U.S. Department
of Transportation
**Federal Aviation
Administration**

New York Airports District Office
1 Aviation Plaza, Suite 111
Jamaica, NY 11434
(718) 995-5790

June 16, 2022

Mr. Charles R. Everett, Jr.
Director of Aviation
Port Authority of New York and New Jersey
Aviation Department
4 World Trade Center
150 Greenwich Street, 18th Floor
New York, New York 10007

RE: LaGuardia Airport 14 CFR Part 150 Study-FAA Acceptance of Revised Noise Exposure Maps and Receipt of Noise Compatibility Program

Dear Mr. Everett:

This letter is to advise you that we have received your electronic submittal dated, June 15, 2022, of a Revised "With Program" 2021 Noise Exposure Map (NEM) and the Noise Compatibility Program (NCP) for LaGuardia Airport. The FAA has evaluated and accepted the Revised "With Program" 2021 Noise Exposure Map and supporting documentation. In accordance with 49 U.S.C. Section 47503 (formerly the Aviation Safety and Noise Abatement Act of 1979), as amended, we have determined that:

1. The projected aircraft operations, and the 2021 noise contours and supporting documentation are accepted as the description of the future conditions as set forth in Part 150, updating the 2021 NEM previously accepted on May 15, 2017, and are accordingly accepted as the currently valid 2021 NEM under this Part.

2. The documentation provides sufficient evidence consultation was accomplished in accordance with Section 150.21(b).

FAA's acceptance of the Revised "With Program" 2021 NEM is limited to the determination that the map was developed in accordance with the procedures contained in Appendix A of Part 150. Such acceptance does not constitute approval of your data, information, or plans.

Should any questions arise concerning the precise relationship of specific properties to noise exposure contours depicted on the Noise Exposure Map, you should note that the FAA will not be involved in any way in the determination of relative locations of specific properties with regard to the depicted noise contours, or in interpreting the maps to resolve questions concerning, for example, which properties should be covered by the provision of 49 U.S.C. 47506. These

functions are inseparable from the ultimate land use control and planning responsibilities of local government. These local responsibilities are not changed in any way under Part 150 or through FAA's acceptance of your Noise Exposure Map. Therefore, the responsibility for the detailed overlaying of noise contours onto the maps depicting properties on the surface rests exclusively with you the airport operator, or those public agencies and planning agencies with which consultation is required under 49 U.S.C 47503. The FAA relies on the certification by you under 150.21 of FAR Part 150, that the statutorily required consultation has been accomplished. (14 C.F.R. 150.5)

We are also in receipt of the proposed Noise Compatibility Program submitted in conjunction with the Noise Exposure Maps for LaGuardia Airport. It should be clearly understood, however, that FAA's determination on the NEM under Part 150 shall not be construed as approval or endorsement of a Noise Compatibility Program, potential related Federal funding of such a program, or any related operating restrictions at the airport. The FAA must approve or disapprove such a program (other than the proposed use of flight procedures for noise control) within 180 days. For the purpose of this review, the 180-day period begins on the date of the FAA official signature of the notice in the Federal Register.

The FAA will publish a notice in the *Federal Register* announcing the acceptance of the Revised "With Program" Noise Exposure Map for LaGuardia Airport. We will include in this notice that we have received your Noise Compatibility Program for review. Such notice will include pertinent information regarding the program as specified in section 150.31 of Part 150 and will invite comments by interested parties.

Your notice of this determination, and the availability of the NEM, which when published at least three (3) times in a newspaper of general circulation in the county where the affected properties are located, will satisfy the requirements of 49 U.S.C. 47506 of the Act**.** Please refrain from publishing the announcement until the Notice has been published in the Federal Register indicating compliance with the requirements of 14 CFR Part 150. We will notify you of the expected publication date for the Notice once it is available.

Your attention is called to the requirements of Section 150.21(d) of Part 150, involving the prompt preparation and submission of revisions to the NEM, if any further actual or proposed change in the operation of the subject airport might create any substantial, new noncompatible land use in any areas depicted on the maps, or if there would be a significant reduction in noise over existing incompatible land uses that is not reflected in the NEM on file with the FAA.

Thank you for your continued interest in noise compatibility planning.

Sincerely,

Evelyn Martinez
Manager, New York Airports District Office

Appendix I

2021 Revised Noise Exposure Map and 2021 With Program Noise Exposure Map

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APPENDIX I

2021 Revised Noise Exposure Map and 2021 With Program Noise Exposure Map

This appendix includes the 2021 Revised Noise Exposure Map and 2021 With Program Noise Exposure Map exhibits for the LaGuardia Airport (LGA) Title 14 Code of Federal Regulations (CFR) Part 150 Noise Compatibility Program (NCP), as well as supporting documentation.

- Appendix I-1 2021 Revised Noise Exposure Map Exhibits
- Appendix I-2 2021 With Program Noise Exposure Map Exhibits
- Appendix I-3 Supporting Documentation

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I-1 2021 Revised Noise Exposure Map Exhibits

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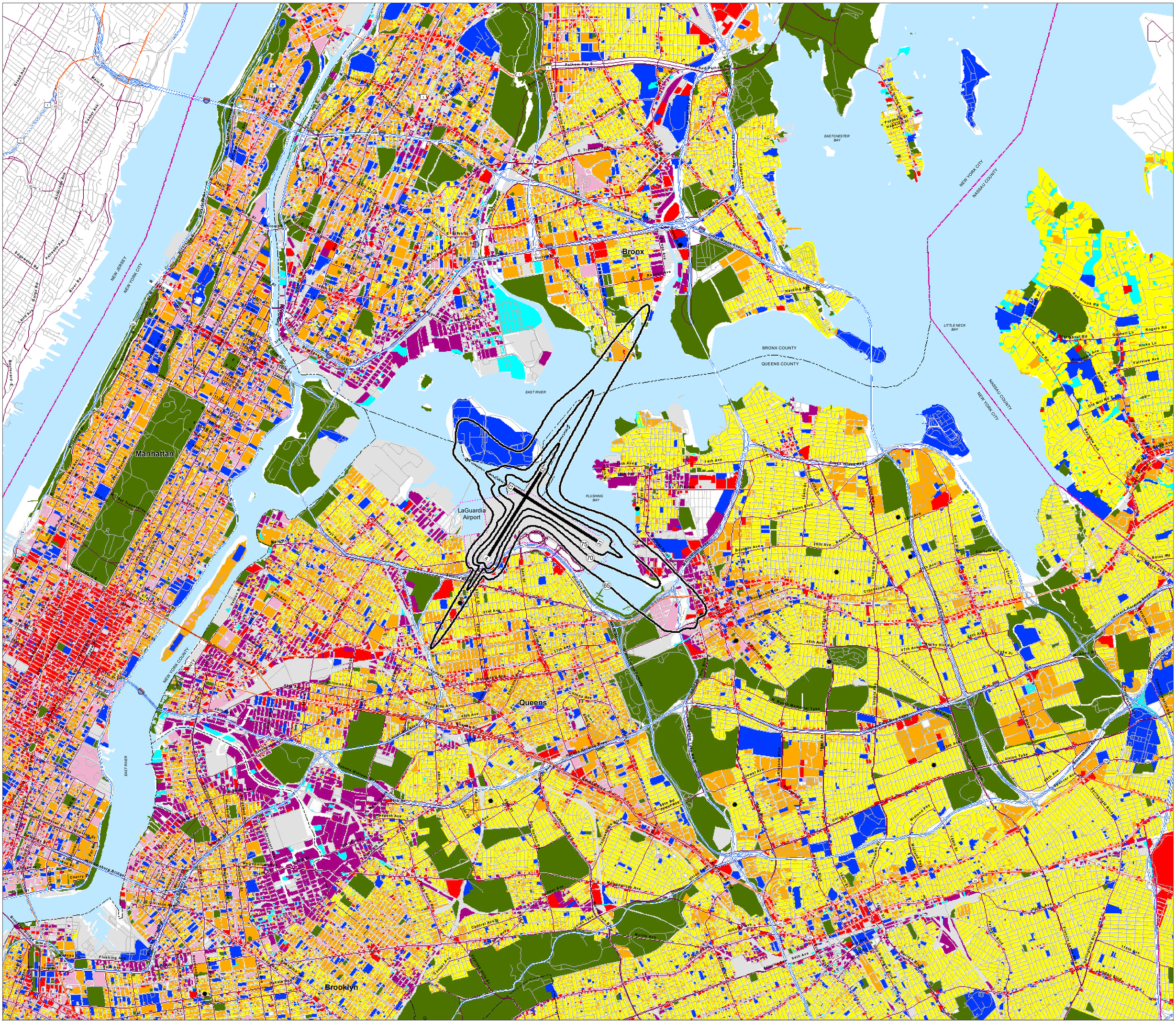

Legend

- Airport Property Line
- Airport Easement Line
- Airport Runway
- Limited Access Highway
- Highway
- Major Roadway
- Local Street
- DNL Contour
- County Boundary
- City Boundary
- Noise Monitor
- Place of Worship
- School
- Historic Structure
- Day Care/Assisted Living
- Health Care Facility

Future Land Use

- Single- and Two-Family Residential
- Multi-Family Residential
- Mixed Residential and Commercial
- Commercial and Office
- Industrial and Manufacturing
- Transportation, Parking, and Utilities*
- Public Facilities and Institutions
- Open Space, Cemeteries, and Outdoor Recreation
- Vacant Land
- Unclassified

*The PLUTO Transportation land use designations on LGA were updated to reflect new airport facilities that were constructed during the LGA Redevelopment Project.

