John F. Kennedy International Airport

Title 14 Code of Federal Regulations (CFR) Part 150 Final Noise Exposure Map Report

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Nicholas & Lence Communications

Planning Technology, Inc.

VHB Engineering, Surveying, and Landscape Architecture, P.C.



April 2017



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John F. Kennedy International Airport

Title 14 Code of Federal Regulations (CFR) Part 150 Final Noise Exposure Map Report

Prepared for the

April 2017

Port Authority of New York & New Jersey 4 World Trade Center 150 Greenwich Street New York, NY 10007

by

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THE PORT AUTHORITY OF NY & NJ

April 26, 2017

Mr. Andrew Brooks Environmental Program Manager Federal Aviation Administration Eastern Regional Office 1 Aviation Plaza Jamaica, NY 11434

Subject: Noise Exposure Map (NEM) Submission pursuant to Title 14 of the Code of Federal Regulations, Part 150 for John F. Kennedy International Airport (JFK)

Dear Mr. Brooks:

The Port Authority of New York and New Jersey (PANYNJ) is pleased to submit Noise Exposure Maps (NEMs) and supporting documentation for John F. Kennedy International Airport (JFK) prepared in accordance with 14 CFR Part 150 ("Airport Noise Compatibility Planning"). As of December 31, 2016, the aircraft operations at John F. Kennedy International Airport within this document are hereby certified by the PANYNJ to be consistent with the fleet mix, forecast operational levels, and flight procedures depicted for calendar years 2016 and 2021.

In accordance with 14 CFR Part 150, Section 150.21(c), PANYNJ requests that Federal Aviation Administration (FAA) confirm receipt of these Existing (2016) and Forecast (2021) Noise Exposure Maps (NEMs) and indicate whether they are in compliance with the applicable requirements. Both the Existing (2016) and Forecast (2021) NEMs were prepared using the forecast operations reviewed and approved by the FAA.

As discussed in Chapter 6 of the document, the PANYNJ provided all interested parties adequate opportunity to submit their views, data, and comments concerning the correctness and adequacy of the draft noise exposure map and descriptions of forecast aircraft operations, consistent with Part 150, §150.21(b). The Sponsor's Certification, the formal certification required by Part 150, is provided after the report cover. As requested, each document contains a CD attached to the front cover containing electronic copies of the document.

The PANYNJ is grateful for the meaningful participation provided throughout this project by your office, the New York Airports District Office, FAA Washington D.C. headquarters, New York TRACON, and the JFK Air Traffic Control Tower. We look forward to continuing to work with the FAA during preparation of the NCP and implementation of the NCP measures.

Please do not hesitate to contact me with any questions.

Sincerely yours,

in

Tom Bock General Manager Aviation Regulatory & Operational Support

> 4 World Trade Center 150 Greenwich Street, 18th Floor New York, NY 10007

enc.

THE PORT AUTHORITY OF NY & NJ

SPONSOR'S CERTIFICATION

The Port Authority of New York and New Jersey has completed a comprehensive Title 14 Code of Federal Regulations (CFR) Part 150 Noise Exposure Map Report for John F. Kennedy International Airport.

This is to certify the following:

- (1) The 2016 and 2021 Noise Exposure Maps for John F. Kennedy International Airport, and the associated documentation the Port Authority of New York and New Jersey submitted in this volume to the Federal Aviation Administration under Title 14 CFR Part 150, Subpart B, Section 150.21, are true and complete as of December 31, 2016, under penalty of 18 U.S.C. 1001.
- (2) Pursuant to Title 14 CFR Part 150, Subpart B, Section 150.21(b), all interested parties have been afforded adequate opportunity to submit their views, data, and comments concerning the correctness and adequacy of the draft noise exposure maps, and of the descriptions of forecast aircraft operations.
- (3) The "2016 Existing Condition Noise Exposure Map" (Appendix M, 2016 Map 1 of 6) accurately represents conditions for calendar year 2016.
- (4) The "2021 Five-Year Forecast Condition Noise Exposure Map" (Appendix M, 2021 Map 1 of 6) accurately represents forecast conditions for calendar year 2021 as of December 31, 2016.

Though submittal of the document is occurring in April 2017, the operations at John F. Kennedy International Airport are hereby certified to currently be consistent with the fleet mix, forecast operational levels, and flight procedures depicted for 2016 within this document, as of December 31, 2016. Further information regarding development of the fleet mix, forecast, and procedures can be found in Chapter 4 - NEM Development, Appendix E - Radar Flight Tracks and Flight Profiles, and Appendix F - Forecast and Operational Data.

Bv: Director, Aviation Dept., Port Authority of New York & New Jersey Title:

Date:

Airport Name: Airport Owner/Operator: Address: John F. Kennedy International Airport Port Authority of New York & New Jersey 4 World Trade Center, 150 Greenwich Street, 18th Floor; New York, NY 10007

AIRPORT NAME: John F. Kennedy International Airport

PROGRAM REQUIREMENT	YES	NO	SUPPORTING PAGES/REVIEW COMMENTS
I. Submitting And Identifying The NEM:			
A. Submission is properly identified:			
1. 14 C.F.R. Part 150 NEM?	Х		Front Cover and Inside Cover state, "Title 14 Code of Federal Regulations Noise Exposure Map Report".
2. NEM and NCP together?		Х	Submittal is for NEM only. Front Cover and Inside Cover state "Noise Exposure Map Report".
3. Revision to NEMs FAA previously determined to be in compliance with Part 150?		x	There are no revision to NEMs that FAA has previously determined to be in compliance with Part 150 because there is no prior 14 CFR Part 150 Study for John F. Kennedy International Airport.
B. Airport and Airport Operator's name are identified?	Х		Airport and Airport Operator's name are identified in the Front Cover and Page 1-1.
C. NCP is transmitted by airport operator's dated cover letter, describing it as a Part 150 submittal and requesting appropriate FAA determination?	x		Submission is NEM only. The dated sponsor's cover letter follows the report cover and describes the submission as a Noise Exposure Map for John F. Kennedy International Airport dated April 2017. The cover letter requests the FAA to "confirm receipt of these Existing (2016) and Forecast (2021) Noise Exposure Maps (NEMs) and indicate whether they are in compliance with the applicable requirements."
II. Consultation: [150.21(b), A150.105(a)]			
A. Is there a narrative description of the consultation accomplished, including opportunities for public review and comment during map development?	x		See Section 1.4, Chapter 6, and Appendices H, K, and L for a narrative description of the consultation accomplished, including opportunities for public review and comment during map development.
B. Identification of consulted parties:			
1. Are the consulted parties identified?	Х		See Chapter 6 and Appendices H and K for identification of consulted parties.
2. Do they include all those required by 150.21(b) and A150.105(a)?	Х		See Chapter 6 and Appendices H and K for identification of all consulted parties required by 150.21(b) and A150.105(a).
3. Agencies in 2, above, correspond to those indicated on the NEM?	x		See the NEM, Chapter 5, Chapter 6, and Appendices H and K for the indication that the New York City (NYC) Department of City Planning; Nassau County Planning Department; the planning departments of the Villages of Cedarhurst, Woodsburgh, and Valley Stream; and the National Park Service are the sole land use agencies for the land within the 2016 and 2021 DNL 65 contours. These agencies correspond to the agencies indicated on the NEM.
C. Does the documentation include the airport operator's certification, and evidence to support it, that interested persons have been afforded	Х		See Sponsor's Certification following inside cover. Sponsor's Certification indicates that interested persons have been afforded

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PROGRAM REQUIREMENT	YES	NO	SUPPORTING PAGES/REVIEW COMMENTS
adequate opportunity to submit their views, data, and comments during map development and in accordance with 150.21(b)?			adequate opportunity to submit their views, data, and comments during map development and in accordance with 150.21(b). Evidence is contained in Chapter 6 and Appendices H and K.
D. Does the document indicate whether written comments were received			See Section 6.3 and Appendix L. Written comments received
during consultation and, if there were comments that they are on file with the	Х		during consultation are included in Appendix L and are on file with
FAA regional airports division manager?			the FAA regional airports division manager.
III. General Requirements: [150.21]			
A. Are there two maps, each clearly labeled on the face with year (existing condition year and one that is at least 5 years into the future)?	x		There are two maps, each clearly labeled on the face with year (Existing Conditions year of 2016, and the five-year Future Conditions year of 2021). Full size plots of the 2016 and 2021 NEMs are provided in Appendix M.
B. Map currency:			
1. Does the year on the face of the existing condition map graphic match the year on the airport operator's NEM submittal letter?		х	Though submittal of the document is occurring in April 2017, the operations at John F. Kennedy International Airport are hereby certified to currently be consistent with the fleet mix, forecast operational levels, and flight procedures depicted for 2016 within this document. Further information regarding development of the fleet mix, forecast, and procedures can be found in Chapter 4 - NEM Development, Appendix E - Radar Flight Tracks and Flight Profiles, and Appendix F - Forecast and Operational Data. The Existing Conditions map reflects 2016 conditions which is also the year of the Draft NEM Report submittal.
2. Is the forecast year map based on reasonable forecasts and other planning assumptions and is it for at least the fifth calendar year after the year of submission?	x		The Future Conditions map of year 2021 is based on reasonable forecasts and other planning assumptions, and is for at least the fifth calendar year after the year of submission (2016). See Section 4.3.2 and Appendix F-1 for information regarding the forecast and the FAA's approval for use in developing the NEMs.
3. If the answer to 1 and 2 above is no, the airport operator must verify in writing that data in the documentation are representative of existing condition and at least 5 years' forecast conditions as of the date of submission?		x	Not applicable. The 2021 Future Conditions Noise Exposure Map (Figure 5-2 on page 5-11, and Appendix M, 2021 Figure 1 of 10) accurately represents forecast conditions for calendar year 2021.
C. If the NEM and NCP are submitted together:			
1. Has the airport operator indicated whether the forecast year map is based on either forecast conditions without the program or forecast conditions if the program is implemented?		x	Not applicable. This is an NEM submission only.
2. If the forecast year map is based on program implementation:		Х	Not applicable. This is an NEM submission only.
a. Are the specific program measures that are reflected on the map identified?		Х	Not applicable. This is an NEM submission only.
b. Does the documentation specifically describe how these		X	Not applicable. This is an NEM submission only.

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measures affect land use compatibilities depicted on the map?			
3. If the forecast year NEM does not model program implementation, the airport operator must either submit a revised forecast NEM showing program implementation conditions [B150.3(b), 150.35(f)] or the sponsor must demonstrate the adopted forecast year NEM with approved NCP measures would not change by plus/minus 1.5 DNL? (150.21(d))		x	Not applicable. This is an NEM submission only.
IV. Map Scale, Graphics, And Data Requirements: [A150.101, A150.103, A150.105, 150.21(a)]			
A. Are the maps of sufficient scale to be clear and readable (they must not be less than 1" to 2,000'), and is the scale indicated on the maps? (Note (1) if the submittal uses separate graphics to depict flight tracks and/or noise monitoring sites, these must be of the same scale, because they are part of the documentation required for NEMs.) (Note (2) supplemental graphics that are not required by the regulation do not need to be at the 1" to 2,000' scale)	x		Full size plots of the 2016 and 2021 NEMs, flight track figures, and noise monitoring sites are at a scale of 1 inch = 2,000 feet and are of sufficient scale to be clear and readable. The scale is indicated on the maps. The full size plots are provided in Appendix M. Supplemental Figures 5-1 and 5-2 are at a scale of 1 inch = 5,000 feet; supplemental flight track figures (Figures 4-2 through 4-5) are 1 inch = 20,000 feet; and the supplemental noise monitoring sites figure is 1 inch = 12,000 feet (Figure 4-12).
B. Is the quality of the graphics such that required information is clear and readable? (<i>Refer to C. through G., below, for specific graphic depictions</i> <i>that must be clear and readable</i>)	x		The quality of the graphics is such that required information is clear and readable. Refer to NEM Checklist IV.C. through IV.G., below. Also see full sized NEMs for 2016 and 2021 included in this submittal in Appendix M.
C. Depiction of the airport and its environs:			
1. Is the following graphically depicted to scale on both the existing condition and forecast year maps?			
a. Airport boundaries	х		Airport boundaries are graphically depicted to scale on both the Existing Conditions and Future Conditions maps. See the 2016 and 2021 NEMs in Appendix M.
b. Runway configurations with runway end numbers	х		Runway configurations with runway end numbers are depicted to scale on both the Existing Conditions and Future Conditions maps. See the 2016 and 2021 NEMs in Appendix M.
2. Does the depiction of the off-airport data include?			
a. A land use base map depicting streets and other identifiable geographic features	x		The depiction of the off-airport data includes a land use base map depicting streets and other identifiable geographic features. See the 2016 and 2021 NEMs in Appendix M.
b. The area within the DNL ¹ 65 dB (or beyond, at local discretion)	Х		The depiction of the off-airport data includes the area within the DNL 65. See the 2016 and 2021 NEMs in Appendix M.
c. Clear delineation of geographic boundaries and the names of all jurisdictions with planning and land use control authority within the DNL 65	x		The depiction of the off-airport data includes a clear delineation of geographic boundaries. The NEMs include the names of the

¹ CNEL for California airports

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PROGRAM REQUIREMENT	YES	NO	SUPPORTING PAGES/REVIEW COMMENTS
dB (or beyond, at local discretion)			following jurisdictions that have planning and land use control authority over land within the 2016 and 2021 DNL 65 contours: New York City (NYC); Nassau County; and the Villages of Cedarhurst, Woodsburgh, and Valley Stream. See the 2016 and 2021 NEMs in Appendix M.
D. 1. Continuous contours for at least the DNL 65, 70, and 75 dB?	Х		Continuous contours for the DNL 65, 70, and 75 are shown on the 2016 and 2021 NEMs provided in Appendix M.
2. Has the local land use jurisdiction(s) adopted a lower local standard and if so, has the sponsor depicted this on the NEMs?		x	The DNL 65, 70, and 75 contours are shown on the NEMs. In response to public requests, supplemental graphics provided in Appendix J depict the DNL 55 and 60 contours, for informational purposes only. However, the local land use jurisdictions have not adopted a standard lower than DNL 65. The New York City (NYC) Department of City Planning; Nassau County Planning Department; and planning departments of the Villages of Cedarhurst, Woodsburgh, and Valley Stream are the sole land use agencies for the land within the DNL 65 contour.
3. Based on current airport and operational data for the existing condition year NEM, and forecast data representative of the selected year for the forecast NEM?	х		The 2016 NEM is based on current airport and operational data for the Existing Conditions year (2016). The 2021 NEM is based on forecast data representative of the selected year for the forecast NEM (2021). See Section 4.3, Section 5.2, Section 5.3, and Appendix F.
E. Flight tracks for the existing condition and forecast year timeframes (these may be on supplemental graphics which must use the same land use base map and scale as the existing condition and forecast year NEM), which are numbered to correspond to accompanying narrative?	х		Flight tracks for the Existing Conditions and Future Conditions timeframes are shown in full-size flight track plots in Appendix M. Also see Figures 4-2 through 4-5, which are numbered to correspond to the accompanying narrative, and follow page 4-10. Flight tracks for the Existing Conditions and Future Conditions timeframes are the same, as described in Section 4.5.
F. Locations of any noise monitoring sites (these may be on supplemental graphics which must use the same land use base map and scale as the official NEMs)	х		Locations of noise monitoring sites are shown in Appendix M using the same land use base map and scale as the official NEMs. Also see Figure 4-12, which follows page 4-28.
G. Noncompatible land use identification:			
1. Are noncompatible land uses within at least the DNL 65 dB noise contour depicted on the map graphics?	х		Noncompatible land uses within the DNL 65 contour are depicted on the map graphics. See full-sized plots in Appendix M. Also see supplemental Figure 5-1 (page 5-5) and supplemental Figure 5-2 (page 5-11).
2. Are noise sensitive public buildings and historic properties identified? (<i>Note: If none are within the depicted NEM noise contours, this</i> <i>should be stated in the accompanying narrative text.</i>)	X		Noise sensitive public buildings and historic properties are identified. See supplemental Figures 3-2 through 3-8. Also see Section 3.3 and Appendix D.
3. Are the honcompatible uses and holse sensitive public buildings	X	I	I Noncompatible uses and noise sensitive public buildings are

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PROGRAM REQUIREMENT	YES	NO	SUPPORTING PAGES/REVIEW COMMENTS
readily identifiable and explained on the map legend?			readily identifiable on the NEMs and explained on the map legend. See full sized plots in Appendix M. Also see supplemental Figure 5-1 (page 5-5) and supplemental Figure 5-2 (page 5-11).
4. Are compatible land uses, which would normally be considered noncompatible, explained in the accompanying narrative?	х		Compatible land uses that would normally be considered noncompatible are explained in Section 5. See footnote on Tables 5-2, 5-5 and 5-6. Several schools within the DNL 65 contour have been sound insulated (see Section 2.6.1).
V. Narrative Support Of Map Data: [150.21(a), A150.1, A150.101, A150.103]			
A. 1. Are the technical data and data sources on which the NEMs are based adequately described in the narrative?	х		Technical data and data sources on which the NEMs are based are adequately described in the narrative. See Sections 4.3 through 4.5 and Appendices E and F.
2. Are the underlying technical data and planning assumptions reasonable?	х		The underlying technical data and planning assumptions are reasonable. See Sections 3 and 4.3 through 4.5; and Appendices E and F.
B. Calculation of Noise Contours:			
 Is the methodology indicated? 	Х		The methodology is indicated. See Section 4.2.
a. Is it FAA approved?	Х		The methodology is FAA-approved. INM 7.0d was used, and approval is included in Appendix G.
b. Was the same model used for both maps? (Note: The same model also must be used for NCP submittals associated with NEM determinations already issued by FAA where the NCP is submitted later, unless the airport sponsor submits a combined NEM/NCP submittal as a replacement, in which case the model used must be the most recent version at the time the update was started.)	x		The same model was used for both maps. INM 7.0d was used for both the Existing Conditions NEM (2016) and the Future Conditions NEM (2021).
c. Has AEE approval been obtained for use of a model other than those that have previous blanket FAA approval?		х	Not applicable.
2. Correct use of noise models:			
a. Does the documentation indicate, or is there evidence, the airport operator (or its consultant) has adjusted or calibrated FAA-approved noise models or substituted one aircraft type for another that was not included on the FAA's pre-approved list of aircraft substitutions?	x		The documentation indicates that the airport operator (or its consultant) has substituted one aircraft type for another that was not included on the FAA's pre-approved list of aircraft substitutions. INM 7.0d was used for this NEM report. There are 35 aircraft that operate at JFK that aren't included in the INM 7.0d database or on the FAA's pre-approved list of aircraft substitutions. Substitutions for these 35 aircraft were approved by the FAA. See Appendix G for FAA AEE's approval of the proposed INM aircraft substitutions.

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			several aircraft that routinely operated following profiles that differ from the INM standard profiles. Section 4.5.3 and Appendix E-2 detail the user-defined aircraft profiles. FAA approval of the profiles is provided in Appendix G-1, and airline concurrence with the profiles is provided in Appendix G-2.
b. If so, does this have written approval from AEE, and is that written approval included in the submitted document?	х		The use of substitutions not included on the FAA's pre-approved list of substitutions and the use of user-defined departure and arrival profiles has written approval from AEE. See Appendix G.
3. If noise monitoring was used, does the narrative indicate that Part 150 guidelines were followed?		Х	No noise monitoring was conducted as part of this NEM report. Calendar Year 2014 and 2015 noise measurement data from the Port Authority's permanent noise monitoring system are presented in Table 4-8 and Table 5-3. While the information was reviewed relative to the modeled results, the information had limited value due to limitations of the collection periods (partial years) and the difference in operational conditions between the measured and modeled information. The noise monitoring data was used for information purposes only and was not used to calibrate the model.
4. For contours below DNL 65 dB, does supporting documentation include an explanation of local reasons? (<i>Note: A narrative explanation,</i> <i>including evidence the local jurisdiction(s) have adopted a noise level less</i> <i>than DNL 65 dB as sensitive for the local community(ies), and including a</i> <i>table or other depiction of the differences from the Federal table, is highly</i> <i>desirable but not specifically required by the rule. However, if the airport</i> <i>sponsor submits NCP measures within the locally significant noise contour,</i> <i>an explanation must be included if it wants the FAA to consider the</i> <i>measure(s) for approval for purposes of eligibility for Federal aid.</i>)		x	DNL 65, 70, and 75 contours are shown on the NEMs. Supporting documentation in Section 3.2 and Appendix I indicate that in response to public requests, supplemental graphics provided in Appendix J depict the DNL 55 and 60 contours, for informational purposes only. However, the local jurisdictions have not adopted a standard lower than DNL 65.
1. Does the narrative (or map graphics) give estimates of the number of people residing in each of the contours (DNL 65, 70 and 75, at a minimum) for both the existing condition and forecast year maps?	x		The narrative gives estimates of the number of people residing in each of the DNL 65, 70, and 75 contours for both the existing condition and forecast year maps. See Tables 5-2 and 5-5.
2. Does the documentation indicate whether the airport operator used Table 1 of Part 150?	x		The documentation indicates the airport operator used Table 1 of Part 150. See Sections 3.3.1, 5.2, and 5.3; Table 3-2; and Appendix D-1. However, the "Residential" land use category from Table 1 of Part 150 was divided into subcategories including, Single and Two Family Residential, Multi-Family Residential, and Mixed-Residential Commercial, which is common in New York City and other urban areas. Additionally, Table 1 includes Transient Lodging as a subcategory of Residential; however, this is included as "Commercial and Office" for consistency with New York City

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			Department of City Planning land use categories.
a. If a local variation to table 1 was used:			
(1) Does the narrative clearly indicate which adjustments were made and the local reasons for doing so?	x		The narrative clearly indicates which adjustments were made to Table 1 of Part 150 and the local reasons for doing so. Section 3.3 discusses Table 1 and indicates how the compatibility guidelines apply to the conformed land uses developed for New York City and Nassau County. Further detail can be found in Appendix D-1.
(2) Does the narrative include the airport operator's complete substitution for table 1?	x		Section 3.3 discusses Table 1 and indicates how the compatibility guidelines apply to the conformed land uses developed for New York City and Nassau County. Further detail can be found in Appendix D-1.
3. Does the narrative include information on self- generated or ambient noise where compatible or noncompatible land use identifications consider non-airport and non-aircraft noise sources?	x		Chapter 3 includes information on self-generated and ambient noise and implications for how non-airport and non-aircraft noise sources affect compatible or noncompatible land use identifications.
4. Where normally noncompatible land uses are not depicted as such on the NEMs, does the narrative satisfactorily explain why, with reference to the specific geographic areas?	x		Sound-insulated schools, including those within the DNL 65 contour, are depicted on the NEMs by symbolic representation. Also see footnote on Tables 5-2, 5-5 and 5-6; and Section 2.6.1.
5. Does the narrative describe how forecast aircraft operations, forecast airport layout changes, and forecast land use changes will affect land use compatibility in the future?	x	X The narrative describes how forecast aircraft operation airport layout changes, and forecast land use changes land use compatibility in the future. See Section 5.3 ar	
VI. Map Certifications: [150.21(b), 150.21(e)]			
A. Has the operator certified in writing that interested persons have been afforded adequate opportunity to submit views, data, and comments concerning the correctness and adequacy of the draft maps and forecasts?	x		The operator has certified in writing that interested persons have been afforded adequate opportunity to submit views, data, and comments concerning the correctness and adequacy of the draft maps and forecasts. See Sponsor's Certification before Table of Contents.
B. Has the operator certified in writing that each map and description of consultation and opportunity for public comment are true and complete under penalty of 18 U.S.C. § 1001?	x		The operator has certified in writing that each map and description of consultation and opportunity for public comment is true and complete under penalty of 18 U.S.C. § 1001. See Sponsor's Certification before Table of Contents.

