December 1997, page 25.

other appropriate unit of geographic analysis.[10]

The methodology to evaluate environmental justice impacts relied on these definitions of minority and low income populations. This methodology is also based on the assumption that a disproportionate impact would potentially result from a significant noise impact. The first step was to identify the census blocks that are significantly impacted by noise. Census blocks were considered significantly impacted by noise if the noise exposure level increased greater than or equal to 1.5 DNL as a result of one of the Proposed Action Airspace Alternatives, where the noise exposure for the Future No Action Airspace Alternative was already greater than 65 DNL.

The next step was to determine the minority composition and median income of the census blocks. Census bureau data was processed to predict the median income and minority composition of the census blocks in 2006 and 2011. Details on this process are found in Appendix H. The potential for disproportionate impacts to minority or low-income populations was based on projected census data. Census data by census block was used to project the racial composition of census blocks in 2006 and 2011. Because income information is not available at the census block level, census data by census block group was used to project census block median incomes for 2006 and 2011. **Appendix I** shows the results of the census block analysis.

The final step to determine whether there would be disproportionate impacts to a low-income community, was to compare the median income of the significantly noise impacted census blocks to poverty level income. Based on the definition of a low-income person, a community is considered low-income if the median income is below poverty level. A disproportionate impact to low-income communities would occur if the median household income of each of the significantly noise impacted census blocks fell below the poverty level income. Poverty level income was based on the 2005 HHS Poverty Guideline median annual income (family of four) of $19,350.[11]

The final step to evaluate potential disproportionate impacts to minority communities is more complex because the definition of a minority population is more subjective. The potential for disproportionate noise impacts to minority communities was evaluated based on CEQ's definition of a minority population. Using this definition, a population was considered minority when the minority population percentage of the significantly noise impacted census block was 50 percent or meaningfully greater than the minority population percentage of an appropriate unit of geographic analysis. The appropriate units of geographic analysis, referred to as Environmental Justice (EJ) Study Areas, were developed based on the locations of the significantly noise impacted census blocks and the associated Airspace Redesign alternative's feature that caused the significant impact. Based on the feature responsible for the impact, the EJ Study Area was developed to include the areas that would likely be impacted by alternatives to this feature. For example, an area to the southeast of EWR was significantly impacted by flights departing to the southeast. The alternative of directing the flights to the southwest would potentially

[10] Ibid, pages 25 – 26.

[11] The 2005 HHS Poverty Guidelines, United Sates Department of Health & Human Services, http://aspe.hhs.gov/poverty/05poverty.shtml.

result in significant impacts to the area to the southwest of EWR. Therefore, the EJ Study Area included the entire area adjacent to the runways where there was potential for significant impacts due to the specific features of the Proposed Action Airspace alternatives and alternatives to those specific features. The EJ Study Areas are shown in **Figures 4.26** and **4.27**. Census data for all of the census blocks within the study area was compared to determine:

- If the significantly noise impacted blocks were over 50 percent minority, or
- If the significantly impacted blocks had a meaningfully greater minority population than comparison blocks in the EJ Study Area.

Results

The following paragraphs discuss the results of the environmental justice analysis.

LaGuardia Airport

One census block would be significantly noise impacted by the Integrated Airspace Alternative Variation without the ICC and the Integrated Airspace Alternative Variation with ICC near LGA. This block consists of the entirety of Rikers Island, which is New York City's main penal facility.

Table 4.15 shows the 2006 racial composition of the impacted block by each alternative and the same composition statistics for the comparison census blocks within the LGA EJ Study Area. **Table 4.16** shows the 2011 data for the same statistics.

The LGA EJ Study Area was determined based on the flight paths that caused the impact to Rikers Island (in this case, the impacts were caused by minor changes in departure routings off of Runway 31). Alternative flight paths were then chosen for these routes. The LGA EJ Study Area was then defined by combining all alternative flight paths. Figure 4.26 shows this area.

The minority population of Rikers Island would be approximately 92 percent in both 2006 and 2011. Therefore, the population of Rikers Island would be considered a minority population per the first CEQ criteria.

The minority composition of the significantly impacted census block was then compared to that of the remaining blocks in the LGA EJ Study Area to determine if the minority population of the

Table 4.15
2006 Minority Composition

Alternative	Airport	Significant noise Impacted Census Blocks		Comparison Census Blocks	
		Population	Percent Minority	Population	Percent Minority
Modifications to Airspace Alternative	EWR	5480	82.0%	136113	77.2%
	PHL	2599	3.7%	20399	25.0%
Integrated Airspace (Variation Without ICC only)	LGA	12834	91.3%	53359	44.0%
	EWR	5480	83.9%	136113	77.2%
	PHL	2495	3.4%	15420	9.2%

Note: The Ocean Routing Airspace Alternative is not shown because it did not result in significant noise impacts. The Integrated Airspace Alternative Variation with ICC is not shown because it does not exist in 2006.

Source: HNTB Analysis, 2005.

Table 4.16
2011 Minority Composition

Alternative		Airport	Significant Noise Impacted Census Blocks		Comparison Census Blocks	
			Population	Percent Minority	Population	Percent Minority
Modifications to Airspace Alternative		EWR	768	78.4%	144874	80.9%
		PHL	242	7.4%	22755	23.4%
Integrated Airspace Alternative	Variation Without ICC	LGA	12846	92.0%	53227	45.4%
		EWR	496	91.9%	145146	80.9%
		PHL	242	7.4%	22755	23.4%
	Variation With ICC	LGA	12846	92.0%	53227	45.4%
		EWR	2441	91.6%	143201	80.7%
		PHL	251	2.8%	22746	23.5%

Note: The Ocean Routing Airspace Alternative is not shown because it did not result in significant noise impacts.

Source: HNTB Analysis, 2005.

impacted block was meaningfully greater than the minority population of the comparison blocks. Significant disparity exists between the impacted block and comparison blocks near LGA. Racial composition is substantially different at Rikers Island when compared to the surrounding blocks. Therefore, the minority population of the impacted block would be meaningful greater than that of the comparison blocks. It is thus concluded that the Rikers Island population would also be considered a minority population according to the second CEQ criteria.

Since the minority population of Rikers Island would be subject to significant noise impacts, it may be concluded that there would be a disproportionate impact to a minority community.

Newark Liberty International Airport

Census blocks near EWR would be significantly impacted as a result of the Modifications to Existing Airspace and Integrated Airspace Alternatives. Impacted blocks would vary depending on the alternative. The EWR EJ Study Area was determined in a similar fashion to LGA. Racial composition for disproportionately impacted census blocks and the comparison census blocks within the EWR EJ Study Area are shown in Tables 4.15 and 4.16.

The minority population of the significantly impacted census blocks near EWR exceeds 50 percent in both 2006 and 2011. Therefore, the population of the significantly impacted census blocks would be considered a minority population per the first CEQ criteria.

The second CEQ criteria used to determine whether a population would be considered a minority population was examined. Both impacted and comparison blocks would have high minority composition, although in some cases the comparison blocks would have an approximately 10 percent less minority composition than impacted blocks. In the context of this study a 10 percent difference would not constitute a meaningfully greater difference. The standard error for this type of analysis would likely be around 10 percent because of the variety, complexity and magnitude of the data analyzed. Therefore, the minority population percentage of the impacted census blocks would not be considered meaningfully greater than the minority

population percentage of the appropriate unit of geographic analysis.

The analysis shows that the population of the impacted census blocks would be considered a minority population. Therefore, the significant noise impacts near EWR would constitute a disproportionate impact on a minority population. However, because all communities in the EWR EJ Study Area would be considered minority communities, there is not an alternative to the particular design element causing the significant noise.

No significantly impacted blocks near EWR have a median income below the poverty level. Therefore, no significant noise impacts near EWR would be considered a disproportionate impact to a low-income community.

Philadelphia International Airport

Census blocks near PHL would be subject to significant noise impacts as a result of the Modifications to Existing Airspace and the Integrated Airspace Alternatives. The number of impacted blocks would vary depending on the alternative and year. The EJ Study Area was determined in a similar fashion to LGA.

Racial composition for significantly impacted and comparison census blocks within the EJ Study Area are shown in Tables 4.15 and 4.16. Impacted blocks would have a minority population of less than 50 percent, and the actual percentage would fall well below that of the comparison blocks in the EJ Study Area. Therefore the population of the significantly impacted census blocks would not be considered a minority population. Additionally, significant noise impacts near PHL would, therefore, not result in a disproportionate impact to a minority community.

There are no impacted census blocks near PHL with a median income which is lower than the poverty level. Accordingly, there is not a disproportionate impact to a low-income community due to the significant noise impacts near PHL.

Summary of Environmental Justice Impacts in the Study Area

The Modifications to Existing Airspace Alternative, Integrated Airspace Alternative Variation without ICC, and the Integrated Airspace Alternative Variation with ICC all would result in disproportionate impacts to minority populations and, therefore, would result in significant environmental justice impacts. Mitigation measures to avoid, minimize, rectify, reduce, eliminate, or compensate for these significant impacts will be considered. Section 4.21, *Mitigation*, provides information regarding potential mitigation measures.

4.3 SECONDARY OR INDUCED IMPACTS

Major development proposals have the potential to produce induced or secondary impacts on surrounding communities. Induced impacts could include shifts in population and growth; increased (or decreased) demand for public services; and changes in business and economic activity within the confines of the Study Area.

Significant induced impacts would normally result from significant impacts to other impact categories especially noise, compatible land use and social impacts. Therefore, potential secondary impacts were considered based on analysis of noise, land use, and social impacts. There is potential for significant noise impacts with all of the proposed alternatives with the exception of the Ocean Routing Alternative, however, it is not expected that any of the Airspace

Redesign alternatives would result in shifts in population and growth; increased demand for public services; or changes in business and economic activity. All of the significantly impacted census blocks are located in the vicinity of LGA, EWR, and PHL. These areas are already exposed to extensive aircraft noise. In addition, because of their urban setting ambient noise is also high in these areas. For example, the noise levels recorded at noise measurement sites near EWR ranged from 64 to 68 DNL (See Section 3.3.2, *Background Noise Measurement*). Therefore, it would be unlikely that noise impacts associated with the Proposed Action Airspace Redesign alternatives would result in significant secondary impacts.

4.4 DEPARTMENT OF TRANSPORTATION ACT SECTION 4(f), AND LAND AND WATER CONSERVATION FUND ACT SECTION 6(f)

Section 303(c), Title 49 USC, commonly referred to as Section 4(f) of the DOT Act,[12] states that the "…Secretary of Transportation will not approve a project that requires the use of any publicly-owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance or land from a historic site of national, state, or local significance as determined by the officials having jurisdiction thereof, unless there is no feasible and prudent alternative to the use of such land…and [unless] the project includes all possible planning to minimize harm resulting from the use."[13] Section 4601, Title 16 USC, The Land and Water Conservation Fund (LWCF) Act, commonly referred to as Section 6(f) states that no public outdoor recreation areas acquired with LWCF assistance can be converted to non-recreation uses without the approval of the Secretary of the Interior. The potential impacts to both Section 4(f) and Section 6(f) were analyzed.

4.4.1 Section 4(f)

A list of the 4(f) resources within the Study Area is found in Chapter Three, *Affected Environment*, Section 3.7, *Department of Transportation Act: Section 4(f).*

In regard to 4(f) properties, the term use encompasses both physical use of the property as well as constructive uses. Indirect adverse impacts, such as noise, that prevent the use of Section 4(f) properties for their intended purpose are considered as constituting a constructive use. In determining whether there is a constructive use, the FAA must determine if the impacts would substantially impair the property. A Section 4(f) property is determined to be substantially impaired when the activities, features, or attributes of the site that contribute to its significance or enjoyment are substantially diminished. According to FAA Order 1050.1E, the Part 150 land use compatibility guidelines may be used to determine if there is a constructive use of a Section 4(f) property, if the guidelines are relevant to the value, significance, and enjoyment of that particular property.

The Airspace Redesign alternatives do not require land acquisition or facility construction. Therefore, the Airspace Redesign alternatives do not result in a physical use of any Section 4(f) property. However, because the Proposed Action Airspace Redesign alternatives would potentially result in significant changes in

[12] Department of Transportation Act of 1966, § 4(f) [recodified at 49 USC 303 (c)].

[13] FAA Order 1050.1E, Appendix A, page A-19.

noise, constructive use of Section 4(f) properties is also addressed.

Two methods were used to evaluate noise impacts to the Section 4(f) properties. The first method was to determine which Section 4(f) properties were located within the significantly impacted census blocks by using the GIS land use data. The second method was to input location data (latitudes and longitudes) for Section 4(f) properties within these census blocks into the noise model and calculate noise values at the specific Section 4(f) locations. The results of these analyses may be found in **Appendix J**, *Section 4(f) and 6(f) Properties*.

Based on these analyses it was determined that the noise level would potentially increase significantly at two historic sites located south of PHL: the Lazaretto and Printzhof sites. These sites are discussed in Section 4.5, *Historical, Architectural, Archaeological, and Cultural Resources.* Although a significant noise change would result at both sites for the Modifications to Existing Airspace Alternative and the Integrated Airspace Alternative Variation without ICC, this noise would not result in a constructive use. A quiet setting is not a recognized purpose or attribute of either site. The Lazaretto site has been purchased by a community to in part construct a fire house. The Printzhof, of which only the foundation remains, is located within a recreational park already subjected to aircraft noise. Therefore, Part 150 land use compatibility guidelines may be applied to determine where there is a constructive use. Since neither site is or is expected to be used as a residence these sites are compatible with noise exposure levels of up to 70 DNL. The noise exposure at the Lazaretto and Printzhof sites would potentially increase to 66.5 DNL and 65.7 DNL in 2006, and 64.6 DNL and 63.5 DNL in 2011 for both the Modifications to Existing Airspace Alternative and Integrated Airspace Alternative Variation without ICC. Since the noise exposure remains below 70 DNL, neither the Modifications to Existing Airspace Alternative nor the Integrated Airspace Alternative Variation without ICC would result in a constructive use of either historic site.

One other noise-sensitive site, the Frank M. Charles Memorial Park, was identified for further analysis. As a result of the implementation of the Ocean Routing Airspace Alternative (2006), the noise exposure at this park increased to 65.0 DNL. The Frank M. Charles Memorial Park is part of the Gateway National Recreation Area located in the heart of the New York metropolitan Area. A National Recreation Area in an urban area is described as "a combination of scarce open spaces with the preservation of significant historic resources and important natural areas in (a) location that can provide outdoor recreation for large numbers of people".[14] Due to this Park's urban setting and given it is intended to provide outdoor recreation for large numbers of people, a quiet setting would not be a recognized purpose or attribute of the Frank M. Charles Memorial Park. Therefore, Part 150 land use compatibility guidelines may be applied to determine where there is a constructive use. According to the compatibility guidelines, a park is compatible with noise exposure levels of up to 75 DNL. However, if a park's features include an amphitheatre, a lower level of noise exposure is appropriate. Noise exposure of less than 65 DNL is considered compatible with an amphitheatre. There is not an amphitheatre within the Frank M. Charles Memorial Park. Therefore, the increase in noise exposure resulting from the

[14] The National Park Service website, Designation of National Park System Units, www.nps.gov/legacy/nomenclature.html.

Ocean Routing Airspace Alternative would not be considered a constructive use of the Frank M. Charles Memorial Park.

The noise impacts associated with the Airspace Redesign Alternatives do not substantially impair any Section 4(f) sites because the activities, features, or attributes that contribute to the sites' significance or enjoyment are not substantially impaired. Thus, the proposed Airspace Redesign will not physically use any 4(f) properties nor will it constructively use any 4(f) properties.

4.4.2 Section 6(f)

To evaluate the potential for impacts to 6(f) properties, a list of 6(f) projects was compiled from the National Parks Service website. Most 6(f) projects were associated with a particular county. Therefore, the list of 6(f) projects was limited to those for counties with significantly impacted census blocks. All the 6(f) projects were then categorized in the following manner:

- AS – project already studied as part of the land use compatibility or 4(f) analysis.
- NI – project not impacted because its location was outside the significantly impacted census blocks.
- NE – projects not expected to be impacted because of the nature of the project such as game land acquisition (location data was not available for these properties).

Based on this analysis, no 6(f) properties were determined to be significantly impacted by noise associated with the Proposed Action Airspace Redesign alternatives. Thus, no 6(f) properties are expected to be converted to non-recreational uses by any of the Airspace Redesign alternatives.

4.5 HISTORICAL, ARCHITECTURAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

Historical, architectural, archaeological, and cultural resources that will be affected by federally funded and licensed undertakings come under the protection of the National Historic Preservation Act of 1966 (16 U.S.C. 470), as amended. This Act, in Section 106, requires Federal agencies to consider the effects of such undertakings on properties listed, or eligible for listing, in the National Register of Historic Places (NRHP). Regulations related to this process are described in 36 CFR Part 800, Protection of Historic Properties.

Primary impacts would include the removal or alteration of historic resources. Secondary or indirect impacts would include changes in noise, vehicular traffic, light emissions, or other changes that could interfere substantially with the use or character of the resource.

A variety of historic resources are in the Study Area as discussed in Chapter Three, *Affected Environment*, Section 3.8, *Historical, Archaeological, Architectural, and Cultural Resources*. See Appendix F for a listing of cultural resources located within the Study Area.

There would be no ground disturbance as a result of the Proposed Action. Therefore, there would be no direct impacts on properties on or eligible to be on the National Register of Historic Places.

The potential for indirect impacts to historic resources must also be assessed. Indirect impacts include noise impacts that would diminish the integrity of the property's setting. Since implementation of any of the

Airspace Redesign Alternatives would change the noise exposure in the Study Area, the potential for noise impacts on historic resources was studied.

The first step was to identify the appropriate area of potential effect (APE) to account for significant noise impacts on cultural resources. It was proposed that the APE be developed to include all significantly impacted census blocks. The FAA coordinated the proposed methodology for developing the APE with the State Historic Preservation Officers (SHPOs) for Connecticut, Delaware, New Jersey, New York, and Pennsylvania. All of the SHPOs agreed to this methodology with the exception of the Delaware SHPO. The Delaware SHPO requested that all of New Castle County, within the Study Area, be examined for impacts to cultural resources (See **Figure 4.28**.). Potential noise changes in this area of interest were considered while developing the APE.

Once the results of the noise analysis were available, the APE was established. The APE was limited to census blocks where the noise exposure would change greater than 1.5 DNL within the 65 and higher DNL range (significantly impacted). The APE was developed by combining all of the significantly impacted census blocks for all of the Airspace Alternatives. The resulting APE is located in the vicinity of LGA, EWR, and PHL and is illustrated in **Figures 4.29 and 4.30**. The APE includes Rikers Island, an area south of EWR, and an area west of PHL. The APE does not include any areas in the states of Connecticut or Delaware because not only were there no significantly impacted census blocks within these states, there were also no moderately or slightly impacted census blocks in either state.

The next step was to identify historic resources listed on or eligible for listing on the National Register located within the APE. Three methods were used to identify the historic resources. The first method was to use the GIS land use data obtained for the entire Study Area. The second method was to use the latitudes and longitudes for the historic sites included on the National Register. The final method was to conduct windshield surveys in the APE. Windshield surveys are currently in progress. Results of these surveys will be made available upon completion.[15]

To date, two historic sites have been identified in the APE, the Lazaretto and the Printzhof sites. (See Figure 4.30).