SOURCES: New York City Department of City Planning, MapPLUTO 15V1-Tax lot/land use geographic information database, March 2015-June 2015 (adapted by ESA); Nassau County Department of Public Works Planning Division; Property classification and geographic information database, September 2015; ESRI Mapping Services; Google Earth Aerial Imagery Research, Image © 2020 CNES/Airbus; Environmental Science Associates, 2016 and 2020; Planning Technology, Inc. 2016; KB Environmental Sciences, Inc., 2016 and 2020.

Note: NYC Department of City Planning is the sole land use agency for all areas within the DNL 65 dBA contour.

Note: All schools within the DNL 65 dBA contour have been previously sound insulated.

North

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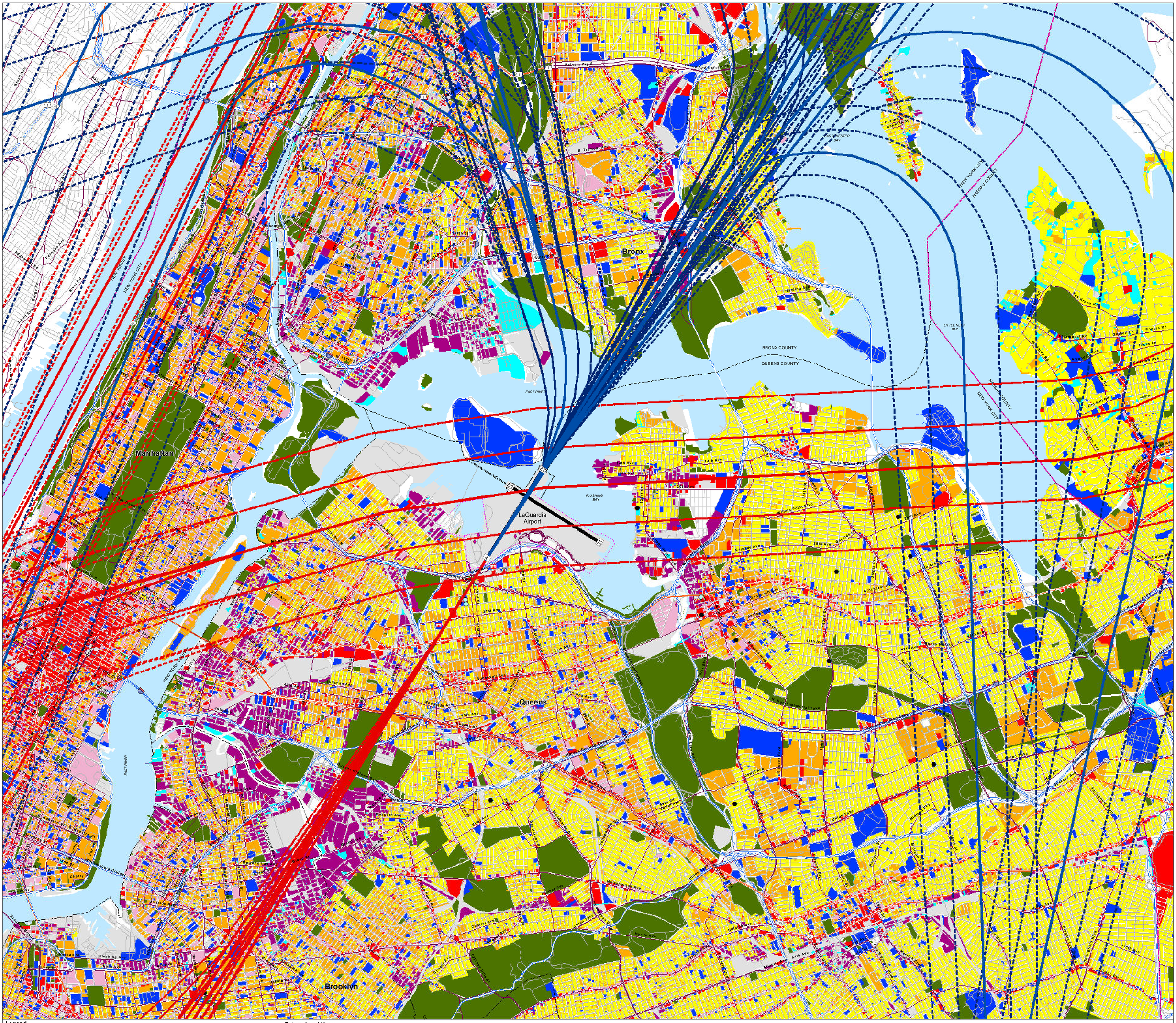
Sponsor's Certification

The Port Authority of New York and New Jersey certifies that it has afforded interested persons adequate opportunity to submit their views, data, and comments concerning the correctness and adequacy of the LaGuardia Airport 2021 Revised noise exposure map and descriptions of forecast aircraft operations. The 2021 Revised operations at LaGuardia Airport are hereby certified to be consistent with expected fleet mix, forecast operational levels, and flight procedures depicted on this 2021 Revised noise exposure map as of INSERT DATE.

2021 Revised Noise Exposure Map

Map 1 of 6

LaGuardia Airport



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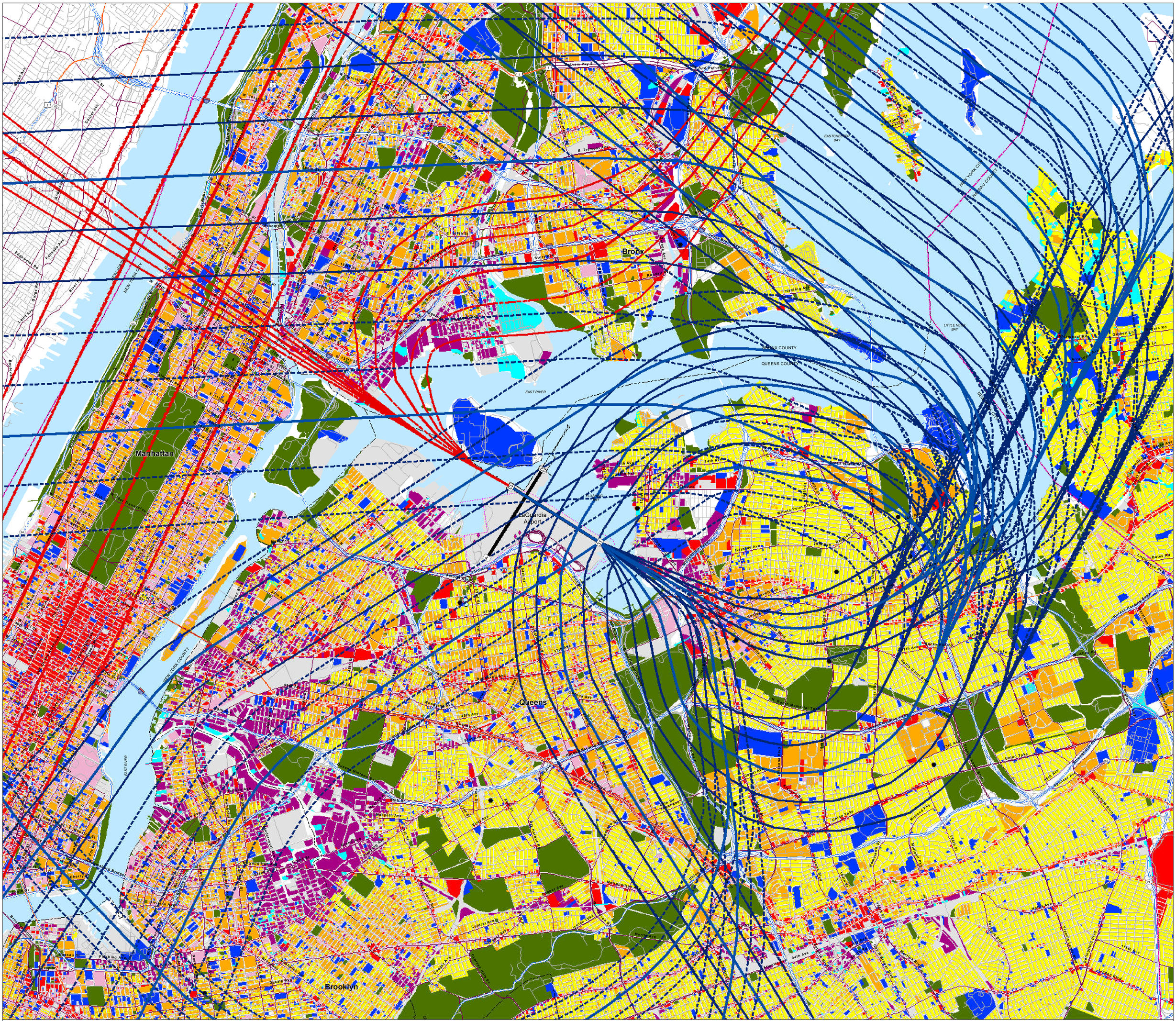
2021 Revised: INM Flight Tracks - Runway 4