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- Appendix A Glossary of Terms and Acronyms List
- Appendix B Airport Facilities and Airspace

Appendix C Aircraft Noise

- Appendix D Land Use, Zoning and Noise Sensitive Sites
- Appendix E Arrival and Departure Flight Tracks and Flight Profiles
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CHAPTER 1 Introduction

1.1 Introduction

This document represents the Port Authority of New York and New Jersey's (Port Authority) study to prepare Noise Exposure Maps (NEMs) for John F. Kennedy International Airport (JFK) in accordance with the requirements of the Title 14 *Code of Federal Regulations* Part 150, "Airport Noise Compatibility Planning" (14 CFR Part 150). The Federal Aviation Administration (FAA) checklist that outlines the requirements for NEMs and NEM documentation is included in this report. The associated supporting references in this document are identified either within the footnotes or appendices.

In 2014, Governor Cuomo directed the Port Authority to coordinate with local communities to address aircraft noise complaints. As a result, the Port Authority initiated 14 CFR Part 150 Studies at four of its New York-area airports (JFK, LaGuardia Airport, Newark Liberty International Airport, and Teterboro Airport). The Port Authority, operator of JFK, is evaluating aircraft noise and land use compatibility in the vicinity of JFK, pursuant to 14 CFR Part 150. The preparation of a 14 CFR Part 150 Study is a voluntary action on the part of the Port Authority.¹ This study provides the opportunity for aviation interests, state and local government officials, and the community members to address noise and land use compatibility issues related to the aircraft operations occurring at the Airport. The three primary objectives of this study are listed below. This component of the study, preparation of the NEMs, addresses the first objective. The Noise Compatibility Program (NCP) phase will address the second and third objectives, listed below, and will be initiated after the NEMs are prepared.

	Objectives	Study Component
1	Identify JFK's existing operational procedures and determine the existing and future noise conditions around the Airport. Determine existing and future land uses that are and are not compatible with aircraft noise based on the noise conditions and land use compatibility guidelines in 14 CFR Part 150, Appendix A, Table 1.	Noise Exposure Maps
2	Identify and evaluate potential future operational, land use, and program management measures that could be implemented to reduce noise impacts to noise sensitive land uses.	Noise Compatibility Program
3	Develop a comprehensive NCP that consists of Airport Sponsor recommendations to the FAA to reduce future noise impacts to the surrounding communities.	

¹ The regulations contained in 14 CFR Part 150 are voluntary and airport operators are not required to participate. However, accepted NEMs and an approved NCP are necessary for federal financial participation in 14 CFR Part 150-related noise abatement projects at an airport.

1.2 14 CFR Part 150 Study Process

In 2014, the Port Authority initiated its first ever 14 CFR Part 150 studies, beginning with JFK and LaGuardia Airport (LGA). These studies are voluntary and are designed to identify existing incompatible land uses surrounding an airport and to recommend measures to both mitigate existing incompatibilities as well as minimize future incompatibilities. Coordination with representatives of the affected jurisdictions, aviation officials, local communities, and interested members of the public has occurred throughout the study process, aided by regular meetings of a Technical Advisory Committee (TAC) established as a coordination mechanism at the beginning of the JFK 14 CFR Part 150 Study.

In late 2014, the Port Authority retained a team of consultants led by Environmental Science Associates (ESA) to assist in conducting 14 CFR Part 150 Studies at JFK and LGA. An overview of the 14 CFR Part 150 study process undertaken by the Port Authority and its consultant team is provided on the following page.

Early in the Study, the ESA Study Team produced a unified study protocol document covering both the LGA and JFK 14 CFR Part 150 Studies. The study protocol is presented in **Appendix I** and was reviewed by the TAC before being released to the public. The purpose of the study protocol was to provide consistency in the following key aspects of both Studies:

- Roles and responsibilities of all Study stakeholders, including the interested public;
- Strategies for communication with communities, government, and the media;
- Methods for managing data;
- Forecasts of aviation activity;
- Aircraft noise modeling methodology;
- · Land use designation and analysis methodology; and
- Study schedules, milestones, and deliverables.

Project Initiation	 Develop management plans, study protocols, and project schedule. Establish the Technical Advisory Committee. Coordinate with agencies and implement the public participation program.
Prepare Noise Exposure Maps	 Collect and review operational data and develop aviation activity forecast. Assemble land use data to develop base maps. Develop INM inputs and model noise impacts to prepare 2016 and 2021 NEMs. Submit the NEMs to the FAA for acceptance.
Prepare Noise Compatibility Program	 Identify potential noise abatement measures available to the Port Authority, the FAA, and JFK's airlines and tenants that would reduce the extent of aircraft noise exposure over existing and future noise- sensitive land uses. Consult with the FAA and solicit input from airlines, airport tenants and users, local planning agencies, local elected officials, communities, and the public. Use input to develop recommended noise mitigation measures (e.g., sound insulation, land use controls). Develop a process and timetable for program implementation. Develop a future 2021 NEM with program implementation to depict and document the benefits to be derived from implementation of the noise abatement measures. Prepare and submit the NCP to the FAA for approval.

1.3 Preparation of Noise Exposure Maps

NEMs graphically depict aircraft noise exposure levels on and in the vicinity of an airport by presenting lines of equal Day-Night Average Sound Level (DNL) values. Aircraft DNL values represent the sound produced by a 24-hour period of aircraft activity. For 14 CFR Part 150 studies, this 24-hour period of aircraft activity is based on average aircraft activity over a 12-month period and the sound energy is represented as A-weighted decibels (dBA). NEMs provide local communities an opportunity to visualize aircraft noise exposure levels in order to make better informed decisions regarding proposed noise sensitive development in the vicinity of an airport.

1.3.1 NEM Study Years

The official NEMs include two maps. The first NEM depicts existing noise exposure levels and incompatible land uses in the vicinity of an airport without the NCP. The JFK Existing Conditions (2016) NEM was developed using an aircraft operations forecast developed by the Port Authority and a consultant (Landrum & Brown) and calendar year 2014 day/night utilization, runway usage, flight tracks, flight profiles, and trip length data from the Port Authority's Airport

Noise and Operations Management System (ANOMS).^{2.3} The aircraft operations forecast used for the JFK 14 CFR Part 150 Study was approved by the FAA on May 2, 2016, as shown on **Page F-3** of **Appendix F-1**.

The second NEM depicts noise exposure levels anticipated five years in the future, which represents forecast conditions without the NCP. The future NEM was developed using projected levels of aircraft activity at JFK in 2021 as derived from the Port Authority's aircraft operations forecast. In accordance with 14 CFR Part 150, the future conditions NEM represents conditions five years after the NEM date of submittal to the FAA. The Port Authority will proceed with preparing the NCP for JFK after submitting the NEMs to the FAA for acceptance. A third NEM, the future scenario with program implementation, will be created and included in the NCP Report if the recommended noise abatement measures included in the NCP would modify the size or shape of the DNL 65 contour. The third NEM will take into account anticipated changes in land use patterns in the airport environs and recommended noise abatement and mitigation measures included in the NCP.

1.3.2 Technical Approach to Preparing Noise Exposure Maps

Subsequent chapters of this report describe in detail the information, methods, and tools used to develop the NEMs and estimate existing and future aircraft noise impacts in the vicinity of JFK. A brief overview of the technical approach is provided below.

1.3.2.1 Data Collection and Verification

A wide range of data and information related to the operation of the Airport were collected (see **Appendix F**) to provide a complete understanding of aircraft noise at JFK and its effects on local communities including:

Aircraft Activity

The Study Team collected information related to all the types of aircraft that operate at the Airport, the number of annual operations generated by these aircraft, the times of day that these aircraft operate, and the flight paths and flight profiles used by these aircraft for departures and arrivals. The Study Team performed a detailed analysis of FAA data (e.g., Terminal Area Forecast), airline schedules and aircraft fleets, and JFK radar data from the ANOMS. To provide a basis for the NEMs, the Port Authority developed a forecast of aviation activity for 2016 and 2021, which was reviewed and approved by the FAA.

² An aircraft operation is defined as one arrival flight or one departure flight.

³ The FAA's 2014 Terminal Area Forecast for JFK (issued in January 2015) was used as the baseline for developing the operational forecast for 2016 and 2021 activity. Calendar year 2014 information and data related to aircraft fleet mix and runway utilization provided a baseline for developing Integrated Noise Model (INM) inputs for the 2016 Existing Conditions NEM. The 2016 INM inputs served as the basis for developing the INM inputs for the 2021 Future Conditions NEM.

Approach and Departure Procedures

The Study Team reviewed the airspace structure in the New York City area and air traffic control procedures used to direct flights by the FAA in and out of JFK.

Land Use

The Study Team collected existing land use information for the study area established for the JFK 14 CFR Part 150 study and developed land use base maps (see **Appendix D**).⁴ The Study Team also identified proposed land use changes that are anticipated to occur over the next five-year period.

1.3.2.2 Aircraft Noise Modeling

Using the FAA's Integrated Noise Model (INM) Version 7.0d, noise exposure contours were developed for the year 2016 (Existing Conditions NEM) and the year 2021 (Future Conditions NEM). This process involved compiling information and generating detailed input data for the INM that represent aircraft activity and operating conditions at JFK. At the time the study started, the INM 7.0d was the most current FAA-approved model for determining aircraft noise exposure around airports and was identified as the model required for use in this study (see **Appendix G-1**).

1.3.2.3 Preparation of NEMs

Using Geographic Information System (GIS) software, the Study Team developed 2016 and 2021 NEMs in accordance with criteria and guidelines found in 14 CFR Part 150.

1.3.2.4 Aircraft Noise Impact Analysis

Using GIS software, the type and amount (acreage) of incompatible land uses were identified for the 2016 NEM and the 2021 NEM. The analysis also determined the number of people, households, and noise-sensitive sites that are incompatible with aircraft noise exposure levels they receive.

1.4 Consultation and Public Involvement

14 CFR Part 150 Sections 150.21(b) and A150.105(a) (Appendix A to Part 150) require that the NEMs and documentation submitted "...be developed and prepared...in consultation with states, public agencies and planning agencies whose area, or any portion of whose area, of jurisdiction is within the DNL 65 contour depicted on the map, FAA regional officials, and other Federal officials having local responsibility for land uses depicted on the map. This consultation must include regular aeronautical users of the airport. The airport operator shall certify that it has afforded interested persons adequate opportunity to submit their views, data, and comments concerning the correctness and adequacy of the draft noise exposure map and descriptions of

⁴ A study area was established for the collection of detailed land use information and related data. The study area was designed to encompass the anticipated existing conditions and future conditions DNL 65 and higher contours.

forecast aircraft operations." The consultation and public involvement process for the JFK 14 CFR Part 150 Study included the following elements to provide adequate opportunities for engagement and participation during the development of the NEMs:

- Airlines, other airport tenants and users, the FAA, planning agencies, local communities, elected officials, and the general public were involved in the development of the NEMs for JFK.
- TAC meetings were the primary means of disseminating information to stakeholders and receiving feedback throughout the development of the NEMs. A list of the TAC members is provided in **Chapter 6**.
- Public Workshops soliciting input through the development of the draft NEM Report.
- For stakeholders, agencies, and the general public, a Study website⁵ was developed to
 provide the draft NEM report as well as updates on the project progress and schedule,
 Frequently Asked Questions (FAQs), Study documents, additional links, and contact
 information to submit questions to the Study Team. The website also allowed for the
 submission of questions and comments related to "the correctness and adequacy...of the
 maps" as stated above.

Additional information related to public outreach activities is included in Chapter 6.

1.5 NEM Report Organization

This report provides the NEMs for JFK and the technical documentation required by 14 CFR Part 150. This report is organized as follows:

Chapter 1 Introduction

Chapter 2 John F. Kennedy International Airport Overview

This chapter provides background information regarding the Airport and the history of noise abatement at JFK.

Chapter 3 Land Use

This chapter describes the JFK 14 CFR Part 150 Study land use study area and methods for collecting data, land uses in the study area, and noise sensitive sites.

Chapter 4 NEM Development

This chapter describes the development of the noise exposure maps, the noise model and noise modeling inputs.

⁵ <u>http://panynjpart150.com/JFK_homepage.asp</u>

Chapter 5 2016 and 2021 Noise Exposure

This chapter presents the 2016 and 2021 Noise Exposure Maps and information on land use compatibility and aircraft noise-related impacts.

Chapter 6 Consultation and Public Involvement

This chapter documents stakeholder and public outreach engagement efforts undertaken during the 14 CFR Part 150 study process.

Technical information, documentation, and maps are contained in the appendices to this report. The appendices are organized as follows:

Appendix A	Glossary of Terms and Acronyms List
Appendix B	John F. Kennedy International Airport Facilities and Airspace
Appendix C	Aircraft Noise
Appendix D	Land Use, Zoning and Noise Sensitive Sites
Appendix E	Arrival and Departure Flight Tracks and Flight Profiles
Appendix F	Forecast and Operational Data
Appendix G	Correspondence and Consultation
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Appendix K	Public Outreach
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Appendix M	Official Noise Exposure Maps

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CHAPTER 2 John F. Kennedy International Airport Overview

2.1 Airport Location and Setting

JFK is located on Jamaica Bay in the southeastern section of the Borough of Queens, within the city limits of New York City. JFK covers 4,930 acres, including 880 acres in the Central Terminal Area. JFK is bounded by water with Jamaica Bay immediately to the southeast and southwest. Communities that border the Airport include Lindenwood and Howard Beach to the west, South Ozone Park, Rochdale, and Springfield Gardens to the north, South Valley Stream to the northeast, and Brookville, Rosedale, Woodmere, Cedarhurst, and Inwood to the east. Major regional access to JFK is provided by the Van Wyck Expressway (U.S. Interstate Highway 678), JFK Expressway, Belt Parkway (State Highway 27), Conduit Avenue, and Rockaway Boulevard. The location of the Airport is depicted on **Figure 2-1**. The Airport and its environs are depicted on **Figure 2-2**.

2.1.1 JFK Airport History

JFK has been operated by the Port Authority under a lease with New York City since June 1947, and was known as Idlewild Airport.⁶ In April 1942, New York City began filling the marsh tidelands of Idlewild Golf Course for the construction of the Airport. Construction was completed in 1947 and commercial operations were initiated in 1948. On December 24, 1963, the Airport was renamed John F. Kennedy International Airport in memory of the former President.

2.2 JFK Airport Overview

2.2.1 Aviation Role

In 2015, JFK was the fifth busiest commercial service airport, based on passenger traffic, in the United States.⁷ The Port Authority's *Airport Traffic Report 2015*, notes "JFK has been recognized for decades as the premier U.S. gateway for passengers and cargo. JFK is the busiest airport in the New York City metropolitan area, and among the busiest in North America and the

⁶ <u>http://www.panynj.gov/airports/jfk-about.html</u>. Accessed March 7, 2016.

⁷ FAA Calendar Year 2015 Revenue Enplanements at Commercial Service Airports (July 17, 2016). Retrieved from http://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/passenger/media/preliminary-cy15commercial-service-enplanements.pdf.

world." JFK provides scheduled domestic and international service for both passengers and air cargo. The report also notes that JFK handled a record 56.8 million passengers and more than 1.3 million tons of cargo in 2015. This included an all-time record of about 30 million international passengers in 2015.

The FAA's National Plan of Integrated Airport Systems (NPIAS) identifies JFK as a Large Hub Primary Commercial Service Airport.⁸ Large hubs are those airports that each account for at least one percent of total U.S. passenger enplanements.

2.2.2 Airport Facilities Overview

This section provides an overview of JFK's facilities, airspace, and approach and departure procedures. The configuration of the major airfield and landside facilities at JFK is described in the following sections and shown on **Figure 2-3**. More detailed information on JFK's facilities and airspace can be found in **Appendix B** of this report.

2.2.2.1 Passenger Terminal Facilities

There are six terminals that comprise the Central Terminal Area at JFK. They are:

- Terminal One: Adjacent to Runway 13R-31L
- Terminal Two: Adjacent to Runway 13R-31L
- Terminal Four: Adjacent to Runway 4L-22R
- · Terminal Five: Adjacent to Runways 4L-22R and 13L-31R
- Terminal Seven: Adjacent to Runway 13L-31R
- Terminal Eight: Adjacent to the Jamaica AirTrain JFK Station. Part of Terminal Eight belongs to the Central Terminal Area, and part of Terminal Eight is separate from and adjacent to the Central Terminal Area.

There are currently no terminals named "Terminal Three" or "Terminal Six" at JFK. Terminals Three and Six were demolished in 2011 and 2013, respectively.

Passenger access to these terminals is via AirTrain JFK, which circulates the six terminals and allows departing/arriving passengers to be dropped off at their desired terminal. AirTrain JFK also connects the terminals to airport parking lots, rental car facilities, hotel shuttle areas, the MTA New York City Transit subway system, and the Long Island Rail Road. Terminals One, Four, Seven, and Eight have Customs and Border Protection (CBP) services for arriving international passengers.

⁸ Report to Congress – National Plan of Integrated Airport Systems (NPIAS) 2015 - 2019. Federal Aviation Administration, September 30, 2014.

2.2.2.2 Runways

JFK has a total of four runways. There are two pairs of runways:

- · Runways 13L-31R and 13R-31L: oriented in a northwest-southeast direction
- Runways 4R-22L and 4L-22R: oriented in a southwest-northeast direction

Table 2-1 presents additional information regarding the runways at JFK.

Northwest-Southeast Parallel Runways

Runway 13L-31R is adjacent to Terminals Five and Seven and is 10,000 feet long and 150 feet wide. Runway 13L has a displaced threshold of 907 feet that reduces the available landing distance for Runway 13L to 9,093 feet. Runway 31R has a displaced threshold of 1,027 feet that reduces the available landing distance for Runway 31R to 8,486 feet. The available takeoff distance is 10,000 feet for both runway ends. Runway 13L-31R is constructed of asphalt and is grooved.

Runway 13R-31L is adjacent to Terminals One and Two and is 14,511 feet long and 200 feet wide. Runway 13R has a displaced threshold of 2,043 feet that reduces the available landing distance for Runway 13R to 12,468 feet. Runway 31L has a displaced threshold of 3,263 feet that reduces the available landing distance for Runway 31L to 11,248 feet. The available takeoff distance is 14,511 feet for both runway ends. Runway 13R-31L is constructed of concrete and is grooved.

Southwest-Northeast Parallel Runways

Runway 4L-22R is adjacent to Terminals Four and Five and is 12,079 feet long and 200 feet wide. Runway 4L has a displaced threshold of 460 feet that reduces the landing distance available to 11,010 feet. Runway 22R has a displaced threshold of 3,425 feet that reduces the landing distance available to 7,795 feet. The available takeoff distance for Runway 4L is 11,351 feet, while the available takeoff distance for Runway 22R is 12,079 feet. Runway 4L-22R is constructed of asphalt and concrete and is grooved.

Runway 4R-22L is southeast of Runway 4L-22R and is 8,400 feet long and 200 feet wide. It has no displaced thresholds, and the available takeoff and landing distances are 8,400 feet for both runway ends. Runway 4R-22L is constructed of asphalt and is grooved.

2.2.2.3 Helipads

A review of ANOMS data indicated that helicopters normally arrive to and depart from five areas at JFK. Three of these areas are helipads marked with the letter "H" at the following locations, and shown on **Figure 2-2**:

West of the passenger terminals at the north end of Taxiway QD;

- North of the passenger terminals in an area bounded by N. Hangar Rd, Taxiway C, and Taxiway CE; and
- North of the passenger terminals at the north end of Taxiway CB.

The other two helicopter arrival and departure areas are located on the following runways:

- On Runway 13L, at the intersection of Runway 13L and Taxiway D; and
- On Runway 13R, at the intersection of Runway 13R and Taxiway M.

2.2.2.4 Taxiways

As shown on **Figure 2-3**, a series of taxiways connects the four runways to the passenger terminal complex, the air cargo aprons, Fixed Base Operator (FBO) facilities, and general aviation areas. There are several primary taxiways that run parallel to the main runways. These primary taxiways move aircraft parallel to the active runways when departing aircraft position for takeoff, or when arriving aircraft taxi to their gates after arrival. Each of these primary taxiways also has individual connectors that connect the main runway with the parallel taxiway.

2.2.2.5 Airport Traffic Control Tower

The Airport is serviced by an FAA-staffed airport traffic control tower (ATCT) located near Terminal Four, which features the latest aviation technology, including a system that tracks the surface movement of aircraft and vehicles, enhancing safety and efficiency. The ATCT operates 24 hours a day, 365 days a year. Radar approach and departure control is operated by the New York Terminal Radar Approach Control (NY TRACON) facility located in Westbury, New York.

2.2.2.6 General Aviation Facilities

General aviation (GA) includes all facets of civil aviation operations other than military, cargo, scheduled commercial passenger air service, and non-scheduled air transportation for hire. The predominant general aviation activity at JFK is business/corporate aviation.

Sheltair Aviation provides FBO services at JFK's General Aviation Terminal. Sheltair is a fullservice FBO that provides GA and commercial aircraft ground handling, GA aircraft fueling, catering, pilot's lounge / flight planning room, passenger lounge, rental cars (Hertz), and crew cars. Twenty-four hour U.S. Customs is available at the General Aviation Terminal.

2.2.2.7 Air Cargo Facilities

JFK is a leading international air cargo center and accommodates long-haul direct and nonstop international/transcontinental traffic. The JFK Air Cargo Center consists of four cargo facility areas. As shown in **Figure 2-3**, Cargo Area D is located north of Runway 13L-31R and Cargo Areas A, B, and C are located between Runways 13L-31R and 13R-31L near Terminals Seven and Eight.



John F. Kennedy International Airport 14 CFR Part 150 Study.140037 Figure 2-1 Airport Location Map John F. Kennedy International Airport

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John F. Kennedy International Airport 14 CFR Part 150 Study.140037 Figure 2-2 Airport Vicinity Map John F. Kennedy Interational Airport

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SOURCE: Federal Aviation Administration, 2017; ESA, 2017

John F. Kennedy International Airport 14 CFR Part 150 Study .140037 Figure 2-3 Airport Diagram John F. Kennedy International Airport

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	Runway	ay 13L-31R Runway 13R-31L		Runway 4L-22R		Runway 4R-22L		
Runway Characteristics	13L	31R	13R	31L	04L	22R	04R	22L
Runway Length (Feet)	10,0	000	14,5	11	12,0	079	8,4	00
Runway Width (Feet)	15	50	200)	20	00	20	00
Displaced Arrival Threshold (Feet)	907	1,027	2,043	3,263	460	3,425	0	0
Runway Landing Distance Available (Feet)	9,093	8,486	12,468	11,248	11,010	7,795	8,400	8,400
Runway Takeoff Distance Available (Feet)	10,000	10,000	14,511	14,511	11,351	12,079	8,400	8,400
Approach Surface Slope	50:1	50:1	34:1	50:1	50:1	50:1	50:1	50:1
Runway End Elevation (Feet above MSL)	11.3	11.8	12.5	12.5	11.9	12.7	11.8	11.8
Runway Markings	Precision	Precision	Precision	Precision	Precision	Precision	Precision	Precision
Runway Lighting	HIRL, CL, VASI, TDZ	HIRL, CL, TDZ	HIRL, CL, PAPI	HIRL, CL, PAPI	HIRL, CL, PAPI	HIRL, CL, PAPI	HIRL, CL, TDZ	HIRL, CL, PAPI, TDZ
Part 77 Runway Category and Navigational Aids	Precision ILS CAT II	Precision ILS CAT I	Non-Precision None	Precision ILS CAT I	Precision ILS CAT I	Precision ILS CAT I	Precision ILS CAT IIIb	Precision ILS CAT IIIc
Runway Approach Lighting	ALSF2	MALSR	RLLS	None	None	None	ALSF2	ALSF2

TABLE 2-1 EXISTING RUNWAY CHARACTERISTICS

NOTES: MSL = Mean Sea Level HIRL = High Intensity Runway Lighting CL= Centerline Lighting PAPI = Precision Approach Path Indicator TDZ = Touchdown Zone lighting VASI = Visual Approach Slope Indicator ALSF2 = Approach Lighting System with Sequenced Flashing Lights RLLS = Runway Lead-in Light System MALSR = Medium Intensity Approach Light System with Runway Alignment Indicator Lights ILS CAT = Instrument Landing System Category This table does not include data for helipads. SOURCES: FAA Airport Master Record, Form 5010 (http://www.gcr1.com/5010web/airport.cfm?Site=JFK&AptSecNum=3&SpecRWYid=1942724 accessed July 26, 2015); AirNav.com accessed

July 26, 2015.