The next step was to determine if the significant noise impacts met the criteria of adverse effect for either the Lazaretto or the Printzhof sites. An adverse effect is one that diminishes the integrity of a cultural resource. According to 36 CFR 800.5(a), "An adverse effect is found when and undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location design, setting, materials workmanship, feeling, or association."[16] The Lazaretto and Printzhof sites are described and evaluated for adverse effect in the following paragraphs.

The Lazaretto site is located on the Delaware River in Essington, PA. The noise analysis showed that the noise exposure at

[15] The results of the windshield surveys may be requested by contacting the FAA at the address or phone number on the cover of this document.

[16] 36 CFR Part 800, Protection of Historic Properties, August 2004, Subpart B § 800.5 (1).

this location would potentially increase from 63.7 DNL to 66.5 DNL in 2006 and from 63.0 DNL to 64.6 DNL in 2011 for both the Modifications to Existing Airspace Alternative and Integrated Airspace Alternative Variation without ICC. The Lazaretto is the only known remaining quarantine house from the 19th century that continues to exist. Built in 1799, it was added to the National Register in 1972. After its use as a quarantine site ended, it became a resort and a seaplane base before World War I. The Lazaretto has become a contested site over the past few years, starting when it was purchased by Island Marine Partners, LLC in 2000, with the intent of developing the property. Tinicum Township, the governing municipality, denied the development plans due to the historic nature of the location, and eventually bought the property in 2005. The township is planning on using part of the land to develop a firehouse, and surveys are being conducted to determine the feasibility of this development. The Township also plans to initiate a feasibility study to determine whether the Lazaretto site could be preserved solely as a public historic site or a combination of a museum and community services facility. Additional information on the Lazaretto site, including the Nomination Form for inclusion in the National Register and photos is provided in **Appendix F**.

The Printzhof site is also located in Essington, PA. The noise analysis showed that the noise exposure at this location would increase from 61.9 DNL to 65.7 DNL in 2006 and from 61.2 DNL to 63.5DNL in 2011 for both the Modifications to Existing Airspace Alternative and Integrated Airspace Alternative Variation without ICC. The Printzhof was the residence of Governor Johan Printz from 1643-1653. Johan Printz was the governor of the first permanent European settlement, New Sweden, which became Pennsylvania. This site was added to the National Register in 1966. The significance of preservation is due to the site's relationship to the history of Sweden in America. The only visual remnant of the Printzhof structure is the stone foundation. The Printzhof foundation and a statue of Johan Printz are now part of the Governor Printz Park. The Nomination Form for inclusion of the Printzhof in the National Register is provided in Appendix F.

Although a significant noise change would result at both sites for the Modifications to Existing Airspace Alternative and the Integrated Airspace Alternative Variation without ICC, this noise does not alter the historic characteristics which made them eligible for listing in the National Register. A quiet setting is not a recognized purpose or attribute of either site. Moreover, the Lazaretto site has been purchased by a community to in part construct a fire house. The Printzhof, of which only the foundation remains, is located within a recreational park already subjected to aircraft noise. Even at 65.7 DNL, the site is considered a compatible land use according to 14 CFR Part 150 guidelines. (These guidelines identify that noise levels up to 75 DNL as compatible with parks.) Therefore, the noise impacts would not constitute an adverse effect on these historic sites.

Pending the results of the windshield surveys, analysis will be completed to determine if the alternatives would have an adverse effect on historic and cultural resources.

4.6 WILD AND SCENIC RIVERS

The Wild and Scenic Rivers Act (PL 90-542, as amended) provides for the protection and preservation of rivers which possess outstandingly remarkable recreational,

geologic, fish and wildlife, historic, cultural, and other similar values.

As discussed in Chapter Three, *Affected Environment*, Section 3.13, *Wild and Scenic Rivers*, there are five designated National Wild and Scenic Rivers within the Study Area: the Farmington Wild and Scenic River in Connecticut, the White Clay Creek in Delaware and Pennsylvania, the Great Egg Harbor River and the Maurice River in New Jersey, and the Delaware River in New York. Since the Airspace Redesign Alternatives involve only air traffic procedural changes and no infrastructure development is required for the changes to take place, there would be no direct significant impacts to these resources.

Potential indirect impacts to Wild and Scenic Rivers were also considered. Indirect impacts may result from changes in noise or aesthetics. Implementation of the Airspace Alternatives would potentially result in changes in noise exposure. None of the change zones associated with the significant, moderate or slight noise impacts extend to include the five Wild and Scenic Rivers identified. Therefore, there would be no noise impacts to the five Wild and Scenic Rivers within the Study Area.

The extent of visual impacts, like noise impacts, is related to how far a particular resource is from the primary airports. The more visible airspace changes are those at lower altitudes which are predominantly near the primary airports. All five of the Wild and Scenic Rivers segments identified are at least 15 miles from the primary airports. Proposed airspace changes this far from an airport are not normally visually intrusive because of their distance from the ground. Therefore, it may be concluded that there would be no indirect impacts that adversely affect the natural cultural or recreational values of the Wild and Scenic Rivers.

In summary, there would be no indirect or direct impacts that would adversely affect the natural cultural or recreational values of the Wild and Scenic Rivers. Therefore, there would be no significant impact to Wild and Scenic Rivers and no further analysis is required.

Wild and Scenic Rivers may also be subject to the requirements of Sections 4(f) and 6(f). If a Wild and Scenic River corridor includes historic sites or is designated as a park, recreation area, or wildlife and waterfowl refuge, then Section 4(f) criteria apply. Similarly, if the Wild and Scenic River corridor was acquired or developed with assistance from the LWCF, then Section 6(f) criteria apply. See Section 4.4, *Department of Transportation 4(f)* for information regarding the evaluation of 4(f) and 6(f) properties.

4.7 FISH, WILDLIFE, AND PLANTS

This section addresses impacts on fish, wildlife, and plants. Section 4.7.1 analyzes species other than migratory birds. Section 4.7.2 focuses on migratory birds.

4.7.1 Plants and Species other than Migratory Birds

Potential impacts to fish, wildlife, and plants were evaluated in accordance with FAA Order 1050.1E. A significant impact would occur if the Proposed Action would jeopardize the continued existence of federally listed threatened or endangered species or result in the destruction or adverse modification of critical habitat for any species. Impacts were also considered in accordance with Executive Order 13112, “Invasive Species.” Impacts considered are those that could prevent the introduction,

provide for the control, and minimize the economic, ecological, and human health impacts that are caused by invasive species.

The Proposed Action involves only air traffic procedural changes for aircraft in-flight and does not require ground disturbance. It will not destroy or modify critical habitat for any species. Additionally, no species that meets the definition of an invasive species will be introduced in the project area due to the Proposed Action. Therefore, there are no significant impacts to fish, terrestrial wildlife, and plants.

4.7.2 Migratory Birds Impacts

This section discusses potential impacts that the Airspace Redesign alternatives would have on avian species, migratory birds in particular, in the Study Area.

4.7.2.1 Impact Factors

Commercial air traffic has increased concurrently with an extremely successful period of wildlife management in North America. Habitat preservation and aggressive species management have contributed to increases in the populations of many avian species, particularly migratory birds which utilize available habitat in and adjacent to airports with increasing frequency. These concurrent increases in air traffic and avian populations contribute to an increased probability of bird strikes.

The multi-agency Bird Strike Committee USA reports that over 4,300 bird strikes were reported by the U.S. Air Force in 2003. Over 5,900 bird strikes were reported for U.S. civil aircraft in 2003. Despite this, an estimated 80 percent of bird strikes to U.S. civil aircraft go unreported. Further complicating the problem is the fact that about 90 percent of all bird strikes in the U.S. are by species federally protected under the Migratory Bird Treaty Act (Bird Strike Committee USA, 2004).

Three important factors, in addition to the growth of migratory bird populations, have contributed to the increase in overall numbers of bird strikes. First, jet aircraft have replaced slower piston-powered aircraft in commercial uses, which has increased probabilities of strikes. Secondly, natural habitat attractive to these avian species is typically abundant around airports, which are often located away from extreme urban centers or near shorelines and estuaries along the coast. Lastly, civilian and military traffic has steadily increased over the years which again, have lead to more collisions. The FAA reports that 42 percent of bird strikes occur during the approach phase, three percent during "en-route" phase, 39 percent during take-off run and climb, and 16 percent during the landing roll.[17] Dolbeer (2004), in an analysis of available birdstrike records, reports that during the period 1990-2003, some 30,875 bird strikes were reported to the FAA **(Table 4.17)**. About 73 percent of the bird strikes occurred when the aircraft was at an altitude of less than 500 feet AGL with 93 percent occurring under 3,500 feet AGL. The study further indicated that the incidence of bird strikes declined consistently by 31 percent every 1,000 feet from 501 to 20,500 feet. In addition, for strikes that resulted in substantial damage to the aircraft, 67 percent occurred at ≤500 feet and 28 percent occurred between 501 and 3,500 feet.

[17] Wildlife strikes to Civil Aircraft in the United States 1990-2004, U.S. DOT Federal Aviation Administration and U.S. Department of Agriculture, May 2005, Table 8, page 20.

Table 4.17
Bird Strikes

Height of aircraft (feet above ground level)	Number of reported strikes (% of total)	Percent (number) of strikes causing substantial damage to aircraft
0-500	22,606 (73)	4.1 (928)
501-3,500	6,076 (20)	6.4 (389)
>3,500	2,193 (7)	3.1 (68)
Total	30,875 (100)	4.5 (1,385)

Source: Richard A. Dolbeer. 2004. Height Distribution of Birds as Recorded by Collisions with Civil Aircraft (Unpublished manuscript). USDA Wildlife Services.

4.7.2.2 Spatial and Temporal Aspects of the Atlantic Flyway

Migration routes may be defined as the various lanes birds travels from their breeding ground to their winter quarters. Flyways are well defined and proven patterns of migration made up of thousands of individual migration routes. Several flyways have been identified in the Western Hemisphere. The particular flyway that is pertinent to this Study is the Atlantic Flyway.

The actual routes followed by a given migratory bird species vary by such variables as distance traveled, time of starting, flight speed, geographic position and latitude of the breeding, and wintering grounds. The most frequently traveled migration routes conform very closely to major topographical features that lie in the general north-south movement of migratory bird flyways. Therefore, the lanes of heavier concentration along the Atlantic Flyway follow the coasts, mountain ranges and principal river valleys.

A critical part of these journeys are "stopovers" where migrating birds stop to feed, rest, and gather energy needed to finish the migration. Depending on distance to travel, timing with regard to season and breeding cycles, these stopover areas may support millions of birds for short to extended periods of time. Typical stopover habitat includes the coastal or estuarine beaches, salt and freshwater marshes, and mudflats, especially within the two regions described in Chapter 3, Section 3.14.2.2, *Population Centers for Migratory Birds*, the New York Bight and the Delaware Bay Estuary. New Jersey, for example, lying in proximity to the New York Bight and the Delaware Bay Estuary, has some 435 migratory bird species of which approximately 349 are annual visitors. In fact, in any given year, these areas of New Jersey play host to one of the highest concentrations of migrating shorebirds (i.e., sandpipers). In Delaware Bay alone, one million birds, including the third largest colonial waterbird (e.g., gulls) population, may use the abundant fresh and/or saltwater marshes as temporary stopovers. **Table 4.18** provides information about the timing of migrations of one important group of migratory birds in the study area, passerines, or altricial songbirds (order Passeriformes), one of the largest orders of birds and comprising more than half of all living birds. Examples of common passerine bird species include the Canada warbler, red-winged blackbird, swamp warbler, hooded warbler, and fox sparrow The pattern of the arrival and departure dates throughout the spring/fall migrations is an indicator that is useful in gauging the duration of stopovers by all migratory bird species.

Table 4.18
Migration Timing Characteristics

State	Earliest Arrival Date (Spring)	Latest Departure Date (Fall)	Common Passerine Bird Species
NJ	March	December	Canada Warbler, Louisiana Waterthrush, Snow Bunting, Common Yellowthroat
NY	January	December	American Redstart, Dark-eyed Junco, Hooded Warbler, Fox Sparrow
CT	February	December	Northern Parula, Northern Waterthrush, Swamp Sparrow, Mourning Warbler
PA	February	November	Red-winged Blackbird, Chimney Swift, Lapland Longspur, Magnolia Warbler
DE	March	November	Louisiana Waterthrush, Yellow-breasted Chat, Common Yellowthroat, Hooded Warbler

Source: BirdNature, 2003.

4.7.2.3 Potential for Impacts to Migratory Birds

The potential hazards from the simultaneous use of airspace by both birds and aircraft is a function of several factors: 1) the relative abundance of bird habitat adjacent to or in the proximity of airports, 2) the increased abundance of migratory birds resulting from successful management, 3) the increased pressure from the growing volume of air traffic, and 4) the difficult task of redesigning airspace within the primary impact zone of 500 feet or less.

Table 4.19 provides statewide statistics on bird strikes for three avian groups. Factors explaining these strikes include the proximity of their migration routes, the proximity of stopover areas or activities relating to permanent residence. In addition to these statistics, other migratory bird losses occur from inclement weather, predators in the air or on the ground, collisions with radio towers or tall buildings and severe degradation or loss of viable habitat in critical zones of their migration routes.

Dolbeer, in his analysis of over a decade of birdstrike data identified not only the flight elevations most critical to bird mortality but also identified particularly susceptible species groups. **Table 4.20** shows the relationship between bird mortality and elevations at the time of known collisions. The data show that 73 percent of all birdstrikes occur within the first 500 feet, and the frequency of strikes decrease consistently by approximately 31 percent for every 1,000 feet of altitude above 500 feet.

Table 4.19
Bird Strikes Statewide

State	Ducks, Geese, Swans	Swallows	Shorebirds
NJ	108	31	258
NY	121	39	849
CT	67	7	136
PA	110	49	259
DE	9	11	39
TOTALS	415	137	1,541

Source: 2003 FAA National Wildlife Strike Database, 1990-2002.

Table 4.20
Species Groups Reported Struck by Civil Aircraft in USA – June 2003

	Height (feet) AGL			
Species Group	**0-500**	**501-3,500**	**>3,500**	**Total**
Gulls/Terns	3,366	417	40	3,823
Passerines	3,399	322	51	3,772
Waterfowl	994	561	149	1,704
Pigeons/Doves	1,546	59	4	1,609
Raptors	895	131	19	1,043
Other known birds	1,299	272	19	1,590
Unknown birds	11,107	4,316	1,911	17,334
Total	22,606	6,076	2,193	30,875

Source: Richard A. Dolbeer. 2004. Height Distribution of Birds as Recorded by Collisions with Civil Aircraft (Unpublished manuscript). USDA Wildlife Services.

Dolbeer's analysis confirms that management programs to reduce birdstrikes should focus on the airport environment, that is, the first 500 feet of airspace used by aircraft and the adjacent habitat encompassing that 500 feet of airspace. Furthermore, he notes that the months of July-November, especially August, are the months in which management efforts to disperse birds from airports should be the most intense, because these months have the highest strike rates below 500 feet. With the large numbers of recently fledged (young) birds, populations of most North American bird species are at their highest levels in late summer.

4.7.2.4 Impact Assessment

Wherever there is an interface of habitat and the airport environment, the probability of collisions increase, particularly where the habitat meets the end of a runway. Since the data show that the primary impact zone is between 0-500 feet, departure flight-paths are of critical importance to this analysis.

The Proposed Action would include a redesign of departure headings for certain runways at LGA, EWR, and PHL. The Modifications to Existing Airspace and the Integrated Airspace Alternatives include changes to departure headings for Runway 4 at LGA, Runways 22R and 4L at EWR, and Runways 9L/R and 27L/R at PHL Essentially, this means that air-traffic controllers would be able to direct take-offs into three or four departure paths rather than the previous one or two. Such flight–paths could increase the exposure of any avian species that utilize habitat and airspace adjacent to these runways. However, the degree of exposure depends on whether habitat exists in that location, the position of the habitat with respect to the flight-path and whether the headings achieve an altitude in excess of 500 feet before interfacing with the habitat.

All three airports, LGA, EWR, and PHL, have Wildlife Hazard Management Plans in place. The plans promote a comprehensive approach to managing wildlife in the airport environment. Starlings, gulls, pigeons, geese/Brants and passerines are identified as the birds of most concern. However, the plans also address control features for raptors, shorebirds, waders and other waterfowl. Control methods employ a comprehensive approach consisting of both passive control and direct control. Passive control methods consist of habitat management techniques within the airport environment. Such techniques discourage

habitat attractants of any kind by minimizing nesting and perching habitat (tree control) and food sources (vegetation control). In addition, control of aquatic water habitat is managed through any means possible to distance such habitat from the airport environment. Direct control methods range from harassment techniques, capture and lethal control, the latter requiring that depredation permits be kept current. Wildlife hazard management plans include provisions to monitor bird populations on and near the airport as well as bird strikes. The plans are reviewed on a yearly basis and would be modified if bird strikes increase.

In conclusion, impacts to various bird categories would be expected to continue but not necessarily increase as a result of the Modifications to Existing Airspace or Integrated Airspace Alternatives. Therefore, no significant impacts to bird species would be expected to result from any on the Airspace Redesign alternatives.

4.8 LIGHT EMISSIONS AND VISUAL IMPACTS

The potential for the Airspace Redesign alternatives to result in light emission or visual impacts is described in the following paragraphs.

4.8.1 Light Emissions

To evaluate the potential for light emissions impact, the FAA considers the extent to which any lighting associated with an action will create an annoyance among people or interfere with their normal activities.

The lights associated with aircraft operating at higher altitudes potentially changed by the Proposed Action Airspace Redesign alternatives routes would not be bright enough to be an annoyance to people or interfere with normal activities on the ground. Proposed airspace changes at lower altitudes are predominantly near the primary airports. Radar data indicates that under existing conditions all areas near these airports are likely exposed to aircraft lights. Therefore the Proposed Action would not likely result in significant changes in light emissions to people on the ground. Therefore, no significant impacts relating to light emissions are anticipated for any of the alternatives considered.

4.8.2 Visual Impacts

Visual, or aesthetic, impacts are inherently more difficult to define because of the subjectivity involved. Aesthetic impacts deal more broadly with the extent that the development contrasts with the existing environment and whether the community's jurisdictional agency considers this contrast objectionable.

Visual impacts are normally related to the disturbance of the aesthetic integrity of an area caused by development, construction, or demolition, and, thus, do not typically apply to airspace changes.

The Proposed Action Airspace Redesign alternatives would not result in the development, construction, or demolition of facilities. Proposed airspace changes at lower altitudes are predominantly near the primary airports where flights are already extensive and, therefore, these changes would not result in a visual contrast with the existing environment. Proposed airspace changes at higher altitudes are normally not visually intrusive because of their distance from the ground. Therefore, the proposed airspace changes would likely not create a visual impact of significance.

Because of the unique cultural qualities of Tribal Lands, additional analysis of potential visual impacts on Native American Tribes

located within the Study Area was completed. A summary of the potential changes in flights over Tribal Lands resulting from the Proposed Action Airspace Redesign alternatives is shown in **Table 4.21**.

The Ocean Routing Airspace Alternative, Integrated Airspace Alternative Variation without ICC, and Integrated Airspace Alternative Variation with ICC would result in moderate changes in aircraft routes in the vicinity of the Ramapough Mountain Indian lands. Since this area is already subject to extensive overflights, no significant visual impacts would be expected.