Map 2 of 6

LaGuardia Airport



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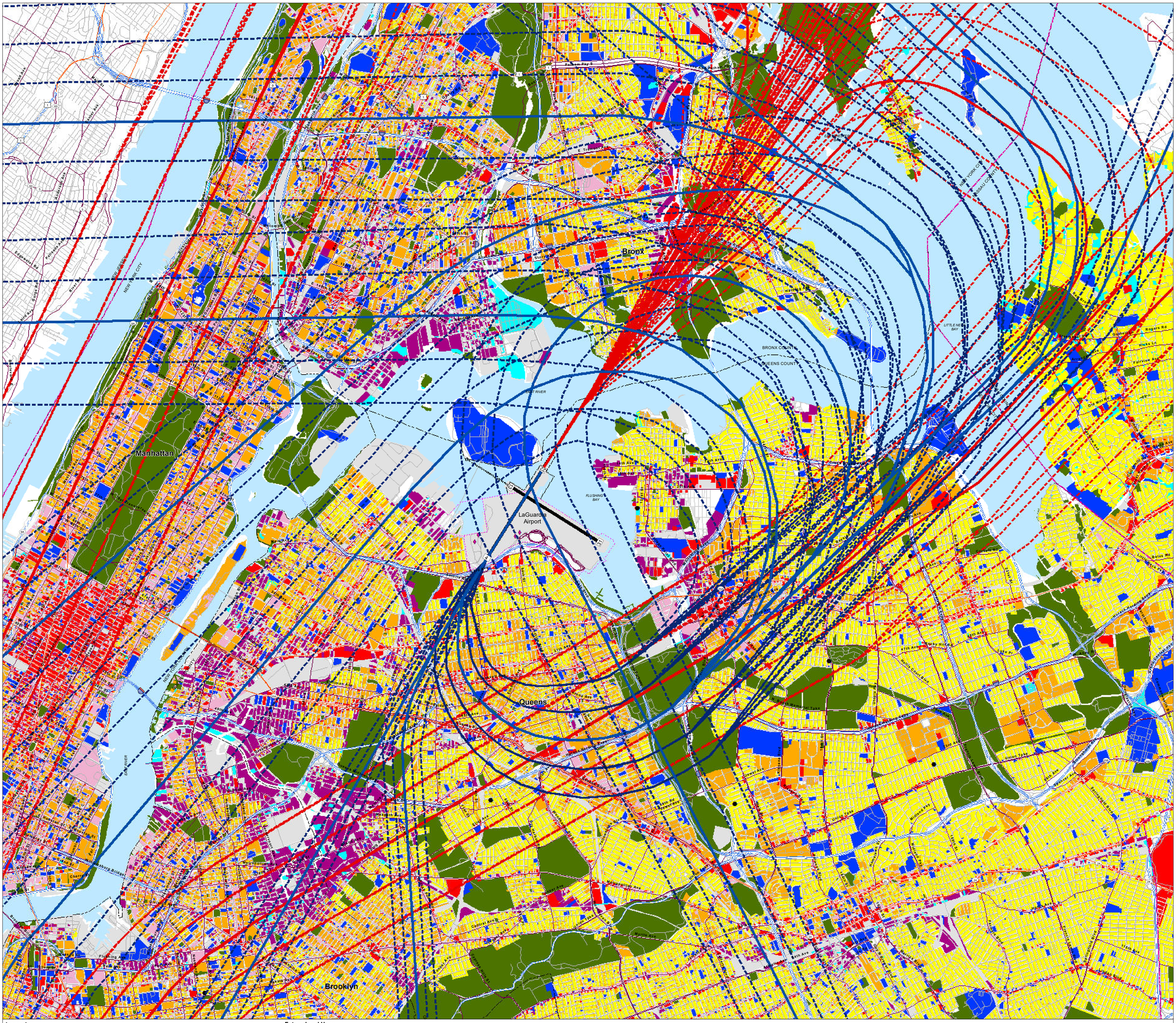
2021 Revised: INM Flight Tracks - Runway 13

Map 3 of 6

LaGuardia Airport



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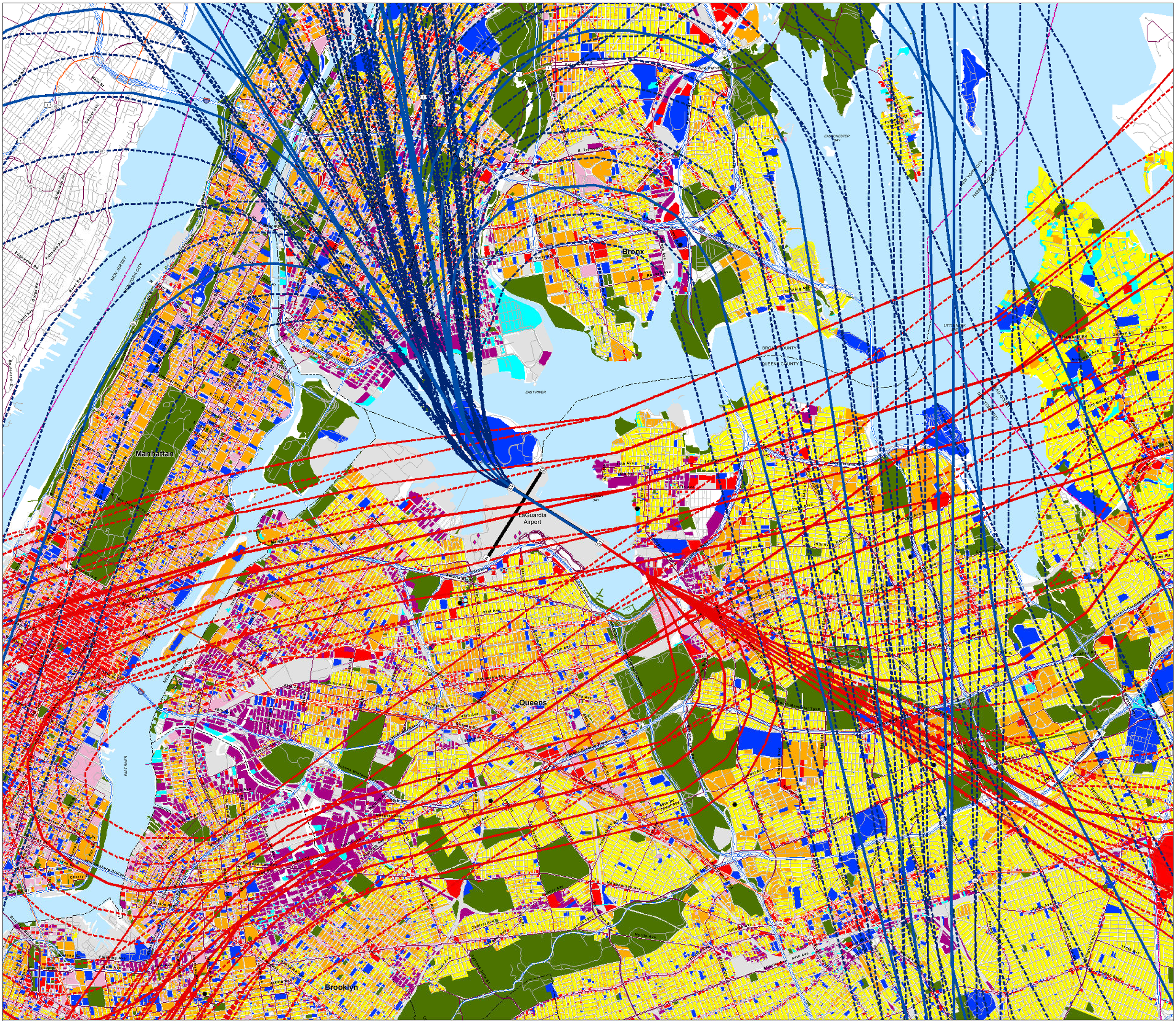
2021 Revised: INM Flight Tracks - Runway 22