2.2.2.8 Other Aviation-Related Facilities

In addition to the passenger terminals, cargo facilities, and general aviation facilities, a number of aviation-related support facilities are located on airport property. These facilities include:

- Aircraft Rescue and Fire Fighting (ARFF)
- Aircraft Maintenance
- Airport Surveillance Radar
- Airport Police Department
- Animal Care
- U.S. Post Office Airport Mail

2.2.3 Future/Planned Airport Facilities

A review of the Port Authority's *Capital Plan Summary 2014-2023* was conducted to determine if there are ongoing or planned projects at JFK that will be constructed and operational at JFK by 2021 that would have the potential to substantially affect the level of aviation activity, runway use, and/or flight patterns at the Airport either during or after construction.⁸ The Capital Improvement Plan (CIP) shows that the proposed capital projects at JFK primarily consist of airfield pavement rehabilitation, terminal and support building repair and rehabilitation, and roadway and access rehabilitation and improvements. The CIP also includes the replacement of airfield and building equipment. Although these projects at JFK may, individually or cumulatively, have some effect on capacity, none of the planned projects would have a substantial effect on aviation activity, runway use, and/or flight patterns at JFK for the 2021 Future Conditions study year. Recent JFK capital projects, including the rehabilitation and widening of Runway 4L-22R (which involved the closure of Runway 13L-31R from March 1 to April 9, 2015 and the closure of Runway 4L-22R from April 10 to September 21, 2015), were accounted for and incorporated into the 2016 Existing Conditions study year.

On January 4, 2017, New York State Governor Andrew Cuomo announced a vision plan to renovate JFK.⁹ The plan includes interconnected passenger terminals; upgrades to mass transit airport access, on-airport roads, and parking; and airside improvements such as expanded taxiways. A timeline for the renovation has not yet been announced. For this reason, the effects of the JFK renovation on aviation activity in 2021 are not reasonably foreseeable and have not been represented in the JFK 14 CFR Part 150 Study.

⁸ *Capital Plan Summary 2014-2023*. Port Authority of New York and New Jersey. February 2014.

⁹ Governor Cuomo Presents 2nd Proposal of 2017 State of the State: Transforming JFK International Airport for the 21st Century. January 4, 2017. https://www.governor.ny.gov/news/governor-cuomo-presents-2nd-proposal-2017state-state-transforming-jfk-international-airport

In 2017, the Port Authority will rehabilitate Runway 4R-22L.¹⁰ The runway will be closed for a portion of 2017 due to the rehabilitation, but this closure is not expected to change aircraft operations and procedures at JFK within the timeframe of this study. The Port Authority also intends to acquire and install a Ground Based Augmentation System (GBAS) for JFK by 2018. The installation and use of GBAS is not expected to change aircraft operations and procedures at JFK within the timeframe of this study.

2.2.4 Demand Management at JFK

JFK has historically been one of the more congested airports in the United States, in one of the most highly congested airspaces in the country. JFK is less than 15 miles away from the Downtown Manhattan/Wall Street Heliport, the East 34th Street Heliport, the West 30th Street Heliport, and LGA. JFK is less than 25 miles away from Newark Liberty International Airport (EWR), Teterboro Airport (TEB), and Republic Airport (FRG). Furthermore, within a 50-mile radius are Morristown Municipal Airport (MMU), Westchester County Airport (HPN), and Long Island MacArthur Airport (ISP). Because air traffic controllers must separate aircraft traveling to and from these airport/heliport facilities to keep their flight paths from interfering with each other, arrival and departure operations to and from JFK are constrained in both location and frequency.

As a congestion mitigation measure, Title 14 CFR Part 93.123 identifies JFK as a "high density airport" and limits the hourly number of allocated aircraft operations (slots) at the airport. Slot limits at JFK are in effect daily between 6:00 A.M. and 10:59 P.M. During these hours, scheduled aircraft operations are currently limited to 81 per hour. The FAA has extended these slot limits until October 27, 2018. Additional information on the demand management measures implemented at JFK to reduce congestion is provided in **Page B-3** of **Appendix B**.

2.2.5 Regional Economic Impact

Along with EWR and LGA, JFK is a significant driver of the New York–New Jersey metropolitan region's economy. The operating activities associated with these airports produce both direct economic contributions and an equally significant multiplier effect to the local economy. The Port Authority's *Airport Traffic Report 2015*, summarizes the direct contribution and regional benefit that is generated by JFK. The report notes that JFK employed 37,000 people and had a \$42 billion impact on the local economy.¹¹

¹⁰ Reconstruction and Rehabilitation of Runway 4L-22R at JFK. Port Authority of New York and New Jersey. https://www.panynj.gov/press-room/press-item.cfm?headLine_id=2305

¹¹ Airport Traffic Report 2015, Port Authority of New York and New Jersey, April 1, 2016. <u>http://www.panynj.gov/airports/pdf-traffic/ATR_2015.pdf</u>. Accessed July 1, 2016.



JFK Economic Impact (2015)

2.3 Navigational Aids

Navigational aids, airport lighting, and airport markings help users of JFK to safely navigate around the Airport and through local airspace. The NAVAIDS available to pilots using JFK are summarized in **Table 2-2**.

Navigational Aids	Description
	An ILS is a type of precision ground-based electronic landing navigation aid that has been in use in the U.S. for more than 50 years. An ILS guides pilots to runways during periods of limited visibility or inclement weather. An ILS has several components, including:
	 Localizer antenna (LOC) that provides lateral course guidance to the runway
Instrument Landing Systems (ILS)	Glide slope antenna (GS) that provides vertical course guidance
	 Marker beacons along the extended runway centerline
	Approach lighting system
	Non-precision LOC instrument approach procedures are often available when a GS is not installed or for approaches from the opposite end of the runway ("back-course" approach).
Area Navigation (RNAV)	RNAV is a method of Instrument Flight Rules (IFR) navigation that permits aircraft operation on any desired flight path using the combination of both GPS and ground-based navigational aids. RNAV routes and terminal procedures, including departure procedures and standard terminal arrivals, are designed with RNAV systems in mind to save time and fuel, reduce aircraft dependence on air traffic control (ATC) vectoring, and provide for more efficient use of the airspace.
Global Positioning System (GPS)	The GPS, operated by the Department of Defense, uses a network of satellites that create reference points to enable aircraft equipped with GPS receivers to determine their latitude, longitude, and altitude. GPS systems can be used during all phases of flight.
Required Navigation Performance (RNP)	RNP is similar to Area Navigation (RNAV); but, RNP requires on- board navigation performance monitoring and alerting capability to ensure that the aircraft stays within a specific containment area.
Very High Frequency Omni- Directional Range (VOR)	A VOR is a ground-based electronic system that provides azimuth information for high and low altitude routes and airport approaches. DME determines a slant range distance from an aircraft to the DME.
Distance Measuring Equipment (DME)	VORs can be stand-alone or equipped with DME. These navigational aids provide navigational fixes on an aeronautical chart.
Airport Beacon	Airport beacons help pilots identify an airport at night. Beacons that alternately flash white and green designate civilian land airports.

TABLE 2-2 JFK AIRPORT NAVIGATIONAL AIDS

Source: FAA, 2016. Adapted by Environmental Science Associates.

2.4 Instrument Approach Procedures and Charted Visual Flight Procedures

Instrument approach procedures (IAPs) are flight procedures developed and published by the FAA that pilots use to navigate their aircraft to the runway. The IAPs currently published for JFK are listed in **Table 2-3**.

JFK also has two charted visual flight procedures (CVFPs). CVFPs are approaches that depict visual landmarks, and are established for environmental, safety, or air traffic efficiency reasons.¹² They can be used only by aircraft following IFR flight plans that have been cleared by Air Traffic Control to use the procedures for landing at an airport with an operating control tower.¹³ Pilots following a CVFP use reference landmarks and altitudes on the procedure chart to navigate to the runway. Once cleared to follow a CVFP, a pilot continues operating under IFR, but requires visual meteorological conditions (cloud ceilings of at least 1,000 feet, and visibility of at least 3 miles) to fly the CVFP approach. A CVFP may also have higher minimum weather requirements than a Visual Approach.^{14·15} Runways 13L and 13R have a CVFP called the "Parkway Visual" available when weather conditions are 2,500-foot cloud ceilings and more than 3 statute miles visibility. Runway 22L also has a CVFP called the "Belmont Visual" for when weather conditions are 3,500-foot ceilings and more than 5 statute miles visibility.

Pilots operating under IFR can also be directed by Air Traffic Control to fly visual approaches to runways without the use of CVFPs. Once given a clearance to fly a visual approach without a CVFP, pilots continue operating under IFR but must maintain visual separation from other aircraft.¹⁶

¹² Aeronautical Information Manual. Paragraph 5-4-24. Federal Aviation Administration, December 10, 2015.

¹³ Order JO 7110.65W, *Air Traffic Control*. Federal Aviation Administration, December 10, 2015.

¹⁴ FAA Aeronautical Information Manual (AIM), Section 5-4-24. December 10, 2015.

¹⁵ FAA Information for Operators (InFO) 11003. January 25, 2011.

¹⁶ FAA Aeronautical Information Manual (AIM), Section 5-4-23. December 10, 2015.

Runway 13R-31L		Runway 13L-31R		
13R	31L	13L	31R	
VOR or GPS	ILS or LOC RNAV (RNP) Z ² RNAV (GPS) Y VOR	ILS ILS or LOC VOR or GPS	ILS or LOC RNAV (RNP) Z RNAV (GPS) Y	
Runway 4	1R-22L	Runway	4L-22R	
4R	22L	4L	22R	
ILS ILS or LOC RNAV (RNP) Z RNAV (GPS) Y VOR	ILS ILS or LOC RNAV (RNP) Z RNAV (GPS) Y VOR/DMF	ILS or LOC RNAV (RNP) Z RNAV (GPS) Y VOR	ILS RNAV (GPS)	

TABLE 2-3 JFK INSTRUMENT APPROACH PROCEDURES¹

SOURCE: Federal Aviation Administration, 2016. Notes:

1 Circling IAPs published for JFK include the Copter RNAV (GPS) 028.

2 When two or more straight-in approaches with the same type of guidance exist for a runway, a letter suffix is added to the title of the approach so that it can be more easily identified. These approach charts start with the letter Z and continue in reverse alphabetical order.

2.5 Standard Terminal Arrivals and Departure Procedures

New York airspace is structured so that arriving aircraft can be safely and efficiently transitioned from the en route environment to the approach control environment and eventually to the airfield. Likewise, the airspace is structured so that departing aircraft can transition from the airfield to the terminal environment and ultimately to the en route environment. Standard Terminal Arrival Routes (STARs) and Departure Procedures (DPs) simplify and expedite Instrument Flight Rules (IFR) arrival and departure procedures in the New York airspace. As discussed previously, aircraft flying in and out of JFK follow these routes, depending on the operational flow of the Airport. Furthermore, the locations of these routes and their frequencies of use are heavily influenced by the complexity of air traffic management associated with the numerous other airports near JFK, as discussed in **Section 2.2.4**.

2.5.1 Standard Terminal Arrival Routes

The New York TRACON and JFK ATC use six STARs to route aircraft into JFK. Currently there is one RNAV (GPS) arrival procedure and five conventional arrival procedures,¹⁷ as shown in

¹⁷ FAA's *Instrument Procedures Handbook* (FAA-H-8083-16A) notes that STARs based on conventional NAVAIDs essentially have the same procedure design and obstacle clearance criteria as that for en route procedures. STAR procedures typically include standardized descent gradients and allow for deceleration segments. RNAV STARs serve the same purpose as conventional STARs, but are only used by aircraft equipped with Flight Management

Table 2-4. Page B-13 and Attachment 1 of Appendix B include a copy of the charts and descriptions of the STARs.

Procedure Name	Procedure Type	Arrival Direction
CAMRN FOUR	Conventional	South
KINGSTON ONE	Conventional	North
LENDY SIX	Conventional	North/Northwest
PARCH TWO	RNAV	East/Northeast
PAWLING TWO	Conventional	North
ROBER TWO	Conventional	North/Northeast
	_	
NOTE: RNAV = Area Navigation		
SOURCE: AirNav.com, July 2016.		

 TABLE 2-4

 JFK STANDARD TERMINAL ARRIVAL ROUTES

2.5.2 Departure Procedures

Aircraft departing JFK are often assigned a specific DP. A DP is a published procedure that provides a standard route from the runway to the appropriate en route airspace structure. In some cases, a DP may have an associated en route transition, which is a published procedure segment that connects the end of the DP to one of several en route structures. DPs are designed to separate departing aircraft from arriving aircraft, provide for efficient interception of an outbound course, simplify the issuance of departure clearances, and reduce radio communication.

DPs at JFK include a mix of RNAV and conventional procedures. **Table 2-5** summarizes the DPs for JFK. **Page B-15** of **Appendix B** includes these charts and descriptions of each procedure listed in the charts.

Procedure Name	Procedure Type
BETTE FOUR	Conventional
DEEZZ FOUR	RNAV
GREKI FOUR	Conventional
HAPIE FOUR	Conventional
KENNEDY THREE	Conventional
MERIT FOUR	Conventional
SKORR THREE	RNAV
NOTE: RNAV = Area Navigation. SOURCE: AirNav.com, July 2016.	

TABLE 2-5 JFK DEPARTURE PROCEDURES

System or GPS. An RNAV STAR typically includes flyby (or flyover) waypoints. These waypoints may be assigned crossing altitudes and speeds to optimize the descent and deceleration profiles.

2.6 Port Authority Noise Monitoring, Noise Abatement, and Community Outreach Programs

Since 1959, the Port Authority has been active in addressing aircraft noise concerns and currently has several programs in place to monitor aircraft noise levels and assist local communities in understanding the effects of aircraft noise. These include a fully-staffed noise office, installation of a noise monitoring system in the communities around JFK, and implementation of a sound insulation program.

2.6.1 School Sound Insulation Program

The Port Authority voluntarily conducted a soundproofing program for schools in the vicinity of Port Authority airports between 1988 and 2012. To date 23 schools in the vicinity of JFK have been sound insulated to reduce noise impacts. Total program expenditures for the 23 schools exceed an estimated \$394 million, which was paid for in part with FAA grants through the Airport Improvement Program. **Table 2-6** provides additional information related to each of the 23 schools including the year in which the school was sound insulated and the estimated number of students in attendance in the 2015/2016 school year. It is important to note that once a school has been insulated, it is considered a compatible use for the purposes of 14 CFR Part 150.

	School	City	Number of Students	Completion Year
1	Lawrence Public School #5	Cedarhurst	385	1994
2	Lawrence High School	Cedarhurst	929	1990
3	Lawrence Middle School	Lawrence	818	1995
4	Lawrence Public School #4	Inwood	343	1997
5	Our Lady of Grace (Ave Maria Catholic Academy)	Howard Beach	189	1995
6	PS 104Q	Far Rockaway	622	1991
7	PS 138Q	Rosedale	788	1993
8	PS 181 Brookfield	Springfield Gardens	363	1988
9	PS 183Q	Far Rockaway	530	1993
10	PS 38 Rosedale	Rosedale	207	1990
11	PS/MS 42 R. Vernam	Arverne	662	2000
12	St. Clare Catholic Academy	Rosedale	318	2002
13	St. Rose of Lima	Rockaway Beach	428	1992
14	Yeshiva Darchei Torah	Far Rockaway	800	1998
15	Hebrew Academy of Five Towns & Rockaway	Lawrence	1098	2006
16	Lawrence Public School #2	Inwood	414	2012
17	PS 146Q	Howard Beach	701	2006
18	IS/MS 180Q (Now Scholars Academy)	Rockaway Park	1,251	2010
19	PS 195Q	Rosedale	680	2008
20	PS 198Q (Now Goldie Maple Academy)	Arverne	541	2010
21	St. Joachim School	Cedarhurst	508	2006
22	St. Pius X (Now Success Academy – Rosedale)	Rosedale	254	2006
23	Tapeinu School for Girls (Now Challenge Preparatory Charter School)	Far Rockaway	419	2005

 TABLE 2-6

 PORT AUTHORITY SCHOOL SOUNDPROOFING PROGRAM AT JFK

SOURCE: Port Authority, 2015. New York City Department of Education, 2016. National Center for Education Statistics, 2016.

2.6.2 Airport Noise Monitoring

The Port Authority operates an Airport Noise and Operations Management System (ANOMS) that collects noise monitoring data in the vicinity of JFK using permanent and portable noise monitors. The ANOMS, which gathered data from 19 noise monitors in 2015, can also link noise events and complaints to specific aircraft operations.

The Port Authority's WebTrak System allows the public to watch aircraft movements and view noise levels within the New York metropolitan area via a website.¹⁸ For each aircraft, WebTrak provides specific information regarding aircraft type, altitude, and origin/destination airports and flight identification. Noise level readings at the noise monitors near each airport are also shown on WebTrak in A-weighted instantaneous sound pressure level readings.

In this NEM report, 2014 and 2015 monthly noise level data for the monitors near JFK are provided in **Section 4.6**. These data are provided for informational purposes only as described in the study protocol (in **Appendix I, Section 6.6**). The data were not used in the development of noise contours, as 14 CFR Part 150 does not allow noise monitoring data to be used to "calibrate" the noise model used to develop contours.

2.6.3 Aircraft Noise Complaints

As part of its noise program, the Port Authority collects and manages noise complaint information related to each of the airports in its system. There are two primary means of filing an aircraft noise complaint: (1) by completing and submitting the form on the Port Authority's website or 2) by leaving a voicemail on the airport noise complaint hotline.¹⁹ Noise complaints are recorded and processed with the help of the Port Authority's PlaneNoise® complaint management system. Each noise complaint received is compiled in a database, verified for accuracy, analyzed, and mapped for reporting.

The Port Authority provides noise complaint reports to the FAA on a monthly basis for informational purposes. **Table 2-7** provides the number of noise complaints and individual households submitting complaints for 2014 through 2016. **Figures 2-4 through 2-6** provide a visual depiction of the locations of the households submitting complaints for 2014 and 2015, respectively. The majority of complaints are from households located more than 2 miles from the airport and outside the DNL 65 contours (See **Chapter 5** for the 2016 and 2021 noise exposure maps).

TABLE 2-7 JFK AIRCRAFT NOISE COMPLAINTS					
Year	Number of Noise Complaints	Number of Distinct Households			
2016 ¹	10,244	522			
2015 (Jan-Jun)	17,051	4 407			
2015 (Jul-Dec)	15,187	1,107			
2014	24,041	1,000			
SOURCE: Port Author 1 Data provided for Ja	prity, 2016. anuary-June 2016.				

¹⁸ <u>http://webtrak.bksv.com/panynj</u>

¹⁹ The noise complaint form is located at: <u>http://www.planenoise.com/panynj/daPRAbr9/</u>. The airport noise complaint hotline can be reached by calling 1-800-225-1071.

2.6.4 Community Outreach

The Port Authority continues to participate in local community and town meetings to discuss and answer citizen questions related to aircraft noise. For the JFK 14 CFR Part 150 Study, the TAC serves as one method of outreach to communities and other stakeholders (see **Section 6.2**). In conjunction with the approval to initiate the 14 CFR Part 150 studies for JFK and LGA, the Port Authority also initiated the formation of a community aviation roundtable (Roundtable) that includes elected officials and representatives of local community boards in the vicinity of JFK and LGA. In the spring of 2015, the responsibility for the Roundtable was turned over to the elected Coordinating Committee, which coordinated the writing and adoption of by-laws, which were passed in February 2017. The Roundtable provides a forum for the Port Authority, the FAA, and the affected community at large for discussions on aircraft noise issues.

2.6.5 Aircraft Noise Abatement

The Port Authority has pursued aircraft noise abatement measures for several decades. In 1959, the Port Authority established a noise limit of 112 Perceived Noise Decibels (PNdB) for aircraft departures. PNdB expresses the perceived loudness of an individual aircraft noise event.²⁰ To enforce the departure noise limit, the Port Authority installed the world's first airport noise monitoring system. This monitoring system consisted of 11 permanent noise monitors in total, located near LGA, JFK, EWR, and TEB. In 1986, the Port Authority and airlines agreed to a \$250 penalty for each aircraft that exceeded the noise departure limit at JFK, based on noise levels measured by the monitoring system. The original system required manual correlation of noise levels with individual aircraft operations; a system upgrade in 1992 added flight tracking and automated this process.

In the year 1985, the Port Authority prohibited the use of Stage 1 aircraft at JFK, LGA, and EWR. "Stage 1" aircraft are transport-category aircraft of at least 12,500 pounds in maximum takeoff weight, or subsonic jet-powered aircraft of any category, that have never been shown to meet the noise standards in 14 CFR Part 36 (*Noise Standards: Aircraft Type and Airworthiness Certification*). In 1989, the Port Authority also prohibited the scheduling of additional nighttime flights of Stage 2 aircraft at JFK, LGA, and EWR. "Stage 2" aircraft met the noise standards in 14 CFR Part 36, Section B36.5(b), originally established in 1969. "Stage 3" aircraft operating at JFK, LGA, and EWR at that time were not subject to the Stage 1 and Stage 2 use restrictions. "Stage 3" aircraft meet the noise standards in 14 CFR Part 36, Section B36.5(c), established in 1977.

Passage of the Airport Noise and Capacity Act of 1990 (ANCA) subsequently prohibited operation of Stage 1 and Stage 2 aircraft with a maximum weight above 75,000 pounds within the United States after December 31, 1999. This prohibition provided noise benefits nationwide. ANCA also prevented the Port Authority from establishing additional operational restrictions on

²⁰ K.D. Kryter, "The Meaning and Measurement of Perceived Noise Level," *Noise Control* 6:5, Sept.-Oct., 1960, pp. 12-17; K.D. Kryter, "Scaling Human Reaction to Sound from Aircraft," *Journal of the Acoustical Society of America*, vol. 31, 1959, p.1415.

Stage 2 (or quieter) aircraft in flight except through compliance with 14 CFR Part 161, *Notice and Approval of Airport Noise and Access Restrictions*. In addition, the FAA Modernization and Reform Act of 2012 (FMRA) prohibits operation of Stage 1 and Stage 2 aircraft with a maximum weight of 75,000 pounds or lower within the 48 contiguous United States after December 31, 2015.

The New York TRACON Standard Operating Procedures (SOP) manual contains noise abatement procedures for JFK.²¹ The SOP indicates that the procedures are for "when traffic, weather, and workload permit." The JFK noise abatement procedures include, but are not limited to:

- Preferred locations and directions for vectoring jet aircraft arrivals and departures.
- Advisements to jet aircraft pilots requesting an arrival runway other than the runway in use: "Runway XX, is not the selected noise abatement runway. Advise intentions."
- Variation in headings for Runway 13 L/R jet departures.
- Preferred departure procedures between 11:00 P.M. and 7:00 A.M.

²¹ Federal Aviation Administration, Order N90 7110.1D, February 15, 2016.



SOURCE: PANYNJ and PlaneNoise, 2016; Google Maps.

NOTE: The green noise complaint indicators without a number reflect locations where a single noise complaint was filed.