The Integrated Airspace Alternative Variation with ICC also results in moderate change to aircraft routes over the Schaghticoke Reservation. Changes to routes over the Schaghticoke Reservation are unlikely to result in significant visual impacts because this area is currently exposed to regular overflights.

Therefore, the implementation of any of the Airspace Redesign alternatives would not result in significant visual impacts to Tribal lands within the Study Area.

4.9 AIR QUALITY

The FAA met with the representatives of EPA Regions 1, 2 and 3 to discuss the Proposed Action alternatives and analysis of air quality impacts. (EPA Regions 1, 2, and 3 have jurisdiction over areas with the Study Area.) During these meetings the FAA indicated that no air quality analysis would be undertaken. Several reasons were provided to explain the FAA's assertion that no detailed air quality analysis was required and that no significant air quality impacts would result from the implementation of the Proposed Action. These reasons were:

- The Proposed Action alternatives examined in this Draft EIS are exempt from analysis under the General Conformity Rule. The final rule for Determining Conformity of General Federal Actions to State and Federal Implementation Plans[18] was published in the Federal Register in 1993.[19] In Section 51.853 (c)(1), the Environmental Protection Agency (EPA) lists actions that are *de minimis* and, thus, do not require an applicable analysis under this rule. EPA states in the preamble to this regulation that it believes, "air traffic control activities and adopting approach, departure, and en route procedures for air operations" are illustrative of *de minimis* actions.

- The Proposed Action is not a capacity enhancement project. The total number of aircraft operations would not differ between the Future No Action Alternative and the other Airspace Redesign Alternatives.

- The purpose and need for the Proposed Action includes increasing efficiency and reducing delay in the airspace system. Qualitatively, reduction of delay and more efficient flight routings would serve to reduce fuel burn and thereby reduce air pollutant emissions.

In response to these coordination meetings, the EPA indicated that induced changes to vehicular traffic were a concern to the Agency.

[18] 40 CFR Parts 6, 51, and 93.

[19] 40 C.F.R. Parts 6, 51, and 93. United States Government Printing Office, World Wide Web Address: www.access.gpo.gov, July 2001.

Table 4.21
Changes in Aircraft Routes over Native American Tribal Lands

Native American Tribal Land	Location	State	Future No Action	Ocean Routing	Modifications to Existing Airspace	Integrated Airspace Variation without ICC	Integrated Airspace Variation with ICC
Rankokas Indian Reservation	Rancocas	NJ	Regular Overflights 3,000 – 8,000+ MSL	No Change	No Change	No Change	No Change
Nanticoke Lenni Lenape Indian Reservation	City of Bridgeton	NJ	Scattered Overflights 10,000-18,000+ MSL	Minor Change-some shifted higher	No Change	No Change	No Change
Ramapough Mountain Indians	Township of Mahwah	NJ	Extensive Overflights 3,000-14,000+ MSL	Moderate change-some shifted higher & some moved north	No Change	Moderate change-some routes moved northwest	Moderate change-some routes moved north or south
Poospatuck Reservation	Mastic	NY	Regular Overflights 3,000-14,000+ MSL	No Change	No Change	Minor Change - some routes moved east	Minor Change - Dep. routes flow W to E rather than N to S. Similar altitudes
Shinnecock Reservation	Shinnecock Indian Reservation	NY	Regular Overflights 2,000-10,000+ MSL	No Change	No Change	No Change	No Change
Golden Hill Paugeesukq	Golden Hill Indian Reservation	CT	Regular Overflights 6,000-14,000+ MSL	No Change	No Change	No Change	Minor Change - some routes moved southeast
Golden Hill Paugeesukq	Trumbull	CT	Extensive Overflights 1,000-14,000+ MSL	Minor Change - some shifted higher	No Change	No Change	No Change
Schaghticoke Reservation	Schaghticoke Indian Reservation	CT	Regular Overflights 6,000-12,000 MSL	Minor Change - some shifted higher	No Change	No Change	Moderate change-some routes moved east or south

Source: Landrum & Brown Analysis, 2005.

Changes in vehicular traffic as the result of the implementation of the Proposed Action alternatives are not anticipated. Aircraft operations and vehicular traffic would grow with or without the proposed air traffic procedural changes. In addition, the implementation of any one of the Proposed Action Airspace Redesign alternatives would not significantly alter the distribution of vehicular traffic among the airports because these alternatives would not likely change air passenger airport preferences. Air passengers traditionally select an airport based on the ticket cost, airport location, and service to a desired destination.

Therefore, since the Proposed Action Airspace Redesign alternatives would be considered *de minimus* actions and would have little effect on vehicle traffic, no negative air quality impacts would be expected.

4.10 NATURAL RESOURCES AND ENERGY SUPPLY

According to FAA Order 1050.1E, "for purposes of the EA or EIS, the proposed action will be examined to identify any proposed major changes in stationary facilities or the movement of aircraft and ground vehicles that would have a measurable effect on local supplies of energy or natural resources."

None of the Proposed Action Airspace Redesign alternatives considered would result in the construction of facilities that would potentially impact known sources of minerals or energy.

The proposed changes in air traffic procedures are intended to improve air traffic flow and enhance the safe operation of aircraft within the airspace structure. With the exception of the Ocean Routing Airspace Alternative the Proposed Action Airspace Redesign alternatives propose changes in air traffic procedures that would result in more direct routing and less delay. Therefore, when compared to the Future No Action Airspace Alternative, these alternatives would result in reduced fuel consumption.

Therefore, it is anticipated that the Proposed Action Airspace Redesign alternatives would not result in the depletion of local supplies of energy and/or natural resources.

4.11 CONSTRUCTION IMPACTS

The implementation of changes to air traffic procedures does not involve any construction activity; therefore, there would be no construction impacts associated with the Proposed Action Airspace Redesign alternatives and no further analysis is required.

4.12 FARMLANDS

The Farmland Protection Policy Acts (FPPA) of 1980 and 1995 require identification of proposed actions that would affect any soils classified as prime and unique. Prime farmland contains soil that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is available for these uses. Unique farmland is land other than prime farmland that is used for the production of specific high value food and fiber crops.

The Airspace Redesign alternatives would not result in the development of facilities. Therefore, no prime and/or unique farmland soils would be impacted and further analysis is required.

4.13 COASTAL RESOURCES

The following sections address two aspects of coastal resources: coastal zone management and coastal barriers.

4.13.1 Coastal Zone Management Program

The increasing pressures of over-development upon the nation's coastal resources prompted the U.S. Congress to promulgate the Coastal Zone Management Act (CZMA) in 1972. The CZMA encourages states to preserve, protect, develop, and, where possible, restore or enhance valuable natural coastal resources such as wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and coral reefs, as well as the fish and wildlife using those habitats. A unique feature of the CZMA is that participation by states is voluntary. To encourage states to participate, the act makes federal financial assistance available to any coastal state or territory that is willing to develop and implement a comprehensive coastal management program.

The states of Connecticut, Delaware, New Jersey, New York, and Pennsylvania have initiated coastal zone management programs. However, since the Proposed Action Airspace Redesign alternatives do not impact surface resources, none of the alternatives would impact resources within the CZMP for Connecticut, Delaware, New Jersey, New York, and Pennsylvania.

While the proposed action is not expected to impact coastal areas, correspondence from the State of Delaware Department of Natural Resources and Environmental Control Division of Soil and Water Conservation requested that the FAA review the Proposed Action for Consistency with Delaware's Coastal Management Program. Therefore, a consistency certification has been prepared and is included in **Appendix K**.

4.13.2 Coastal Barriers

The Coastal Barrier Resources Act (CBRA) of 1982 and the Coastal Barrier Improvement Act of 1990 were created to minimize the loss of human life, protect coastal resources, and reduce expenditures and subsidies for coastal development.

None of the Proposed Action Airspace Redesign alternatives considered would result in development of facilities that would adversely impact resources protected under the Coastal Barrier Resource System. Therefore, no further analysis is required.

4.14 WATER QUALITY

The Airspace Redesign alternatives involve air traffic procedural changes and would not require the construction of facilities. Therefore, no impacts to water quality would be expected and no further analysis is required. The Proposed Action Airspace Redesign alternatives would not impact water resources.

4.15 WETLANDS

Executive Order 11990, *Protection of Wetlands*, was enacted to avoid, to the extent possible, adverse impacts associated with the destruction or modification of wetlands, and to avoid direct or indirect new construction of wetlands. Wetlands include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds. The Proposed Action Airspace Redesign alternatives would not result in the construction of facilities. Therefore, no wetlands impacts are anticipated and no further analysis is required.

4.16 FLOODPLAINS AND FLOODWAYS

Executive Order No. 11988, *Floodplain Management*, was issued in order to avoid, to the extent possible, the short and long-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practical alternative. The order was issued in furtherance of NEPA, the National Flood Insurance Act of 1968, and the Flood Disaster Protection Act of 1973.

The Proposed Action Airspace Redesign alternatives would not result in the construction of facilities. Therefore, none of the alternatives considered would encroach upon areas designated as a 100-year flood event area as described by the Federal Emergency Management Agency (FEMA). No further analysis is required.

4.17 HAZARDOUS MATERIALS, POLLUTION PREVENTION AND SOLID WASTE

NEPA documentation includes the consideration of hazardous materials and solid waste impacts as well as pollution prevention.[22]

4.17.1 Hazardous Materials

The Proposed Action Airspace Redesign alternatives were reviewed for their potential to generate or disturb materials identified as a substance that has been determined to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce (49 CFR Part 172, Table 172.101). This includes hazardous substances[23] and hazardous wastes.[24]

The Proposed Action Airspace Redesign alternatives would not result in any physical disturbances to the ground. In addition, aircraft operational activity is expected to grow with or without the proposed air traffic procedural changes. Therefore, the potential to generate or disturb materials identified as a substance that has been determined to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce is not anticipated.

4.17.2 Pollution Prevention

With the exception of the Ocean Routing Airspace Alternative the Proposed Action Airspace Redesign alternatives propose changes in air traffic procedures that would result in more direct routing and less delay. Therefore, when compared to the Future No Action Airspace Alternative, all alternatives (with the exception of the Ocean Routing Airspace Alternative) would result in reduced fuel consumption and less pollution.

4.17.3 Solid Waste

None of the Proposed Action Airspace Redesign alternatives would result in solid waste impacts that are associated with the potential long-term generation of municipal solid waste (MSW). None of the alternatives considered would result in a physical disturbance to the ground or

[22] FAA Order 1050.1E, June 2008,Appendix A, Section 10.

[23] Hazardous Substance – any element, compound, mixture, solution, or substance defined as a hazardous substance under the Comprehensive Environmental Response, Compensation, Liability Act (CERCLA) and listed in 40 CFR Part 302. If released into the environment, hazardous substances may pose substantial harm to human health or the environment.

[24] Hazardous Waste – under the Resource Conservation and Recovery Act (RCRA) a waste is considered hazardous if it is listed in, or meets the characteristics described in 40 CFR Part 261, including ignitability, corrosivity, reactivity, or extraction procedure toxicity.

construction debris. In addition, aircraft operational activity is expected to grow with or without the proposed airspace changes, therefore the potential for impacts as it relates to solid waste is not anticipated.

4.18 CUMULATIVE IMPACTS

Consideration of cumulative impacts applies to the impacts resulting from the implementation of the Proposed Action as well as other actions. The concept of cumulative impacts addresses the potential for individually minor but collectively significant impacts to occur over time. Council on Environmental Quality Regulations, Section 1508.7, defines "Cumulative Impact" as the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of the agency, Federal or non-Federal, undertaking such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

4.18.1 Potential Cumulative Impacts

Projects within the vicinity of the Study Airports were reviewed to evaluate the potential for cumulative impacts. A list of potential projects proposed on or near the Study Airports was compiled. The majority of the information came from the FAA Airport's Division. Projects with no potential for cumulative impacts such as taxiway rehabilitation were not included.

For each of the primary airports, additional project data was gathered from DOT websites, Comprehensive Land Use Plans, and other area and local plans. Projects within a search radius of each primary airport were added to this list of projects with potential to result in cumulative impacts. The search radius was based on the noise impacts resulting from the Proposed Action Airspace Redesign alternatives. The search radius for each primary airport was determined such that at a minimum all areas where noise levels changed 1.5 DNL or more in an area exposed to 65 DNL or higher were included. Thus, the search radius was one mile for TEB, three miles for JFK, LGA, and PHL, and 3.5 miles for EWR. Project data for projects in the vicinities of JFK and LGA came predominantly from the New York State DOT Five Year Transportation Capital Program Projects List,[25] which is a comprehensive listing of Federal and State projects within each geographical region of New York. Information regarding projects near PHL was gathered from the Pennsylvania Department of Transportation website[26] and the Delaware Valley Regional Planning Commission register of projects slated to begin before or during the year 2030. Construction project near EWR and TEB were obtained using the North Jersey Transportation Planning Authority's Access & Mobility 2030 Plan.

Table 4.22 shows the resulting list of projects considered in regard to the potential for cumulative impacts. Note that these projects may or may not occur and even when a timeframe is provided there is no certainty that this project will actually be accomplished. Since all impacts resulting from the Proposed Action Airspace Redesign alternatives were noise or noise-related impacts, only other proposed projects with the potential for cumulative noise impacts were considered. Table 4.22 indicates whether there would be potential for cumulative impacts when a project's

[25] 2005-2010 Transportation Program MOU, Appendices A and B: New York State Department of Transportation.

[26] ttp://www.dot.state.pa.us/penndot/districts/district6.nsf/main?Readform.

Table 4.22
Potential Cumulative Impacts

Airport	Description	Year(s)	Primary Impact Locations	Potential for Noise Impacts	Potential Noise Mitigation	Potential for Significant Cumulative Noise Impacts
ABE						
Airport Improvements						
	Noise mitigation measures - residences w/in 65-69 DNL	2005-2009	Airport Vicinity	No	Yes	No
	Extend Runway 13/31	2006-2011	Airport Property	Yes	No	No
	Acquire land for development - 104 acres, East Allen Township	2007	Airport Vicinity	No	No	No
	Acquire land for approaches - relocate 28 residences	2007	Airport Vicinity	No	No	No
	Acquire land for noise compatibility w/in 65-69 DNL	2007-2009	Airport Vicinity	No	Yes	No
	Extend Runway 6/24 - Runway 6 Extension	2008-2009	Airport Vicinity	Yes	No	No
	Install Cat II ILS for Runway 24	2008	Airport Vicinity	Yes	No	No
	Modify Access Road	2010	Airport Property	No	No	No
ACY						
Airport Improvements						
	Construct new terminal apron	2005-2007	Airport Property	No	No	No
	Install runway vertical/visual guidance system 13/31	2006	Airport Vicinity	Yes	No	No
	Runway 13 CAT ILS -- Install CAT III Runway 13	2006	Airport Vicinity	Yes	No	No
	Rehabilitate Runway 4/22	2010	Airport Property	No	No	No
BDR						
Airport Improvements						
	Rehabilitate Runway 6/24	2006-2009	Airport Property	No	No	No
CDW						
Airport Improvements						
	Construct 14,000 square foot T-Hangars	2005	Airport Property	No	No	No
	Install Miscellaneous NAVAIDS	2005	Airport Property	No	No	No

Table 4.22 (continued)
Potential Cumulative Impacts

Airport	Description	Year(s)	Primary Impact Locations	Potential for Noise Impacts	Potential Noise Mitigation	Potential for Significant Cumulative Noise Impacts
CDW (continued)						
Airport Improvements (continued)						
	Relocate Airport Beacon	2005	Airport Property	No	No	No
	Rehabilitate/Extend Runway 9/27	2005-2007	Airport Vicinity	Yes	No	No
EWR						
Airport Improvements						
	Noise mitigation measures for public buildings - soundproofing of schools	2005-2007	Airport Vicinity	No	Yes	No
	Improve southern access roads	2007-2009	Airport Property	No	No	No
	Improve central terminal access roads	2007-2009	Airport Property	No	No	No
Other Construction						
	Operational Improvements: Rte. 1&9 Haynes Avenue Bridges		Essex County	Yes	No	No
	Newark Circulation Improvements		Essex County	Yes	No	No
	Pedestrian Improvements: Rte. 1&9		Essex County	No	No	No
FOK						
Airport Improvements						
	Rehabilitate Runway 6/24	2005	Airport Property	No	No	No
	Obstruction removal in proximity of runways	2005	Airport Property	No	No	No
	Acquire land for approaches - Runway 6	2007	Airport Vicinity	No	No	No
FRG						
Airport Improvements						
	Rehabilitate access road - perimeter road	2007	Airport Property	No	No	No
	Rehabilitate Runway 1/19 - relocate Runway 1/19 northward	2008	Airport Vicinity	Yes	No	No

Table 4.22 (continued)
Potential Cumulative Impacts

Airport	Description	Year(s)	Primary Impact Locations	Potential for Noise Impacts	Potential Noise Mitigation	Potential for Significant Cumulative Noise Impacts
HPN						
Airport Improvements						
	Widen existing terminal roadway for security emergency ingress/egress	2008	Airport Property	No	No	No
	Modify access road - relocate a portion of existing perimeter road	2009	Airport Property	No	No	No
HVN						
Airport Improvements						
	Improve terminal building	2005	Airport Property	No	No	No
	Rehabilitate runway	2007	Airport Property	No	No	No
	Expand apron and glycol area	2009	Airport Property	Yes	No	No
ILG						
Airport Improvements						
	Remove obstructions	2006	Airport Vicinity	No	No	No
	Rehabilitate Runway 9/27	2006-2007	Airport Property	No	No	No
	Rehabilitate terminal building	2009	Airport Property	No	No	No
	Construct access road	2010	Airport Property	No	No	No
ISP						
Airport Improvements						
	Construct service road - connects south airside to operational areas	2005	Airport Property	No	No	No
	Construct access road at east end of terminal ramp	2005	Airport Property	No	No	No
	Rehabilitate Runway 10/28	2005	Airport Property	No	No	No
	Install runway vertical/visual guidance system Runway 6/24	2007-2008	Airport Vicinity	Yes	No	No

Table 4.22 (continued)
Potential Cumulative Impacts

Airport	Description	Year(s)	Primary Impact Locations	Potential for Noise Impacts	Potential Noise Mitigation	Potential for Significant Cumulative Noise Impacts
ISP (continued)						
Airport Improvements (continued)						
	Install CAT 2 ILS system for Runway 6/24	2007-2008	Airport Vicinity	Yes	No	No
	Improve west concourse of terminal building	2009-2010	Airport Property	No	No	No
	Acquire Halstead Property for development	2010	Airport Vicinity	No	No	No
JFK						
Airport Improvements						
	Improve airport access road - Van Wyck Expressway	2005	Airport Vicinity	No	No	No
	Rehabilitate access road - 148th Street	2006	Airport Vicinity	No	No	No
	Construct new domestic terminal building	2006-2009	Airport Property	No	No	No
	Noise mitigation measures for public buildings - school soundproofing	2006-2007	Airport Vicinity	No	Yes	No
	Rehabilitate various access roads	2007	Airport Property	No	No	No
	Rehabilitate Runway 13R/31L	2008	Airport Property	No	No	No
Other Construction						
	Belt/Rockaway Parkway		Kings County	Yes	No	No
	Eastern Queens Intelligent Traffic Signalization (ITS) (Clearview Expressway, Cross Island Parkway, Nassau Expressway)		Queens County	Yes	No	No
	Improvements: Van Wyck Expressway		Queens County	Yes	No	No