Map 4 of 6

LaGuardia Airport



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Future Land Uses

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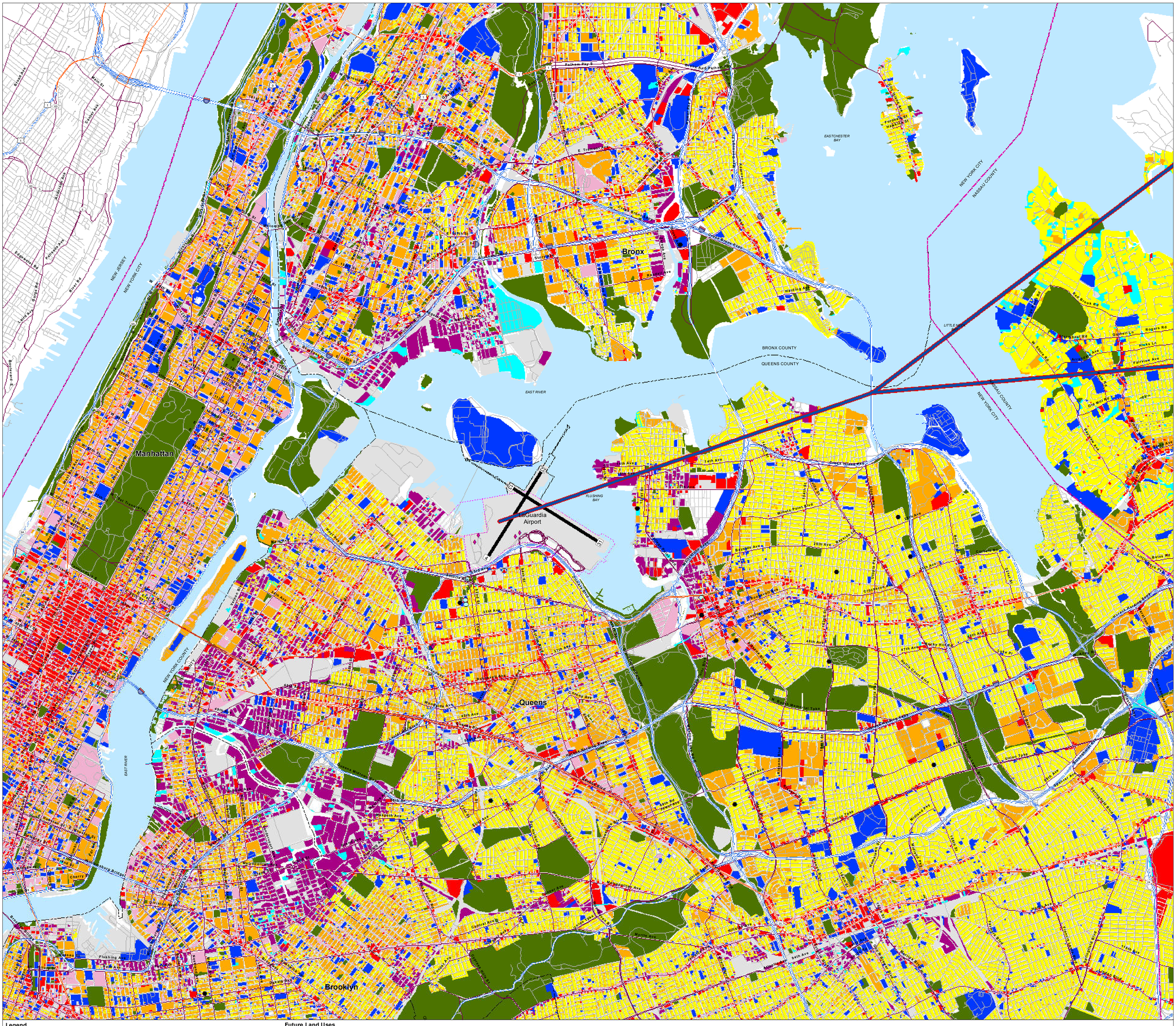
2021 Revised: INM Flight Tracks - Runway 31

Map 5 of 6

LaGuardia Airport



Legend

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2021 Revised: INM Helicopter Flight Tracks

Map 6 of 6

LaGuardia Airport

I-2 2021 With Program Noise Exposure Map Exhibits

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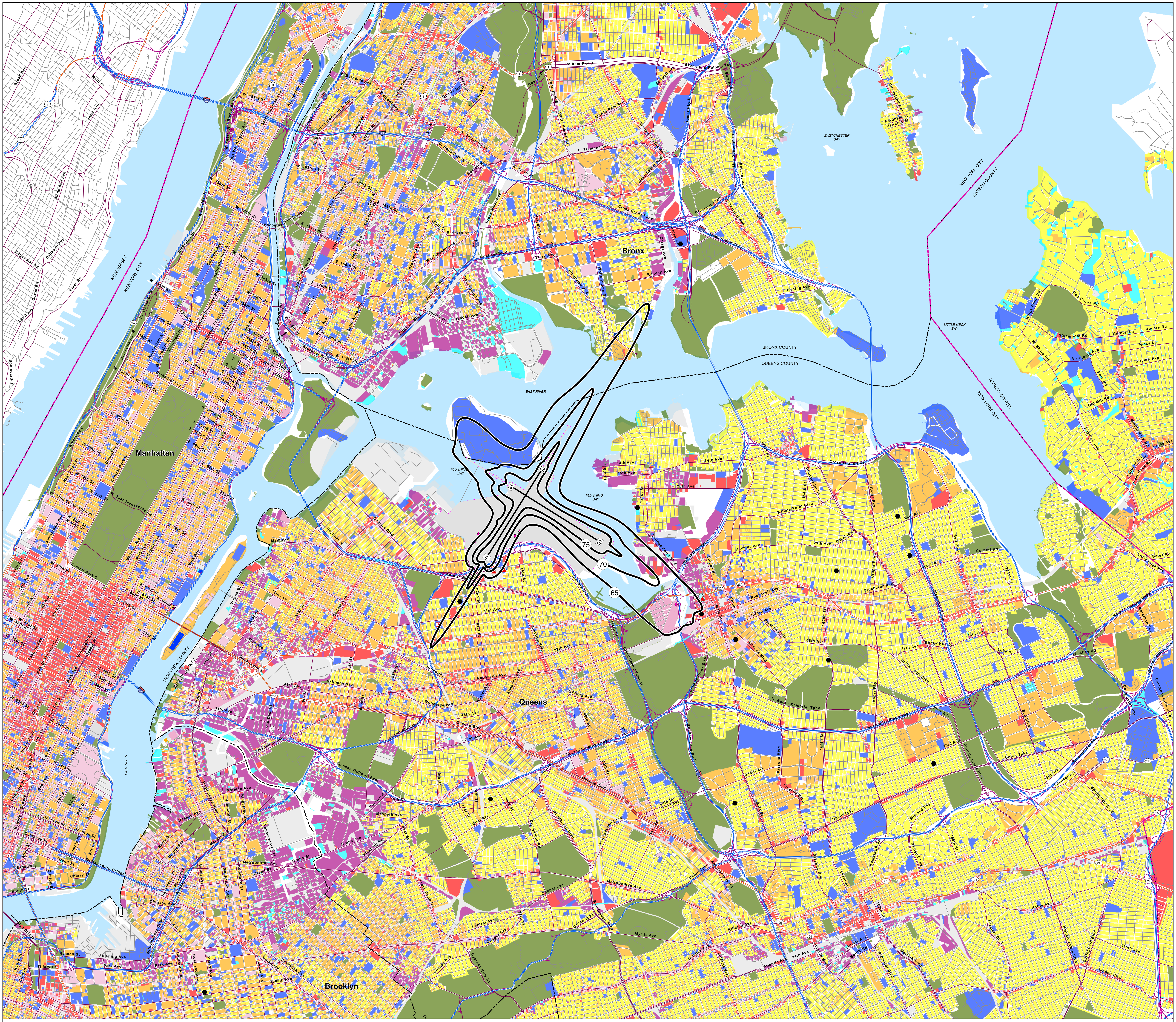