John F. Kennedy International Airport 14 CFR Part 150 Study:140037 Figure 2-4 2014 Noise Complaints John F. Kennedy International Airport

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SOURCE: PANYNJ and PlaneNoise, 2016; Google Maps. NOTE: The blue noise complaint indicators without a number reflect locations where a single noise complaint was filed. John F. Kennedy International Airport 14 CFR Part 150 Study140037 Figure 2-5 January - June 2015 Noise Complaints John F. Kennedy International Airport

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SOURCE: PANYNJ and PlaneNoise, 2016; Google Maps. NOTE: The blue noise complaint indicators without a number reflect locations where a single noise complaint was filed. John F. Kennedy International Airport 14 CFR Part 150 Study140037 Figure 2-6 July - December 2015 Noise Complaints John F. Kennedy International Airport

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CHAPTER 3 Land Use

3.1 Introduction

Title 14 CFR Part 150 requires the review of land uses located in the airport environs to understand the relationship between those land uses and the noise exposure associated with arriving and departing flights at an airport. This includes delineation of land uses within the DNL 65 and higher contours on the NEMs and identification of noise sensitive uses that may be incompatible with that level of noise exposure. Identification of a noise sensitive use within the DNL 65 contour does not necessarily mean that the use is either considered incompatible or that it is eligible for mitigation. Rather, identification merely indicates that the use is *generally* considered incompatible, but requires further investigation. Factors that influence compatibility and/or eligibility may include but not be limited to previous sound reduction treatments, current interior noise levels, structure condition, ambient and self-generated noise levels, whether a given use is considered temporary or permanent, and the timeframe within which a given structure was constructed.¹⁷ These factors will be more thoroughly evaluated during the NCP and subsequent implementation phase.¹⁸

This chapter outlines the land use data collection process, land use compatibility and noise sensitive uses, and the land use regulatory environment.

3.2 Land Use Data Collection

Various types of land use information were collected to provide the basis for the evaluation of land use compatibility and noise exposure in this study.

The Port Authority, in response to requests from several communities, has agreed to identify the locations of both the DNL 60 and DNL 55 contours on a map separate from the NEMs for *informational purposes only* (see **Appendix J** and the study protocol in **Appendix I**, **Section 6.7**). It is important to note that the FAA considers all uses compatible with noise levels below DNL 65.

 ¹⁷ On March 27, 1998, FAA issued a policy on 14 CFR Part 150 airport noise compatibility programs that limits approval of remedial mitigation measures, e.g., soundproofing, property acquisitions, and relocation, etc., to land uses that were in place as of October 1, 1998 unless an airport can demonstrate that DNL contours were not published prior to that date. New non-compatible uses resulting from airport expansion may be eligible for consideration.
 ¹⁸ Determination of eligibility would be made when the JFK Noise Compatibility Program has been approved,

¹⁸ Determination of eligibility would be made when the JFK Noise Compatibility Program has been approved, program protocols have been established and the implementation phase has been initiated.

3.2.1 Land Use Data Collection Area

The JFK 14 CFR Part 150 Study required the development of a database of existing land uses located in the airport environs affected by noise and flight activity. As described in the study protocol in **Appendix I, Section 7.2**, the Land Use Data Collection Area for this study considered a number of factors, including:

- The most recent set of noise contours for JFK¹⁹ to ensure that the 2016 Existing Conditions and 2021 Future Conditions DNL 65 contours developed for the 14 CFR Part 150 Study would be encompassed.
- Land use within a radial distance of 30,000 feet from each runway end at JFK for capture of flight tracks per 14 CFR Part 150 requirements.
- Flight track data associated with arrivals and departure operations at JFK in 2014.

After review by the Port Authority, the Land Use Data Collection Area was further refined through the use of political and jurisdictional boundaries and man-made and/or natural features including:

- Major roadways and transportation corridors.
- Readily identifiable geographic features including waterways, shorelines, streams/rivers and large expanses of open space.

This process defined a broad data collection area that conforms to 14 CFR Part 150 criteria. A more detailed discussion and depiction of the Land Use Data Collection Area provided on **Page D-4** of **Appendix D-1**.

3.2.2 Study Area

A Study Area was identified for more detailed collection and review of land use data and information. The JFK 14 CFR Part 150 Study Area included areas with the potential to be located within or in proximity to JFK's 2016 Existing and/or 2021 Future DNL 65 and higher contours. The JFK 14 CFR Part 150 Study Area is discussed in more detail on **Page D-8** of **Appendix D-1**.

3.2.3 Local Agency and Government Coordination

In addition to the National Park Service, the Federal Agency that manages the Gateway National Recreation Area, the following New York City agencies were consulted in order to document existing land uses, discuss applicable land use studies and data, and identify future projects that may affect land use in the JFK 14 CFR Part 150 Study Area:

New York City Department of City Planning (DCP) – Environmental Review, Manhattan, Queens, Brooklyn and Bronx offices

.

¹⁹ Environmental Assessment for Runway 4L/22R Improvements.

- New York City Economic Development Corporation (NYCEDC)
- New York City Department of Housing and Preservation (HPD)

These agencies are the primary City agencies responsible for approval of land use changes.²⁰ The School Construction Authority (SCA) and the NYC Health + Hospitals were also contacted to determine if these organizations had relevant planning studies or future projects that would occur within the Study Area, within the five-year timeframe.

In addition, the following government entities were consulted to determine existing land uses in Nassau County, as well as applicable land use studies and future projects in the study area:

- Nassau County Department of Public Works Planning Division (NC)
- City of Long Beach (COLB)
- Town of Hempstead (TOH)
- Town of North Hempstead (TONH)

3.3 Land Use Compatibility

3.3.1 Aircraft Noise and Land Use Compatibility

Guidelines regarding the compatibility of land uses within various DNL contour intervals are specified in *Appendix A of 14 CFR Part 150*. These guidelines are consistent with land use guidelines developed by other federal agencies, such as the U.S. Environmental Protection Agency and the U.S. Department of Housing and Urban Development. The noise metric used for land use compatibility is the Day-Night Average Sound Level (DNL), which represents average noise levels over a 24-hour period. DNL values are expressed in A-weighted decibels (dBA), which is a sound pressure level metric that emphasizes sound at the frequency range where the human ear is most sensitive. In the calculation of DNL, sound events occurring during the nighttime (10:00 P.M. to 7:00 A.M.) are increased by a 10 decibel-weighting to represent the increased sensitivity of people to noise that occurs at night. Aircraft DNL values represent the cumulative effects of all aircraft operations occurring during an average 24-hour period referred to as an "annual average day," which is derived from aircraft operations data for an entire calendar year. Further details on aircraft noise are presented in **Appendix C** of this report.

The FAA has determined that the major land uses listed in 14 CFR Part 150, Appendix A, Table 1 (presented here as **Table 3-1**) are normally compatible with aircraft noise below the DNL 65 contour. Therefore, when evaluating land use compatibility, attention is focused on uses within the DNL 65 contour.

²⁰ Other City agencies, such as the NYC Board of Standards and Appeals also approve development projects within NYC; however, these agencies generally do not approve substantial land use and zoning changes, which are instead undertaken by the NYC DCP.

As shown in **Table 3-1**, noise sensitive land uses such as residential, mobile home parks, transient lodging, schools, and outdoor music venues are considered incompatible with noise levels of DNL 65 or higher. Other noise sensitive land uses such as hospitals, nursing homes, churches, auditoriums, and concert halls are considered compatible with noise levels of DNL 65 to 75, provided that appropriate noise attenuation is designed into the building's structure. Commercial, manufacturing, and recreational land (parks, amusement parks, zoos, etc.) are generally less sensitive to noise and are considered compatible with noise levels up to DNL 70 without noise attenuation and up to DNL 80 with appropriate levels of noise attenuation. For the JFK 14 CFR Part 150 study, the identification of compatible and incompatible land uses within the DNL 65 and higher contours was documented using the guidance provided in **Table 3-1** (on the following page) to the extent that it was readily applied to the New York City Land Use categories.

3.3.2 Local Ambient Noise Environment

One important consideration in evaluating land use compatibility relative to aircraft noise is the overall noise environment in proximity to the airport. 14 CFR Part 150, Appendix A, Section 101 indicates that "if the self-generated noise from a given use and/or the ambient noise from other non-aircraft and non-airport uses is equal to or greater than the noise from aircraft and airport sources," the land use is considered compatible.

Ambient noise levels generally increase as intensity of development increases ranging from rural to suburban to urban to dense urban environment. New York City and the five (5) boroughs include land uses that can be classified at the higher end of this range. Reviewing these classifications relative to JFK, it can be determined that areas in near proximity to JFK generally fall within the urban to dense urban classification. The areas closest the airport would be classified as urban or dense urban. Information from the Port Authority's ANOMS indicates that community noise levels at the noise monitors placed around JFK vary from around the DNL 50 range to the DNL 70+ range and in many cases exceed the DNL values for aircraft noise measurements at those sites.

Table 3-2 and **Table 3-3** compare aircraft-associated measured DNL values, communityassociated measured DNL values, and total measured DNL values for the years 2014 and 2015, respectively. Each value is a yearly average of all available monitor data. A number of monitors did not have a full year of data. **Table 3-2** shows that in 2014, monitor sites J13RP, J13LP, J04BP, J31RP, J31LP, J22RP, CEDAH, and ARV64 measured aircraft-associated DNL values of greater than DNL 65. **Table 3-3** shows that in 2015, monitor sites J13RP, J13LP, J04BP, J31RP, J31LP, CEDAH, ARV64, and JHB165AV measured aircraft-associated DNL values of greater than DNL 65. Site J31RP measured an average community-associated DNL value that was greater than the aircraft-associated DNL value for both 2014 and 2015. This suggests that a detailed analysis of ambient noise near site J31RP may be necessary during the NCP phase and subsequent implementation of the JFK 14 CFR Part 150 Study NCP recommendations.

	Yearly Day-Night Noise Level (DNL) in decibels						
Land Use	Below 65	65-70	70-75	75-80	80-85	Over 85	
Residential	-	-	-	-	-	-	
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	Ν	Ν	Ν	
Mobile home parks	Y	Ν	Ν	Ν	Ν	Ν	
Transient lodgings	Y	N(1)	N(1)	N(1)	Ν	Ν	
Public Use							
Schools	Y	N(1)	N(1)	Ν	Ν	Ν	
Hospitals and nursing homes	Y	25	30	Ν	Ν	Ν	
Churches, auditoriums and concert halls	Y	25	30	Ν	Ν	Ν	
Government services	Y	Y	25	30	Ν	Ν	
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)	
Parking	Y	Y	Y(2)	Y(3)	Y(4)	Ν	
Commercial Use							
Offices, business and professional	Y	Y	25	30	Ν	Ν	
Wholesale and retail - building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	Ν	
Retail trade – general	Y	Y	25	30	Ν	Ν	
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	Ν	
Communication	Y	Y	25	30	Ν	Ν	
Manufacturing and Production							
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	Ν	
Photographic and optical	Y	Y	25	30	Ν	Ν	
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)	
Livestock farming and breeding	Y	Y(6)	Y(7)	Ν	Ν	Ν	
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y	
Recreational							
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	Ν	Ν	Ν	
Outdoor music shells, amphitheaters	Y	Ν	Ν	Ν	Ν	Ν	
Nature exhibits and zoos	Y	Y	Ν	Ν	Ν	Ν	
Amusements, parks, resorts and camps	Y	Y	Y	Ν	Ν	Ν	
Golf courses, riding stables and water recreation	Y	Y	25	30	Ν	Ν	

TABLE 3-1 14 CFR PART 150 LAND USE COMPATIBILITY GUIDELINES IN AIRCRAFT NOISE EXPOSURE AREAS

TABLE 3-1 14 CFR PART 150 LAND USE COMPATIBILITY GUIDELINES IN AIRCRAFT NOISE EXPOSURE AREAS (CONTINUED)

Numbers in parenthesis refer to notes.

* The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

Key to Table

- SLUCM Standard Land Use Coding Manual
- Y(Yes) Land use and related structures compatible without restrictions.
- N (No) Land use and related structures are not compatible and should be prohibited.
- NLR Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
- 25, 30 or 35 Land Use and related structures generally compatible; measures to achieve NLR of 25, 30 or 35 dB must be incorporated into design and construction of structure.

Notes:

- (1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor NLR of at least 25 dB to 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.
- (2) Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where normal noise level is low.
- (3) Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where normal noise level is low.
- (4) Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where normal noise level is low.
- (5) Land use compatible provided that special sound reinforcement systems are installed.
- (6) Residential buildings require an NLR of 25 dB.
- (7) Residential buildings require an NLR of 30 dB.
- (8) Residential buildings not permitted.

SOURCE: Title 14 Code of Federal Regulations Part 150, "Airport Noise Compatibility Planning."

TABLE 3-2

2014 MEASURED AIRCRAFT, NON-AIRCRAFT, AND TOTAL DNL

Site Number	Site ID	Location	Aircraft DNL	Community DNL	Total DNL
4	J13RP	Peppe Rd, Inwood, NY 11096	66.1	65.9	69.0
5	J13LP	Broad St, Queens, NY 11422	71.3	68.1	76.0
6	J04BP	147th Street, Springfield Gardens, NY 11413	70.3	68.1	72.0
7	J31RP	150th Ave, South Ozone Park, NY 11420	67.6	76.1	76.4
8	J31LP	Russell St, Howard Beach, NY 11414	66.7	66.6	70.1
9	J22RP	Almeda Ave, Arverne, NY 11692	66.4	65.4	68.9
28	CEDAH	Hanlon Dr, Cedarhurst, NY 11516	69.8	68.7	72.1
54	ATL65	The Plaza, Atlantic Beach, NY 11509	58.7	65.7	66.4
55	FLPRK	Floral Parkway, Floral Park, NY 11001	60.2	61.7	63.9
56	ARV64	Beach 64th Street, Arverne, NY 11692	67.8	61.6	68.7
57	ROSED	231st Street, Brookville, NY 11413	64.8	62.7	66.2
64	JFRSQ	Renken Blvd., Franklin Square, NY 11010	50.6	57.0	58.1
65	JRHYALE	Yale Street, Roslyn Heights, NY 11577	56.1	59.4	61.0
66	JMLVRN	Hempstead Ave, Malverne, NY 11656	59.4	57.6	61.8
67	JBYSWTR	Bay Court, Bayswater NY 11691	58.9	64.2	65.5
68	JBRDCHNL	Church Road, Broad Channel, NY 11693	59.6	62.3	64.3
SOURCE: Po	rt Authority, 2016.	-			

Site Number	Site ID	Location	Aircraft DNL	Community DNL	Total DNL
4	J13RP	Peppe Rd, Inwood, NY 11096	67.6	63.7	69.1
5	J13LP	Broad St, Queens, NY 11422	73.0	69.2	78.5
6	J04BP	147th Street, Springfield Gardens, NY 11413	67.7	62.6	68.6
7	J31RP	150th Ave, South Ozone Park, NY 11420	70.5	77.7	78.0
8	J31LP	Russell St, Howard Beach, NY 11414	70.2	66.5	71.9
9	J22RP	Almeda Ave, Arverne, NY 11692	64.2	66.5	68.3
28	CEDAH	Hanlon Dr, Cedarhurst, NY 11516	69.6	62.7	70.4
54	ATL65	The Plaza, Atlantic Beach, NY 11509	60.5	61.3	63.9
55	FLPRK	Floral Parkway, Floral Park, NY 11001	59.4	61.0	63.1
56	ARV64	Beach 64th Street, Arverne, NY 11692	66.8	59.3	67.6
57	ROSED	231st Street, Brookville, NY 11413	64.0	62.6	66.2
64	JFRSQ	Renken Blvd., Franklin Square, NY 11010	54.6	57.8	59.5
65	JRHYALE	Yale Street, Roslyn Heights, NY 11577	55.1	59.3	60.5
66	JMLVRN	Hempstead Ave, Malverne, NY 11656	55.1	59.6	59.3
67	JBYSWTR	Bay Court, Bayswater NY 11691	63.0	64.7	68.0
68	JBRDCHNL	Church Road, Broad Channel, NY 11693	58.3	61.5	63.0
69	JOLDBRK	Valentines Lane, Old Brookville, NY 11545	49.3	59.8	59.9
72	JEHLS	Harbor Hill Road, East Hills, NY 11576	51.2	59.2	59.7
74	JHB165AV	165th Avenue, Howard Beach, NY 11414	72.6	61.6	72.9
SOURCE: Po	ort Authority, 2016.				

 TABLE 3-3

 2015 MEASURED AIRCRAFT, NON-AIRCRAFT, AND TOTAL DNL

3.3.3 Land Uses within the Study Area

JFK is bounded by Jamaica Bay and major roads and highways, including Belt Parkway (State Road 878), Nassau Expressway, S. Conduit Avenue, and Rockaway Boulevard. Communities in the immediate vicinity of JFK include Howard Beach to the west; South Ozone Park, South Jamaica, Rochdale, Laurelton, Springfield Gardens, and Rosedale to the north; Valley Stream, Woodmere, Cedarhurst, Inwood, and Lawrence to the east; and Bayswater, Edgemere, Rockaway Beach, and Arverne to the south. A variety of data sources were used to determine details of the land uses in the Study Area. The study protocol notes these data sources in **Appendix I**, **Section 7.3**; further information can be found on **Page D-9** of **Appendix D-1**.

With the exception of sections of shoreline and islands in Jamaica Bay dedicated to open space, wildlife sanctuary, and recreation, land in the Study Area is densely developed and urbanized. The predominant land use in the vicinity of JFK is residential. Commercial development is found along major road corridors. Areas west of JFK have concentrations of industrial land use (e.g., East New York). Land uses in the Study Area are summarized in **Table 3-4** and depicted on **Figure 3-1**. Transient lodgings (i.e., airport hotels) are included in the "Commercial and Office" land use category, as shown in **Appendix D-1**, for consistency with New York City Department of City Planning land use categories. Based on the criteria established in 14 CFR Part 150 and the land use compatibility guidelines shown in **Table 3-1**, eligibility for mitigation will be evaluated

in the NCP. Unclassified land uses shown on the figure are land uses which have no designation in the New York City land use database. All unclassified parcels located within the DNL 65 contour were further investigated and resolved. A more detailed discussion of land uses and the methods used to identify land uses is provided on **Page D-9** of **Appendix D-1**.

It should be noted that the Mixed Residential and Commercial land use category is a land use designation that is common in New York City's densely urbanized environment. This classification may involve a residential use located directly over a commercial use (e.g., an apartment over a coffee shop) or a commercial development with localized concentrations of residential development (e.g., a multilevel residential tower constructed over a portion of a shopping mall). Per **Table 3-1**, the commercial elements of this type of use may be considered compatible within the DNL 65 contour while the residential use equals or exceeds that of the aircraft, the residential use would not be considered incompatible (as described in the discussion of ambient noise above). For the NEM, population totals reported in **Chapter 5** include all potentially incompatible residential land uses, including Mixed Residential and Commercial. As described here and in **Section 3.3.2**, a detailed analysis of ambient noise may be necessary during the NCP phase and implementation of the JFK 14 CFR Part 150 Study NCP recommendations, to determine eligibility and precise incompatible population estimates.

Consolidated Land Use Categories	Typical Uses	Compatibility with aircraft noise levels of DNL 65
Single and Two-Family Residential	Single family homes, two-family homes, and duplex buildings.	Generally considered incompatible.
Multi-Family Residential	Apartment buildings, cooperative apartment buildings, condominiums, public housing complexes, single room occupancy (SROs), and assisted living facilities.	Generally considered incompatible.
Mixed Residential and Commercial	Multiple use buildings with dwellings attached or apartments above shopping centers or other commercial uses, one-story multi-use buildings with single or multiple occupants.	Per Table 3-1, residential portions of this land use may be considered incompatible while the commercial portions may be considered compatible. Considerations include the configuration of uses and self- generated noise associated with the Commercial uses.
Commercial and Office	Retail, including shopping malls, shopping centers, stores, shops, entertainment, restaurants, bars, galleries, and service establishments. Business, professional, and healthcare services. Transient lodging, such as hotels and motels.	Generally considered compatible.
Industrial and Manufacturing	Piers, wharves, docks and marinas, bulk fuel storage, heavy manufacturing and assembly plants, light manufacturing and processing facilities, warehouse and storage, truck terminals, junkyards, sand and gravel pits, and wholesale nurseries and greenhouses.	Generally considered compatible.
Transportation, Right of Way, Parking and Utilities	Roadways and highways (including rights-of- way), parking lots and garages, electric power generation and transmission, and water supply and treatment facilities.	Generally considered compatible.

 TABLE 3-4

 CONSOLIDATED LAND USE CATEGORIES WITHIN THE STUDY AREA

CONSOLIDATED LAND USE CATEGORIES WITHIN THE STUDY AREA					
Public Facilities and Institutions	Schools and universities, libraries, museums, cultural facilities, places of worship, government buildings, auditoriums, hospitals and hospice facilities, nursing homes, police and fire protection, post offices, correctional institutions, and animal shelters.	Generally considered compatible. Some specific noise sensitive uses (hospitals, churches, nursing homes) are generally compatible with noise levels between DNL 65 and DNL 75 provided that appropriate noise attenuation was designed into the building's structure.			
Open Space, Cemeteries, and Outdoor Recreation	Parks, recreation areas, playgrounds, athletic fields, golf courses, beaches, conservation land, preserves, cemeteries, and public land.	Generally considered compatible with the exception of outdoor music venues.			
Source: Kimley-Horn and Associa					

TABLE 3-4 (CONTINUED) CONSOLIDATED LAND USE CATEGORIES WITHIN THE STUDY AREA

3.3.4 Noise Sensitive Sites

In addition to identifying and mapping land uses, 14 CFR Part 150 also requires the identification of noise sensitive public buildings and properties eligible for inclusion in the National Register of Historic Places. The JFK 14 CFR Part 150 Study identified the following noise sensitive uses within the Land Use Data Collection Area:

- · Places of worship
- Schools, colleges and universities
- · Libraries/cultural institutions
- · Hospitals and residential healthcare facilities
- Daycare and assisted living facilities, and
- Historic properties.

Data used to identify these sites were collected from a number of sources including various NYC government departments, the Nassau County Planning Department, Tax Assessor records, previous environmental studies conducted within the area, and various readily available on-line data and mapping sources. Information sources for the identification of historic resources included the National Register of Historic Places, the New York State Register of Historic Places, and the New York City Landmarks Preservation Commission. For the JFK 14 CFR Part 150 Study, only those resources that have been previously determined to be eligible for listing, or already listed in, the National Register of Historic Places were identified and their locations mapped.

The locations of noise sensitive uses in the Land Use Data Collection Area are depicted in **Figures 3-2** through **3-8**. A more detailed discussion of methods used to identify noise sensitive sites and historic resources is provided on **Page D-25** of **Appendix D-1**. As indicated previously, inclusion of these properties within the DNL 65 contour does not necessarily mean that a use is either considered incompatible or that it is eligible for mitigation. Inclusion merely indicates that the use is generally considered incompatible, but requires further investigation during the NCP and subsequent implementation phase. In particular, some places of worship identified during the data collection process occupy temporary spaces (e.g., leased storefronts). For those places of worship that did not have appropriate noise attenuation designed into the building's structure,

investigation will occur for each facility during the NCP and subsequent implementation phase to determine eligibility for mitigation.

3.4 Land Use Control Regulations

The identification of land use controls was undertaken to provide an understanding of existing land use control regulations (e.g., zoning ordinances) within each political jurisdiction inside the Study Area. Review of the permitted uses by zoning district for each jurisdiction's zoning provisions found that there have been occasions where one or more uses permitted in a zoning district have been identified as potentially being incompatible, depending on the results of the noise analysis. These concerns will be explored in the NCP phase of the JFK 14 CFR Part 150 Study by identifying and evaluating land use management measures that may be considered to avoid the establishment of additional incompatible land uses in areas exposed to aircraft noise of DNL 65 or higher.

A discussion of zoning classifications by jurisdiction, the permitted uses within the zoning districts on a jurisdiction by jurisdiction basis and, where residential uses and/or noise sensitive uses are found to be permitted in commercial or industrial zoning classification is provided on **Page D-44** of **Appendix D-1**.