Table 4.22 (continued)
Potential Cumulative Impacts

Airport	Description	Year(s)	Primary Impact Locations	Potential for Noise Impacts	Potential Noise Mitigation	Potential for Significant Cumulative Noise Impacts
LDJ						
Airport Improvements						
	Acquire land for approaches	2006	Airport Vicinity	No	No	No
LGA						
Airport Improvements						
	Improve access roads/access road bridges	2005-2006	Airport Vicinity	No	No	No
	Improve terminal building	2005	Airport Property	No	No	No
	Rehabilitate Runway 4/22	2005	Airport Property	No	No	No
	Rehabilitate Runway 13/31	2005	Airport Property	No	No	No
	Noise mitigation measures for public buildings - school soundproofing program	2006	Airport Vicinity	No	Yes	No
	Improve access roads west of central terminal building	2008	Airport Property	No	No	No
Other Construction						
	Queens East River N. Shore Greenway Ph. 1		Queens County	Yes	No	No
	Rehabilitation: Brooklyn Queens Expressway/Grand Central Parkway East Leg		Queens County	Yes	No	No
	Improvements: Van Wyck Expressway		Queens County	Yes	No	No
	Bridge Rehabilitation: Roosevelt Avenue over Van Wyck Expressway		Queens County	No	No	No
	Rehabilitation: Brooklyn Queens Expressway/Grand Central Parkway West Leg		Queens County	No	No	No

Table 4.22 (continued)

Potential Cumulative Impacts

Airport	Description	Year(s)	Primary Impact Locations	Potential for Noise Impacts	Potential Noise Mitigation	Potential for Significant Cumulative Noise Impacts
LGA (continued)						
Other Construction (continued)						
	Transmit Expansion (Grand Central Parkway, Van Wyck Expressway, Whitestone Expressway)		Queens County	No	No	No
	Improvements: Van Wyck Expressway		Queens County	Yes	No	No
MMU						
Airport Improvements						
	Install runway vertical/visual guidance Runway 5/23	2005-2006	Airport Vicinity	Yes	No	No
	Rehabilitate Runway 13/31	2006	Airport Property	No	No	No
PHL						
Airport Improvements						
	Noise mitigation measures for residences w/in 65-69 DNL	2005-2008	Airport Vicinity	No	Yes	No
	Extend Runway 17/35	2005-2007	Airport Vicinity	Yes	No	No
	Rehabilitate Runway 9R/27L	2006-2007	Airport Property	No	No	No
	Acquire land for development	2008-2010	Airport Vicinity	No	No	No
Other Construction						
	I-95 Airport Ramps		Philadelphia	Yes	No	No
	Interchange Reconstruction: I-476/I-95		Philadelphia	Yes	No	No
	I-95 Within Philadelphia		Philadelphia	Yes	No	No
	New Station: Regional Rail 1/Route 36		Philadelphia	Yes	No	No
	Rail Line Extension: Broad Street Subway		Philadelphia	Yes	No	No
	Flyover Construction: Regional Rails 1 and 2		Philadelphia	Yes	No	No

Table 4.22 (continued)
Potential Cumulative Impacts

Airport	Description	Year(s)	Primary Impact Locations	Potential for Noise Impacts	Potential Noise Mitigation	Potential for Significant Cumulative Noise Impacts
PNE						
Airport Improvements						
	No activities likely to have cumulative impacts			No	No	No
SWF						
Airport Improvements						
	Improve terminal building	2005-2006	Airport Property	No	No	No
	Construct apron and glycol system - north cargo area	2006-2007	Airport Property	No	No	No
	Extend Runway 16/34	2006-2009	Airport Vicinity	Yes	No	No
	Remove obstructions in proximity of Runway 16 end	2006-2007	Airport Vicinity	No	No	No
	Construct access road	2007-2008	Airport Property	No	No	No
	Expand terminal building	2007-2008	Airport Property	No	No	No
	Remove Tower Hill obstruction	2008-2009	Airport Vicinity	No	No	No
TEB						
Airport Improvements						
	Noise mitigation measures for public buildings - school soundproofing program	2005-2006	Airport Vicinity	No	Yes	No
Other Construction						
	Rte. 17 Essex Street Bridge		Bergen County	Yes	No	No
	Rte. 17 Railroad Avenue		Bergen County	Yes	No	No
	Rte. 120 Paterson Plank road from route 17 to Murray Hill Boulevard		Bergen County	Yes	No	No
	Rte. 46 Main Street, Lodi		Bergen County	Yes	No	No
	Operational and Safety Improvements: Rte. 46 Little Ferry Circle		Bergen County	Yes	No	No

Table 4.22 (continued)
Potential Cumulative Impacts

Airport	Description	Year(s)	Primary Impact Locations	Potential for Noise Impacts	Potential Noise Mitigation	Potential for Significant Cumulative Noise Impacts
TNN						
Airport Improvements						
	Construct terminal building	2006-2007	Airport Property	No	No	No
	Improve terminal access road	2006-2007	Airport Property	No	No	No
	Construct deicing containment facility infrastructure	2007-2008	Airport Property	No	No	No
	Acquire land for approaches in proximity of Runway 6	2010	Airport Vicinity	No	No	No
WRI						
Airport Improvements						
	Receive 13 new C-17s to replace C-141s, and improve infrastructure improvements and facility upgrades to accommodate the new aircraft	2004-2005	Airport Property and Vicinity	No	Yes	No
	Base Realignment and Closure Commission (BRAC) recommended 'Mega-Base' at WRI	2005-2011	Airport Property and Vicinity	Yes	No	No

Source: FAA Airport's Division, New York State DOT Five Year Transportation Capital Program Projects List, Department of Transportation website, Regional Planning Commission register of projects slated to begin before or during the year 2030, North Jersey Transportation Planning Authority's Access & Mobility 2030, McGuire Air Force Base Public Website, http://public.mcguire.amc.af.mil/, http://www.sjcommunityNEWS.com, and HNTB analysis, 2005.

impacts are combined with the impacts of the Proposed Action Airspace Redesign alternatives. Table 4.22 also shows potential noise mitigation projects. These proposed projects would have the potential to decrease cumulative impacts of noise.

While the PHL Capacity Enhancement Program (CEP) may potentially have cumulative impacts when combined with this project, it has not been included in this analysis. The FAA is preparing an EIS for the proposed airport development included in the CEP, whose purpose is to increase airfield capacity at PHL. Potential improvements under CEP could include the relocation and/or extension of the existing runways. Because there has been no determination of what the alternatives for this proposed project will look like, there is insufficient information to evaluate cumulative impacts, especially as they related to noise, at this time.

Other airspace redesign projects were also considered during the evaluation of potential cumulative impacts. EISs for the Chicago Terminal Airspace Project (CTAP) and the Potomac Consolidated TRACON Airspace Redesign have been completed and the FAA

issued Record of Decisions for both projects. Neither of the Study Areas for these projects overlaps the NY/NJ/PHL Metropolitan Area Airspace Redesign Project's Study Area and the projects themselves do not induce growth or increase capacity; therefore, significant cumulative impacts are not anticipated. The FAA is in the process of completing an EA for the Midwest Airspace Enhancement Airspace Redesign in the Cleveland/Detroit Metropolitan Areas. The environmental study area for this project does not overlap the Study Area for the NY/NJ/PHL Metropolitan Airspace Redesign and the project itself does not induce growth or increase capacity; therefore, significant cumulative impacts are not anticipated. Therefore, no cumulative impacts from the implementation of the NY/NJ/PHL Metropolitan Airspace Redesign and other airspace redesign projects are anticipated.

4.18.2 Ambient Noise Comparison

The potential for cumulative noise impacts resulting from any of the Airspace Redesign Alternatives may also be explored by looking at the total noise; ambient noise and aircraft noise. The noise measurement data presented in Appendix D, *Noise Measurement Report*, was analyzed in conjunction with the noise modeling computations for each of the 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. Therefore, 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. See Figure 3.7 for the location of the noise measurement sites. 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 mathematically subtracted from 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 4.23** 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 4.24**

Table 4.23

Comparison of Total DNL Noise Values at Measurement Sites

Measurement Site	Measured Background DNL	No Action	Ocean	Modifications	Integrated without ICC	Integrated with ICC
		2006 Total Noise (background + modeled)				
Site 1a	40.3	41.3	41.3	41.3	41.3	
Site 1b	62.7	62.7	62.7	62.7	62.7	
Site 2	46.6	46.7	46.7	46.7	46.7	
Site 3	59.5	59.5	59.5	59.5	59.5	
Site 4	53.7	53.8	53.8	53.8	53.8	
Site 5	67.3	67.3	67.3	67.3	67.3	
Site 6	56.8	57.0	57.0	57.0	57.0	
Site 7a	61.5	62.3	62.4	61.7	61.7	
Site 7b	58.7	60.7	60.9	59.1	59.1	
Site 8	65.4	66.3	66.6	66.3	66.3	
Site 9	60.8	61.0	60.9	61.0	61.0	
Site 10	57.4	57.7	57.5	57.7	57.6	
Site 11	60.7	60.7	60.7	60.7	60.8	
Site 12	61.7	61.8	61.8	61.8	61.8	
Site 13	64.1	64.2	64.2	64.1	64.1	
Site 14	59.1	59.1	59.1	59.1	59.1	
Site 15	60.6	60.8	60.8	60.8	60.8	
Site 16	57.8	58.4	58.4	58.4	58.4	
		2011 Total Noise (background + modeled)				
Site 1a	40.3	41.2	41.2	41.2	41.2	40.5
Site 1b	62.7	62.7	62.7	62.7	62.7	62.7
Site 2	46.6	46.7	46.7	46.7	46.7	46.8
Site 3	59.5	59.5	59.5	59.5	59.5	59.5
Site 4	53.7	53.8	53.8	53.8	53.8	53.9
Site 5	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
Site 7a	61.5	62.2	62.5	61.7	61.7	61.6
Site 7b	58.7	60.5	61.0	59.1	59.1	59.1
Site 8	65.4	66.3	66.6	66.3	66.3	66.3
Site 9	60.8	60.9	60.9	60.9	60.9	60.9
Site 10	57.4	57.6	57.5	57.6	57.6	57.7
Site 11	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
Site 13	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
Site 15	60.6	60.9	60.9	60.8	60.8	60.8
Site 16	57.8	58.4	58.4	58.4	58.4	58.5

Source: Landrum & Brown analysis, 2003-2005.

Table 4.24
Difference in Total Noise for Project Alternatives at Measurement Sites

Measurement Site	2006 Change in Total Noise - DNL			2011 Change in Total Noise - DNL			
						Integrated	
	Ocean	Modifications	Integrated without ICC	Ocean	Modifications	Variation without ICC	Variation with 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	-0.6	-0.6	0.3	-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.

presents the estimated differences in total noise at each site for each alternative in each of the future years. As Table 4.24 indicates, only Sites 7a and 7b exhibit any noteworthy 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 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 environment for locations that are not situated very near a major airport. This analysis supports the assertion that no significant cumulative impacts are expected as a result of combining the impacts of any of the Airspace Redesign Alternatives with other past, present, or reasonably foreseeable future actions.

4.19 CONSISTENCY WITH STATE AND LOCAL PLANS

The proposed air traffic procedural changes are consistent with applicable state and local plans as they would not have an impact on existing or proposed state and local government land use plans and development patterns.

4.20 SUMMARY OF POTENTIAL FOR SIGNIFICANT ENVIRONMENTAL IMPACTS

Table 4.25 summarizes the potential for significant impacts associated with each alternative. Potential significant impacts exist for Noise/Compatible Land Use and Socioeconomic Impacts/Environmental Justice. There is no potential for significant impacts associated with the Ocean Routing Airspace Alternative.

4.21 MITIGATION

Mitigation measures are those designed to avoid, minimize, rectify, reduce, eliminate, or compensate for significant impacts. Since significant noise-related impacts would potentially result from the implementation of the Modifications to Existing Airspace and Integrated Airspace Alternatives, mitigation will be considered.

Any mitigation measures will be developed upon receipt of public and agency comments regarding the Draft EIS. This ensures that public and agency input is appropriately considered in the development of mitigation. Also, potential specific mitigation strategies would be coordinated with the appropriate airport operators. Mitigation strategies that may be considered include:

- Continuous Descent Approach (CDA): Today, aircraft on approach perform a series of short descents and level offs to join the glide slope for landing. With CDA, aircraft on approach do a continuous steady descent to landing, which results in a higher altitude flight path and lower engine power levels. This reduces noise on the ground. CDA is currently in a limited testing and development phase at several airports around the U.S. Noise benefits would typically be realized for areas below 65 DNL.

- Nighttime abatement procedures: During nighttime hours when traffic demand decreases, it may be possible to implement flight track and runway use programs that direct aircraft away from residential and noise-sensitive land uses.

- Additional use of water and/or industrial areas: Proposed flight tracks may be refined so that aircraft are routed away from residential and noise-sensitive uses, to the extent possible.

- Sound insulation of impacted buildings with educational or medical uses: these buildings may be eligible for Airport Improvement Program (AIP)-funded sound insulation, if sponsored by an airport as part of its Noise Compatibility Program or by a non-airport public agency per FAA Order 5100.38C.

Table 4.25
Summary of Potential for Significant Environmental Impacts

Environmental Impact Category	Alternative							
	Modifications to Existing Airspace		Ocean Routing Airspace		Integrated Airspace			
					without ICC		with ICC	
	2006	2011	2006	2011	2006	2011	2006	2011
Noise / Compatible Land Use	Yes	Yes	No	No	Yes	Yes	N/A	Yes
Socioeconomic Impacts / Environmental Justice	Yes	Yes	No	No	Yes	Yes	N/A	Yes
Secondary or Induced Impacts	No	No	No	No	No	No	N/A	No
Department of Transportation Act: Sections 4(f) and 6(f)	No	No	No	No	No	No	N/A	No
Historical, Architectural, Archaeological and Cultural Resources	No	No	No	No	No	No	N/A	No
Wild and Scenic Rivers	No	No	No	No	No	No	N/A	No
Fish, Wildlife, and Plants	No	No	No	No	No	No	N/A	No
Light Emissions and Visual Impacts	No	No	No	No	No	No	N/A	No
Air Quality	No	No	No	No	No	No	N/A	No
Natural Resources and Energy Supply	No	No	No	No	No	No	N/A	No
Construction Impacts	No	No	No	No	No	No	N/A	No
Farmlands	No	No	No	No	No	No	N/A	No
Coastal Resources	No	No	No	No	No	No	N/A	No
Water Quality	No	No	No	No	No	No	N/A	No
Wetlands	No	No	No	No	No	No	N/A	No
Floodplains and Floodways	No	No	No	No	No	No	N/A	No
Hazardous Materials and Solid Waste	No	No	No	No	No	No	N/A	No

Source: Source: Landrum & Brown, Metron and HNTB analysis, 2005.

Chapter Five
PUBLIC INVOLVEMENT AND AGENCY COORDINATION

In accordance with NEPA guidelines, the FAA has involved the public and other agencies, with jurisdiction or special knowledge, in the impact assessment process. This chapter summarizes actions that the FAA has taken to inform and involve the public and agencies during the NEPA process.

Public involvement and agency coordination included informal pre-scoping meetings, formal scoping meetings, agency meetings, newsletters and a website. During the informal pre-scoping and formal scoping period for the EIS, the public and agencies were given the opportunity to assist in determining the scope of issues to be addressed in this EIS. After the scoping meetings, the FAA held a number of agency meetings, distributed newsletters, and created a web site to educate, inform, and receive feedback from concerned citizens and organizations. The sections that follow provide a brief description of the public involvement and agency coordination conducted during the EIS process for the NY/NJ/PHL Metropolitan Airspace Redesign.

5.1 PRE-SCOPING

The FAA recognized that this project has the potential to be viewed as controversial based on potential environmental impacts. Public reaction to a previous airspace redesign project, the Expanded East Coast Plan, indicated that the NY/NJ/PHL Metropolitan Airspace Redesign had the potential to be controversial. In recognition of the potential for controversy, the FAA held extensive pre-scoping meetings to understand critical public issues and to improve public understanding of the proposed airspace redesign.

The pre-scoping process involved conducting a series of airspace redesign workshops. The workshops provided a forum for informal discussions between the public and experienced FAA personnel. The goal of the workshops was to gather critical public comment prior to the formal scoping process. The pre-scoping process was intended to provide the following benefits:

- Increased partnership with the public early in the redesign phase
- Expanded design options in the beginning of the project
- Increased understanding of critical public issues that will need to be addressed as the project proceeds
- Improved public understanding of the project and its goals in order to facilitate meaningful discussions concerning project alternatives
- Development of a more comprehensive project

Advertising for the workshops was done by distribution to the mailing list, newspaper notices, and press briefings. Thirty-one workshops were held between September

22, 1999 and February 3, 2000. The date and location for each workshop is shown in **Table 5.1**. The same information was presented at each workshop. Materials distributed included: a point of contact brochure containing address, phone, fax, and e-mail of the lead contractor; airport flight operations at the major airports for the years of 1990, 1995, and 1998; aircraft noise brochures published by FAA Eastern Region; FAA Air Traffic Environmental Guide; and an Airspace Redesign Project Newsletter. Displays included: a presentation covering the purpose of the meetings, description of the project and the redesign concepts, maps depicting actual aircraft radar tracks, and the NEPA process.

A total of 1,174 people attended the workshops and 712 comments were received. A summary of the comments received at each workshop is included in Appendix M.

Table 5.1
Pre-Scoping Workshops

Location	Date
Waterbury, CT	September 22, 1999
Danbury, CT	September 23, 1999
Kingston, NY	September 28, 1999
Stamford, CT	September 29, 1999
New York, NY	September 30, 1999
Yonkers, NY	October 5, 1999
Bronx, NY	October 6, 1999
New Rochelle, NY	October 7, 1999
East Elmhurst, NY	October 12, 1999
Uniondale, NY	October 13, 1999
Staten Island, NY	October 14, 1999
Montclair, NJ	November 3, 1999
Hasbrouck Heights, NJ	November 4, 1999
Newark, NJ	November 9, 1999
Elizabeth, NJ	November 10, 1999
Carteret, NJ	November 16, 1999
Edison, NJ	November 17, 1999
Springfield, NJ	November 18, 1999
Bridgewater, NJ	December 1, 1999
Parsippany, NJ	December 2, 1999
Bordentown, NJ	December 7, 1999
Philadelphia, PA	December 8, 1999
Wilmington, DE	December 9, 1999
Hazlet, NJ	December 14, 1999
Toms River, NJ	December 15, 1999
Tinton Falls, NJ	December 16, 1999
New York, NY	January 11, 2000
White Plains, NY	January 12, 2000
Weehawken, NJ	January 13, 2000
Bronx, NY	January 19, 2000
Jamaica, NY	February 3, 2000

5.2 NOTICE OF INTENT

On January 22, 2001 the FAA Eastern Region published a Notice of Intent (NOI) to prepare an EIS in the Federal Register. The announcement stated that the EIS would assess the potential environmental impacts resulting from the proposed modifications to air traffic routings in the study area. The NOI provided readers a standard mail and electronic mail address to submit scoping comments. The NOI also included an announcement to conduct public scoping meetings; a web site address and toll free number was provided to obtain a schedule, meeting locations, and other pertinent scoping information.