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- DNL Contour

Existing Land Uses

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- Multi-Family Residential
- Mixed Residential and Commercial
- Commercial and Office
- Industrial and Manufacturing
- Transportation, Parking and Utilities
- Public Facilities and Institutions
- Unclassified
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By: Charles Everett

Title: Director, Aviation Department, Port Authority of New York and New Jersey

Address: 4 World Trade Center, 150 Greenwich Street, 18th Floor; New York, NY 10007

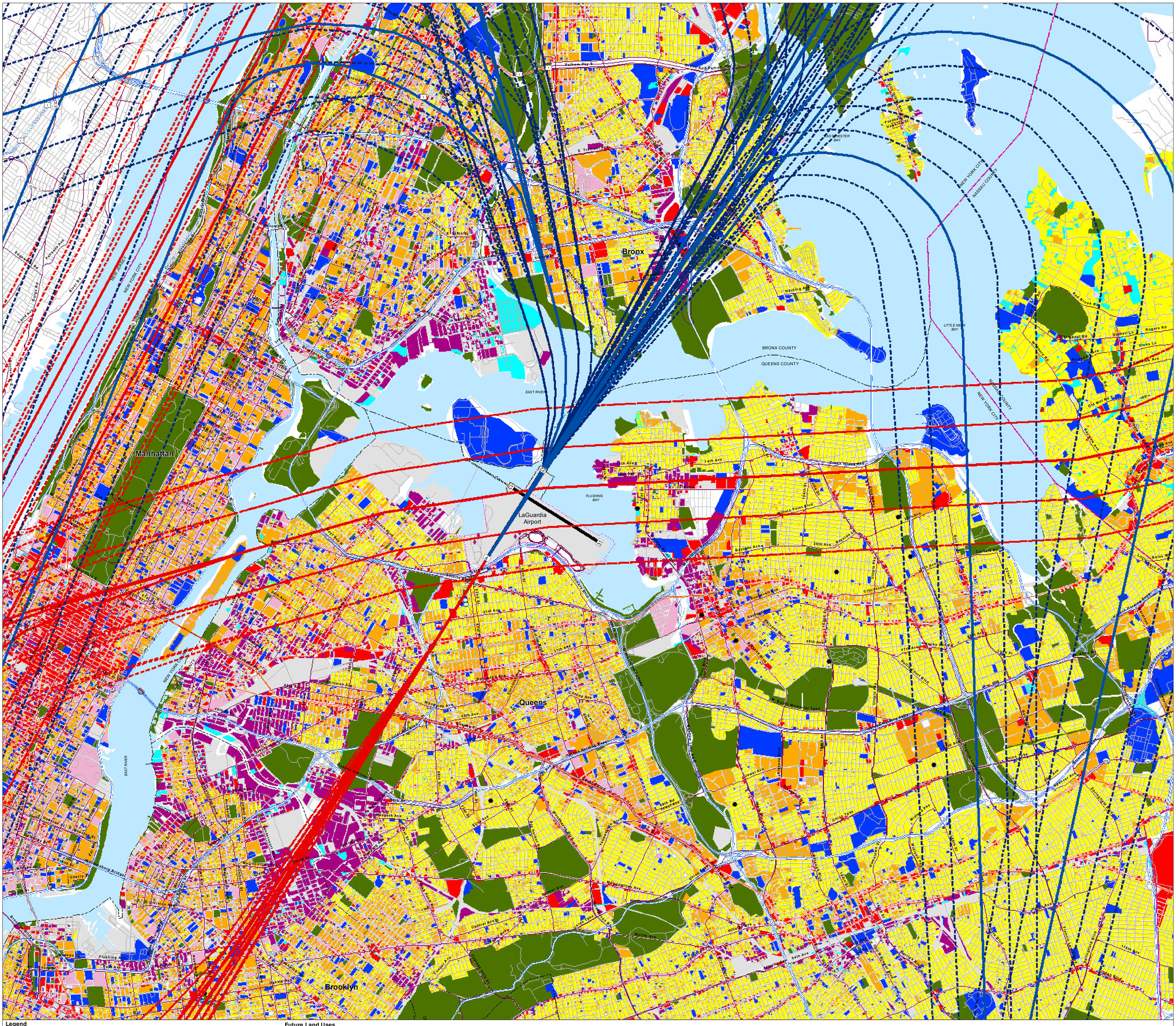
DocuSigned by: Charles R Everett Jr A45E189A8B2449D... 6/10/2022

Signature Date

2021 With Program Noise Exposure Map

Map 1 of 6

LaGuardia Airport



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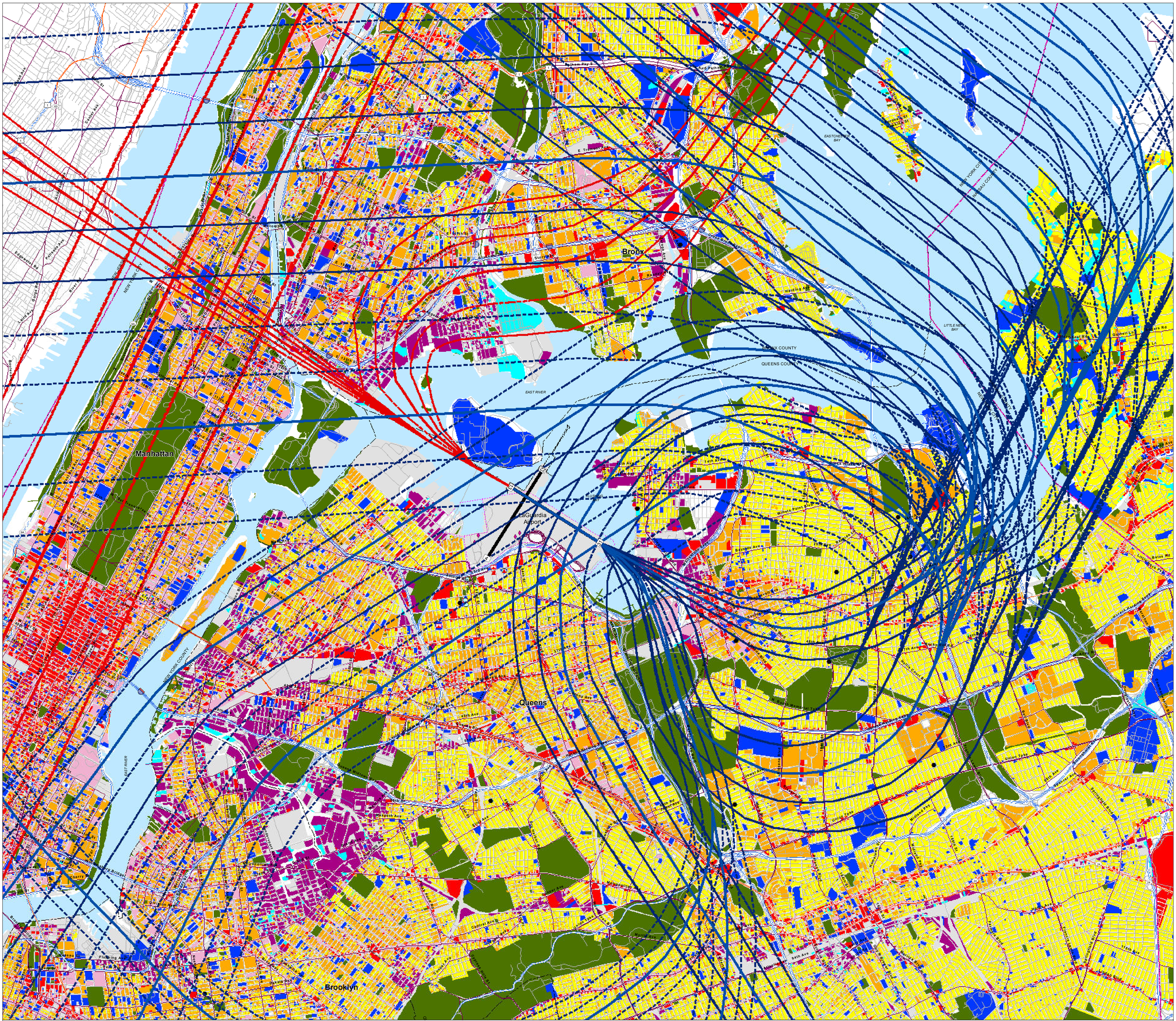
2021 With Program: INM Flight Tracks - Runway 4