SOURCE: New York City Department of City Planning, MapPLUTO 15V1 - Tax lot/land use geographic information database, March 2015-June 2015; Nassau County Department of Public Works Planning Division: Property classification and geographic information database, September 2015; INM 7.0d; ESA, 2016; ESRI Mapping Services. John F. Kennedy International Airport 14 CFR Part 150 Study.140037 Figure 3-1 Generalized Existing Land Uses John F. Kennedy International Airport

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NOTE: This map depicts, for informational purposes, existing noise sensitive sites in the vicinity of the John F. Kennedy International Airport. This map is not intended to identify, or otherwise indicate, sites that may be incompatible with aircraft noise or sites that may require mitigation.

SOURCE: New York City Department of City Planning, MapPLUTO 15V1 - Tax lot/land use geographic information database, March 2015-June 2015; Nassau County Department of Public Works Planning Division: Property classification and geographic information database, September 2015; INM 7.0d; ESA, 2016; ESRI Mapping Services. John F. Kennedy International Airport 14 CFR Part 150 Study.140037 Figure 3-2 Noise Sensitive Sites John F. Kennedy International Airport

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This map is not intended to identify, or otherwise indicate, sites that may be incompatible with aircraft noise or sites that may require mitigation.

SOURCE: New York City Department of City Planning, MapPLUTO 15V1 - Tax lot/land use geographic information database, March 2015-June 2015; Nassau County Department of Public Works Planning Division: Property classification and geographic information database, September 2015; INM 7.0d; ESA, 2016; ESRI Mapping Services. John F. Kennedy International Airport 14 CFR Part 150 Study.140037 Figure 3-3 Noise Sensitive Sites - Schools John F. Kennedy International Airport

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This map is not intended to identify, or otherwise indicate, sites that may be incompatible with aircraft noise or sites that may require mitigation.

SOURCE: New York City Department of City Planning, MapPLUTO 15V1 - Tax lot/land use geographic information database, March 2015-June 2015; Nassau County Department of Public Works Planning Division: Property classification and geographic information database, September 2015; INM 7.0d; ESA, 2016; ESRI Mapping Services. John F. Kennedy International Airport 14 CFR Part 150 Study.140037
 Figure 3-4

Noise Sensitive Sites - Libraries and Cultural Institutions John F. Kennedy International Airport

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NOTE: This map depicts, for informational purposes, existing noise sensitive sites in the vicinity of the John F. Kennedy International Airport. This map is not intended to identify, or otherwise indicate, sites that may be incompatible with aircraft noise or sites that may require mitigation.

SOURCE: New York City Department of City Planning, MapPLUTO 15V1 - Tax lot/land use geographic information database, March 2015-June 2015; Nassau County Department of Public Works Planning Division: Property classification and geographic information database, September 2015; INM 7.0d; ESA, 2016; ESRI Mapping Services.

John F. Kennedy International Airport 14 CFR Part 150 Study.140037 Figure 3-5

Noise Sensitive Sites - Hospitals and Health Care (Residential) John F. Kennedy International Airport



NOTE: This map depicts, for informational purposes, existing noise sensitive sites in the vicinity of the John F. Kennedy International Airport. This map is not intended to identify, or otherwise indicate, sites that may be incompatible with aircraft noise or sites that may require mitigation.

SOURCE: New York City Department of City Planning, MapPLUTO 15V1 - Tax lot/land use geographic information database, March 2015-June 2015; Nassau County Department of Public Works Planning Division: Property classification and geographic information database, September 2015; INM 7.0d; ESA, 2016; ESRI Mapping Services.

John F. Kennedy International Airport 14 CFR Part 150 Study.140037 Figure 3-6

Noise Sensitive Sites - Day Care and Assisted Living Facilities John F. Kennedy International Airport



This map is not intended to identify, or otherwise indicate, sites that may be incompatible with aircraft noise or sites that may require mitigation.

SOURCE: New York City Department of City Planning, MapPLUTO 15V1 - Tax lot/land use geographic information database, March 2015-June 2015; Nassau County Department of Public Works Planning Division: Property classification and geographic information database, September 2015; INM 7.0d; ESA, 2016; ESRI Mapping Services. John F. Kennedy International Airport 14 CFR Part 150 Study.140037 Figure 3-7

Noise Sensitive Sites - Places of Worship John F. Kennedy International Airport



This map is not intended to identify, or otherwise indicate, sites that may be incompatible with aircraft noise or sites that may require mitigation.

SOURCE: New York City Department of City Planning, MapPLUTO 15V1 - Tax lot/land use geographic information database, March 2015-June 2015; Nassau County Department of Public Works Planning Division: Property classification and geographic information database, September 2015; INM 7.0d; ESA, 2016; ESRI Mapping Services. John F. Kennedy International Airport 14 CFR Part 150 Study.140037 Figure 3-8

Noise Sensitive Sites - Historic Resources John F. Kennedy International Airport

CHAPTER 4 NEM Development

4.1 Introduction

This chapter summarizes the methods and data used to conduct the aircraft noise analysis and produce the noise exposure contours that are depicted on the NEMs. This chapter will provide information on the noise model used to calculate noise exposure, the noise metric used in this study, information used as inputs into the noise model, and information on noise monitors near JFK. Noise monitor data were not used as input into the noise model, as 14 CFR Part 150 does not allow noise monitor data to be used to "calibrate" the noise model.

4.2 FAA Noise Model and Metrics

4.2.1 Integrated Noise Model

This 14 CFR Part 150 Study was initiated in October 2014, prior to the FAA's release of the Aviation Environmental Design Tool (AEDT) on May 29, 2015.²¹ At the time the study started, the INM 7.0d was the most current FAA-approved model for determining aircraft noise exposure around airports and was identified as the model required for use in this study. As noted by the study protocol in **Appendix I, Section 6.1**, the INM 7.0d was used to calculate noise exposure for the existing conditions (2016) and the five-year future year (2021) scenarios in this study.

The INM uses airport-specific information (e.g., runway data); flight track information; aircraft operation levels distributed by time of day, aircraft fleet mix, and aircraft profiles to develop noise exposure contours. During an annual average 24-hour period, referred to as "annual average day" (AAD), the INM accounts for each aircraft flight along flight tracks departing from, or arriving to, an airport. The flight tracks are coupled with information in the model's database relating to noise levels at varying distances and flight performance data for each type of aircraft. In general, the model computes and sums noise levels at grid locations at ground level around the airport. The cumulative values of noise exposure at each grid location are used to develop contours of equal noise exposure. The INM can also compute noise levels at user-defined points.

²¹ The FAA's Aviation Environmental Design Tool (AEDT) replaced the Integrated Noise Model (INM) and Emissions and Dispersion Modeling System (EDMS) as the required model to calculate noise exposure, fuel burn, and emissions for federal actions that are required to comply with the National Environmental Policy Act (NEPA) and for 14 CFR Part 150 studies as of May 29, 2015. The use of AEDT for this 14 CFR Part 150 Study was not required because the study and substantial work on the noise analysis at JFK was initiated prior to May 29, 2015 (see Page G-5 of Appendix G-1).

4.2.2 Day-Night Average Sound Level (DNL)

Day-Night Average Sound Level (DNL), expressed in A-weighted decibels²² (dBA), accounts for the noise levels of all individual aircraft events, the number of times those events occur, and the period of day/night in which they occur. The calculation of DNL logarithmically averages aircraft sound levels at grid locations over a 24-hour period, with a 10-decibel adjustment added to those noise events occurring between 10:00 P.M. and 7:00 A.M. Because of the increased sensitivity to noise during normal sleeping hours and because ambient (without aircraft) sound levels during nighttime are typically lower than during daytime hours, the 10-decibel adjustment, or "weighting," represents the added intrusiveness of sounds occurring during nighttime hours.

The DNL metric is the noise descriptor required by the FAA for aircraft noise exposure analyses under NEPA, FAA Order 1050.1F, and land use compatibility planning under 14 CFR Part 150.²³ A more detailed discussion of the INM and noise metrics is provided in **Appendix C**.

4.3 Data for Developing Noise Exposure Maps

The following sections summarize the information used to develop the noise exposure maps.

4.3.1 Aircraft Activity Levels

In accordance with 14 CFR Part 150 and the study protocol in **Appendix I, Section 5.1**, the JFK NEMs were prepared for two scenarios: existing conditions (2016) and a five-year future year (2021). To obtain aircraft activity levels for the development of the NEMs, either an existing forecast needs to be identified or a new forecast developed. The Port Authority developed the John F. Kennedy International Airport (JFK) Aircraft Fleet Mix and Annual Aircraft Operations Forecast 2014-2033 (JFK NEM Forecast) through an independent consultant for use in the JFK 14 CFR Part 150 study. For the development of the aircraft fleet for 2016 and the fleet changes forecasted to occur in 2021, the JFK NEM Forecast used available information, including airline fleet data; commercial aircraft order and delivery data from Boeing, Airbus, Embraer, and Bombardier; interviews with airlines operating at JFK; Official Airline Guide (OAG) commercial carrier schedule data; aircraft manufacturer publications; and FAA industry forecasts. Using the JFK NEM Forecast, another forecast was developed to provide the additional inputs required for the INM. This forecast, known as a "derivative forecast," contains details on aircraft and engine types, daytime and nighttime operations, and departure flight distances (known as "stage lengths") and described below). The forecast and derivative forecast were approved by the FAA on May 2, 2016. Appendix F-1 contains further details on the development of the forecasts along with a copy of the JFK NEM Forecast, the derivative forecast, and FAA's approval of the JFK NEM Forecast and the derivative forecast. The following sections summarize elements of the forecasts.

²² When assessing the effect of sound on humans, sound is measured using an electronic filter that de-emphasizes frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to extremely low and extremely high frequencies. This method of frequency weighting is referred to as A-weighting, and A-weighted sound levels are expressed in units of A-weighted decibels (dBA).

²³ U.S. Department of Transportation. Federal Aviation Administration. Order 1050.1F, *Environmental Impacts: Policies and Procedures*. July 16, 2015.

4.3.2 Forecasted Annual Aircraft Operations

The number of annual aircraft operations modeled for the 2016 study year and 2021 study year was obtained from the JFK NEM Forecast. The forecast projected 451,492 annual aircraft operations at JFK in 2016 and 459,991 annual aircraft operations in 2021. By comparison, the FAA's 2014 Terminal Area Forecast (TAF) projected 463,110 operations in 2016 and 521,188 operations in 2021.²⁴ The FAA considers an airport's forecasts consistent with the agency's TAF if, "For all classes of airports, forecasts for total enplanements, based aircraft, and total operations are considered consistent with the TAF if they meet the following criterion: Forecasts differ by less than 10 percent in the 5-year forecast period, and 15 percent in the 10-year forecast period."²⁵ As described in the JFK NEM Forecast (see Page F-5 of Appendix F-1), the annual operations are lower for both 2016 and 2021 than those in the FAA's 2014 TAF. For 2021, this decrease exceeds 10 percent of the 2014 TAF projection. In addition to reducing the number of flights at JFK during parts of the year when aircraft are not full, many airlines operating at JFK are adding seats on existing planes and/or replacing aircraft on certain routes with larger aircraft. This practice (referred to as "upgauging") allows an airline to increase its capacity to serve customers at an airport while reducing the number of flights. The aviation forecast prepared for the JFK NEM anticipated that airlines operating at JFK will continue to increase the capacity of their aircraft. This, in turn, results in more passengers being served with fewer aircraft operations. The following quote from the JFK NEM Forecast addresses this difference in annual operations:

"In the case for 2021, the difference between JFK NEM forecast and TAF is more than 10% which is justified as follows. As described in Section 1, page 3 of this document, slot limitations will slow the growth rate of future aircraft operations because airlines are currently using approximately 97 percent of their slot inventories during peak seasons. This slot utilization rate is forecast to grow gradually until it reaches 99 percent. 100 percent utilization is unlikely to be achieved due to flight cancelations for operational reasons. Trends over the past ten years indicate that the ratio of peak season flights to off-season flights is increasing, meaning that airlines have been more aggressively discontinuing offseason flights versus flying them with marginal passenger loads. While this trend is assumed to level off in the future, there is no reason to assume that airlines will reverse their course and increase off-season flights. While slot limitations will reduce the growth of future aircraft operations from the unconstrained levels shown in the FAA 2014 TAF, airlines have indicated that they will increase the seating capacities of existing aircraft by using thinner slim-line seats, and their current orders show delivery of larger aircraft during the forecast period. Thus, the FAA 2014 TAF forecast of future passenger volumes can be accommodated on fewer aircraft operations." (see Appendix F-1)

4.3.3 Aircraft Fleet Mix

The JFK NEM Forecast and information from the Port Authority's Airport Noise and Operations Management System (ANOMS) was used to determine the types of aircraft (fleet mix) projected

²⁴ *Terminal Area Forecast*. Federal Aviation Administration. Issued January 2016.

²⁵ FAA Director of Airport Planning and Programming (APP-1) guidance paper, *Review and Approval of Aviation Forecasts*, June 2008.

to operate at JFK in 2016 and 2021 and the number of operations generated by each aircraft type in those years. In addition, the FAA's Civilian Aircraft Registry and JFK's ANOMS data were utilized to identify different aircraft type and engine combinations. This information was then used to assign the aircraft within INM (or the selection of an FAA-approved INM substitute aircraft). Details pertaining to INM aircraft type assignments and substitutions are included in **Appendix F-1**, starting on **Page F-8**.

The number of forecasted annual aircraft operations at JFK in 2016 and 2021, by aircraft type, are summarized in **Table 4-1**. The table also identifies the INM aircraft assignments. As required for use in the INM, annual aircraft operations were converted to AAD operations.

		2016	2021
Aircraft Category	Aircraft Fleet Mix	Annual Operations	Annual Operations
	Airbus A330-200	7,979	8,595
	Airbus A330-300	12,752	13,736
	Airbus A330-800neo	-	1,638
	Airbus A330-900neo	-	2,048
	Airbus A340-200	76	-
	Airbus A340-300	414	287
	Airbus A340-500	1,143	791
	Airbus A340-600	2,364	1,733
	Airbus A350-900	-	2,586
	Airbus A350-1000	-	1,679
	Airbus A380-800	6,628	7,982
Widebedy	Boeing 747-400	8,147	6,920
widebody	Boeing 747-800	631	697
	Boeing 767-200	401	-
	Boeing 767-300ER	18,560	13,626
	Boeing 767-400	3,787	3,638
	Boeing 777-200	1,306	1,400
	Boeing 777-200ER	7,930	8,500
	Boeing 777-300	2,347	2,347
	Boeing 777-300ER	16,552	18,814
	Boeing 777X	-	1,752
	Boeing 787-8	6,111	6,747
	Boeing 787-9	611	1,228
	Boeing 787-10	-	1,931
	Widebody Total	97,739	108,675
	Airbus A318	994	994
	Airbus A319	6,885	5,852
Narrowhody	Airbus A320	78,174	72,833
Narrowbody	Airbus A320neo	-	3,405
	Airbus A321	37,351	37,012
	Airbus A321neo	-	4,505

TABLE 4-1 ANNUAL AIRCRAFT OPERATIONS BY INM AIRCRAFT TYPE

TABLE 4-1 (CONTINUED)
ANNUAL AIRCRAFT OPERATIONS BY INM AIRCRAFT TYPE

Aircraft Category	Aircraft Elect Mix	2016 Annual Operations	2021 Annual Operations
Ancian Category	Boeing 717-200	9.194	9.194
	Boeing 737-300	362	-
	Boeing 737-600	22	
	Boeing 737-700	593	593
	Boeing 737-800	54,983	53,122
	Boeing 737-900	2,609	7,261
	Boeing 737 MAX 7	-	2,158
	Boeing 737 MAX 8	-	3,022
	Boeing 737 MAX 9	-	2,015
	Boeing 757-200	31,274	26,822
	Boeing 757-300	947	695
	Boeing/Douglas MD-88	8,802	2,543
	Embraer 190	32,200	32,200
	Narrowbody Total	264,390	264,226
	Canadair Regional Jet 200	1,237	-
	Canadair Regional Jet 700	7,791	7,113
Deviewal lat	Canadair Regional Jet 900	29,923	35,524
Regional Jet	Embraer 175	4,139	4,985
	Embraer RJ140	3,086	-
	Embraer RJ145	21,210	13,179
	Regional Jet Total	67,386	60,801
	Business Jet	5,839	6,002
	Helicopter	2,595	2,666
General Aviation	Turboprop	608	587
General Aviation	Piston	553	482
	Narrowbody	133	136
	Widebody	61	63
	General Aviation Total	9,789	9,936
	Boeing 767-400	1,630	2,231
	Douglas DC10-10	953	270
	Boeing 747-8	1,382	2,448
	Boeing 747-200	1,077	1,285
	McDonnell Douglas MD11	1,182	1,812
	Boeing 777-300ER	1,153	2,218
Cargo Widebody	Boeing 767-200	562	541
	Airbus A300-200	429	663
	Boeing 747-400	467	878
	Boeing 767-300	200	149
	Airbus A300-600	248	419
	Douglas DC10-30	76	41
	Boeing 777-200	172	568
	Cargo Widebody Total	9,531	13,523
.	Boeing 757-200	1,834	1,949
Cargo Narrowbody	Boeing 737-400	50	58
	Boeing 737-300	23	24

Aircraft Category	Aircraft Fleet Mix	2016 Annual Operations	2021 Annual Operations
	Boeing 727-200	4	-
	McDonnell Douglas MD80/83	19	54
	Cargo Narrowbody Total	1,930	2,085
	Beech 1900	508	509
	Cessna C208	160	174
Cargo Turboprop	ATR 72	51	62
	Shorts SD330	4	-
	Cessna C441	4	-
	Cargo Turboprop Total	727	745
All Aircraft		451,492	459,991

TABLE 4-1 (CONTINUED) ANNUAL AIRCRAFT OPERATIONS BY INM AIRCRAFT TYPE

NOTE: One operation is equivalent to one arrival/landing or one departure/takeoff.

SOURCE: John F. Kennedy International Airport Aircraft Fleet Mix and Annual Aircraft Operations Forecast 2014-2033, April 2016.

4.3.4 Aircraft Operations by Time of Day

As discussed previously, aircraft operations modeled in INM are assigned as occurring during daytime or nighttime. **Table 4-2** summarizes time of day splits in which aircraft arrivals and departures are expected to occur in 2016 and 2021 (by percent of total operations). The 2014 ANOMS data served as the primary source for the operational splits and time of day information since ANOMS captures actual arrival and departure times, versus scheduled times. This accounts for delayed arrivals and departures that sometimes occur at JFK. While it is expected that the time of day splits for 2021 will be similar to the base conditions, the expected fleet changes result in some small differences as shown in **Table 4-2**. A detailed breakout of operation times of day, by aircraft type, is provided on **Page F-21** of **Appendix F-1**.

ANNUAL AIRCRAFT OPERATIONS (ALL AIRCRAFT) BY TIME OF D					
Study Voar	Dav	Night	Depart	Night	
2016	79.66%	20.34%	83.27%	16.73%	
2021	80.26%	19.74%	83.53%	16.47%	

TABLE 4-2	
ANNUAL AIRCRAFT OPERATIONS (ALL AIRCRAFT)	BY TIME OF DAY

SOURCE: John F. Kennedy International Airport Aircraft Fleet Mix and Annual Aircraft Operations Forecast 2014-2033. Port Authority of New York and New Jersey. April 28, 2016. Adapted by Environmental Science Associates, 2016.

4.3.5 Departure Stage Length

Noise exposure from aircraft departures varies depending on takeoff weight. For example, a fully loaded aircraft departing on a long-haul flight typically weighs more on departure than the same fully loaded aircraft departing on a short-haul flight, due to the weight of the additional fuel needed to travel a longer distance (see **Figure 4-1**). A heavier aircraft typically requires higher power (thrust settings) to reach its takeoff speed and uses more runway length. Heavier aircraft also climb at a slower rate than lighter aircraft. Therefore, more land area can be exposed to higher levels of aircraft noise by departures of heavier aircraft. To account for this variance in aircraft weight, the INM contains up to nine departure climb profiles (corresponding to different

departure weights), depending on the type of aircraft. These profiles represent aircraft origin-todestination trip lengths from 500 nautical miles to over 6,500 nautical miles. The trip distances for each stage length are shown **Table 4-3**.



TABLE 4-3 INM DEPARTURE STAGE LENGTH CATEGORIES

age Length Category	Departure Route/Trip Length (nautical miles)	
	1	0 - 500
	2	501 – 1,000
	3	1,001 - 1,500
	4	1,501 - 2,500
	5	2,501 - 3,500
	6	3,501 - 4,500
	7	4,501 - 5,500
	8	5,501 - 6,500
	9	Over 6,500

As per the study protocol in **Appendix I, Section 6.5.8**, calendar year 2014 ANOMS operations data were analyzed to determine existing departure stage lengths at JFK by aircraft type and assist with projecting stage lengths in 2016 and 2021. For this analysis, additional effort was taken to determine actual take-off weights for the top ten aircraft (by number of operations) that operate at JFK. Additional details for these aircraft are included in **Section 4.5.3** of this chapter. **Table 4-4** summarizes the projected departure stage lengths for all aircraft at JFK in 2016 and 2021,

respectively. A detailed discussion of stage length and a breakout of stage length by aircraft type is provided on **Page F-28** of **Appendix F-1**.

DEPARTURE STAGE LENGTH (ALL AIRCRAFT) Study Voor Stage Length									
Study real	1	2	3	4	5	6	7	8	9
2016	23.24%	18.22%	13.03%	24.38%	11.27%	3.59%	1.28%	4.26%	0.74%
2021	21.42%	19.56%	12.30%	23.22%	13.07%	3.96%	1.62%	3.92%	0.93%

TABLE 4-4 DEPARTURE STAGE | ENGTH (ALL AIRCRAET)

NOTE: Values may not add to 100 percent due to rounding.

SOURCE: Environmental Science Associates, 2016; Port Authority of New York and New Jersey, Airport Noise and Operations Management System (ANOMS) data for calendar year 2014.

4.4 Meteorological Conditions

The INM accounts for the influences of meteorological conditions on aircraft performance and atmospheric sound absorption. As specified by the user, the INM uses temperature and relative humidity to calculate atmospheric absorption coefficients, which in turn are used to adjust standard aircraft performance noise-power-distance curve levels.

While the study protocol in **Appendix I, Section 6.5.1**, references use of 2014 meteorological data, it was subsequently determined that the 30-year average meteorological data were more representative of typical conditions at JFK for the purposes of noise modeling. The 30-year average meteorological data at JFK (Weather Station ID: 94789) were obtained from the National Climate Data Center (NCDC). The 30-year averages recorded at the station are 54.5 degrees Fahrenheit, 67.5 percent relative humidity, and 29.99 inches of mercury while the 2014 average conditions recorded at the station are 53.9 degrees Fahrenheit, 63 percent relative humidity, and 30.01 inches of mercury. The average headwind for each operating configuration could not be readily calculated as the operating configuration is influenced by other factors besides winds including runway availability, safety, and operational efficiency. As per the study protocol, the INM default headwind of 8 knots was used for both 2016 and 2021.

4.5 Airport Operational Information

Operational inputs necessary to model noise levels in INM include runway utilization, the locations of the aircraft flights, and flight track utilization. Additionally, custom departure and arrival profiles were developed for several aircraft that routinely operated following profiles that differ from the INM default profiles (also known as "standard profiles"). This is detailed further in this section.

4.5.1 Runway Use

Runway use refers to the frequency with which aircraft utilize each runway end for departures and arrivals. The more often a runway is used, the more noise is generated in areas located off each end of that runway. As per the study protocol in **Appendix I, Section 6.5.10**, runway utilization data were derived from JFK ANOMS data for calendar year 2014. The present runway

utilization rates are forecast to remain constant for the 2016 and 2021 study years. Tables 4-5 and 4-6 provide a summary of arrival and departure runway utilization. A detailed breakout of arrival and departure runway utilization by aircraft type is provided in Appendix F-2.