Advertisements summarizing the NOI and mentioning the scoping meeting schedule and locations were published on January 18, 2001 in the following newspapers: *New York Daily News*, *Newsday*, *The Advocate* (CT), *The Journal News* (NY), *Newark Star Ledger*, *Philadelphia Daily News*, *El Diario* (Spanish) and *The Village Voice* (NY). A copy of the NOI may be found in Appendix M.

5.3 FORMAL SCOPING

In accordance with the National Environmental Policy Act (NEPA) and regulations set forth by the Council on Environmental Quality (CEQ), a formal scoping process was conducted for the NY/NJ/PHL Metropolitan Airspace Redesign EIS. The formal scoping process is intended to encourage and facilitate early public involvement in the environmental process. The objectives of the scoping process and associated public meetings were:

- To provide a description of the proposed action to interested parties and participants of the EIS process,
- To provide an early and open process to determine the scope of issues to be addressed in the EIS,
- To identify potentially significant issues or impacts related to the proposed action that should be analyzed in the EIS;
- To identify any coordination efforts associated with the proposed action that are outside Federal requirements; and
- To identify and eliminate from detailed study those issues that are not deemed significant to the study.

The formal scoping period was January 22, 2001 through June 29, 2001. The scoping process consisted of 28 public meetings and three agency meetings held in various locations throughout the Study Area. The date and location for each meeting is shown in **Table 5.2**. The same information was presented at each meeting. In addition to a presentation and question and answer session, exhibits depicting the environmental and computer modeling processes were on display. A court recorder was available to record individual comments and an area was provided for the public to write and submit written comments.

A total of 1,031 people attended the scoping meetings and 901 comments were received. A summary of the comments received at each meeting is included in Appendix M.

5.4 AGENCY COORDINATION

In addition to formal scoping meetings, the FAA met with agencies with jurisdiction or special knowledge relative to the Airspace

Table 5.2
Formal Scoping Meetings

Location	Date (2001)
Danbury, CT	February 7
Kingston, NY	February 8
White Plains, NY	February 12
Stamford, CT	February 13
New Rochelle, NY	February 14
Newark, NJ	March 6
Carteret, NJ	March 7
Edison, NJ	March 8
Clifton, NJ	March 12
Hasbrouck Heights, NJ	March 13
Park Slope, Brooklyn, NY	March 14
Springfield, NJ	March 20
Somerville, NJ	March 21
Parsippany, NJ	March 26
Jersey City, NJ	March 27
Tottenville, Staten Island, NY	March 28
Uniondale, NY	April 3
Lawrence, NY	April 4
Elmhurst, Queens, NY	April 5
NW Staten Island, NY	April 24
Manhattan, NY	April 25
Bronx, NY	April 26
Glen Mills, PA	May 14
Toms River, NJ	May 15
Tinton Falls, NJ	May 16
Talleyville, DE	May 22
Philadelphia, PA	May 23
Trenton, NJ	May 24

Redesign project on an as needed basis. Typically, each meeting consisted of introductions, a slide show presentation, and a video on the NY/NJ/PHL Metropolitan Airspace Redesign project. The agencies were encouraged to share their concerns or comments regarding the Airspace Redesign project. **Table 5.3** provides a list of agencies consulted. The agency comments and concerns were used by the FAA in assembling the materials needed for the Draft EIS. Periodic briefings were also given to members of Congress, the New Jersey and Delaware Congressional delegations, and various Governors' offices.

5.5 OTHER COMMUNITY INVOLVEMENT

The Airspace Redesign project has engaged in several initiatives to educate and involve the public in the project. These activities are summarized in the following sections.

5.5.1 Newsletters

A series of newsletters was prepared and distributed to the mailing list over the course of the project. The newsletters are included in Appendix M.

Table 5.3
Agencies Consulted

Airline Pilots Association
Brandywine Hundred, Delaware
Connecticut State Department of Transportation
Connecticut State Historic Preservation Officer
Delaware Department of Natural Resources and Environmental Control
Delaware State Historic Preservation Officer
Delaware Valley Regional Planning Commission
Eastern Region Helicopter Council
Environmental Protection Agency Regions 1, 2, and 3
Manhattan Borough President, Manhattan Borough President's Helicopter Task Force
Metropolitan New York Aircraft Noise Mitigation Committee (Governor's Group of Nine)
Mid-Atlantic Federal Partners for the Environment
NBAA Users Forum
New England Airspace/Range Council
New Jersey Department of Environmental Protection
New Jersey Department of Transportation
New Jersey State Commerce Department
New Jersey State Historic Preservation Officer
New York Department of Transportation
New York State Department of Environmental Conservation
New York State Historic Preservation Officer
Newark International Airport Aircraft Advisory Committee
New Jersey Acting Governor and Director of Aeronautics
Pennsylvania Department of Environmental Protection
Pennsylvania Department of Transportation
Pennsylvania State Historic Preservation Officer
Philadelphia Airport Authority
Port Authority of New York/New Jersey
Queens Borough President's Aviation Advisory Committee
State Aviation Directors
Town and Village Aviation Safety/Noise Abatement Committee
Transportation Research Board

5.5.2 Web Site

A World Wide Web site was established for the NY/NJ/PHL Metropolitan Airspace Redesign project. The web site provides background, current information, and points of contact for the project. The web site is located at http://www.faa.gov/nynjphl_airspace_redesign/.

Chapter Six
LIST OF ACRONYMS, ABBREVIATIONS AND GLOSSARY OF TERMS IN THIS EIS

6.1 LIST OF ACRONYMS AND ABBREVIATIONS

ABE	Allentown/Lehigh Valley International Airport
ACY	Atlantic City International Airport
ADIZ	Air Defense Identification Zone
AFFF	Aqueous Film Forming Foam Agent
AGL	Above Ground Level
AIM	Aeronautical Information Manual
AIP	Airport Improvement Plan
AMP	Airspace Management Program
AIR-21	Aviation Investment and Reform Act for the 21st Century
AOP	Airline Operations Centers
APO	Federal Aviation Administration's Office of Aviation Policy and Plans
ARD	Yardley, Pennsylvania Fix
ARFF	Airport Rescue and Fire Fighting
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
ATCSCC	Air Traffic Control System Command Center, Command Center
ATCT	Airport Traffic Control Tower
BDL	Bradley International Airport
BDR	Bridgeport/Igor I. Sikorsky Memorial Airport
BRAC	Base Realignment and Closure Commission

CAA	Clean Air Act
CBRA	Coastal Barriers Resources Act
CDW	Caldwell/Essex County Airport
Center	Air Route Traffic Control Center
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CIFRR	Common IFR Room
CO	Carbon Monoxide
CTAP	Chicago Terminal Airspace Project
CTAS	Center/TRACON Automation System
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
dB	Decibel
DC	District of Columbia
DCMP	Delaware Coastal Management Program
DME	Distance Measuring Equipment
DNL	Day-Night Average Sound Level
DNREC	Delaware Department of Natural Resources and Environmental Control
DOT	Department of Transportation (United States)
DP	Departure Procedure
DRVSM	Domestic Reduced Vertical Separation Minimum
DSWC	Delaware Division of Soil and Water Conservation
EECP	Expanded East Coast Plan
EIS	Environmental Impact Statement

EPA	Environmental Protection Agency (United States)
ETMS	Enhanced Traffic Management System
EWR	Newark International Airport
FAA	Federal Aviation Administration
FACT	Future Airport Capacity Task
FAR	Federal Aviation Regulations
FEMA	Federal Emergency Management Agency
FICON	Federal Interagency Committee on Noise
FOK	Westhampton Beach/The Francis S. Gabreski Airport
FPPA	Farmland Protection Policy Act
FR	Federal Register
FRG	Republic Airport
FY	Fiscal Year
GAO	Government Accountability Office
GPS	Global Positioning System
HDR	High Density Rules
HPN	White Plains/Westchester County Airport
HVN	New Haven/Tweed-New Haven Airport
IAP	Instrument Approach Procedure
ICAO	International Civil Aviation Organization
ICC	Integrated Control Complex
IFR	Instrument Flight Rules
ILG	Wilmington/New Castle County Airport
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions

INM	Integrated Noise Model
ISP	Long Island MacArthur Airport
JFK	John F. Kennedy International Airport
LAAS	Local Area Augmentation System
LDJ	Linden Airport
LGA	LaGuardia Airport
LWCF	Land and Water Conservation Fund
MASE	Midwest AirSpace Enhancement
MMU	Morristown Municipal Airport
MOA	Military Operations Areas
MSL	Mean Sea Level
MSW	Municipal Solid Waste
MXE	Modena Airspace Fix
N90	New York TRACON
NAAQS	National Ambient Air Quality Standards
NAR	National Airspace Redesign
NAS	National Airspace System
NASA	National Aeronautics and Space Administration
NAVAID	Navigation Aid
NDB	Non-Directional Beacon
NEPA	National Environmental Policy Act
NIRS	Noise Integrated Routing System
NJCAAN	New Jersey Citizens Against Aircraft Noise
NJCER	New Jersey Citizens for Environmental Research, Inc.
NM	Nautical Miles

NO_2	Nitrogen Dioxide
NOAA	National Oceanographic and Atmospheric Administration
NO_x	Nitrogen Oxides
NOI	Notice of Intent
NRHP	National Register of Historic Places
NYICC	New York Integrated Control Complex
NY/NJ/PHL	New York/New Jersey/Philadelphia
O_3	Ozone
OEP	Operational Evolution Plan
OPSNET	Operational Network
ORD	Chicago O'Hare International Airport
PANYNJ	Port Authority of New York and New Jersey
Pb	Lead
PCT	Potomac Consolidated TRACON
pFAST	Passive Final Approach Spacing Tool
PHL	Philadelphia International Airport
PM-2.5	Particulate Matter less than 2.5 micrometers in diameter
PM-10	Particulate Matter less than 10 micrometers in diameter
PNE	Northeast Philadelphia Airport
RBV	Robbinsville, New Jersey Fix
RJ	Regional Jet
RNAV	Area Navigation
ROD	Record of Decision
SDAISA	State Designated American Indian Statistical Areas
SIP	State Implementation Plan

SO_2	Sulfur Dioxide
SWAP	Severe Weather Avoidance Plans
SWF	Newburgh/Stewart International Airport
TAAM	Total Airspace & Airport Modeler
TACAN	Tactical Air Navigation Equipment
TAF	Terminal Area Forecast
TEB	Teterboro Airport
TMI	Traffic Management Initiative
TMS	Traffic Management Systems
Tower	Airport Traffic Control Towers
TRACON	Terminal Radar Approach Control
TTN	Trenton/Mercer County Airport
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
VOC	Volatile Organic Compound
VOR	VHF Omni-directional Radio Range Station
VORTAC	VHF Omni-directional Range with Tactical Air Navigation
WAAS	Wide Area Augmentation System
WRI	McGuire Air Force Base
ZBW	Boston Air Route Traffic Control Center
ZDC	Washington Air Route Traffic Control Center
ZNY	New York Air Route Traffic Control Center

6.2 GLOSSARY OF TERMS

A-Weighted Sound Level – A quantity, in decibels, read from a standard sound-level meter with A-weighting circuitry. The A-weighting scale discriminates against the lower frequencies below 1000 hertz according to a relationship approximating the auditory sensitivity of the human ear. The A-weighted sound level is approximately related to the relative "noisiness" or "annoyance" of many common sounds.

Acoustics – The science of sound, including the generation, transmission, and effects of sound waves, both audible and inaudible.

Air Carrier – An entity holding a Certificate of Public Convenience and Necessity issued by the Department of Transportation to conduct scheduled air services over specified routes and a limited amount of non-scheduled operations.

Air Pollutant – Any substance in air that could, in high enough concentration, harm man, other animals, vegetation, or material. Pollutants may include almost any natural or artificial composition of airborne matter capable of being airborne. They may be in gases, particulates, or in combinations thereof. Generally, they fall into two main groups: (1) those emitted directly form identifiable sources and (2) those produced in the air by interaction between two or more primary pollutants, or by reaction with normal atmospheric constituents, with or without photoactivation.

Air Route Traffic Control Center (ARTCC, Center) – An FAA facility established to provide air traffic control service to aircraft operating on an IFR flight plan within controlled airspace and principally during the en-route phase of flight. When equipment capabilities and controller workload permit, certain advisory/assistance services may be proved to VFR aircraft.

Air Taxi – An air carrier certificated in accordance with Part 135 and authorized to provide, on demand, public transportation of persons and property by aircraft. Generally operates small aircraft "for hire" for specific trips.

Air Traffic Clearance – An authorization by air traffic control for the purpose of preventing collision between known aircraft, for an aircraft to proceed under specified traffic conditions within controlled airspace.

Air Traffic Control (ATC) – A service operated by appropriate authority to promote the safe, orderly, and expeditious flow of air traffic.

Airport Traffic Control Tower (ATCT, Tower) – A facility that uses air/ground communications, visual signaling, and other devices to provide ATC services to aircraft operating in the vicinity of an airport. Authorizes aircraft to land or take-off at the airport controlled by the tower regardless of flight plan or weather conditions.

Airspace – Navigable area used by aircraft for purposes of flight.

Airspace complexity – a function of the degree to which aircraft routes are intermingled, with more route crossings resulting in more complex airspace. Complexity is also related to the number of aircraft, types of aircraft, and duration of a flight in a particular volume of airspace.

Airway – A control area or portion of established in the form of a corridor, the center line of which is the defined by radio navigational aids. The network of airways serving aircraft operations up to but not including 18,000 feet MSL are referred to as "Victor" airways. The network of airways serving aircraft operations at or above 18,000 feet MSL are referred to as "Jet " airways.

Altitude – Height above a reference point, usually expressed in feet. Reference points are typically sea level, the ground, or airfield elevation in which case MSL, AGL or AFE further describes the altitude, respectively.

Ambient Noise Level – The level of noise that is all-encompassing within a given environment for which a single source cannot be determined. It is usually a composite of sounds from many and varied sources near to and far from the receiver.

Area Navigation (RNAV) – A method of navigation that permits aircraft operation on any desired course within the coverage of station-referenced navigation signals or within the limits of a self-contained system capability.

Arithmetic Averaged Sound Pressure Level – The arithmetic sum of a series of sound pressure levels divided by the number of levels included in the sum.

Arrival distance below 18,000 feet – the metric used to calculate changes in complexity associated with arrivals. This metric is the average distance flown by the arriving aircraft flying from 18,000 feet to landing.

Attainment Area – An area in which the Federal or state standards for ambient air quality are being achieved.

Based Aircraft – Active aircraft which are stationed at an airport on a permanent basis.

Block – Census blocks are small areas bounded on all sides by visible features such as streets, roads, streams, and railroad tracks, and by invisible boundaries such as city, town, township, and county limits; property lines; and short, imaginary extensions of streets and roads. Blocks are numbered uniquely within each census tract or block numbering area (BNA). A three-digit number identifies a block, sometimes with a single alphabetical suffix. The U.S. Bureau of Census designates census blocks.

Block time – the average time a flight takes to fly from gate to gate in a 24 hour period.

Centroid – A point representing the geographic center of a US Bureau of Census census block.

Change in Route Length Per Flight – the difference between the distance flown for the Future No Action Airspace Alternative and each of the other Alternatives.

Clearance – *see Air Traffic Clearance.*

Climb – The act or instance of increasing altitude.

Common Automation Platform - includes shared displays on screens, radar data processing and presentation, and communications.

Conformity – A determination that a project conforms with a State Implementation Plan (SIP) whose purpose is to eliminate or reduce the severity and number of violations of the National Ambient Air Quality Standards; and does not impede the scheduled attainment of such standards.

Controlled Airspace – Airspace of defined dimensions within which air traffic control service is provided to IFR flights and to VFR flights in accordance with the airspace classification.

Corner Post – An airspace structure wherein arriving aircraft are routed to one of four arrival fixes located at the corners of the TRACON airspace, at approximately 90-degrees from one another. A straight track from the arrival fix to the major airport is used to route arriving aircraft; therefore, there are four primary arrival routes in a corner post system. Departing aircraft are routed via several departure routes that use the airspace between the arrival routes. This effectively segregates arriving and departing aircraft into different sections of airspace.

Criteria Pollutants – The 1970 amendments to the Clean Air Act required EPA to set National Ambient Air Quality Standards for certain pollutants known to be hazardous to human health. EPA has identified and set standards to protect human health and welfare for six pollutants: ozone, carbon monoxide, total suspended particulates, sulfur dioxide, lead, and nitrogen oxide. The term, "criteria pollutants" derives from the requirement that EPA must describe the characteristics and potential health and welfare effects of these pollutants. It is on the basis of these criteria that standards are set or revised.

***de minimis* Levels –** *de minimus* levels are levels and vary according to the type of pollutant and severity of the non-attainment area. These levels are consistent for all conformity determinations (unless the State chooses to set lower *de minimis* levels and apply the conformity requirements to non-federal as well as Federal entities). The calculation of total project emissions is made and compared to these *de minimis* cutoffs. If the emissions for a pollutant are above *de minimis*, the project requires a conformity determination. All emissions from the project must be analyzed and found to conform, not only those above the *de minimis* levels.

Departure – The act of an aircraft taking off from an airport.

Departure Procedure – A preplanned IFR ATC departure procedure printed for pilot use in graphic and/or textual form. DP's provide transition from the terminal to the appropriate en route structure.

Descent – The process of decreasing altitude.

Distance Measuring Equipment (DME) – Equipment (airborne and ground) used to measure, in nautical miles, the slant-range distance of an aircraft from the DME navigational aid.

Day-Night Average Sound Level (DNL) – A measure of the annual average noise environment over a 24-hour day. It is the 24-hour, logarithmic- (or energy-) average, A-weighted sound pressure level with a 10-decibel penalty applied to the nighttime event levels that occur between 10 p.m. and 7 a.m.

Decibel (dB) – Commonly used to define the level produced by a sound source. The term used to identify 10 times the common logarithm of two like quantities proportional to power, such as sound power or sound pressure squared.

Delay – the primary measure of the operational efficiency of the airspace system. Delays in the airspace system are the result of congestion and severe weather.

Emissions – Pollution discharged into the atmosphere from stationary sources such as smokestacks, surface areas of commercial or industrial facilities, residential chimneys, and from mobile sources such as motor vehicles, locomotives, or aircraft exhausts.

Energy-Averaged Sound Pressure Level – The logarithmic sum of the sound power of a series of sound pressure levels divided by the number of levels included in the sum.

Enplanement – the total number of revenue passengers boarding aircraft, including originating, stopover, and transfer passengers, in scheduled and non-scheduled services.

En Route Airspace – A general term to describe the airspace controlled by an ARTCC.

End of Day's Last Arrival Push – the time when the final bank of scheduled flights for all of the modeled airports enters the TRACON system.

Environmental Impact Statement (EIS) – An EIS is a document that provides a discussion of the significant environmental impacts which would occur as a result of a proposed project, and informs decision-makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts. Public participation and consultation with other federal, state, and local agencies is a cornerstone of the EIS process.

Equivalent Sound Level (L_{eq}, LAEQ, LAEQD or LAEQN) – The level of a constant sound which, in the given situation and time period, has the same average sound energy, as does a time-varying sound. Specifically, equivalent sound level is the energy-averaged sound pressure level of the individual A-weighted sound pressure levels occurring during the time interval. The time interval over which the measurement is taken (or for which the metric is computed) should always be specified. For example, if the time interval is the daytime period (7 a.m. to 10 p.m.) then the acronym LAEQD is used. Similarly, if the time interval is the nighttime period (10 p.m. to 7 a.m.) then the acronym LAEQN is used.