Map 2 of 6

LaGuardia Airport



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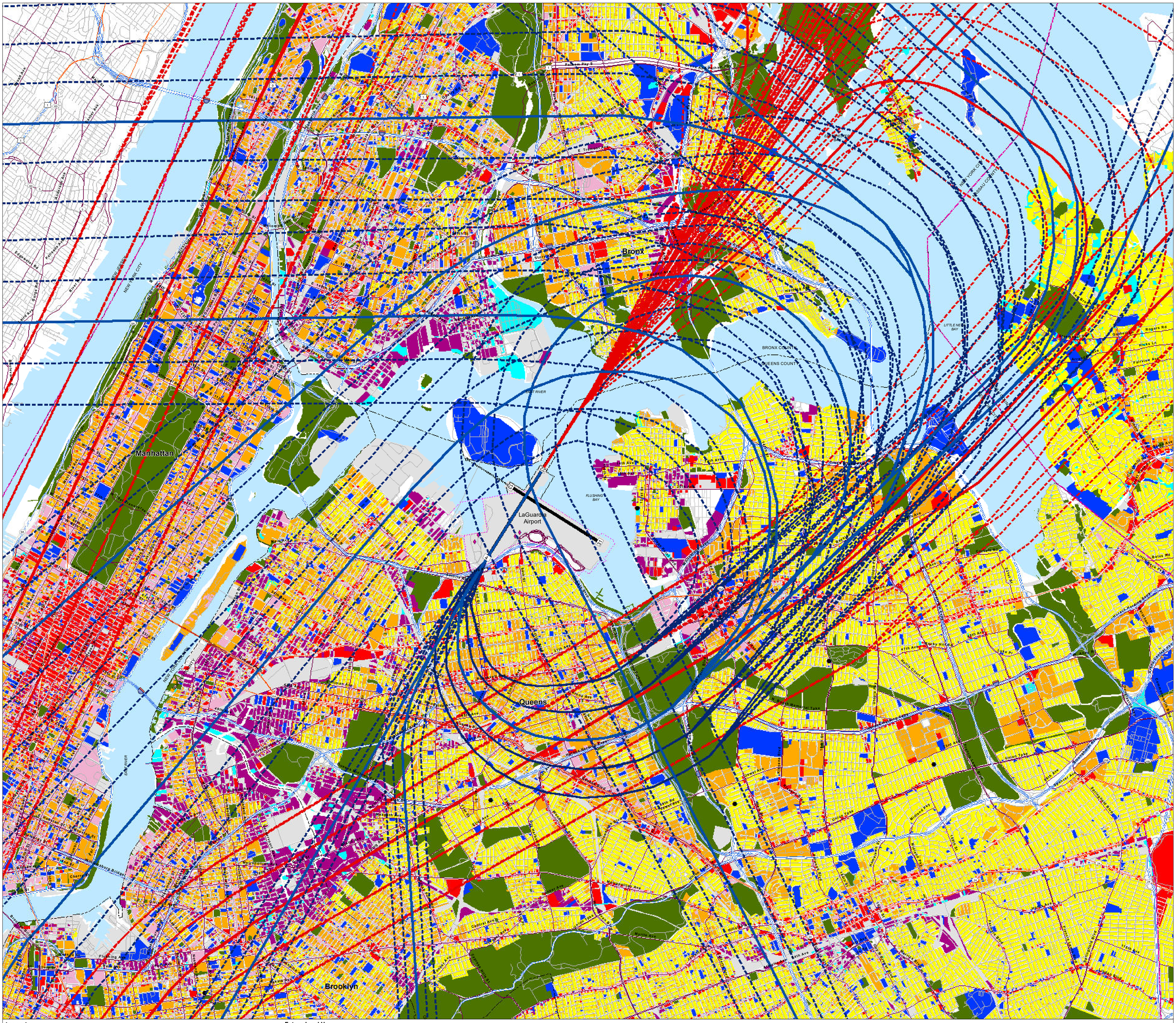
2021 With Program: INM Flight Tracks - Runway 13

Map 3 of 6

LaGuardia Airport



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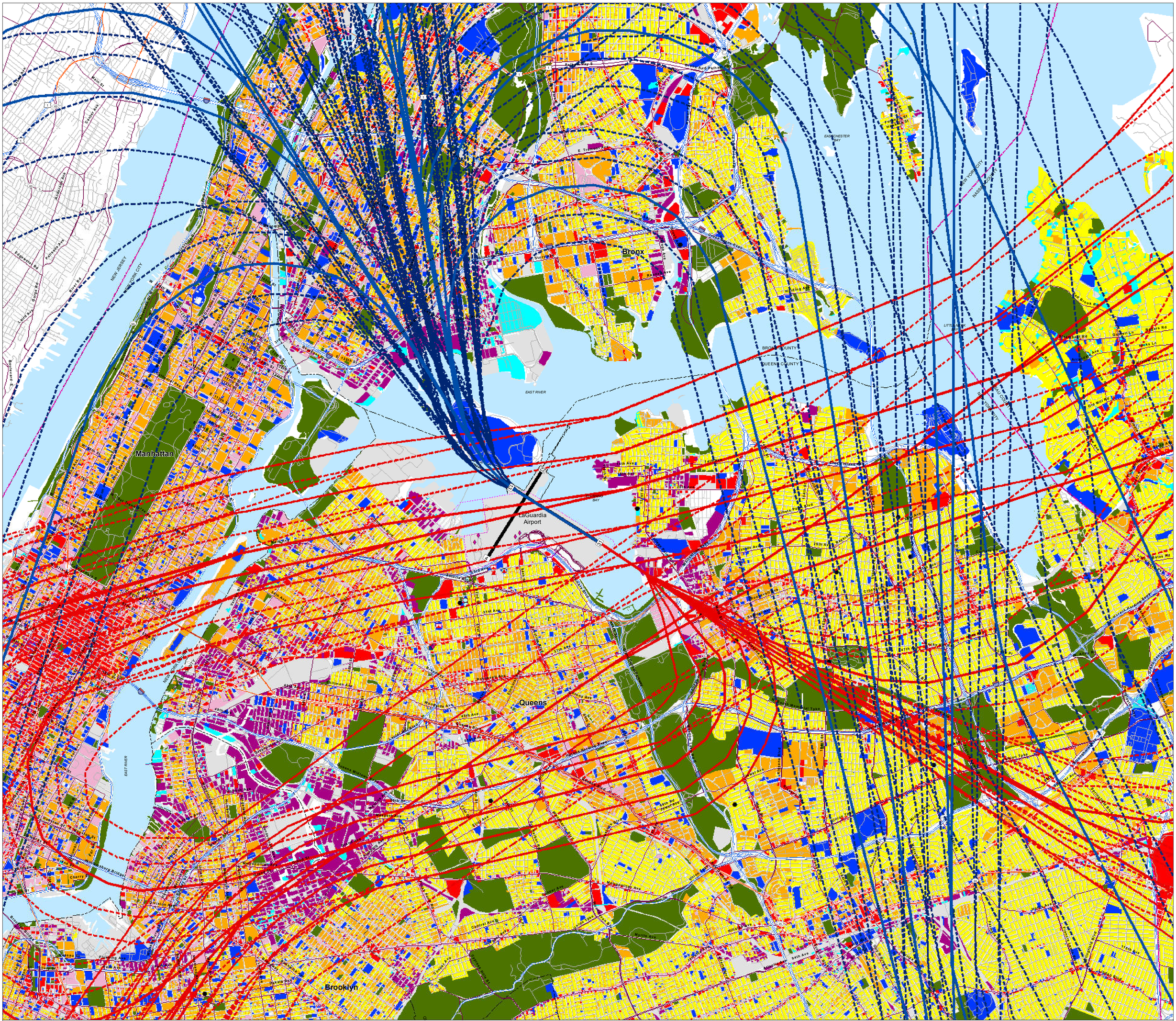
2021 With Program: INM Flight Tracks - Runway 22