ARRIVAL RUNWAY USE (ALL FIXED-WING AIRCRAFT)								
Arrivals (Time of Day)	Runway 13R	Runway 31L	Runway 4L	Runway 22R	Runway 13L	Runway 31R	Runway 4R	Runway 22L
Daytime Arrivals	0.35%	8.42%	3.74%	4.30%	14.12%	21.91%	17.37%	29.79%
Nighttime Arrivals	0.46%	10.20%	2.64%	2.22%	11.61%	33.88%	16.20%	22.78%

TABLE 4-5

NOTE: Does not include helicopter operations. Values may not add to 100 percent due to rounding. SOURCE: Environmental Science Associates, 2016; Port Authority of New York and New Jersey, ANOMS data for calendar year 2014.

TABLE 4-6
DEPARTURE RUNWAY USE (ALL FIXED-WING AIRCRAFT)

Departures (Time of Day)	Runway 13R	Runway 31L	Runway 4L	Runway 22R	Runway 13L	Runway 31R	Runway 4R	Runway 22L
Daytime Departures	15.83%	41.82%	17.47%	24.57%	0.18%	0.05%	0.04%	0.04%
Nighttime Departures	13.83%	42.43%	16.82%	25.59%	0.82%	0.41%	0.07%	0.03%

NOTE: Does not include helicopter operations. Values may not add to 100 percent due to rounding.

SOURCE: Environmental Science Associates, 2016; Port Authority of New York and New Jersey, ANOMS data for calendar year 2014.

Flight Tracks and Utilization 4.5.2

Flight tracks refer to the route an aircraft follows when arriving to or departing from a runway. To identify flight tracks that represent annual average day conditions at JFK, aircraft arrival and departure data from the Port Authority's ANOMS were reviewed for calendar year 2014, as per the study protocol in **Appendix I**, Section 6.5.11. The 2014 data were used to develop the flight tracks for use in the INM. The 2014 data provided information on the following parameters:

- Arrival and departure paths .
- Arrival and departure times .
- Arrival and departure profiles .
- Departure stage lengths

Flight corridors utilized by arriving and departing aircraft to and from each runway end were reviewed and a series of centerlines of the flight corridors (backbone tracks) were established. These tracks were dispersed within the INM to generate sub-tracks in order to distribute the aircraft within each of the primary flight corridors. The INM flight tracks are depicted on Figures 4-2 through 4-5. Additional graphics that provide a more detailed depiction of JFK's arrival and departure flight tracks are provided in Appendix E and large-scale drawings are included in **Appendix M.** The flight tracks and their respective utilization rates are forecast to remain constant for the 2016 and 2021 study years. Flight track utilization, by time of day, is provided in

Appendix F, Tables F-2.11 and F-2.12. The flight track with the highest utilization during daytime operating conditions, for each runway, includes:

- Runway 4L: Arrival Track 04LA8 (56.5%), Departure Track 04LD15 (13.2%)
- Runway 4R: Arrival Track 04RA10 (31.3%), Departure Track 04RD4 (24.1%)
- Runway 13L: Arrival Track 13LA21 (17.3%), Departure Track 13LD2 (21.8%)
- Runway 13R: Arrival Track 13RA6 (37.6%), Departure Track 13RD51 (14.7%)
- Runway 22L: Arrival Track 22LA30 (23.9%), Departure Track 22LD6 (25.5%)
- Runway 22R: Arrival Track 22RA13 (23.0%), Departure Track 22RD23 (14.7%)
- Runway 31L: Arrival Track 31LA38 (17.4%), Departure Track 31LD37 (43.6%)
- Runway 31R: Arrival Track 31RA15 (27.9%), Departure Track 31RD 3 (43.7%)

4.5.3 Departure and Arrival Profiles

As per the study protocol in **Appendix I, Section 6.5.8**, aircraft arrival and departure flight profile data contained in the Port Authority's ANOMS were reviewed. Based on this review, it was determined that modifications to the standard INM arrival and departure profiles were required for the JFK 14 CFR Part 150 Study, to better represent how aircraft operate to and from JFK. These modifications result in a better depiction of the noise levels around JFK.

During the review of the radar arrival tracks in ANOMS, the arrival profile altitude data showed that many aircraft fly level-flight segments at altitudes below 6,000 feet above ground level (AGL) for several nautical miles, often starting at points more than 20 nautical miles from the aircraft's touchdown location on the runway. These flight altitudes differ considerably from the standard INM profiles. The review of radar departure profiles also revealed that many aircraft departing JFK actually climb at a slower rate than the INM's standard departure profiles. Discussions with representatives of various airlines that operate at JFK indicated that the slower climb rates are seen partly because aircraft are departing with weights that are higher than the INM default take-off weights, and partly because the take-off thrust values identified by the airline personnel are lower to the ground during departure when compared to the INM standard departure profiles.

Analyses of JFK arrival and departure profile data were conducted for the ten aircraft types that generated a majority (approximately 65 percent) of the total aircraft operations at JFK in calendar year 2014. It was determined that developing user-defined arrival and departure profiles for all aircraft types in the data set was not practical. **Table 4-7** lists the INM aircraft types for which user-defined arrival and departure flight profiles were developed for the JFK 14 CFR Part 150 study. Included in the list is the INM aircraft type MD83 – this INM aircraft type represents one of the loudest aircraft on departure that operates at JFK.



John F. Kennedy International Airport 14 CFR Part 150 Study.140037 Figure 4-2 INM Flight Tracks - Runway 4L/4R John F. Kennedy International Airport



John F. Kennedy International Airport 14 CFR Part 150 Study.140037 Figure 4-3 INM Flight Tracks - Runway 22L/22R John F. Kennedy International Airport



John F. Kennedy International Airport 14 CFR Part 150 Study.140037 Figure 4-4 INM Flight Tracks - Runway 13L/13R John F. Kennedy International Airport



John F. Kennedy International Airport 14 CFR Part 150 Study.140037 Figure 4-5 INM Flight Tracks - Runway 31L/31R John F. Kennedy International Airport

INM Aircraft Type	Annual Operations (2014)	Percent of Total Operations (2014)	
A320-232	71,759	17%	
737800	50,236	12%	
CRJ9-ER	32,123	7%	
EMB190	31,761	7%	
757PW	27,938	6%	
767400	19,774	5%	
7773ER	18,332	4%	
A330-301	12,569	3%	
74720B	9,634	2%	
MD83	6,546	2%	
Total	280,672	65%	

TABLE 4-7 AIRCRAFT SELECTED FOR USER-DEFINED PROFILES

4.5.3.1 Arrival Profiles

All available JFK radar arrival flight tracks for calendar year 2014 were downloaded from the Port Authority's ANOMS. The aircraft flight profiles that traverse through the Aircraft Profile Study Area (a 13-nautical mile radius centered on JFK) were charted. This review focused on the profiles of the arrival aircraft using Runways 13L/R and 22L/R, which consist of approximately 46 percent of arrival operations. Arrivals to Runways 04L/R and 31L/R were not analyzed because, once over land, a majority of arrival aircraft would be on the final approach, which corresponds with INM's default 3-degree approach slope. Therefore, it was determined that the remainder of arrival operations, to Runways 04L/R and 31L/R, would be consistent with the INM standard profiles. When the number of arrivals for any of the aircraft included in Table 4-7 was less than 10 operations and/or 5 percent for a given INM flight track, it was assumed that those aircraft operations would not affect the DNL contours and were not considered for user-defined profile development. The altitude and distance information charted from the actual ANOMS data were compared to the INM standard profile for each of the ten aircraft listed in **Table 4-7**. Three graphs were developed for each user-defined arrival profile: Altitude vs. Distance, Speed vs. Distance, and Thrust vs. Distance. Samples of these graphs for the INM aircraft type A320-232 are shown on Figures 4-6 through 4-8 with comparisons to the INM standard profiles and the user-defined profiles developed for this study.

User-defined profiles were developed for each of the ten INM aircraft types listed in **Table 4-7** to ensure a positive correlation between the modeled profiles in the INM and the actual ANOMS altitude data. The methods used to develop the user-defined aircraft arrival profiles are discussed in more detail on **Page E-16** of **Appendix E-2**.



Figure 4-6 Altitude vs. Distance for A320-232 Arrivals



Figure 4-7 Speed vs. Distance for A320-232 Arrivals



 NOTE:
 ANOMS: Airport Noise and Operations Monitoring System. INM: Integrated Noise Model. Altitude is feet above field elevation (AFE). Distance is feet from touchdown point.

 SOURCE:
 Environmental Science Associates, 2016.

Thrust vs. Distance for A320-232 Arrivals

4.5.3.2 Departure Profiles

JFK departures for each of the ten INM aircraft types listed in **Table 4-7** were downloaded from ANOMS for calendar year 2014. The aircraft flight profiles within the vicinity of JFK (13-nautical mile radius centered on JFK) were charted. This review focused on the profiles of the departure aircraft using Runways 04L, 13R, 22R, and 31L, which consist of approximately 99 percent of departure operations. Because of the limited number of departure operations on the other runway ends, it was determined that these departures would not affect the DNL contours. Additionally, when the number of departures for any of the aircraft included in **Table 4-7** was less than 10 operations and/or 5 percent for a given INM flight track, it was assumed that those aircraft operations would also not affect the DNL contours and not considered for user-defined profile development.

The portion of each radar track profile up to an altitude of 10,000 feet was charted. An altitude of 10,000 feet was used as the limit of the departure profile analysis. The altitude and distance information charted from the ANOMS data were compared to the INM standard profile for each

of the ten aircraft. Three graphs were developed for each aircraft: Altitude vs. Distance, Speed vs. Distance, and Thrust vs. Distance. This comparison demonstrated that the aircraft were climbing at slower climb rates and ground speeds than the standard INM departure profile; therefore, user-defined departure profiles were needed. Samples of these graphs for the INM aircraft type A320-232 are shown on **Figures 4-9** through **4-11**, including comparisons to INM standard profiles and the user-defined profiles used in this study.

User-defined profiles were developed for each of the ten aircraft to ensure a closer correlation between the modeled profiles in the INM and the actual ANOMS altitude and speed data. The full detailed methodology used to develop the user-defined aircraft departure profiles used in the INM is described in **Appendix E-2** on **Page E-16**.

4.5.3.3 Airline Concurrence and FAA Approval

The Port Authority transmitted the user-defined arrival and departure profile altitude, speed and thrust charts to the airlines that operate the aircraft types listed in **Table 4-7** and requested their review and concurrence that the user-defined profiles fall within reasonable bounds, in terms of the performance of the aircraft while operating at JFK. The signed airline concurrence letters are included in **Appendix G-2**. The user-defined arrival and departure profiles were approved by the FAA for use in the JFK 14 CFR Part 150 Study. The FAA's approval letter is included in **Appendix G-1** on **Page G-40**.

4.6 Airport Noise Monitoring

The locations of the JFK noise monitoring stations from which data were obtained for this study are depicted on **Figure 4-12**. As per the study protocol in **Appendix I, Section 6.6**, the Port Authority provided monthly noise level data (energy averages) for the monitoring stations near JFK for the year 2014. By request of the TAC, the Port Authority also provided monthly noise level data for the year 2015. This information is provided in **Table 4-8**. 14 CFR Part 150 guidelines were followed for noise monitoring. The data, expressed in DNL, provide information regarding aircraft noise in communities around JFK. It should be noted that only partial year information is available for many of the noise monitoring sites. Furthermore, Runway 13L/31R was closed between March 1 and April 9, 2015, while Runway 4L/22R was closed between April 10, 2015 and September 21, 2015; this affected runway use at JFK for that year.

The noise monitoring information provided in this report is provided for informational purposes only. Due to the possibility of other ambient noise sources affecting the noise levels at the monitoring sites, 14 CFR Part 150 does not allow noise monitoring data to be used to "calibrate" the INM. Therefore, noise monitoring data were not used as an INM input.



NOTE: ANOMS: Airport Noise and Operations Monitoring System. INM: Integrated Noise Model. Altitude is feet above field elevation (AFE). Distance is feet from start of takeoff roll. SOURCE: Environmental Science Associates, 2016.

Altitude vs. Distance for A320-232 Stage Length 4 Departures



NOTE: ANOMS: Airport Noise and Operations Monitoring System. INM: Integrated Noise Model. Altitude is feet above field elevation (AFE). Distance is feet from start of takeoff roll. SOURCE: Environmental Science Associates, 2016.

Speed vs. Distance for A320-232 Stage Length 4 Departures



NOTE: ANOMS: Airport Noise and Operations Monitoring System. INM: Integrated Noise Model. Altitude is feet above field elevation (AFE). Distance is feet from start of takeoff roll. SOURCE: Environmental Science Associates, 2016.

Thrust vs. Distance for A320-232 Stage Length 4 Departures

	AVERAGE MONTHLY NOISE MONITORING DATA (AIRCRAFT DNL) – 2014 AND 2015														2015				
Date										Remote	Monitorir	ng Statior	IS						
Duic	J13RP	J13LP	J22RP	J04BP	J31RP	J31LP	CEDAH	ATL65	FLPRK	ARV64	ROSED	JFRSQ	JRHYALE	JBRDCHNL	JBYSWTR	JMLVRN	JOLDBRK	JEHLS	JHB165AV
											2014								
Jan-14	64.7	72.7	63.8	67.1	60.7	65.9	71.2	61.9	60.7	65.9	N/A ¹								
Feb-14	62.0	71.5	64.0	68.2	59.8	64.9	69.9	58.2	60.8	70.2	63.3								
Mar-14	63.2	71.2	65.3	70.4	62.7	64.3	64.6	52.8	57.9	68	66.1								
Apr-14	67.2	70.8	65.0	70.6	68.0	65.5	62.9	59.5	57.8	66.7	62.9								
May-14	65.8	N/A ¹	67.7	71.2	65.8	69.1	67.9	57.1	60.1	66.9	63.7								
Jun-14	67.5	N/A ¹	68.2	72.0	67.9	67.3	67.1	60	61.2	68.1	65.1								
Jul-14	67.6	68.2	69.5	68.8	69.1	65.3	67	60.7	62.8	67.2	63.5								
Aug-14	69.0	69.5	67.9	69.2	71.2	68.1	67.8	61.6	60.2	66.6	63.7								
Sep-14	66.5	71.5	66.7	70.0	69.5	68.7	68.4	58.3	59.6	68.5	66.0								
Oct-14	66.8	71.8	64.2	73.3	70.3	67.9	74.4	57.5	57.6	66.4	64.9								
Nov-14	62.3	N/A ¹	64.9	67.5 ²	63.5	63.2	72.5	52.2	61.3	66.1	63.4	49.7	57.1						
Dec-14	63.9	74.0	64.6	71.3	N/A ¹	65.8	70.6	51.0	59.4	69.8	67.7	51.4	54.9	59.6	58.9	59.4	48.5		
Average	66.1	71.5	66.4	70.3	67.6	66.7	69.8	58.7	60.2	67.8	64.8	50.6	56.1	59.6	58.9	59.4	48.5		
, troitago					0.10		0010	0011	00.2	0110	0110	0010		0010	0010		1010		
	2015																		
Jan-15	64.6	74.1	63.3	65.9	53.6	64.2	69.5	49.1	59.0	65.6	62.0	47.5	56.1	58.9	56.2	55.4	48.0		
Feb-15	62.3	73.3	66.9	69.2	57.8	60.7	69.5	49.8	57.5	68.0	66.1	52.9	53.8	59.8	56.7	56.3	48.3		
Mar-15	65.0	68.4	67.2	69.7	55.8	66.2	65.4	50.0	62.3	69.5	67.6	49.1	58.1	61.2	59.2	56.5	51.6		
Apr-15	64.3	68.3	69.0	72.9	65.9	67.6	64.5	55.9	62.7	70.5	67.8	51.3	58.8	62.0	60.5	58.0	53.4	54.7	
May-15	69.4	72.8	48.6	46.9	72.0	72.3	69.9	63.0	56.6	56.1	54.6	56.0	50.6	51.3	64.8	48.2	44.6	47.4	
Jun-15	69.5	74.2	50.9	44.3	72.9	72.6	71.2	63.4	54.7	63.8	53.0	56.3	50.9	51.8	68.0	50.2	46.6	47.7	
Jul-15	69.9	73.5	49.1	40.8	72.4	72.5	70.6	64.3	56.5	58.3	52.6	57.1	50.3	51.7	64.6	47.2	45.1	46.9	
Aug-15	69.7	73.7	49.9	42.7	72.0	72.2	70.5	63.8	55.5	59.3	51.3	57.9	49.3	51.9	64.3	50.0	45.1	46.3	73.4
Sep-15	69.3	73.3	56.7	56.8	71.7	72.2	70.4	62.0	54.8	63.6	52.6	56.7	49.8	55.3	63.9	51.1	46.6	46.9	72.9
Oct-15	66.8	72.6	66.5	70.8	68.4	69.9	69.1	57.7	61.3	69.9	67.2	53.0	56.7	59.5	61.0	57.0	51.4	53.1	71.3
Nov-15	67.2	73.2	63.4	67.2	72.8	68.8	69.9	59.2	58.7	67.0	63.6	54.1	54.2	57.3	61.9	55.4	47.8	51.3	71.9
Dec-15	65.5	74.1	65.6	70.9	72.9	70.0	70.4	56.5	62.1	68.2	65.9	51.4	57.4	60.4	60.2	58.6	51.7	54.8	73.0
Average	67.6	73.0	64.2	67.7	70.5	70.2	69.6	60.5	59.4	66.8	64.0	54.6	55.1	58.3	63.0	55.1	49.3	51.2	72.6

TABLE 4-8

SOURCE: Port Authority, 2016.

1 Site malfunction 2 J04BP removed from the pole and installed on ground at a residential location (temporarily) due to ConEd pole replacement program (on 10/9/14).


SOURCE: Port Authority of New York and New Jersey ANOMS, 2016; INM 7.0d; ESA, 2016; ESRI Mapping Services.

John F. Kennedy International Airport 14 CFR Part 150 Study.140037 Figure 4-12 Noise Monitor Locations John F. Kennedy International Airport

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CHAPTER 5 2016 and 2021 Noise Exposure

5.1 Introduction

This chapter presents the 2016 Existing Conditions and 2021 Future Conditions DNL contours for JFK. As discussed in **Chapter 4**, the contours show how noise from aircraft operations is distributed over the surrounding area. This chapter identifies land use compatibility using FAA guidelines, identifies noise sensitive locations, and quantifies the types of land uses and population within the DNL 65 and higher contours.

Title 14 CFR Part 150 requires that the aircraft noise exposure for the year of submittal (in this case 2016) and for a future year (2021) be developed. The DNL 65, DNL 70, and DNL 75 contours are the only contours required by the FAA for inclusion in a 14 CFR Part 150 Study and for the agency's acceptance of the NEMs. Specific elements that are required to be included on the existing and future NEMs and required supplemental graphics are identified in 14 CFR Part 150. These include depictions of noise sensitive sites within the DNL 65 contour. While noise sensitive sites outside of the DNL 65 contour are sometimes shown on NEMs for 14 CFR Part 150 study would obscure the land use types and geographic features on the NEMs due to the high number of sites. 14 CFR Part 150 requires the NEMs to be of a quality sufficient to discern "streets and other identifiable geographic features." The official JFK 2016 and 2021 NEMs are included in **Appendix M** of this report. The 2021 Future Conditions NEM reflects noise exposure levels around JFK that would occur without the implementation of a Noise Compatibility Program.

5.2 2016 Existing Noise Exposure

Figure 5-1 depicts the 2016 Existing Conditions DNL contours superimposed on an existing land use map. In accordance with 14 CFR Part 150, the DNL 65, DNL 70, and DNL 75 contours are shown.²⁶ Furthermore, the contours accurately represent noise based on airport and operational data that are representative of the year 2016, as described in **Section 4.3**. The figure also depicts community and geographic reference points, such as JFK's boundary and runways, county-level political boundaries, area roads and highways, and waterbodies. This figure assists in understanding the geographic relationship of JFK's DNL contours to the surrounding community.

²⁶ Maps depicting the DNL 60 and DNL 55 contours for 2016 and 2021 are provided in Appendix J. These maps are provided for informational purposes only.

The long relatively narrow shape of the contours extending off of Runways 31R, 13L, 22L, and 4R are consistent with runways that are primarily used for arrivals. The wider more varied shape of the contours located off of the ends of Runways 22R, 31L, 04L, and 13R are consistent with runways that are heavily used by departures. Approximately 99% of departing aircraft use these four runways. The largest concentration of noise exposure occurs to the west and southwest of JFK where the DNL contours extend over Howard Beach, Arverne, the Rockaways, and water. Small bumps in the sides of the DNL contours, particularly to the north and west, reflect the influence of departure turns.

5.2.1 Land Use Compatibility - 2016

The total area encompassed by the 2016 DNL 65 and greater contour is approximately 8,915 acres. Land uses located within the 2016 DNL 65 and higher contours were identified by overlaying the contours on parcel-level land use data provided by the City of New York. Using geographic information system (GIS) software, the types and amount of land uses were calculated. The total acres for each land use category within the DNL 65 and greater contours are shown in **Table 5-1**. The New York City (NYC) Department of City Planning; Nassau County Planning Department; the planning departments of the Villages of Cedarhurst, Woodsburgh, and Valley Stream; and the National Park Service are the public agencies with zoning and planning authority for land within the 2016 DNL 65 contour.

The FAA's Land Use Compatibility Guidelines discussed in **Section 3.3** show that noisesensitive land uses such as residential, mobile home parks, transient lodging (e.g., hotels and motels), schools, and outdoor music venues are not compatible with noise levels of DNL 65 or higher. Other noise-sensitive land uses such as hospitals, nursing homes, churches, auditoriums, and concert halls are generally compatible with noise levels between DNL 65 and DNL 75 when measures that achieve an outdoor-to-indoor Noise Level Reduction (NLR) of 25 to 30 decibels are incorporated into the structures.²⁷ Commercial, manufacturing, and recreational land (parks, amusement parks, zoos, etc.) are generally less sensitive to noise and considered compatible with noise levels up to DNL 70 (parks are compatible up to DNL 75). Commercial and manufacturing properties are compatible with noise levels up to DNL 80 with NLR of 25 to 30 decibels.

As shown in **Table 5-1**, the 2016 NEM DNL 65 and higher contours contain approximately 750 acres of Single and Two-Family Residential land use, 50 acres of Multi-Family Residential, and 6 acres of Mixed Residential Commercial land uses. Aside from Water and Airport Property (approximately 5,635 total acres), the majority of the non-residential land uses exposed to aircraft noise of DNL 65 and higher in 2016 are Transportation, Right of Way, Parking, and Utilities (approximately 725 acres) and Open Space, Cemeteries, and Outdoor Recreation (approximately 1,380 acres). There are approximately 1,382 acres of recreational land (Open Space, Cemeteries, and Outdoor Recreation) within the 2016 DNL 65 contour. Within the DNL 65 – 70 contours, there are 94 parcels of recreational land, which includes parks, playgrounds, marinas, shipyards, and yacht clubs. Within the DNL 70 – 75 contours, there are 10 parcels; all 10 parcels are parks and playgrounds. Per 14 CFR Part 150, recreational land within the DNL 65 – 75 contours is

²⁷ Normal residential construction can be expected to provide an outdoor to indoor NLR of 20 dB.

considered compatible (see Table 3-1). Approximately 49 acres of Open Space, Cemeteries, and Outdoor Recreation are exposed to aircraft noise of greater than DNL 75. Specifically, approximately 9 acres of Idlewild Park are exposed to aircraft noise of greater than DNL 75 and would be considered incompatible, per 14 CFR Part 150 (see Table 3-1); however, this area is wetlands and also has aircraft approach lighting equipment and is unlikely to be used for recreational purposes. Approximately 29 acres of the Gateway National Recreation Area are exposed to aircraft noise of greater than DNL 75 and would also be considered incompatible; however it is also wetlands and due to its proximity to Runway 4L is unlikely to be used for recreational purposes. The remaining 11 acres of land are open space and are compatible.