Expanded East Coast Plan (EECP) – A comprehensive revision (prepared in 1986 and implemented in stages) of IFR routes and procedures above 3,000 feet. The plan was designed, to restructure routes to and from the New York metroplex to complement improved terminal ATC procedures, to reduce delays, to adjust arrival and departure corridors and facilitate air traffic management.

Family – According to the U.S. Census Bureau, a family consists of two or more people, one of whom is the householder, related by birth, marriage, or adoption and residing in the same housing unit.

Federal Aviation Administration (FAA) – The Federal Aviation Administration (FAA) is the element of the United States government with primary responsibility for the safety of civil aviation. Among its major functions are the regulation of civil aviation to promote safety and fulfill the requirements of national defense and development and operation of a common system of air traffic control and navigation for both civil and military aircraft.

Federal Airway – *see Airway*

Fix – A geographical position determined by reference to the surface, by reference to one or more NAVAIDs or area navigation (RNAV) (including GPS).

Flexibility – generally defined as the ability of the system to respond to changes in user preferences.

Flight Data Information – Specific information used by ATC for an individual flight. This includes information such as aircraft identification, destination, type, route, and altitude.

Flight Data Processing System – The system used to store and track flight data information.

Flight Level – A level of constant atmospheric pressure related to reference datum of 29.92 inches of mercury. Each FL is expressed in three digits representing hundreds of feet. For example FL 250 represents a barometric altitude of 25,000 feet. Aircraft operating at altitudes greater than 18,000 feet MSL in the United States use Flight levels as their altitude reference.

Flight Track – The route used by an aircraft in flight.

Flight Track Utilization – The amount and type of aircraft that use a specific flight track, on either departure or arrival.

Frequency (acoustic) – The number of oscillations per second completed by a vibrating object.

Gates – Gates and posts described in this document are not necessarily the same as those used for the purposes of controlling air traffic. The gates and posts found in this document were developed specifically to describe and illustrate the various airspace alternatives.

General Aviation (GA) – All civil aviation except scheduled passenger and cargo airlines.

Global Positioning System (GPS) – A satellite-based radio positioning and navigation system operated by the Department of Defense. The system provides highly accurate position and velocity information, and precise time, on a continuous global basis to an unlimited number of properly equipped users.

Handoff – An action taken to transfer the radar identification of an aircraft from one controller to another if the aircraft will enter the receiving controller's airspace and radio communications with the aircraft will be transferred**.**

Heading – A compass bearing indicating the direction of travel.

Hertz (Hz) – The unit used to designate frequency; specifically, the number of cycles per second.

Household – A household includes all the persons who occupy a housing unit. The occupants may be a single family, one person living alone, two or more families living together, or any other group of related or unrelated persons who share living arrangements.

Housing Unit – A housing unit is a house, apartment, a mobile home or trailer, a group of rooms or a single room occupied as separate living quarters or, if vacant, intended for occupancy as separate living quarters.

Hub – Airport that serves as a focus of an air carrier's route structure. Flights from many cities converge at the focal airport permitting passengers to connect to other points in the route structure. See also Hubbing.

Hydrocarbons (HC) – Chemical compounds that consist entirely of carbon and hydrogen.

Instrument Approach Procedure (IAP) – A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing or to a point from which a landing may be made visually.

Instrument Flight Rules (IFR) – Rules governing the procedures for conducting instrument flight. Also a term used by pilots and controllers to indicate type of flight plan.

Instrument Meteorological Conditions (IMC) – Weather conditions expressed in terms of visibility, distance from clouds, and cloud ceilings during which all aircraft are required to operate using Instrument Flight Rules (IFR).

Integrated Noise Model (INM) – A computer program developed, updated and maintained by the Federal Aviation Administration to evaluate aircraft noise impacts in the vicinity of airports.

Inter-Facility Boundary – Boundary of two adjacent ATC facilities.

Intra-Facility Boundary – Internal boundary in an ATC facility (i.e., a sector wall).

In-Trail Spacing – The distance between two aircraft on an identical route; one aircraft is following another**.**

Invasive Species – Invasive species are organisms (usually transported by humans) which successfully establish themselves in, and then overcome, otherwise intact, pre-existing native ecosystems.

Jet route delay – the average delay per operation over a 24 hour period.

Jet Stream – A migrating stream of high speed winds present at high altitudes.

Knots – Speed measured in nautical miles per hour.

Loudness – The attribute of an auditory sensation, in terms of which sounds may be ordered on a scale extending from soft to loud. Loudness depends primarily upon the sound pressure of the source, but it also depends upon the frequency and waveform of the source.

Maximum inter-facility handoffs per hour – This metric is defined as the number of controller-to-controller communications in an hour to transfer the responsibility for an aircraft from a controller in one facility to a controller in another facility.

Maximum Sustainable Throughput – the sum of the weighted average of the peak traffic count for JFK, LGA, EWR, TEB, and PHL.

Mean Sea Level (MSL) – The height of the surface of the sea for all stages of the tide, used as a reference for elevations. Also called sea level datum.

Mean Surface Wind Speed – Average wind velocity calculated at the surface or at ground level elevation.

National Airspace System (NAS) – The NAS is the common network of air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations and procedures, technical information, and manpower and material.

National Ambient Air Quality Standards (NAAQS) – Standards for criteria pollutants established by United States Environmental Protection Agency that apply to outdoor air.

Natural Areas – Undeveloped areas of land such as parks, wildlife refuges/management areas, and nature preserves.

Nautical Mile (NM) – A measure of distance equal to 1 minute of arc on the earth's surface (approximately 6,076 feet).

Navigation Aids (NAVAIDs) – Any visual or electronic device airborne or on the surface which provides point to point guidance information or position data to aircraft in-flight.

Noise – Any sound that is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying.

Noise Abatement Procedure – Measures taken to reduce the off-airport impacts of aircraft noise. Procedures developed by airport operators in cooperation with the FAA, and local community officials, to mitigate aircraft noise near airports.

Noise Exposure – The cumulative acoustic stimulation reaching the ear of a person over a specified period of time (e.g., a work shift, a day, a working life, or a lifetime).

Noise Integrated Routing System (NIRS) – A computer program developed, updated, and maintained by the Federal Aviation Administration to evaluate aircraft noise impact for air traffic actions involving multiple airports over broad geographic areas.

Non-Attainment Area – Areas with levels that exceed one or more of the National Ambient Air Quality Standards for the criteria pollutants designated in the Clean Air Act.

Non-Directional Beacon (NDB) – A radio beacon transmitting non-directional signals whereby the pilot of an aircraft equipped with direction finding equipment can determine his bearing to or from

the radio beacon and "home" on or track to or from the station. When the radio beacon is installed in conjunction with the Instrument Land System (ILS) marker, it is normally called a Compass Locator.

Operation – Landing or take-off of an aircraft.

Operational viability – refers to whether a particular airspace redesign is workable and thus, safe. This gauge of system safety reflects the potential to maintain standards that define spacing between multiple aircraft, aircraft and other physical structures, and aircraft and designated airspace. Operational viability criteria include reduced airspace complexity and reduced voice communications.

Operational efficiency refers to how well a particular design works. Operational efficiency criteria include: reduce delay, balance controller workload, meet system demands, improve user access to the system, expedite arrivals and departures, increase flexibility in routing, and maintain airport throughput.

Overflights – Aircraft whose flights originate or terminate outside the controlling facility's area that transit the airspace without landing.

Piston Driven Aircraft – Propeller driven aircraft powered by an internal combustion engine.

Positive Control – The separation of all air traffic within designated airspace by air traffic control.

Post – Gates and posts described in this document are not necessarily the same as those used for the purposes of controlling air traffic. The gates and posts found in this document were developed specifically to describe and illustrate the various airspace alternatives.

Radar (primary) – A device which, by measuring the time interval between transmission and reception of radio pulses, and correlating the angular orientation of the radiated antenna beam, or beams in azimuth and/or elevation, provides information on range, azimuth, and /or elevation of objects in the path of the transmitted pulses. Also known as Primary Radar.

Radar (secondary) – A radar system in which the object to be detected is fitted with cooperative equipment in the form of a radio receiver/transmitter (transponder). Radar pulses transmitted from the searching transmitter/receiver (interrogator) site are received in the cooperative equipment and used to trigger a distinctive transmission from the transponder. This reply transmission, rather than a reflected signal, is then received back at the interrogator site for processing and display at an ATC facility. Also known as a radar beacon.

Radial – A magnetic bearing extending from a VOR/VORTAC/TACAN navigation facility.

Receiver – The listener or measuring microphone that detects the sound transmitted by the source.

Satellite Navigation – *see Global Positioning System*

Sector – A defined volume of airspace, including both lateral and vertical limits, in which a single air traffic controller is responsible for the safe movement of air traffic. A TRACON's or ARTCC's airspace is comprised of multiple sectors.

Scoping – The early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action. Scoping is also used to eliminate from detailed study the issues that are not significant or have been covered by prior environmental review.

Separation – Spacing between aircraft. This spacing may be vertical, lateral, longitudinal and visual.

Sequencing – Procedure in which air traffic is merged into an orderly flow.

Sound Exposure Level (SEL) – A time-integrated metric (i.e., continuously summed over a time period) which quantifies the total energy in the A-weighted sound level measured during a transient noise event. The time period for this measurement is generally taken to be that between the moments when the A-weighted sound level is 10 dB below the maximum.

Sound Pressure Level – A measure, in decibels, of the magnitude of the sound. Specifically, the sound pressure level of a sound that, in decibels, is 10 times the logarithm to the base 10 of the ratio of the squared pressure of this sound to the squared reference pressure. The reference pressure is usually taken to be 20 micropascals. (See also Energy-Averaged Sound Pressure Level.)

Source (acoustic) – The object that generates the sound.

Statute Mile (SM) – A measure of distance equal to 5,280 feet.

Sulfur Dioxide (SO_2) – Sulfur dioxide typically results from combustion processes, refining of petroleum, and other industrial processes.

Tactical Air Navigation (TACAN) – An ultra high frequency electronic air navigation aid which provides equipped aircraft a continuous indication of bearing and distance to the station.

Terminal Area – A general term used to describe airspace in which approach control services for airport traffic control service is provided.

Terminal Radar Approach Control (TRACON) – An FAA ATC facility which uses radar and two way radio communication to provide separation of air traffic within a specified geographic area in the vicinity of one or more large airports.

Time below 18,000 feet – this is the average time spent descending (arrivals) and climbing (departures) per operation in a 24-hour period.

Traffic Weighted Arrival/Departure Delay 2011 – the weighted average arrival/departure delay per operation in a 24-hour period. The arrival delay is the difference between the arrival time for a specific Alternative's operations and the arrival time for unimpeded operations. Similarly, the

departure delay is the difference between the departure time for a specific Alternative's operations and the departure time for unimpeded operations.

Topography – The configuration of a surface including its relief and the position of its natural and man made features.

Tower – *see Airport Traffic Control Tower*

Turboprop Aircraft – An aircraft whose main propulsive force is provided by a propeller driven by a gas turbine. Additional propulsive force may be provided by gas discharged from the turbine exhaust.

Vector – Heading instructions issued by ATC to provide navigational guidance by radar.

Visual Meteorological Conditions (VMC) – Weather conditions expressed in terms of visibility, distance from cloud, and ceiling equal to or better than specified minima.

Visual Flight Rules (VFR) – Rules that govern the procedures for conducting flight under visual conditions. The term 'VFR' is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan.

Voice communications – includes both controller to controller, and controller to pilot communications. Controller–to-controller communications are required to transfer responsibility for a particular aircraft. Controller-to-pilot communications are required to provide instructions to pilots.

Volatile Organic Compound (VOC) – Any organic compound that participates in atmospheric photochemical reactions except those designated by EPA as having negligible photochemical reactivity.

VOR (Very High Frequency Omni-directional Radio Range Station) – A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360° in azimuth, oriented from magnetic North. DME may be installed. Used as a basis for navigation in the National Airspace System.

VORTAC (Very High Frequency Omni-directional Range with Tactical Air Navigation) – A navigation aid providing VOR azimuth, TACAN azimuth, and TACAN distance measuring equipment (DME) at one site. The most common form of radio navigation currently in use.

Wake Turbulence – Phenomena resulting from the passage of an aircraft through the atmosphere. The term includes vortices, thrust stream turbulence, jet blast, jet wash, propeller wash, and rotor wash both on the ground and in the air.

Weighting – An additive (or subtractive) factor by which the sound pressure level at certain frequencies in an acoustic measurement is increased (or reduced) in order for that measurement to be more representative of certain simulated conditions.

Chapter Seven
LIST OF PREPARERS

This chapter identifies the individuals assisting in the preparation and independent review of the Draft EIS, along with each preparer's responsibilities.

7.1 FAA PREPARERS

Listed below are the employees of FAA who are responsible for the preparation of the Draft EIS or who were involved in its review. Supporting the FAA in this effort are individuals from Northrop Grumman, HNTB Corporation, Landrum & Brown, Metron Aviation, Inc., and The MITRE Corporation.

7.1.1 FAA EIS Environmental Team

Steve Kelley – Airspace Manager, Eastern Terminal Service Area

Steve Kelley has been assigned air traffic duties at the NY TRACON since 1982 as an air traffic controller and operations supervisor in both the Newark and Kennedy approach control areas. In addition he was an airspace specialist for the Newark area during the Expanded East Coast Plan project. Mr. Kelley has served as the project manager for the NY/NJ/PHL Airspace Redesign Project for the last 4 years.

Moira Keane – Environmental Team Lead, Eastern Terminal Service Area

Moira (Mo) Keane has been the FAA Eastern Terminal Service Area's Environmental Specialist since May 1999. Ms. Keane has been with the FAA since 1984. She worked one year in the Oklahoma City Airports District office, while completing her Masters degree in Environmental Health/Epidemiology. She was in the Southwest Region's Airports Division at Fort Worth, Texas, from 1985-1992, where she completed an EIS for two new runways at the Dallas/Fort Worth International Airport. In the Central Region Airports Division (from 1993 to 1999), Ms. Keane worked on a complex EIS for a proposed expansion of the Lambert-St. Louis International Airport. Currently she is the Environmental Lead for the EIS for the New York/New Jersey/Philadelphia Airspace Redesign Project. Ms. Keane also holds a Master of Science in Geosciences from Mississippi State University.

7.1.2 FAA Airspace Redesign Team

The FAA pulled together air traffic controllers from numerous facilities to engage in development of airspace design alternatives for the proposed project. Their names and the facilities in which they work appear below:

New York TRACON (N90)

- Tim Byrnes
- Robert F. Clarke
- James Coschignano, Jr.
- Richard J. De Vivo
- Frank Fleischer
- Paul F. Greco
- Timon A. Kalpaxis

- Ed Kane
- Barry S. Krasner
- John A. Landi
- Christopher A. Leigh
- Ralph P. Mormile
- Patricia L. Moss
- Peter Porcaro
- Philip G. Rodgers
- William J. Russell
- Michael Santos
- John A. Shanahan
- James D. Shelton
- Louis J. Vengilio
- Chris Villafranca
- Thomas White

Philadelphia TRACON (PHL)

- Kevin J. Devery
- Michael J. Gercke
- Michael McFadyen
- Robert S. Niszczak, Jr.
- Stephen Nogar
- Stephen L. Smith

Eastern Terminal Service Area Management

- Tom Bock
- Carmine Gallo
- Loretta J. Martin
- Leon J. Prusak
- Michael J. Sammartino
- Benedict Sliney
- Carl Zimmerman

Washington Center (ZDC)

- Kevin M. Aurandt
- Arthur W. Breon, Jr.
- William Paul Cook, Jr.
- Mark Drew
- Michael L. Goodson
- Rexford A. Jackson
- Kerry L. Johnson
- Andrew L. Kalnoske
- Charles C. Lentile
- Wayne B. McKenna
- Michael F. McLaughlin
- Dale E. Tutterrow
- Jeffery D. Wellborn
- David F. West
- Guy J. Whitlock
- Walter B. Winston

New York Center (ZNY)

- John B. Azzarone
- Edward V. Barrett, Sr.
- Scott Boucher
- Paul G. Cartier
- Christopher A. Chiorando
- Laurence J. Clayton
- Johnny W. Cornett
- Daniel A. Fraser
- Paul J. Galligan
- Reubin Graf
- John M. Hoppe
- Jackie C. Jackson
- Thomas J. O'Neill
- John J. Robertson
- Victor C. Santore
- Steven M. Strano
- Linda Waters

7.1.3 Additional FAA Reviewers

The following table identifies FAA personnel who assisted in the independent review of the Draft EIS.

Table 7.1
Additional FAA Reviewers

Name	Location
Manny Weiss	Administrator, Regional Office (RO), Jamaica NY
John McCartney	Manager, Eastern Terminal Service Area (Air Traffic), RO, Jamaica, NY
Felicia Miller-Brown	Air Traffic, Regional Office (RO), Jamaica NY
Anthony Tallini	Air Traffic, RO, Jamaica NY
Andrew Brooks	Airports Division, RO, Jamaica, NY
Claire Wang	Technical Operations/Engineering, RO, Jamaica NY
Ernestine Gatewood	Air Traffic, Washington, DC
Jeffrey Clark	Manager, NY TRACON
Michael Wagner	Manager, Philadelphia Air Traffic Control Tower
Michael McCormick	Manager, New York Center
Theresa Flieger	Eastern Terminal Service Area Management
Mark Ward	Manager, Enroute Services, Atlanta, GA

7.2 TECHNICAL TEAM

The following individuals provided technical assistance to the FAA in the preparation of the Draft EIS.