Map 4 of 6

LaGuardia Airport



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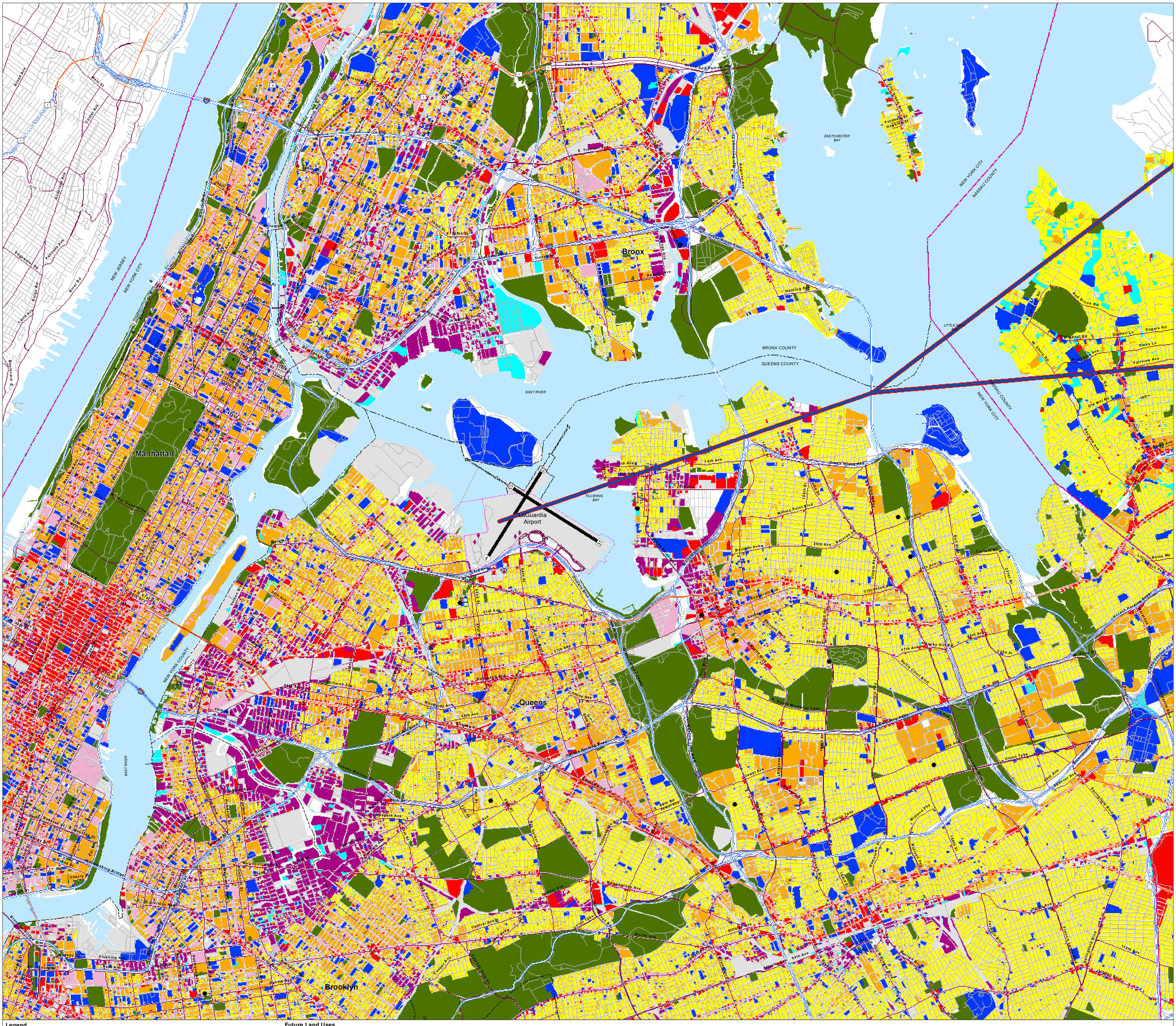
2021 With Program: INM Flight Tracks - Runway 31

Map 5 of 6

LaGuardia Airport



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2021 With Program: INM Helicopter Flight Tracks

Map 6 of 6

LaGuardia Airport

I-3 Supporting Documentation

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FOR IMMEDIATE DISTRIBUTION

CONTACT: Delta Corporate Communications
404-715-2554
news archive at news.delta.com

Delta to fly newer, quieter, more efficient aircraft at New York's LaGuardia Airport
Airline removing MD-88 aircraft from scheduled flying

NEW YORK, March 1, 2017 — Delta will stop flying MD-88 aircraft on a scheduled basis at New York's LaGuardia Airport effective March 2. The airline will instead fly existing MD-88 routes on a mix of quieter, more fuel-efficient Airbus A320 family aircraft, Boeing 737s and a limited number of MD-90 mainline aircraft, minimizing environmental impact at the busy airport and reducing overflight noise for nearly two million nearby residents.

"We're committed to providing our customers an exceptional flying experience when traveling through New York airports while also considering our responsibility to the communities where we live and serve," said Henry Kuykendall, Delta's Vice President – New York. "Delta flights on quieter, more efficient and larger aircraft are good for the community and will also support NextGen initiatives around more fuel-efficient GPS routes in New York airspace, the most congested in the world."

As New York's No. 1 airline, Delta's removal of the roughly 30 daily scheduled MD-88 departures from LaGuardia underscores its commitment to travelers flying through the primarily business-focused airport. Later this year, Delta service between Atlanta and LaGuardia will fly on larger-gauge Airbus A320s and Boeing 737-900ERs, which feature all-new, modern interiors with large, sculpted overhead bins and, on the Boeing 737-900ER, seat-back in-flight entertainment. By summer 2018, Delta's Airbus A320 aircraft will also feature seat-back in-flight entertainment screens.

"I applaud Delta's commitment to updating its fleet at LaGuardia," said New York Senator Chuck Schumer. "Newer and quieter aircraft bring benefits not only to Delta, but to the communities surrounding LaGuardia."

"We are delighted that Delta is replacing its MD-88s with much newer equipment," noted Congresswoman Grace Meng, who represents large portions of Queens. "Queens residents should notice and appreciate the reduction in noise levels."

Queens Borough President Melinda Katz added, "It is always good to see Delta taking actions that make good business sense while addressing the neighborhoods where it operates."

Delta expects to take delivery of more than 50 new aircraft this year, including Boeing 737-900ERs, Airbus A321s, A330-300s and the Airbus A350, the airline's international flagship. In 2018, Delta is scheduled to take delivery of the Bombardier CS100. All aircraft feature state-of-the-art efficiency and engine decibel performance. Delta will redeploy MD-88 flying at its other U.S. hubs.

Building on the more than $2 billion Delta has invested in New York airports over the past seven years, the airline recently announced its plans to redevelop its terminals at LaGuardia as part of a broader plan to redesign and rebuild the facility. More information on Delta's $4 billion, state-of-the-art complex, which will result in a dramatically improved airport and customer experience, is available on delta.com.

Delta operates roughly 270 daily departures from its LaGuardia hub on a mix of mainline and regional aircraft to more than 50 destinations across North America.

Delta Air Lines serves more than 180 million customers each year. In 2017, Delta was named to Fortune's top 50 Most Admired Companies in addition to being named the most admired airline for the sixth time in seven years. Additionally, Delta has ranked No.1 in the Business Travel News Annual Airline

survey for an unprecedented six consecutive years. With an industry-leading global network, Delta and the Delta Connection carriers offer service to 323 destinations in 57 countries on six continents. Headquartered in Atlanta, Delta employs more than 80,000 employees worldwide and operates a mainline fleet of more than 800 aircraft. The airline is a founding member of the SkyTeam global alliance and participates in the industry's leading transatlantic joint venture with Air France-KLM and Alitalia as well as a joint venture with Virgin Atlantic. Including its worldwide alliance partners, Delta offers customers more than 15,000 daily flights, with key hubs and markets including Amsterdam, Atlanta, Boston, Detroit, Los Angeles, Minneapolis/St. Paul, New York-JFK and LaGuardia, London-Heathrow, Paris-Charles de Gaulle, Salt Lake City, Seattle and Tokyo-Narita. Delta has invested billions of dollars in airport facilities, global products and services, and technology to enhance the customer experience in the air and on the ground. Additional information is available on the Delta News Hub, as well as delta.com, Twitter @DeltaNewsHub, Google.com/+Delta, and Facebook.com/delta.

###

Elizabeth Wolf
Corporate Communications
Delta Air Lines, Inc.
o: 212-259-2008 | m: 917-376-0365

From: Lundrigan, Julia S <julia.lundrigan@delta.com>
Sent: Monday, July 17, 2017 12:59 PM
To: Chris Sequeira
Cc: Michael Arnold; Steven Alverson
Subject: RE: Retirement of MD-88 Aircraft Type at LGA

Chris,
Our M88's at LGA have been replaced by the 319/320/321. We can assume an even distribution among the three fleets for the current operations at LGA. Unfortunately, network does not have exact operation information broken down as requested for the future. I believe you already have information for our 320's.
319: CFM56-5-A5
321: CFM56-5B3/3

Does this provide you with enough information? I apologize that I cannot provide more detail and for the delay.
Regards,

Julia Lundrigan

Engineer
Performance Engineering
Delta Air Lines
O: 404-773.2882
M: 678-427-1350

Every Customer. Every Flight. Every Day.