I and Use Category	Land Use	es Exposed to I	Housebolds	Population		
	DNL 65-70	DNL 70-75	DNL 75+	Total	- Housenoids	ropulation
Single and Two-Family Residential	705.8	43.3	-	749.1	10,764	32,145
Multi-Family Residential	48.9	0.5	-	49.4	2,644	5,672
Mixed Residential and Commercial	5.8	0.5	-	6.3	84	233
Commercial and Office	110.6	7.3	-	117.9	-	-
Industrial and Manufacturing	64.5	23.5	0.1	88.1	-	-
Transportation, Right of Way, Parking and Utilities	621.0	59.9	43.6	724.5	-	-
Public Facilities and Institutions	69.3	4.0	-	73.3	-	-
Open Space, Cemeteries, and Outdoor Recreation	1,027.5	305.8	49.1	1,382.4	-	-
Vacant	63.2	18.6	7.8	89.6	-	-
Airport Property	937.7	879.8	1,373.6	3,191.1	-	-
Water (Off Airport Property)	1,767.0	596.4	79.6	2,443.0	-	-
Total	5,421.3	1,939.6	1,553.8	8,914.7	13,492	38,050

TABLE 5-1 LAND USES WITHIN THE DNL 65+ CONTOUR - 2016

SOURCE: Planning Technology, Inc. and Environmental Science Associates, 2016.

5.2.2 Population within 2016 DNL Contours

Table 5-2 presents the estimated number of households, population, and the noise sensitive sites exposed to DNL 65 and higher in 2016. Based on demographic data by census block from the U.S. Census Bureau's 2010 Decennial Census (as per the study protocol in Appendix I, Section **6.9.1**) and parcel data provided by the City of New York, approximately 13,500 households are exposed to aircraft noise of DNL 65 and higher in 2016.

The population exposed to aircraft noise of DNL 65 and higher was determined by calculating the average number of persons per household in each individual census block within the DNL 65 and greater contour and multiplying that number by the number of households (using the New York City household data) within each census block (or portion thereof located within the DNL 65 and higher contours). The population within each individual block (or portion thereof) was then summed to quantify the total number of persons within the DNL 65 and higher contours. The

total population exposed to aircraft noise of DNL 65 and higher was estimated to be approximately 38,000 persons.

There are 12 schools located within the DNL 65 and higher contours. Eight of these schools were insulated as part of the Port Authority's School Soundproofing Program (see Section 2.6.1 for additional information) and are compatible with DNL 65 and higher. There are four schools that were not part of the School Soundproofing Program, that are within the DNL 65 contour. All schools within the DNL 65 are listed in **Table 5-6**; those that were part of the School Soundproofing Program are indicated with a footnote.

 TABLE 5-2

 NOISE SENSITIVE SITES EXPOSED TO DNL 65 AND HIGHER – 2016

Noise Level	Total Area (Acres)	Households	Population	Places of Worship	Schools ¹	Hospitals and Residential Healthcare	Historic Resources ²	Day Care	Library
2016	-					-			-
DNL 65-70	5,421.3	12,752	35,875	18	12	8	3	16	1
DNL 70-75	1,939.6	740	2,175	0	0	0	0	0	0
DNL 75+	1,553.8	0	0	0	0	0	0	0	0
Total	8,914.7	13,492	38,050	18	12	8	3	16	1

NOTE: The household and population estimates provided above were developed using census block-level demographic data from the 2010 Decennial Census and New York City housing data. This approach provided an average number of persons per household for each individual census block, which accounted for changes in land use, housing types, and residential density within the different areas in the DNL 65 and higher contours.

¹ Eight of the twelve schools were included in the School Soundproofing Program, and are compatible with DNL 65+ (see Section 2.6.1). ² Five schools and places of worship are historic sites, but not included here to avoid double counting; see Table 5-6 for the full list. SOURCE: Planning Technology, Inc. and Environmental Science Associates, 2016.



SOURCE: New York City Department of City Planning, MapPLUTO 15V1- Tax lot/land use geographic information database, March 2015- June 2015; Nassau County Department of Public Works Planning Division; Property classification and geographic information database, September 2015; INM 7.0d; ESA, 2016; ESRI Mapping Services. John F. Kennedy International Airport 14 CFR Part 150 Study.140037-Figure 5-1 2016 DNL Contours John F. Kennedy International Airport

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5.2.3 Airport Noise Monitoring Comparison

As described in **Section 4.6** and shown in **Table 4-8**, JFK noise monitoring station data were compiled for 2014 and 2015 monthly and annual averages. The data, expressed in DNL, provide information regarding aircraft noise in communities around JFK. The annual average aircraft noise levels (energy average) from the Port Authority's noise monitoring stations and the modeled aircraft noise levels calculated by the INM for 2016 were compared, and the measured and modeled DNL values are shown in **Table 5-3**. The comparison of measured and modeled DNL values are shown in **Table 5-3**.

The noise monitoring information provided in this report is for informational and comparison purposes only. Because of the limited monitoring collection periods (partial years) for most sites and the difference in operational conditions between the measured and modeled conditions, there is no basis for a direct comparison between measured and modeled aircraft noise levels. The DNL contours for the NEMs for this 14 CFR Part 150 Study were those generated by the INM only. 14 CFR Part 150 does not provide for use of noise monitoring data to "calibrate" the INM.

The Study Protocol for this Study requires that differences greater than 5 decibels be explained. The differences between the monitoring station data and the INM modeling results were reviewed for noise monitors with a full 12 months of noise measurement data. Monitors with less than 12 months of noise measurement data have much greater discrepancies when compared to the modeled levels because the modeled results are an annual average of the aircraft noise exposure, while monitors with less than 12 months of data are affected by seasonal variability in aircraft activity. Large differences (i.e., plus or minus 2 decibels) between actual and modeled noise levels were attributed to periods of time when noise monitors were inoperable (e.g., there were periods of maintenance / mechanical issues that resulted in periods without monitoring) and when ambient noise was recorded by the noise monitors and incorrectly identified as aircraft noise. Only one site, J31LP, had a difference greater than 5 decibels (5.1 dB in 2015). Due to runway closures in 2015 (the closure of Runway 13L-31R from March 1 to April 9, 2015 and the closure of Runway 04L-22R from April 10 to September 21, 2015 for runway construction projects), the operations at the airport were impacted and resulted in the increased sound levels at J31LP.

²⁸ See Section 6.6 of the Study Protocol (**Appendix I**).

Monitoring Station	2014 (Actual)	2015 (Actual)	2016 INM (Projected)
J13RP	66.1	67.6	66.2
J13LP	71.5 ¹	73.0	73.1
J04BP	70.3 ¹	67.7	67.9
J31RP	67.6 ¹	70.5	66.8
J31LP	66.7	70.2	65.1
J22RP	66.4	64.2	66.4
CEDAH	69.8	69.6	69.8
ATL65	58.7	60.5	57.2
FLPRK	60.2	59.4	59.2
ARV64	67.8	66.8	67.0
ROSED	64.8 ¹	64.0	67.9
JFRSQ	50.6 ²	54.6	54.7
JRHYALE	56.1 ²	55.1	53.6
JMLVRN	59.4 ³	55.1	55.7
JBYSWTR	58.9 ³	63.0	63.3
JBRDCHNL	59.6 ³	58.3	58.5
JOLDBRK	48.5 ³	49.3	48.8
JEHLS		51.2 ⁴	51.1
JHB165AV		72.6 ⁵	69.2

TABLE 5-3
COMPARISON OF NOISE MONITORING DATA AND
INM PROJECTED NOISE LEVELS (AIRCRAFT DNL)

SOURCE: Port Authority, 2015. Environmental Science Associates, 2016.

¹These stations experienced periods of site malfunction or other issues which resulted in temporary periods without monitoring in 2014.

² These stations were installed in November 2014.

³ These stations were installed in December 2014.

⁴ This station was installed in April 2015. ⁵ This station was installed in August 2015.

5.3 2021 Future Noise Exposure

The 2021 Future Conditions DNL contours are depicted on **Figure 5-2**. Similar to **Figure 5-1**, the 2021 contours are superimposed over a future land use map. In accordance with 14 CFR Part 150, the 2021 contours reflect the anticipated noise conditions based on airport and operational data that are representative of the year 2021, as described in **Section 4.3**. As discussed in **Section 2.2.3**, there are no future or planned airport development projects expected to substantially affect airside operations in the year 2021. The size and shape of the 2021 contours is very similar to the 2016 with very minor changes. The slight increase in contours is primarily associated with arrivals to Runways 31R, 22L, 4R, and 13L, which extend the contours slightly reflecting the increase in activity between 2016 and 2021.

5.3.1 Land Use Compatibility - 2021

The total area encompassed by the 2021 DNL 65 and greater noise contour is approximately 9,105 acres. The type and amount of land uses within the DNL 65 and higher contour is provided in **Table 5-4**. As shown in **Table 5-4**, the 2021 DNL 65 and higher contours contain approximately 780 acres of Single Family and Two-Family Residential land use, 50 acres of

Multi-Family Residential, and 7 acres of Mixed-Residential Commercial land uses. The majority of non-residential land uses, excluding Water and Airport Property (approximately 5,725 total acres), exposed to aircraft noise of DNL 65 and higher in 2021 are Transportation, Right of Way, Parking, and Utilities (approximately 750 acres) and Open Space, Cemeteries, and Outdoor Recreation (approximately 1,410 acres). There are approximately 1,408 acres of recreational land (Open Space, Cemeteries, and Outdoor Recreation) within the 2021 DNL 65 contour. Within the DNL 65 - 70 contours, there are 94 parcels of recreational land, which includes parks, playgrounds, marinas, shipyards, and yacht clubs. Within the DNL 70 - 75 contours, there are 10 parcels; all 10 parcels are parks and playgrounds. Per 14 CFR Part 150, recreational land within the DNL 65 – 75 contours is considered compatible (see **Table 3-1**). Approximately 52 acres of Open Space, Cemeteries, and Outdoor Recreation are exposed to aircraft noise of greater than DNL 75. Specifically, approximately 11 acres of Idlewild Park are exposed to aircraft noise of greater than DNL 75 and would be considered incompatible, per 14 CFR Part 150 (see Table 3-1); however, as stated in Section 5.2.1, this area has wetlands and aircraft approach landing equipment and is unlikely to be used for recreational purposes. Approximately 31 acres of the Gateway National Recreation Area are exposed to aircraft noise of greater than DNL 75 and would also be considered incompatible; however, this area is also wetlands and due to its proximity to Runway 4L is unlikely to be used for recreational purposes. The remaining 10 acres of land are open space and are compatible. The New York City (NYC) Department of City Planning: Nassau County Planning Department: the planning departments of Villages of Cedarhurst, Woodsburgh, and Valley Stream; and the National Park Service are the public agencies with zoning and planning authority for land within the 2021 DNL 65 contour.

Land Use Category	Land Use	es Exposed to I	gher (acres)	Households	Population	
	DNL 65-70	DNL 70-75	DNL 75+	Total	neuseneius	ropulation
Single and Two-Family Residential	733.2	44.9	-	778.1	11,088	33,143
Multi-Family Residential	51.0	0.5	-	51.5	2,653	5,698
Mixed Residential and Commercial	6.1	0.5	-	6.6	84	233
Commercial and Office	119.2	7.9	-	127.1	-	-
Industrial and Manufacturing	65.2	26.2	0.3	91.7	-	-
Transportation, Right of Way, Parking and Utilities	639.1	63.6	44.8	747.5	-	-
Public Facilities and Institutions	69.1	6.8	-	75.9	-	-
Open Space, Cemeteries, and Outdoor Recreation	1,030.8	325.2	52.4	1,408.4	-	-
Vacant	64.5	18.9	8.6	92.0	-	-
Airport Property	944.9	884.3	1,408.9	3,238.1	-	-
Water (Off Airport Property)	1,780.2	615.4	91.9	2,487.5	-	-
Total	5,503.3	1,994.2	1,606.9	9,104.4	13,825	39,074

TABLE 5-4LAND USES EXPOSED TO DNL 65+ AND HIGHER – 2021

NOTE: Numbers may not add up, due to rounding.

SOURCE: Planning Technology, Inc. and Environmental Science Associates, 2016.

5.3.2 Population within 2021 DNL Contours

Table 5-5 presents the estimated number of households, population and the noise sensitive sites exposed to DNL 65 and higher in 2021. Based on population census block data from the U.S. Census Bureau's 2010 Decennial Census (as per the study protocol in **Appendix I, Section 6.9.1**) and parcel data provided by the City of New York, the total number of households and population exposed to aircraft noise of DNL 65 and higher would be approximately 13,800 and 39,100, respectively, in 2021. When compared to 2016, this represents an increase of approximately 330 households and 1,025 people, as a result of the forecasted increase in aircraft operations at JFK.

Noise Level	Total Area (Acres)	Households	Population	Places of Worship	Schools ¹	Hospitals and Residential Healthcare	Historic Resources ²	Day Care	Library
2021									
DNL 65-70	5,503.3	13,059	36,812	19	12	8	3	17	1
DNL 70-75	1,994.2	766	2,262	0	0	0	0	0	0
DNL 75+	1,606.9	0	0	0	0	0	0	0	0
Total	9,104.4	13,825	39,074	19	12	8	3	17	1

TABLE 5-5NOISE SENSITIVE SITES EXPOSED TO DNL 65 AND HIGHER – 2021

NOTE: The household and population estimates provided above were developed using census block demographic data from the 2010 Decennial Census and New York City housing data. This approach provided an average number of persons per household for each individual census block, which accounted for changes in land use, housing types, and residential density within the different areas in the DNL 65 and higher contours.

¹ Eight of the twelve schools were included in the School Soundproofing Program, and are compatible with DNL 65+ (see Section 2.6.1).

² Five schools and places of worship are historic sites, but not included here to avoid double counting; see Table 5-6 for the full list.

SOURCE: Planning Technology, Inc. and Environmental Science Associates, 2016.

5.4 Noise Sensitive Sites

As per the study protocol in **Appendix I, Section 6.9.3, Table 5-6** presents information regarding noise sensitive facilities (e.g., schools, religious facilities, hospitals, and structures listed in the National Register of Historic Places) exposed to aircraft noise of DNL 65 and higher. As shown in **Table 5-2** and **Table 5-5**, 12 schools and 18 places of worship are estimated to be exposed to aircraft noise of DNL 65 and higher in 2016 and 12 schools and 19 places of worship in 2021. Eight of the twelve schools within the DNL 65 contour were part of the School Soundproofing Program and are presently compatible with aircraft noise levels of DNL 65 and higher (see **Section 2.6.1**). Eight historic resources listed in the National Register of Historic Places are exposed to aircraft noise of DNL 65 and higher in 2016 and 2021. **Table 5-6** provides the names and addresses of the noise sensitive sites exposed to aircraft noise of DNL 65 and higher in 2016 and 2021.



SOURCE: New York City Department of City Planning, MapPLUTO 15V1- Tax lot/land use geographic information database, March 2015- June 2015; Nassau County Department of Public Works Planning Division; Property classification and geographic information database, September 2015; INM 7.0d; ESA, 2016; ESRI Mapping Services. John F. Kennedy International Airport 14 CFR Part 150 Study.140037 Figure 5-2 2021 DNL Contours John F. Kennedy International Airport

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			Within 2016	2016 DNL	Within 2021	2021 DNL
			DNL 65 and	Value If	DNL 65 and	Value If
Name	Address	Facility Type	Higher?	Yes	Higher?	Yes
Rosedale Library	144-20 243 ^{ra} St	Library	Y	67.3	Y	67.4
Mona Prep Day Care Center, Inc.	241-15 N Conduit Ave	Day Care / School	Y	68.2	Y	68.3
Creative Years Day Care Center	138-72 Francis Lewis Blvd	Day Care – Assisted Living	Y	69.3	Y	69.5
Little Flowers Early Childhood Center, Inc.	234-10 & 234-14 Merrick Blvd	Day Care – Assisted Living	Y	65.0	Y	65.1
DCAIB Center Ltd.	140-17 243 rd St	Day Care – Assisted Living	Y	66.2	Y	66.3
It's a Happy Day at Kiddy Corner	243-55 & 243-37 Merrick Blvd	Day Care – Assisted Living	Y	65.5	Y	65.7
Our Kids Place Country Day	137-25 Brookville Blvd	Day Care – Assisted Living	Y	68.9	Y	69.0
Samaritan Village	315 Beach 65 th St	Day Care – Assisted Living	Y	65.6	Y	65.7
Skyway Men's Shelter	132-10 S Conduit Ave	Day Care – Assisted Living	Y	66.5	Y	66.6
Brookville Neighborhood Senior Center	133-33 Brookville Blvd	Day Care – Assisted Living	Y	67.4	Y	67.5
Saratoga Family Inn Day Care	175-15 Rockaway Blvd	Day Care – Assisted Living	Ν	-	Y	65.0
Day Care Center	16 Dewitt St	Day Care – Assisted Living	Y	65.2	Y	65.3
Gan Chamesh Educational Center	748 Central Ave	Day Care – Assisted Living	Y	65.5	Y	65.7
Sylvester- Brown, Daisha	53 Dewitt St	Day Care – Assisted Living	Y	65.0	Y	65.1
New Hope Lutheran Day School	60 Oliver Ave	Day Care – Assisted Living	Ν	-	Y	65.0
Calderon, Brinia	118 Solomon Ave	Day Care – Assisted Living	Y	65.0	Y	65.0
Gan Ami Inc.	508 Peninsula Blvd	Day Care – Assisted Living	Y	69.3	Y	69.4
The Marion & Aaron Gural JCC	207 Grove Ave	Day Care – Assisted Living	Y	67.7	Y	67.8
Resort Nursing Home	430 Beach 68 St	Health Care – Residential	Y	66.4	Y	66.5
Horizon Care Center	64-11 Beach Channel Dr	Health Care – Residential	Y	65.4	Y	65.5
Bernard M. Fineson DDSO	225-04 S Conduit Ave	Health Care – Residential	Ν	-	Y	65.0
South Island Rehabilitation	657 Central Ave	Health Care – Residential	Y	66.9	Y	67.1
The Center for Family Support, Inc.	143-73 230 th St	Health Care – Residential	Y	65.8	Y	65.9
Life's WORC, Inc.	147-24 Edgewood St	Health Care – Residential	Y	67.7	Y	67.9
QSAC, Inc.	230-48 146 th Ave	Health Care – Residential	Y	67.4	Y	67.5
PSCH, Inc.	230-31 148 th Ave	Health Care – Residential	Y	67.8	Y	68.0
PS/MS 42 R. Vernam ¹	488 Beach 66 th St	School / Historic Site	Y	66.7	Y	66.8

TABLE 5-6 NOISE SENSITIVE SITES EXPOSED TO AIRCRAFT NOISE OF DNL 65 AND HIGHER – 2016 AND 2021

TABLE 5-6 (CONTINUED) NOISE SENSITIVE SITES EXPOSED TO AIRCRAFT NOISE OF DNL 65 AND HIGHER – 2016 AND 2021

Name	Address	Facility Type	Within 2016 DNL 65 and Higher?	2016 DNL Value If Yes	Within 2021 DNL 65 and Higher?	2021 DNL Value If Yes
PS 124 Osmond A	129-15 150 [™] Ave	School	Y	66.2	Y	66.3
PS 38 Rosedale ¹	135-21 241 st St	School	Y	68.1	Y	68.2
PS 181 Brookfield ¹	148-15 230 th St	School	Y	68.0	Y	68.1
Saint Clare Catholic Academy ¹	137-25 Brookville Blvd	School	Y	68.9	Y	69.0
Rosedale Child Development Center	133-55 242 nd St	School	Y	67.3	Y	67.5
St. Joachim School ¹	614 Central Ave	School / Historic Site	Y	65.6	Y	65.8
Kulanu Academy	620 Central Ave	School	Y	66.6	Y	66.8
Hebrew Academy of Five Towns & Rockaway ¹	635 Central Ave	School	Y	66.3	Y	66.5
Lawrence Public School #21	1 Donahue Ave	School	Y	65.4	Y	65.5
Lawrence High School ¹	2 Reilly Rd	School	Y	68.1	Y	68.3
Temple Beth El Religious School	46 Locust Ave	School / Historic Site	Υ	66.0	Y	66.2
St. Peter's Episcopal Church	137-44 244 th St	Place of Worship	Y	65.7	Y	65.8
St. Clare's Rectory & Roman Catholic Church	137-21 138 [™] Ave & 137-35 Brookville Blvd (Adjacent)	Place of Worship	Y	68.9	Υ	69.0
Parkway Baptist Church	138-23 Brookville Blvd	Place of Worship	Y	69.2	Y	69.3
St. Peter's Lutheran Church	224-04 & 228-13 147 th Ave	Place of Worship	Y	68.2	Y	68.3
Springfield Assembly Apostolic Faith	230-41 Edgewood Ave	Place of Worship	Y	66.0	Y	66.1
Throop Memorial Presbyterian	140-15 Memphis Ave	Place of Worship	Y	66.2	Y	66.3
Macedonia Baptist Church	330 Beach 67 th St	Place of Worship	Y	66.2	Y	66.3
Kingdom Hall of Jehovah's Witnesses	6-16 Beach 68 th St	Place of Worship	Y	65.8	Y	65.8
Community Life Ministries	514 Beach 69 th St	Place of Worship	Y	65.7	Y	65.7
Battalion Pentecostal Assembly	450 Beach 67 th St	Place of Worship / Day Care	Y	66.6	Y	66.6
Mount Carmel Baptist Church	348 Beach 71 st St	Place of Worship	Y	65.7	Y	65.7
St. John Baptist Church	74-05 Rockaway Beach Blvd	Place of Worship	Y	65.3	Y	65.4
Community Church of God	3-51 Beach 74 th St	Place of Worship	Y	65.0	Y	65.0
Trinity Lutheran Church	60 Oliver Ave	Place of Worship	Ν	-	Y	65.0
St Gregorios Orthodox Church	987 Elmont Rd	Place of Worship	Ν	-	Y	65.0
St Joachim Roman Catholic Church and Rectory	614 Central Ave	Place of Worship / Historic Site	Y	65.6	Y	65.8
Congregation Beth Medrash	504 W Broadway	Place of Worship	Y	65.2	Y	65.3
Ohr Moshe Torah	703 W Broadway	Place of	Y	67.3	Y	67.5

TABLE 5-6 (CONTINUED) NOISE SENSITIVE SITES EXPOSED TO AIRCRAFT NOISE OF DNL 65 AND HIGHER – 2016 AND 2021

			Within 2016 DNL 65 and	2016 DNL Value If	Within 2021 DNL 65 and	2021 DNL Value If
Name	Address	Facility Type	Higher?	Yes	Higher?	Yes
		Worship				
Temple Beth El	46 Locust Ave	Place of Worship / Historic Site	Y	66.0	Y	66.2
Albemarle Historic District	Incorporated Village of Cedarhurst	Historic District	Y	65.1	Y	65.3
124 McGlynn Pl	124 McGlynn Pl	Historic Site	Y	66.4	Y	66.6
Trans World Airlines Flight Center	John F. Kennedy International Airport	Historic Site	Y	65.9	Y	66.1

SOURCE: Environmental Science Associates, 2016.

¹This school was included in the School Soundproofing Program, and is compatible with DNL 65+ (see Section 2.6.1 for additional information).

5.5 Comparison of 2016 and 2021 NEMs

A comparison of the 2021 to the 2016 DNL contours show the land area encompassed by the DNL 65 and higher contours in 2021 would be approximately 190 acres greater than the area encompassed by the 2016 contours (see **Table 5-7**). The amount of non-compatible Single and Two-Family Residential, Multi-Family Residential, and Mixed Residential and Commercial land uses exposed to aircraft noise of DNL 65 or greater would increase by 31 acres in 2021. With respect to housing units, approximately 330 more units and 1,025 more people would be exposed to noise levels of DNL 65 or greater in 2021, when compared to 2016 (see **Table 5-8**). **Figures 5-3** through **5-6** provide detailed side-by-side views of the 2016 and the 2021 DNL contours.