Table 7.2
EIS Technical Team

Preparer	Title	EIS Responsibility
Northrop Grumman Information Technology		
Michael Merrill	NY EIS Program Manager	Program Manager for Program, Schedule & Product Deliverables, Alternative/Design Analysis, Purpose and Need Development
Michael T. Johnson	Airspace Specialist	Airspace Design Analysis, Alternative Descriptions, Purpose and Need Development
Adam Mouw	Environmental Analyst	Environmental Analysis Support
Crown Consulting Inc.		
Jayna Goodman	Environmental Specialist	Environmental Technical Analysis, NEPA Preparation and Coordination
HNTB Corporation		
Kimberly C. Hughes, P.E.	Manager, Environmental Services/Project Manager	Environmental Technical Analysis, Air Quality Specialist, NEPA Preparation
Barbara Kulvelis	Project Manager, Senior Environmental Planner	Environmental Technical Analysis, NEPA Preparation
Kent Duffy	Environmental Planner	Environmental Technical Analysis, Alternatives and Noise, NEPA Preparation
Ashley Eckles	Jr. Environmental Aviation Planner	Environmental Technical Analysis, NEPA Preparation
Naveed Sami	Senior GIS Analyst	GIS Analysis
Kent Miller	GIS Analyst	GIS Analysis
Bryan Bielinski	GIS Analyst	GIS Analysis
Adam Turbett	Jr. Environmental Aviation Planner	NEPA Preparation
Landrum & Brown		
Scott D. Carpenter	Sr. Project Manager	Project Management, Noise Technical Analysis Management
Stephen C. Smith	Sr. Consultant	Noise Technical Analysis and Coordination
Matthew H. Lee	Vice President	Airspace Simulation Integration, Day-Night Schedule Analysis
Richard M. Kula	Sr. Consultant	Day-Night Schedule Analysis
James G. Walsh	Sr. Project Manager	Operational Forecasting
Qianlin Li	Project Manager	Operational Forecasting, Operational Schedule Development
Sarah J. Potter	Consultant	Noise Technical Analysis, Operational Schedule Development
Ralph E. Redman	Consultant	Noise Technical Analysis
Rebecca S. Cointin	Consultant	Noise Technical Analysis, Operational Schedule Development
Stanley K. Eshelman	Consultant	Noise Technical Analysis, Operational Schedule Development
Jesse A. Baker	Consultant	Noise Technical Analysis
Maria T. Cordova	Consultant	Noise Technical Analysis

Table 7.2 (continued)
EIS Technical Team

Preparer	Title	EIS Responsibility
Metron Aviation, Inc.		
Michael L. Graham	Sr. Project Manager	Project Management, Noise Technical Analysis Management
Tyler White	Analyst	Noise Technical Analysis
Aaron Weikle	Analyst	Noise Technical Analysis
Dr. Terrance Thompson	Senior Consultant	Noise Modeling, ADT Analysis
Dejan Neskovic	Analyst	Noise Technical Analysis
MITRE		
Linda M. Boan	Lead Staff, Airspace and Airport Analysis	Alternative Documentation, Design, and Analysis
Marcus P. Stevens	Project Team Manager, Airspace and Airport Analysis	Alternative Documentation, Design, and Analysis
Dr. Jonathan H. Hoffman	Principal Scientist, Center for Advanced Aviation Systems Development	Alternative Documentation, Design, and Technical Analysis
Elizabeth Anderson Comer/Archaeology (EAC/A)		
Elizabeth A. Comer	Archaeologist	Historic and Cultural Resource Specialist

Chapter Eight
DISTRIBUTION LIST

This chapter provides a listing of libraries, officials, agencies, organizations, and individuals that were provided specific forms of the DEIS. These forms include: (1) Executive Summary (with full copy CD), (2) Hard Copy (full document including appendices on CD), and (3) Full Hard Copy (entire document including appendices printed out for review). Both electronic and hard copies are available for review at libraries listed on the following pages. In addition, approximately 4000 officials, agencies, organizations, and individuals have been notified by newsletter that the DEIS had been released and provided information on how to obtain a copy if desired.

Table 8.1
Federal Officials

First Name	Last Name	Position	Organization
Connecticut			
Nancy	Johnson	Member	U.S. House of Representatives
Rosa	DeLauro	Member	U.S. House of Representatives
Christopher	Dodd	Member	United States Senate
Joseph	Lieberman	Member	United States Senate
John	Larson	Member	U.S. House of Representatives
Christopher	Shays	Member	U.S. House of Representatives
District of Columbia			
Hillary	Clinton	Member	United States Senate
Frank	Lautenberg	Senator	United States Senate
Rick	Santorum	Member	United States Senate
Arlen	Spector	Member	United States Senate
Jon	Corzine	Member	United States Senate
Christopher	Dodd	Member	United States Senate
Charles	Schumer	Member	United States Senate
Joseph	Biden Jr.	Member	United States Senate
Joseph	Lieberman	Member	United States Senate
Thomas	Carper	Member	United States Senate
Jose	Serrano	Member	U.S. House of Representatives
John	Larson	Member	U.S. House of Representatives
Joseph	Pitts	Member	U.S. House of Representatives
Donald	Sherwood	Member	U.S. House of Representatives
Sue	Kelly	Member	U.S. House of Representatives
John	Sweeney	Member	U.S. House of Representatives
Sherwood	Boehlert	Member	U.S. House of Representatives
Maurice	Hinchey	Member	U.S. House of Representatives
Jim	Gerlach	Member	U.S. House of Representatives

Table 8.1 (continued)
Federal Officials

First Name	Last Name	Position	Organization
District of Columbia (continued)			
Major	Owens	Member	U.S. House of Representatives
Robert	Brady	Member	U.S. House of Representatives
Chaka	Fattah	Member	U.S. House of Representatives
Michael	McNulty	Member	U.S. House of Representatives
Joseph	Crowley	Member	U.S. House of Representatives
Scott	Garrett	Member	U.S. House of Representatives
Frank	Pallone, Jr.	Member	U.S. House of Representatives
Timothy	Bishop	Member	U.S. House of Representatives
Robert	Menendez	Member	U.S. House of Representatives
Pete	King	Member	U.S. House of Representatives
Carolyn	Maloney	Member	U.S. House of Representatives
Gary	Ackerman	Member	U.S. House of Representatives
Charles	Rangel	Member	U.S. House of Representatives
Gregory	Meeks	Member	U.S. House of Representatives
Nita	Lowey	Member	U.S. House of Representatives
Anthony	Weiner	Member	U.S. House of Representatives
Edolphus	Towns	Member	U.S. House of Representatives
Vito	Fossella	Member	U.S. House of Representatives
Tim	Holden	Member	U.S. House of Representatives
Carolyn	McCarthy	Member	U.S. House of Representatives
Rodney	Frelinghuysen	Member	U.S. House of Representatives
Steve	Israel	Member	U.S. House of Representatives
Mellisa	Hart	Member	U.S. House of Representatives
Bill	Pascrell, Jr.	Member	U.S. House of Representatives
Curt	Weldon	Member	U.S. House of Representatives
Rosa	DeLauro	Member	U.S. House of Representatives
Christopher	Shays	Member	U.S. House of Representatives
Nancy	Johnson	Member	U.S. House of Representatives
Michael	Castle	Member	U.S. House of Representatives
Todd	Platt	Member	U.S. House of Representatives
Bill	Shuster	Member	U.S. House of Representatives
Frank	LoBiondo	Member	U.S. House of Representatives
James	Saxton	Member	U.S. House of Representatives
Steven	Rothman	Member	U.S. House of Representatives
Christopher	Smith	Member	U.S. House of Representatives
Donald	Payne	Member	U.S. House of Representatives
Rush	Holt	Member	U.S. House of Representatives
Jerrold	Nadler	Member	U.S. House of Representatives
Paul	Kanjorski	Member	U.S. House of Representatives
Scott	Garrett	Member	U.S. House of Representatives
Robert	Andrews	Member	U.S. House of Representatives
Nydia	Velazquez	Member	U.S. House of Representatives
Michael	Doye	Member	House of Representatives

Table 8.1 (continued)
Federal Officials

First Name	Last Name	Position	Organization
District of Columbia (continued)			
Thomas	Quaadman	Chief of Staff	Congressman Vito Fossella's Office
Delaware			
Michael	Castle	Member	U.S. House of Representatives
Thomas	Carper	Member	United States Senate
Joseph	Biden Jr.	Member	United States Senate
New Jersey			
Frank	Lautenberg	Member	United States Senate
James	Saxton	Member	U.S. House of Representatives
Donald	Payne	Member	U.S. House of Representatives
Steven	Rothman	Member	U.S. House of Representatives
Robert	Menendez	Member	U.S. House of Representatives
Linda	DiGiovanni		Congressman Franks' Office
Michael	Beson		Congressman Pallone's Office
Adam	Zellner		Congressman Rothman's Office
Donald	Payne	Member	U.S. House of Representatives
Rush	Holt	Member	U.S. House of Representatives
Frank	LoBiondo	Member	U.S. House of Representatives
Scott	Garrett	Member	U.S. House of Representatives
Rodney	Frelinghuysen	Member	U.S. House of Representatives
Bill	Pascrell, Jr.	Member	U.S. House of Representatives
Frank	Pallone, Jr.	Member	U.S. House of Representatives
Christopher	Smith	Member	U.S. House of Representatives
Jon	Corzine	Member	United States Senate
Steven	Rothman	Member	U.S. House of Representatives
Robert	Andrews	Member	U.S. House of Representatives
Robert	Menendez	Member	U.S. House of Representatives
Paul	Dement		Congressman Pallone's Office
New York			
Sue	Kelly	Member	U.S. House of Representatives
Nydia	Velazquez	Member	U.S. House of Representatives
John	Svare		Office of Congressman Hinchey
Lori	DuBord		Congressman Hinchey's Office
Dennis	Velez		Congresswoman Lowey's Office
Jason	Goldstein		Office of Senator Schumer
Steve	Israel	Member	U.S. House of Representatives
Maurice	Hinchey	Member	U.S. House of Representatives
Anthony	Weiner	Member	U.S. House of Representatives
Liliane	Ferrara		Congressman Crowley's Office
John	Sweeney	Member	U.S. House of Representatives
Michael	McNulty	Member	U.S. House of Representatives
Jerrold	Nadler	Member	U.S. House of Representatives
Peter	King	Member	U.S. House of Representatives
Thomas	Reynolds	Member	U.S. House of Representatives
Carolyn	McCarthy	Member	U.S. House of Representatives

Table 8.1 (continued)
Federal Officials

First Name	Last Name	Position	Organization
New York (continued)			
Charles	Rangel	Member	U.S. House of Representatives
Jack	Quinn	Member	U.S. House of Representatives
Nita	Lowey	Member	U.S. House of Representatives
James	Walsh	Member	U.S. House of Representatives
Edolphus	Towns	Member	U.S. House of Representatives
Louise	Slaughter	Member	U.S. House of Representatives
Gregory	Meeks	Member	U.S. House of Representatives
Eliot	Engel	Member	U.S. House of Representatives
Sherwood	Boehlert	Member	U.S. House of Representatives
Major	Owens	Member	U.S. House of Representatives
John	McHugh	Member	U.S. House of Representatives
Jose	Serrano	Member	U.S. House of Representatives
Louis	Torres		Office of Rep. Jose Serrano
Gerald	Nappi		Congresswoman Kelly's Office
Charles	Schumer	Member	United States Senate
Hillary	Clinton	Member	United States Senate
Joseph	Crowley	Member	U.S. House of Representatives
Craig	Donner		Congressman Vito Fossella's Office
Vito	Fossella	Member	U.S. House of Representatives
Linda	Rosenthal		Congressman Nadler's Office
Pennsylvania			
Paul	Kanjorski	Member	U.S. House of Representatives
Donald	Sherwood	Member	U.S. House of Representatives
Tim	Holden	Member	U.S. House of Representatives
Phil	English	Member	U.S. House of Representatives
Chaka	Fattah	Member	U.S. House of Representatives
Curt	Weldon	Member	U.S. House of Representatives
John	Murtha	Member	U.S. House of Representatives
John	Peterson	Member	U.S. House of Representatives
Joseph	Pitts	Member	U.S. House of Representatives
Rick	Santorum	Member	United States Senate
Arlen	Specter	Member	United States Senate
Robert	Brady	Member	U.S. House of Representatives
Gibbson	Armstrong	Member	U.S. House of Representatives
Michael	Doyle	Member	U.S. House of Representatives

Table 8.2
State Officials

First Name	Last Name	Position	Organization
Connecticut			
Jodi	Rell	Governor	State of Connecticut
Delaware			
Robert	Gilligan		DE House of Representative
Ruth Ann	Minner	Governor	State of Delaware
Catherine	Cloutier	Senator, 5th District	State of Delaware
Wayne	Smith	Majority Leader	DE House of Representative
New Jersey			
Richard	Codey	Governor	State of New Jersey
Nick	Goldsack		
Nicholas	Scutari	Member	NJ Senate
New York			
George	Pataki	Governor	State of New York
Pennsylvania			
Rendell	Edward	Governor	State of Pennsylvania

Table 8.3
Local Officials

First Name	Last Name	Position	Organization
Connecticut			
Sebastian	Giuliano	Mayor	City of Middletown
Eddie	Perez	Mayor	City of Hartford
New Jersey			
John	Gregorio	Mayor	City of Linden
Joseph	Doria, Jr.	Mayor	City of Bayonne
Karen	McCoy Oliver	Mayor	City of Hillside
Fred	Profeta, Jr.	Mayor	City of Maplewood
Gregg	David	Mayor	City of Kenilworth
Andrew	Skibitsky	Mayor	City of Westfield
Sal	Bonacorsso	Mayor	City of Clark
James	Kennedy	Mayor	City of Rahway
Daniel	Reiman	Mayor	City of Carteret
Christian	Bollwage	Mayor	City of Elizabeth
Glen	Cunningham	Mayor	Jersey City
Anthony	Terrezza	Mayor	City of Union
Garrett	Smith	Mayor	City of Roselle
Edward	Jackus	President	City Council of Elizabeth
Joseph	Jenkins	City Administrator	East Orange
New York			
Michael	Bloomberg	Mayor	New York City
Jeremy	Wilber	Supervisor	Town of Woodstock
Vito	Pinto	Legislator	Westchester County
Anthony	Borelli		Manhattan Community Board 4
Arthur	Strickler		Manhattan Community Board 2

Table 8.3 (continued)
Local Officials

First Name	Last Name	Position	Organization
New York (continued)			
Paul	Goldstein		Manhattan Community Board 1
Gary	Parker		Manhattan Community Board 5
Toni	Carlina		Manhattan Community Board 6
C. Virginia	Fields	Borough President	Manhattan Borough
Javier	Llano		Manhattan Community Board 11
Lawrence	McClean		Manhattan Community Board 9
Elizabeth	McKee		Manhattan Community Board 8
Barry	Schneider		Manhattan Community Board 8
Penny	Ryan	Manhattan Community	Manhattan Community Board 7
Kathy	Dodd		Staten Island Community Board 2
Marie	Bodnar		Staten Island Community Board 3
Nicholas	Dmytryszyn	SIBP Officer	Office of Staten Island Borough President
Joseph	Carroll		Staten Island Community Board 1
James	Molinaro	Borough President	Staten Island Borough
Hugh	Weinberg	QBPAAC Counsel	Office of Queens Borough Pres.
Helen	Marshall	President	Queens Borough
Betty	Bratton	Chairperson	Queens Community Board 10
Dorothy	Schreiber		Queens Community Board 7
Shirley	Clark		Queens Community Board 3
Millicent	O'Meally		Queens Community Board 7
Giovanna	Reid	Queens Community	Queens Community Board 3
Jimmy	Smith		Queens Community Board 3
Catherine	Poggi		Bronx Community Board #10
Francisco	Gonzales		Bronx Community Board #9
Elizabeth	Ring		Bronx Community Board 9
David	Mojica		Bronx Community Board 4
John	Robert		Bronx Community Board 2
Adolfo	Carrión, Jr.	Borough President	Bronx Borough
John	Fratta		Bronx Community Board 11
Carmen	Angueira		Bronx Community Board 12
James	Vacca		Bronx Community Board 10
Grace	Belkin		Bronx Community Board 8
Rita	Kessler		Bronx Community Board 7
Xavier	Rodriguez		Bronx Community Board 5
John	Dudley		Bronx Community Board 3
Cedric	Loftin	District Manager	Bronx Community Board 1
Marty	Markowitz	President	Brooklyn Borough
Annette	Robinson		Brooklyn Community Board 3
			Brooklyn Community Board 6
			Brooklyn Community Board 15
			Brooklyn Community Board 14
			Brooklyn Community Board 12
			Brooklyn Community Board 10

Table 8.3 (continued)
Local Officials

First Name	Last Name	Position	Organization
New York (continued)			
			Brooklyn Community Board 16
			Brooklyn Community Board 7
			Brooklyn Community Board 13
			Brooklyn Community Board 5
			Brooklyn Community Board 4
			Brooklyn Community Board 2
			Brooklyn Community Board 1
			Brooklyn Community Board 8
			Brooklyn Community Board 11
			Brooklyn Community Board 17
			Brooklyn Community Board 18
			Queens Community Board 9
			Queens Community Board 12
			Queens Community Board 2
			Queens Community Board 1
			Queens Community Board 5
			Queens Community Board 11
			Queens Community Board 4
			Queens Community Board 6
			Queens Community Board 8
			Queens Community Board 13
Pennsylvania			
John	Street	Mayor	City of Philadelphia
Hank	Eberle	Mayor	City of Ridley Park
Ralph	Orr	Mayor	City of Eddystone
Robert	McMahon	Mayor	City of Media
Donald	Cook	Mayor	City of Prospect Park
Dennis	Sharkey	Mayor	City of Narberth

Table 8.4
Federal Agencies

First Name	Last Name	Position	Organization
Connecticut			
Kathleen	McGinty	Commissioner; Secretary Environmental Protection	Department. of Agriculture
Matthew	Kelley	Supervising Engineer	Department of Transportation
Terry	Villanueva	Manager	Bombay Hook NWR
District of Columbia			
Ken	Mittleholtz		EPA
Ethel	Smith		U.S. Department of Interior
Margo	Oge	Dir., Trans. & Air Quality	EPA
Robert	Hargrove		U.S. EPA
Norman	Mineta	Secretary	US Department of Transportation

Table 8.4 (continued)
Federal Agencies

First Name	Last Name	Position	Organization
District of Columbia (continued)			
Camille	Mittelholtz	Environmental Policies Team Leader	Department of Transportation
Don	Klima	Director, Federal Agency Program	ACHP
New Jersey			
Clifford	Day	Supervisor	U.S. Fish & Wildlife Service
Steve	Atzert	Project Leader	U.S. Fish and Wildlife
William	Koch	Refuge Manager	U.S. Fish and Wildlife
Stan	Gorski	Field Office Supervisor	National Marine Fisheries
Karen	Greene	NEPA/Environmental Resources	NOAA National Marine Fisheries
Charles	Kuperus	Secretary	Department of Agriculture
Randy	Turner	Superintendent	Morristown National Historical Park
Steve	Atzert		Edwin B. Forsythe NWR
Howard	Schlegel	Manager	Cape May NWR
Ed	Henrey	Refuge Manager	Wallkill River NWR
New York			
Lynngard	Knutson		EPA Region 2
Frank	Santomauro	Chief, Planning Div.	US Army Corps of Eng.
David	Stillwell	Field Supervisor	U.S. Fish&Wildlife Service
Kathileen	Callahan	Dep. Regional Administrator	EPA
Alan	Steinberg	Regional Administrator	EPA Region 2
Michael	Reynolds	Superintendent	National Park Service, Fire Island National Seashore
Raymond	Werner	Chief, Air Programs Branch	U.S. Environmental Protection Agency, Region 2
Deborah	Lofredo	Office Assistant	Elizabeth A. Morton, Target Bay and Oyster Bay NWR
Pennsylvania			
Barbara	Okorne		EPA Region 3
Donald	Welsh	Regional Administrator	EPA Region 3 (DE,DC,MD,PA,VA,WV US)
Jerry	Pasquale	COE	Army, Environmental Resources Branch
Samantha	Fairchild	Director	EPA Off. Of Enf., Compl.&Env..Jud
Mary	Bomar	Regional Director	NPS
Kate	McManas	Refuge Manager	Johne Heinz NWR at Tinicum
Massachusetts			
Andrew	Raddant	Regional Environmental Officer	U.S. Dept.of the Interior
Marvin	Moriarty	Regional Director	U.S. Fish & Wildlife Service
Betsey	Higgins	Fed. Activities	EPA Region 1
Robert	Varney	Regional Administrator	EPA Region 1 (CT, ME, MA, NH, RI, VT & 10 Tribal Nations)
Delaware			
Michael	Scuse	Deputy Secretary	Department of Agriculture

Table 8.5
State Agencies

First Name	Last Name	Position	Organization
Connecticut			
David	Poirier		State Historic Preservation Office
Paul	Loether		State Historic Preservation Office
Susan	Chandler		State Historic Preservation Office
Brian	Emerick	Supervising Environmental Analyst	CT Dept of Environ Protection
Jane	Stahl	Dep. Com.	CT Dept of Env. Protection
Stephen	Korta	Commissioner	CT Department of Transportation
David	Head	Supervisor of Planning	CT Dept. of Transportation
Carmine	Trotta	Tarnsportation Assistant Planner	CT Dept. of Transportation
Ned	Hurle	Transportation Planning Director	CT Dept. of Transportation
Diane	Bray	Airport Planning	CT Dept. of Transportation
Steve	Korta	Airport Administrator	CT Dept. of Transportation
Kevin	Lynch		CT Dept. of Transportation
Richard	Jaworski	Bureau Chief	CT Bureau of Aviation & Ports
Anne	Gobin	Bureau Chief	CT Bureau of Air Management
Delaware			
Craig	Lukezic	Archaeologist	Delaware State Historic Preservation Office
Timothy	Slavin	Director	Delaware Historical & Cultural Affairs/SHPO
Jim	Hewes	Coastal Management Program	
Sarah	Cooksey	Coastal Management Program Administrator	DE Dept.of Natural Resources and Env.Control
Joe	Cantalupo	Director, Aeronautics Division	DE Dept. of Transportation
Michael	Kirkpatrick	Administrator	DE DOT Office of Aeronautics
Ralph	Reeb, III	Director, Planning	DE DOT
Harry	Van DenHuevel		DEL DOT
Terry	Fulmer		DE DOT Environmental Services Branch
Kevin	Magerr		Delaware DOT, EPA
David	Carter	Environmental Program Manager	DNREC/DSNC/DCP
Ali	Mirzakhalili	Program Administrator	DE - Air Quality Management Section
Steve	Marz	Deputy Director	DE Historical & Cultural Affairs
Charles	Salkin	Director, DE State Parks	Parks&Rec Div.of DNR
New Jersey			
Meghan	MacWilliams-Baratta	Historic Preservation Specialist	NJ Historic Preservation Office
Dan	Saunders		NJ Historic Preservation
Dorothy	Guzzo	Deputy	Natural & Historic Resources
Gregory	McDonough	Chief of Operations	NJ DOT, Division of Aeronautics
Greg	McDonough	Division of Aeronautics	NJ DOT
Tomas	Thatcher	Director	NJ Div. Of Aeronautics
John	Kaiser		NJ DOT, Division of Aeronautics
Ted	Matthews	Executive Director	NJ DOT
James	Fox	Commissioner	NJ DOT

Table 8.5 (continued)
State Agencies

First Name	Last Name	Position	Organization
New Jersey (continued)			
Richard	Gimello	Executive Director	NJ DOT
Jack	Lettiere	Commissioner	NJ Department. of Transportation
Ken	Koschek	Office of Program Coordination	NJ Dept of Environmental Protection
Deborah	Pinto	Chief, Off. of Local Env.Management	NJ Dept. of Environmental Protection
Leslie	McGeorge	Assist Comm, Planning, Science & Technology	NJ Dept of Environmental Protection
Bradley, M.	Campbell	Commissioner	NJ Dept of Environmental Protection
Bradley	Campbell		Dept. of Environmental Protection
Linda	Miller		NJDEP Air Quality Management
Lisa	Jackson	Asst. Commissioner	Dep. of Env.. Protection, LUR Prog.
Jose'	Fernandez	Director	Dept.of Env.Pro., NJ Div. of Parks&Forrestry
Patrick	Brannigan	Deputy Chief	Office of Management & Operations
New York			
Betty Ann	Hughes		NYS Dept. of Environmental Conservation
Thomas	Kunkel	Regional Director	NYS Dept of Env.Conservation
Lou	Berchielli		NYS Dept. of Environmental Conservation
Bryan	Swift		NYS Dept. of Environmental Conservation
James	Ralston	Director Bureau of Air Quality Planning	NYS Dept. of Environ. Cons.
Robert	Kulikowski	Director	NYC Office of Environmental Coordination
David	Shaw	Director	Div. Of Air Resources, NYS DEC
Stephanie	Henrich		Dept. of Environ. And Waterways
Julian	Adams		NY SHPO (NY City Resources)
Ruth	Pierpont	Director	Historic Preservation Staff
Steve	Campbell	Passenger Transportation Division	NYS DOT, Region 1
Joseph	Testo	Passenger Trans. Div.	NYS DOT, Region 1
Thomas	Madison, Jr.	Acting Commissioner	NYS DOT, Region 1
Subinal	Chakraborti	Regional Director	NYS DOT, Region 10
Robert	Dennison	Regional Director	NYS DOT, Region 8
Douglas	Currey	Regional Director	NYS DOT, Region 11
Lorrin	Bird		NYS Aviation Services Bureau
Seth	Edelman	Director	Aviation Services Bureau
Mary	Ivy	Director	NYS DOT Environmental Analysis Bureau
Kevin	McGarry	Environmental Engineer	Bureau of Air Quality Planning
Pennsylvania			
Susan	Zacher	Historic Structures Section Chief	PA Bureau for Historic Preservation

Table 8.5 (continued)
State Agencies

First Name	Last Name	Position	Organization
Pennsylvania (continued)			
Jean	Cutler		Bureau for Historic Preservation
Jim	Burton		PENN DOT - Bureau of Aviation
Ed	Yewdall		PENN DOT
Rob	Betz		PENN DOT Bureau of Aviation
Rick	Harner	Director	Bureau of Aviation, PA DOT
Sharon	Daboyoin	Deputy Secretary	PA DOT Aviation & Rail Freight
David	Lamereaux		PA Department of Environmental Protection
Michael	Bedrin	Director	PA Department of Environmental Protection
Jim	Spontak		PA Department of Environmental Protection
John	Kennedy	Assistant Director	PA Department of Environmental Protection
Joe	Sieber		PA Department of Environmental Protection
Michael	Zuvich	Chief, Division of Air Quality	PA Dept of Environ. Protection
Kurt	Carr	Division Chief	Division of Archaeology & Protection

Table 8.6
Local Agencies

First Name	Last Name	Position	Organization
Connecticut			
Tigist	Zegeye		Wilmington Area Planning Council
New Jersey			
Rick	Gimello	Exec.Director	Intermobile Services
New York			
Iris	Weinshall	Commissioner	NYC DOT
Christopher	Ward	Assistant Commissioner	NYC Dept.of Environ. Pro.
Patricia	Ornst	Director of Aviation	NYC Econ. Dev. Corp.
Joseph	Gallucci		NYPD Aviation Unit
Lee	Ellman	Planning Director	Yonkers Planning Bureau
Pennsylvania			
Roger	Moog	Manager, Office of Aviation	Delaware Valley Regional Planning Commission

Table 8.7
Tribes/Nations

First Name	Last Name	Position	Organization
Mary	Sebastian		Eastern Pequot Indians of Connecticut
			Eastern Pequot Reservation
Roy	Sebastian	Chairperson	Paucatuck Eastern Pequot Tribe
Kenneth	Reels	Chairman	Mashantucket Pequot Tribe
Agnes	Cunha	Chairperson	Paucatuck Eastern Pequot Indian Tribal Nation
Ransford	Collins		The Southern Pequot Tribe
Aurelius	Piper		Golden Hill Paugussett Tribe
Moonface	Bear	Leader	Golden Hill Indian Reservation
Ralph	Sturges		The Mohegan Tribe
Ralph	Sturges	Chief	The Mohegan Tribe of Indians of the State of CT
Ralph	Sturges		The Mohegan Tribe & Nation
Roland	Harris	Chairman	Mohegan Indian Tribe
Paulette	Crone-Morange		Schaghticoke Indian Tribe
Richard	Velky	Chairperson	Schaghticoke Tribal Council
Jerry	Walden		The Nehantic Tribe and Nation
Jacqueline	Johnson	Executive Director	National Congress of American Indians
D. Bambi	Kraus	President	National Assn. Of Tribal HPO
			Nanticoke Indian Association, Inc.
Mark	Gould	Chairperson	Nanticoke Lenni-Lenape Indians of New Jersey
C.W.	Longbow		Cherokee Nation of New Jersey
			Taino Jatibonucu Tribe of Puerto Rico
Walter	Van Dunk		Ramapough Mountain Indians
Roy	Crazy Horse		Powhatan Renape Nation
Randy	King	Chairman	Shinnecock Tribe
Tom	Porter		Mohawk Reservation
Ralph	Bunn		Native American Validation Alliance
			Western Mohegan Tribe and Nation
Harry	Wallace		Unkechauga Nation (Poospatuck Reservation)
			Seneca Nation of Indians (Salamanca)
Kathleen	Mitchell		Seneca Nation of Indians
Ray	Halbritter		Oneida Indian Nation of New York
Glenn	Hoagland		Mohonk Preserve, Inc.
James	Ransom	Chief	St. Regis Mohawk Tribe
Leon	Shenandoah, Sr.	Head Chief	Onondaga Nation Tribal Council
Edward	Smoke	Chief	St. Regis Mohawk Tribe
John	Loran	Head Chief	St. Regis Mohawk Council Chiefs
Dennis	Bowen, Sr.	President	Seneca Nation Tribal Council
Irving	Powless, Jr.	Chief	Onondaga Nation Tribal Council
Emerson	Webster	Chief	Tonawanda Band of Seneca
Bernie	Parker	Chief	Tonawanda Band of Seneca Council of Chiefs
Vernon	Isaac	Chief	Cayuga Nation Tribal Council

Table 8.7 (continued)
Tribes/Nations

First Name	Last Name	Position	Organization
Arnold	Hewitt	Head Chief	Tuscarora Tribal Business Council
Duane	Ray	President	Seneca Nations
Kathleen	Mitchell		Seneca Nation of Indians
Doris	Pieschel		Eastern Lenape Nation of Pennsylvania
Alan	Downer	HPO	Navajo Nation
Jacqueline	Johnson	Executive Director	National Congress of American Indians
D. Bambi	Kraus	President	National Assn. Of Tribal HPO
David	Conrad	Executive Director	National Tribal Environmental Council
		Environmental Mgr	United South & Eastern Tribes

Table 8.8
Airport Authority

First Name	Last Name	Position	Organization
Michael	O'Donnell	Airport Manager	Waterbury-Oxford Airport
Alex	Cole	Airport Operations Manager	New Castle County Airport
Justin	Edwards	Airport Manager	Trenton Mercer Airport
Thomas	Rafter	Director	Atlantic City Int. Airport
Raymond	Zee	Sr. Airport Engineer	Port Authority of NYNJ
Sue	Baer	General Manger	Port Authority of NYNJ
Lanny	Rider	Manager	Port Authority of NYNJ
Tom	Bock	Manager, Airspace Redesign General	Port Authority of NYNJ
Thomas	Bosco	Deputy General Manager	Port Authority of NYNJ
Alfred	Werner	Manager	Long Island MacArthur Airport
Charles	Seliga	President & COO	Stewart International Airport
Alfred	Graser	General Manager	Port Authority of NYNJ
Mike	Geiger	Airport Manager	Republic Airport
William	DeCota	Director of Aviation	Port Authority of NYNJ
Kevin	Bleach	Manger, Aviation Tech. Services	Port Authority of NYNJ
Frank	Woodruff	Manger, Aviation Tech Services	Port Authority of NYNJ
Stephen	Lachetta		Albany County Airport Authority
Robert	Bracchitta	Director of Airport Operations	Westchester County Airport
Alan	Reiss	Deputy Director Aviation	Port Authority of NYNJ
Kurt	Krummenacker	Manager Aviation Tech. Services	Port Authority of NYNJ
Ed	McCarthy	Manager Aviation Tech Services	Port Authority of NYNJ
Rich	Louis	Manager, Airport Operations	Port Authority of NYNJ
Peter	Scherrer	Manager	Westchester County Airport
John	O'Donnell	CEO	Albany County Airport Authority
Warren	Kroeppel	General Manager, LGA	Port Authority of NYNJ

Table 8.8 (continued)
Airport Authority

First Name	Last Name	Position	Organization
Calvin	Davenger	Dep.Director of Aviation, Planning & Environmental	City of Philadelphia Division of Aviation
Charles	Isdell	Director of Aviation	Philadelphia International Airport
Terry	Sroka	Airport Manager	Reading Regional Airport
Lawrence	Krauter	Dep. Executive Director	Lehigh North Hampton Airport Authority
John	Bruer	Airport Manager	NE Philadelphia Airport Suptdt.
David	Eberly	Airport Manager	Lancaster Airport

Table 8.9
Airlines

First Name	Last Name	Position	Organization
Chief	Pilot		United Air Lines Inc.
Frank	Eliano		Continental Airlines
Gregory	Blackhall		Federal Express
Chief	Pilot		Air Canada
Chief	Pilot		British Airways PLC
Chief	Pilot		Northwest Airlines Inc.
Michele	Treacy		Continental Airlines
Chief	Pilot		UPS Company
Chief	Pilot		Midway Airlines Corporation
William	Cranor		Continental Airlines
Monica	Slatter Stokes	Senior Manager, State and Civic Affairs	Continental Airlines, Newark Airport
Glenn	Morse		Continental Airlines
Chief	Pilot		Aerosvit Ukranian Airlines
Chief	Pilot		Aerolineas Argentinas
Pete	Russo	Chief Pilot	JetBlue Airlines
Mauri	Lerpala		Finnair-JFK
Chief	Pilot		Air Lingus Shanon Ltd.
Chief	Pilot		Korean Airlines Co. Inc.
Chief	Pilot		Aeroflot
Chief	Pilot		Ceske Aerline
Robert	Laura		El Al Israel Airlines
Chief	Pilot		Allegheny Airlines Inc.
S. Michael	Scheeringa	Vice President Operations Planning	US Airways
Chief	Pilot		America West Airlines Inc
Jeff	Rehaluk	Manager, Flight Dispatch	Spirit
Ken	Pender	Global ATM Manager	Delta
Chief	Pilot		Delta Air Lines Inc.
Ralph	Davis	Air Traffic Systems Manager	American Airlines
Tim	Stull	Manager, ATS	UPS Airlines
Ron	Haggerty	Manager	Air Traffic Services, UA

Table 8.9 (continued)
Airlines

First Name	Last Name	Position	Organization
Chief	Pilot		Federal Express Corporation
Tom	Amato	Director of Flight Dispatch	Jetblue
Renee	Chesnic	Airfield Operations/ATC	US Airways
George	Dodelin	Systems Operations	Jetblue
Steve	Vail	Senior Manager	FedEx Air Traffic Operations
Dennis	Airey	Supervisor of Airport Operations	United Airlines (IAD)
Jay	Salter	VP – Operations Administration	Continental Airlines
Joseph	Ritorto	Vice President	First Aviation Services
Chief	Pilot		American Airlines Inc.
Chief	Pilot		Continental Airlines Inc.
Mark	Montgomery	Chief Pilot	Southwest Airlines
Charles	Hall	Director ATS	American
Patrick	Dempsey	Manager	ATC Systems, Southwest Airlines
Les	Parson	Managing Director	Continental Airlines-SOCC
Mike	Bleike	Sr. Director	Continental Airlines-SOCC

Table 8.10
Special Interest

First Name	Last Name	Position	Organization
David	Faile	President	Friends of Sikorsky Airport (FOSA)
Jeff	Gilley	Manager	Nat. Bus. Aviation Assn.
Stephen	Alterman	President	Cargo Airline Association
Gregory	Walden	Counsel, NJCER/NJCAAN	Patton Boggs, LLP
			Airline Pilots Association
Dean	Saucier	NE Regional Representative	NBAA
Robert	Lamond, Jr.	Director	NBAA, ATS
Will	Mack	Managing Director	Teterboro Users Group
Pamela	Barsam-Brown	Exec. Director	NJCAAN
Jerome	Feder	President	Westfield/CAAN
Angel & Angela	Garcia		People Against Newark Noise
Wendy and Richard	Rudman		Jockey Hollow Historic Preservation Association
James & Barbara	Frawley	President	Morris County CAAN
Thomas	Carver	President	New Jersey Aviation Assn.
Dennis	Hardie	Co-Chair	The Original Scotch Plains/Fanwood Cit. Against Noise
Christopher	Mazauskas		PROCEED
Jerome	Feder	Chairman	Union County Air Traffic Noise Advisory Board
Frederick	Obrock	President	EWR Runway 22 Coalition, Inc.
William	Holzapfel	City Attorney	City of Elizabeth
Stephen	McCabe	President	Warren Twp. Ad Hoc Noise Mitigation Com.

Table 8.10 (continued)
Special Interest

First Name	Last Name	Position	Organization
Martha	Sides	Secretary	Scotch Plains/Fanwood Cit. Against Air. Noise
Eileen	Werner		Caldwell Aviation Assoc.
Barbara	Reeder		Central Jersey R/W 22 Coalition Inc.
Michael	Schatzki	President	NJ Citizens for Environmental Research Inc.
Robert	Belzer	President	NJCAAN
Fran	Coakley		MOAAN
Ron	Gravino	Chairman	NIAAAC
Donald	Bowen		QUEST
Joyce	Gulden	Member	Governors Group of Nine
Barbara	Krause		Cranford Aircraft Noise Pollution Committee
Kevin	Campbell	Chair	Aircraft Noise Advisory Com.
Rodney & Gloria	Ruth	President	Citizens Air Rights Inc.
Scott	Godfrey	Director	NYALO
Ned	Cloonam		Sound Shore Community Alliance
Susan	Staples		Ulsterites Flight Over flight Noise
Gioia	Timpanelli		Woodstock Overflight Focus Group
Peter	Malkin		Metropolitan New York Aircraft Noise Mitigation Committee
Carl	Baessler	Committee Member	TVASNAC
Patricia	Horing		WRAIN (Westchester Residents Acting to Improve Neighborhoods)
Brian	Shapiro		Woodstock Env. Commission
Joel	Farley	Attorney	NJCAAN
Kendall	Lampkin	Exec. Dir. (TVASNAC)	Aircraft Safety&Noise Abatement
Arline	Bronzaft		Council of the Environment
Constantine	Kaniklidis		AirNoise
Joy	Held		Helicopter Noise Coalition
Mark	Cato		ALPA
Steve	Brown	Senior Vice President	AOPA
Heidi	Williams		AOPA
			Natl. Air Transport Association

Table 8.11
Public Interest Groups/Organizations

First Name	Last Name	Position	Organization
Eric	Zwerling	Dir.	Rutgers University Air & Noise Prog.
Ithan	Zimmer	Program Director	New Jersey Institute of Technology
Alexander	Balaban	Roselle Park Rep.	Union Cty Noise Ad. Board
Katherine	Cowperthwaite		Mayor's Comm. Against Airplane Noise
Robert	Weisenfeld		
Donald	Bluestone	Executive Director	Mosholu Montefiore Community Center
Patricia	Barone		Wurtsboro Flight Service Inc.
Richard	Halik	Sen. Airport Engineer	Aviation Technical Service Division
Patrick	Mallen		Sea Air NY
Abigal	Trenk		Air Pegasus
Matt	Zuccaro		Easter Region Helicopter Council
Mark	Green	Public Advocate	City of New York
Charles	Brodie	Airport Owner/Man.	Aerodrome Devel. Corp.
James	Dougherty		
Tracy	Carluccio		Delaware Riverkeeper