Land Use Category	Net Change in Acreage by Land Use						
	DNL 65-70	DNL 70-75	DNL 75+	Total			
Single and Two-Family Residential	27.4	1.6	-	29.0			
Multi-Family Residential	2.1	-	-	2.1			
Mixed Residential and Commercial	0.3	-	-	0.3			
Commercial and Office	8.6	0.6	-	9.2			
Industrial and Manufacturing	0.7	2.7	0.2	3.6			
Transportation, Right of Way, Parking and Utilities	18.1	3.7	1.2	23.0			
Public Facilities and Institutions	-0.2	2.8	-	2.6			
Open Space, Cemeteries, and Outdoor Recreation	3.3	19.4	3.3	26.0			
Vacant	1.3	0.3	0.8	2.4			
Airport Property	7.2	4.5	35.3	47.0			
Water (Off Airport Property)	13.2	19.0	12.3	44.5			
Total	82.0	54.6	53.1	189.7			

TABLE 5-7 LAND USE CHANGE – 2016 to 2021

NOTE: Numbers may not add up, due to rounding.

SOURCE: Planning Technology, Inc. and Environmental Science Associates, 2016.

Noise Level	Households	Population	Places of Worship	Schools	Hospitals and Residential Healthcare	Historic Resources	Day Care	Library
DNL 65-70	307	937	1	0	0	0	1	0
DNL 70-75	26	87	0	0	0	0	0	0
DNL 75+	0	0	0	0	0	0	0	0
Total	333	1,024	1	0	0	0	1	0
	- na Technology Inc	and Environmer	tal Science A	ssociates 201	6			

TABLE 5-8 NOISE EXPOSURE CHANGE – 2016 to 2021

SOURCE: Planning Technology, Inc. and Environmental Science Associates, 2016.



SOURCE: ESA, 2016; INM 7.0d; ESRI Mapping Services.

John F. Kennedy International Airport 14 CFR Part 150 Study.140037 Figure 5-3 2016 and 2021 DNL 65 Contours Runway Ends 4L/4R John F. Kennedy International Airport

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SOURCE: ESA, 2016; INM 7.0d; ESRI Mapping Services.

John F. Kennedy International Airport 14 CFR Part 150 Study 140037 Figure 5-4 2016 and 2021 DNL 65 Noise Contours Runway Ends 31L/31R John F. Kennedy International Airport

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SOURCE: ESA, 2016; INM 7.0d; ESRI Mapping Services.

John F. Kennedy International Airport 14 CFR Part 150 Study.140037 Figure 5-5 2016 and 2021 DNL 65 Contours Runway Ends 22L/22R John F. Kennedy International Airport

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SOURCE: ESA, 2016; INM 7.0d; ESRI Mapping Services.

John F. Kennedy International Airport 14 CFR Part 150 Study.140037 Figure 5-6 2016 and 2021 DNL 65 Contours Runway Ends 13L/13R John F. Kennedy International Airport

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CHAPTER 6 Consultation and Public Involvement

6.1 Introduction

Title 14 Code of Federal Regulations (CFR) Part 150 §150.21(b) and §A150.105(a) require that Noise Exposure Maps (NEMs) and associated documentation be developed and prepared,

"in consultation with states, public agencies and planning agencies whose area, or any portion of whose area, of jurisdiction is within the DNL 65 contour depicted on the map, FAA regional officials, and other Federal officials having local responsibility for land uses depicted on the map. This consultation must include regular aeronautical users of the airport. The airport operator shall certify that it has afforded interested persons adequate opportunity to submit their views, data, and comments concerning the correctness and adequacy of the draft noise exposure map and descriptions of forecast aircraft operations."

Consultation required by 14 CFR Part 150 includes the following entities:

- Aviation users (e.g., airlines, fixed base operators, based aircraft operators);
- Jurisdictional authorities with land located within the DNL 65 or greater contours (New York City Department of City Planning; Nassau County Planning Department; the planning departments of the Villages of Cedarhurst, Woodsburgh, and Valley Stream; and the National Park Service are the sole land use agencies for land located within the DNL 65 or greater); and
- Interested parties (i.e., the public).

The Port Authority implemented a proactive agency consultation and public involvement program that met the requirements of 14 CFR Part 150. The Port Authority provided opportunities for meaningful public engagement and participation in development of the NEMs. Agency consultation and public involvement efforts undertaken for this 14 CFR Part 150 Study are discussed in this chapter.

6.2 Technical Advisory Committee

As per the study protocol in **Appendix I**, **Section 2.5**, the Port Authority formed a Technical Advisory Committee (TAC), the purpose of which is to provide input into the 14 CFR Part 150 Study prepared for JFK. The TAC is composed of members that represent the Port Authority,

local communities, airlines, airline and airport business associations, local governments, business groups, planning organizations, and the FAA. The TAC members for the JFK 14 CFR Part 150 Study are listed in **Table 6-1**.

Organization Represented	Representative	Alternate Representative
Port Authority		
Aviation Noise Office	Kelly Mitchell	Adeel Yousuf
JFK Airport Management Office	John Selden	April Gasparri
Community Group(s)		
NY Community Aviation Roundtable (NYCAR)	Barbara Brown	Patrick Evans
Eastern Queens Alliance	Clyde Vanel, Esq.	None
Town-Village Aircraft Safety & Noise	Kevin Denning	None
Abatement Committee (TVASNAC)	Kevin Denning	None
Airlines and/or Airlines Associations		
Delta Airlines	Robert Goldman	Mark Hopkins
JetBlue	Rob Mitchell	Jeffrey Goodell
NY Airport Liaison	Debbie Bearden	Sal Debono (AvAirPros)
United Airlines	Glenn Morse	None
Cargo Airlines and/or Cargo Associations		
American Airlines Cargo /	Rich Burkhardt	None
KAAMCO Chairman	Their Burkhardt	
Fixed Base Operators		
Sheltair	Robert McAdams	Eugene Pereira
Airline Business Organizations and/or Airpo	ort Business	
Aviation Development Council	Bill Huisman	None
Chamber of Commerce/Business Organizat	ion/Economic Development	
NYC Economic Development Corp	David A. Hopkins	None
Queens Chamber of Commerce	Thomas J. Grech	None
Local Government		
Queens Borough President	Angelina Martinez-Rubio	Jack Leibler
Town of North Hempstead / QuietSkies.net	Len Schaier	Marilyn Chapoteau
Planning Organizations		
NYC Department of City Planning	Stephen Everett	Scott Solomon
Nassau County Planning	Mark Buttice	Sean E. Sallie, AICP
Town of North Hempstead	Neal Stone, AICP	Michael Levine
Environmental – Noise		
NYC Department of Environmental	Chung S. Chan	Charles Shamoon
Protection	Chung S. Chan	Chanes Shamoon
Federal Aviation Administration (FAA)		
Airport Division	Andrew Brooks	Lindsay Butler
NY ADO	Steve Kapsalis	Suki Gill
TRACON	Mike Porcello	Jeff Brooks
JFK Tower (ATCT - Airport Traffic Control	David Siewart	Claude Viera
Tower)		
Flight Standards District Office (FSDO)	Tom Malone	Dave Swanson
SOURCE: Port Authority, 2015.		

TABLE 6-1 JFK 14 CFR PART 150 TAC PARTICIPANT LIST

The TAC's role is advisory and its purpose is solely limited to this Study. The TAC may offer opinions, advice and guidance to the Study Team, but the Port Authority has the sole discretion to accept or reject the TAC recommendations. In addition to providing input and technical advice for the Study, a responsibility of each TAC member is to inform their respective organizations of the Committee's discussions.

While membership on the TAC is focused on key stakeholders, the TAC meetings are noticed in advance and open to the public. In order to promote balanced and constructive interaction among the TAC members, members of the public are asked to refrain from commenting during TAC member discussions. However, a public comment period is provided at each TAC meeting. Meeting notes capture the TAC meeting discussions and public comments.

A summary of the TAC Committee Meetings, including dates and topics discussed is provided below. Meeting announcements are sent to all TAC members (see **Table 6-1** for a list of members) and posted on the Port Authority's website.²⁹ All TAC meeting materials including agendas, sign-in sheets, presentations, and meeting notes are provided in **Appendix H**.

TAC Meeting #1 (June 10, 2015) - Introduction to the Technical Advisory Committee

The meeting focused on TAC member introductions, educating members of the TAC about the purpose and objectives of the study and the TAC's role in the study, and introducing the charter and participation agreement. The Study Protocol and project schedule were also reviewed during the meeting.

TAC Meeting #2 (August 5, 2015) - Principles of Noise

At the second TAC meeting the Study Team provided an overview of acoustic principles, noise metrics, and aircraft noise assessments. Additionally, the data collection process was reviewed with members of the TAC.

TAC Meeting #3 (October 6, 2015) -14 CFR Part 150 Study Requirements

At the third TAC meeting the Study Team reviewed the federal regulation (14 CFR Part 150) and requirements to complete the study. Noise modeling inputs were also reviewed. The Study Team also provided an update regarding the Study Protocol and the status of the airport activity forecast.

TAC Meeting #4 (December 9, 2015) - Land Use and Noise Model Inputs

A preliminary existing land use map and preliminary noise modeling inputs (aircraft flight tracks and departure/arrival altitude profiles) were presented at this meeting.

²⁹ <u>http://panynjpart150.com/JFK_homepage.asp</u>

TAC Meeting #5 (March 15, 2016) - Noise Model Inputs

At this meeting the Study Team provided information regarding the aviation activity forecast developed for JFK in support of the 14 CFR Part 150 Study. Samples of "custom" (user-defined) arrival and departure profiles developed for JFK to better represent aircraft activity (in comparison with standard profiles), were also presented at this meeting.

TAC Meeting #6 (April 13, 2016) - Aircraft Noise Levels

At the sixth TAC meeting the Study Team provided an update regarding the status of FAA approvals of the forecast and noise modeling inputs. The meeting was focused on reviewing user-defined arrival and departure profiles and a comparison of sound levels produced by aircraft operating at JFK.

TAC Meeting #7 (June 22, 2016) - Aircraft Noise Contours

At the seventh TAC meeting the Study Team provided updates on the FAA's approval of noise model inputs including user-defined arrival and departure profiles and reviewed the preliminary noise exposure contours generated for JFK.

TAC Meeting #8 (August 17, 2016) - Noise Exposure Analysis

At the eighth TAC meeting the Study Team provided additional details regarding the preliminary draft noise exposure analysis and presented information regarding land use acreages and numbers of noise sensitive sites exposed to noise levels of DNL 65 and higher in 2016 and 2021. The Study Team also described the preliminary draft JFK NEM Report and provided an overview regarding the second phase of the 14 CFR Part 150 Study – the Noise Compatibility Program.

TAC Meeting #9 (October 19, 2016) – Elements of a Noise Compatibility Program

At the ninth TAC meeting the Study Team briefly discussed the structure and content of the Draft JFK NEM Report to be released publicly on October 26, 2016. The Study team also provided further detail on the development of a JFK Noise Compatibility Program, including the history of noise control measures for JFK.

TAC Meeting #10 (December 14, 2016) – Noise Abatement Measures

At the tenth TAC meeting the Study Team briefly summarized the nine prior TAC meetings, then presented hypothetical "what-if" scenarios illustrating the effects of certain operational changes on the noise levels surrounding JFK. The Study Team summarized key arrival and departure procedures at JFK, gave a brief reminder of high-level noise abatement strategies, and discussed potential noise abatement measures with the TAC.

6.3 Public Information Workshops, Draft JFK NEM Report, and Public Comments

During the course of the JFK 14 CFR Part 150 Study, the Port Authority accepted comments from the public and held several Public Information Workshops. The first Public Information Workshop was held at the beginning of the Study process, and the second Public Information Workshop was held after the release of the Draft NEM Report. Details of the Workshops, release of the Draft NEM Report, and public comments are provided below.

6.3.1 First Public Information Workshop

The first public information workshop for the JFK 14 CFR Part 150 Study was held on June 17, 2015 at the Radisson Hotel JFK Airport from 6:00 P.M. to 8:00 P.M. There were approximately 70 people in attendance, including press and public officials (see sign-in sheets included in **Appendix K-1**, starting on **Page K-19**). The purpose of the first Public Information Workshop was to inform the public about the 14 CFR Part 150 Study being initiated for JFK, discuss the Study process and requirements, and solicit input to be considered during the Study by inviting the public to submit written comments at the Workshop as well as via e-mail to the Part 150 Study e-mail address. The information presented provided an overview of the Study process, the need for the Study, what the potential outcomes could be, how to provide comments and stay involved, and other relevant information related to the Study. Workshop informational materials included presentation boards and a handout. Copies of the handout were also available at the meeting in the following languages: Spanish, Russian, Chinese, Greek, and Italian. Copies of the Public Information Workshop notice, sign-in sheets, presentation materials, handout, and comments received are provided in **Appendix K-1**.

In response to community requests, an additional Public Information Workshop was held at the Nassau County Community College in Garden City, NY on October 29, 2015 from 6:00 P.M. to 8:00 P.M. to provide communities with another opportunity to learn about the study. The information presented at this Workshop was the same as described above, and the Port Authority invited the public to submit written comments at the additional Workshop as well as via e-mail to the Part 150 Study e-mail address. Materials related to this Workshop are provided in **Appendix K-2**. Public comments received at both Workshops, via e-mail, and via comment letters as well as the responses to those comments, are included in **Appendix L** and summarized in **Section 6.3.3**.

6.3.2 Draft NEM Report and Second Public Information Workshop

This Draft NEM Report was released to the public on October 26, 2016. Printed copies were made accessible at the following locations:

The Port Authority of NY & NJ South Service Road, Bldg. #14 - 2nd Floor Jamaica, NY 11430 Arverne Branch – Queens Library 312 Beach 54th Street Arverne, NY 11692 Howard Beach Branch – Queens Library 92-06 156th Ave Howard Beach, NY 11414

Nassau County – Henry Waldinger Memorial Library 60 Verona Pl Valley Stream, NY 11582 Peninsula Branch – Queens Library 92-25 Rockaway Blvd Rockaway Beach, NY 11693

Queens Library at Rosedale 144-20 243rd Street Rosedale, NY 11422

An electronic copy was also made available at <u>http://panynjpart150.com/JFK_DNEM.asp.</u>

Two Public Information Workshops were held after the publication of the Draft NEM. The first occurred on November 2, 2016 at the JFK Hilton in Jamaica, NY from 6:00 P.M. to 9:00 P.M. The second, located in Nassau County, occurred on November 3, 2016 at the Cradle of Aviation Museum in Garden City, NY from 6:00 P.M. to 9:00 P.M. The purpose of these Workshops was to obtain feedback about the Draft NEMs. **Appendix K** contains Workshop materials. Public comments received during the comment period, as well as the responses to those comments, are included in **Appendix L** and summarized in Section 6.3.3.

The public comment period opened on October 26, 2016 with the release of the Draft JFK NEM Report and closed on November 28, 2016 at 5:00 P.M. Comments were submitted electronically to <u>NYPART150@panynj.gov</u>, in person at the public information workshops described above, or by mail to:

Port Authority of NY & NJ Aviation Department ATTN: Noise Office - NY Part 150 Study 4 World Trade Center 150 Greenwich Street, 18th floor New York, NY 10007

6.3.3 Public Comments Received

During the course of the JFK 14 CFR Part 150 Study, the Port Authority received 55 comment letters from the public. Of these comment letters, 30 were received during the official JFK Draft NEM public comment period (October 26, 2016 to November 28, 2016) and 25 were received before the public comment period, including during/following the first Public Information Workshop. The Port Authority received comment submissions from the public through email, postal mail, and in writing at the Public Information Workshops. Many of the comment submissions contained multiple comments. A summary of the ten most frequent comment categories is provided in **Table 6-2**, in descending order from most frequent comments received. All public comments received during the course of the JFK 14 CFR Part 150 Study (including comments submitted at the Public Information Workshops), as well as the responses to those comments, are included in **Appendix L**.

Comment Category	Description
Quality of Life	The effects of JFK aircraft operations on quality of life
Noise Compatibility Program (NCP) Measures	Suggested noise abatement, administrative, or other NCP measures
Noise Exposure Maps (NEMs)	Locations of noise contours on the Noise Exposure Maps, and the methodology used to produce noise contours
Public Meetings/Participation	Methods of public participation in the JFK 14 CFR Part 150 Study, including the locations and times of Public Information Workshops
Noise Complaint	Complaints about noise exposure
Frequency and Volume of Aircraft Operations	Number of aircraft operations occurring during certain time periods
Aircraft Flight Procedures	Flight paths and altitudes flown by aircraft
Administrative	Port Authority communication and processes
Flight Track Development	Methods of developing modeled aircraft flight tracks
Part 150 Guidelines/Regulation	Study requirements dictated by 14 CFR Part 150
SOURCES: Port Authority of New York and New Jersey and Environmental Science Associates, 2017.	

TABLE 6-2 MOST FREQUENT PUBLIC COMMENTS RECEIVED

6.4 Other Public Outreach and Meetings

Additional elements of the public outreach program implemented by the Port Authority are summarized below.

6.4.1 Study-Specific Meetings

Numerous meetings to discuss the 14 CFR Part 150 Study were held with local, regional, and federal agencies and government officials throughout the development of the NEMs. Port Authority staff and their consultants also met with local and regional planning organizations and the planning departments of towns and villages in the study area to discuss the 14 CFR Part 150 Study and obtain current zoning, land use, and population data. Meetings were also held with the FAA New York Terminal Radar Control facility (NY TRACON), the JFK Airport Traffic Control Tower (ATCT) managers, and the FAA's Airspace Operations Group to discuss airspace, routing of aircraft, and existing and potential future instrument approach and departure procedures. A summary of these meetings, including dates and topics discussed, is provided below.

August 3, 2015 – FAA TRACON

Port Authority staff and their consultants met with FAA's New York TRACON and toured the TRACON facility. FAA's TRACON representatives also conducted a presentation about the area airspace to help the Study Team better understand the region's operational constraints.

August 4, 2015 – FAA JFK and LGA Air Traffic Control Towers

Port Authority staff and their consultants met with the FAA's JFK and LGA Air Traffic Control representatives. The purpose of this meeting was to discuss the airspace structure for JFK and LGA as it relates to the development of the noise modeling efforts for the 14 CFR Part 150 Studies.

December 9, 2015 – FAA JFK and LGA Air Traffic Control Towers

Port Authority staff and their consultants met with the FAA's JFK and LGA Air Traffic Control representatives. The purpose of this meeting was to discuss the JFK and LGA 14 CFR Part 150 Studies and the operational factors being developed for the purposes of noise modeling.

December 16, 2015 – FAA TRACON

Port Authority staff conducted a webinar with the FAA's New York TRACON. The purpose of this webinar was to clarify certain operating conditions in place during the 2014 calendar year and determine what adjustments need to be considered when determining future operating conditions (i.e., changes in airspace operation, procedures, and runway use) in 2016 and 2021.

January 28, 2016 – FAA Office of Environment and Energy

Port Authority staff and their consultants conducted an initial call with the FAA's Office of Environment and Energy representatives. The purpose of this call was to discuss User-Defined Altitude Profile Submission methodology for Port Authority of New York and New Jersey 14 CFR Part 150 Studies at JFK, LGA, EWR, and TEB airports.

March 28, 2016 - FAA Office of Environment and Energy

Port Authority staff and their consultants conducted a follow-up call with the FAA's Office of Environment and Energy representatives. The purpose of this call was to review their comments on the Technical Memorandum describing the User-Defined Altitude Profiles for Port Authority of New York and New Jersey 14 CFR Part 150 Studies at JFK and LGA airports.

April 29, 2016 - FAA Office of Environment and Energy

Port Authority staff and their consultants conducted a call with the FAA's Office of Environment and Energy representatives. The purpose of this call was to resolve any final questions on the User-Defined Altitude Profile Technical Memorandum for Port Authority of New York and New Jersey 14 CFR Part 150 Studies at JFK and LGA airports.

July 7, 2016 - FAA Air Traffic Organization/TRACON

Port Authority staff and their consultants conducted a call with the FAA's Air Traffic Organization. The purpose of this call was to conduct a follow-up and review how future flight procedures would be addressed during modeling of the future (2021) scenario in the 14 CFR Part 150 process.

August 30, 2016 – FAA Airspace Operations Group

Port Authority staff and their consultants met with the FAA's Airspace Operations Group, located within the FAA Air Traffic Organization's Mission Support Services Service Unit, Airspace Services Directorate. The purpose and status of the JFK and LGA 14 CFR Part 150 Studies was presented to a representative of the Airspace Operations Group and the NCP phase of the studies was discussed.

November 2, 2016 - National Park Service

A large portion of Gateway National Recreation Area, managed by the National Park Service (NPS), is within the DNL 65 contour. The Project Team met with FAA, NPS, and the Port Authority via video conference to review the JFK 14 CFR Part 150 NEM process and to solicit input from the NPS on the Draft JFK 14 CFR Part 150 NEM Report, which the NPS received upon its release to the public. During the video conference the Port Authority staff and their consultants solicited the NPS' input on the Study, but received no further communication from the NPS after the video conference.

November 10, 2016 – FAA New York Airspace Webinar

The FAA's New York TRACON hosted a public webinar that provided an overview of the New York airspace and focused on elements of its complexity.³⁰ In particular, the webinar highlighted the overlapping airspace boundaries and flight procedures associated with multiple airports in the New York area. The webinar also used animations to illustrate the high volume of air traffic that occurs in the region. Port Authority staff, members of the consulting team, JFK TAC members, and members of the interested public participated in the airspace webinar.

6.4.2 Newsletters

Another component of the public outreach program implemented by the Port Authority included periodic newsletters that kept the public and interested parties informed about the Study. The newsletters were posted on the JFK 14 CFR Part 150 Study project website (in PDF format). Copies of the newsletters are provided in **Appendix K-4**.

The fall 2015 newsletter (*published in November 2015*) contained information about the Study, who is conducting the study, and how to stay involved. The winter 2016 newsletter (*published in February 2016*) contained Study updates and information on the TAC, the project schedule, and how to stay involved. The summer 2016 newsletter (*published in August 2016*) contained images of the preliminary draft DNL contours, draft noise exposure information, and information on the NCP process and upcoming public workshops. The winter 2017 newsletter (*published in January 2017*) introduced noise abatement, land use, and programmatic NCP strategies; it also described the materials displayed at the public workshops, with links to the JFK 14 CFR Part 150 Study project website for downloading these materials.

6.4.3 Elected Officials

Several elected officials were actively engaged through the NEM development process. The elected official email contact list included public officials representing the New York City boroughs of Brooklyn, Queens, and the Bronx; and those representing Nassau County, as well as the Governor's office, State Senate and Assembly Members, United States Representatives and New York's two United States Senators. Copies of correspondence between the Port Authority and these officials are provided in **Appendix G-3**.

³⁰ https://attendee.gotowebinar.com/register/1209238868691416580

6.4.4 Newspaper Articles

The Port Authority's consultants maintained a file throughout the Study containing copies of newspaper articles and publications that discussed or referenced the JFK 14 CFR Part 150 Study and the other 14 CFR Part 150 studies being conducted by the Port Authority at LaGuardia Airport, Newark Liberty International Airport, and Teterboro Airport. Copies of the articles are provided in **Appendix K-5**.

6.4.5 JFK 14 CFR Part 150 Information Website

A website³¹ was developed and published for the JFK 14 CFR Part 150 Study. The website made Study-related information and documents available to stakeholders, agencies, and the general public. Information and documents available on the website included:

- Project announcements;
- Project schedule information and schedule updates;
- Upcoming project meetings;
- Project documents, including the JFK 14 CFR Part 150 Study Protocol, TAC Meeting materials, Public Information Workshop materials, Draft NEM report and maps, and project newsletters;
- · Links to the FAA's Airport Noise Program and the Port Authority's WebTrak websites;
- Frequently Asked Questions;
- Port Authority contact information;
- · Links to the Port Authority's other 14 CFR Part 150 Study websites; and

A link for interested parties to join the JFK 14 CFR Part 150 mailing list to receive project updates and announcements.

³¹ <u>http://panynjpart150.com/JFK_homepage.asp</u>