From: Chris Sequeira [mailto:CSequeira@esassoc.com]
Sent: Thursday, June 29, 2017 1:26 PM
To: Lundrigan, Julia S <julia.lundrigan@delta.com>
Cc: Michael Arnold <MArnold@ESASSOC.com>; Steven Alverson <SAlverson@esassoc.com>
Subject: Retirement of MD-88 Aircraft Type at LGA

Dear Julia,

The ESA Study Team is aware of the March 2017 retirement of MD-88 aircraft from Delta's LGA fleet. Through agreement with the FAA and the Port Authority, the ESA Study Team will be revising the year 2021 Noise Exposure Map (NEM) to reflect this retirement as a part of the Noise Compatibility Program (NCP) phase of the LGA 14 CFR Part 150 Study. In order to do this, we are seeking information from Delta about what aircraft are projected to replace the MD-88s in the year 2021.

The Final LGA NEM Report indicates that there were 7,132 MD-88 operations (3,566 departure and 3,566 arrivals) expected to occur in the year 2021. For the purposes of 14 CFR Part 150, we must replace these MD-88 operations with the same combined total of replacement aircraft operations. The detailed information that we are seeking is:

- The aircraft/engine types replacing MD-88s
- Stage lengths of the replacement aircraft types
- Number of operations of the aircraft types, by day (7 A.M. to 10 P.M.) and night (10 P.M. to 7 A.M.); the total of all operations (3,566 departure and 3,566 arrivals) must equal 7,132

The two tables below show the information format that would be most helpful for us to expedite revision of the year 2021 modeled fleet.

Arrivals

Aircraft/Engine Type	Annual Daytime Operations	Annual Nighttime Operations

Departures

Aircraft/Engine Type	Stage 1 Annual Ops		Stage 2 Annual Ops		Stage 3 Annual Ops		Stage 4 Annual Ops	
	Day	Night	Day	Night	Day	Night	Day	Night

We would appreciate receiving this information at your earliest convenience. Would you be able to let us know when it could be provided? Please give me a call if you have any questions. Thank you for your help.

Best wishes,

Chris Sequeira
Senior Managing Associate
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CHAPTER 2
2021 Revised Noise Exposure Map

The Port Authority submitted the 2016 and 2021 LGA NEMs to the FAA for acceptance in late March 2017. The NEMs for the LGA 14 CFR Part 150 Study were published in the LGA NEM Report and accepted by the FAA on May 5, 2017. However, a few weeks prior to the Port Authority's March submittal of the NEMs, Delta Air Lines announced that it would cease operations of its MD-88 aircraft at LGA on March 2, 2017. This announcement is provided on **page I-10** of **Appendix I-3**. The removal of the MD-88 aircraft and replacement with other aircraft types affects the noise environment in the vicinity of LGA because the MD-88 aircraft is one of the loudest aircraft operating in the U.S. commercial aircraft fleet during departure, but is one of the quietest aircraft operating in the U.S. commercial aircraft fleet during arrival.

In the interest of keeping the LGA 14 CFR Part 150 Study on schedule, the Port Authority decided to submit the NEMs for acceptance (with the Delta Air Lines' MD-88 aircraft included) in 2017, but promised that an updated 2021 NEM would be developed during the NCP process, which reflect the removal of Delta Air Lines' MD-88 aircraft from LGA's operational fleet and the MD-88's replacement with other aircraft types. This chapter presents the methods and data used to produce the noise contours that are depicted on the 2021 Revised NEM, which includes the removal of Delta Air Lines' MD-88 aircraft from LGA's operational fleet.

2.1 Noise Model and Day-Night Average Sound Level

The LGA 14 CFR Part 150 Study was initiated when the FAA's INM Version 7.0d was the required model for preparing noise contours.[13] As the Study is still ongoing, the 2021 Revised NEM has also been prepared using this version of the INM. The INM was used to produce contours to delineate specific levels of noise exposure. As discussed in detail in **Section 1.4** of this NCP, DNL, expressed in 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 an additional weight of 10 dB for those noise events occurring between 10:00:00 P.M. and 6:59:59 A.M. The DNL metric is the noise descriptor required by the FAA for aircraft noise exposure and land use compatibility planning under 14 CFR Part 150.

13 The FAA's AEDT replaced both the INM and Emissions and Dispersion Modeling System (EDMS) as the required tool for noise, fuel burn, and emissions modeling on May 29, 2015. Updating the aircraft noise exposure information in this 14 CFR Part 150 Study was not required because the Study and substantial work on the analysis of noise at LGA was initiated prior to May 29, 2015.

2.2 Data for Developing the 2021 Revised NEM

The following sections summarize the information used to develop the 2021 Revised NEM.

2.2.1 Forecast Annual Aircraft Operations and Fleet Mix

The Port Authority developed the *LaGuardia Airport (LGA) Aircraft Fleet Mix and Annual Aircraft Operations Forecast 2014-2033* (LGA NEM Forecast) through an independent consultant for use in the LGA 14 CFR Part 150 Study. Using the LGA 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 LGA NEM forecast and the derivative forecast were approved by the FAA on March 28, 2016. The fleet mix used for the 2021 Revised NEM is identical to that used in the 2021 FAA-accepted NEM, except for the operations of MD-88 aircraft. The routes at LGA that were served by Delta Air Lines' MD-88 aircraft are now being served by Airbus A319, A320, and A321 aircraft. Delta Air Lines informed the Study Team that MD-88 operations would be evenly distributed among Airbus A319, A320, and A321 aircraft types (i.e., one-third of the MD-88 operations would go to each Airbus type). Based on a conversion of these aircraft types to INM aircraft types, the Study Team assumed that 66 percent of the 7,132 MD-88 operations[14] used for the 2021 FAA-accepted NEM should be changed to the INM aircraft type A320-211 and 34 percent to the A321-211 for the purpose of noise modeling. The aircraft type A320-211 was used to represent both the A319 and the A320 because the FAA's Office of Environment and Energy approved the INM aircraft A320-211 as the modeling substitute for the A319 with CFM56-5A5 engines on August 13, 2015. This approval is provided in Appendix G-1 of the LGA NEM Report. Correspondence with Delta Air Lines regarding aircraft types is included on **page I-12** of **Appendix I-3**. The number of forecast annual aircraft operations at LGA used in the production of the 2021 Revised NEM, by aircraft type, is summarized in **Table 2-1**.

2.2.2 Aircraft Operations by Time of Day

Aircraft operations modeled in the INM are assigned as occurring during daytime (7:00:00 A.M. to 9:59:59 P.M.) or nighttime (10:00:00 P.M. to 6:59:59 A.M.). **Table 2-2** summarizes the times of day in which aircraft arrivals and departures are expected to occur in 2021 (by percent of total operations), as used in the development of the 2021 Revised NEM. The Port Authority's 2014 Aircraft Noise and Operations Management System (ANOMS)[15] data served as the primary source for the types of operations (arrival or departure) and time-of-day information, since ANOMS captures actual arrival and departure times versus scheduled times. The 2021 Revised NEM assumes identical daytime and nighttime activity levels as the 2021 FAA-accepted NEM.

[14] Table 4-1 of the LGA NEM Report.

[15] ANOMS is an aircraft noise and flight track data collection system produced by EMS Brüel & Kjær, which is described further in **Section 5.1**.

TABLE 2-1
2021 REVISED NEM ANNUAL AIRCRAFT OPERATIONS BY INM AIRCRAFT TYPE

Aircraft Category	Aircraft Type	INM Aircraft Type	2021 Annual Operations
Widebody	Boeing 767-300	767400	30
		Widebody Total	***30***
Narrowbody	Boeing 757-200	757PW	576
		757RR	24
	Boeing 737-800 / 900	737800	37,923
	Boeing 737-600 / 700	737700	28,828
	Boeing 717-200	717200	20,530
	Airbus A321 / A321neo	A321-232	10,979
	Airbus A320 / A320neo	A320-211	28,986
		A320-232	27,338
	Airbus A319	A319-131	3,622
	MD-90	MD9025	1,134
		MD9028	5,445
	Embraer 190	EMB190	24,713
		Narrowbody Total	***190,098***
Regional Jet	Canadair RJ 700 / 900	CRJ9-ER	103,812
	Embraer 175	EMB175	48,192
	Embraer 170	EMB170	38,000
		Regional Jet Total	***190,004***
General Aviation	Business Jet	CL600	875
		CNA525C	93
		CNA55B	100
		CNA560E	274
		CNA560XL	775
		CNA680	413
		CNA750	762
		F10062	162
		GIV	738
		GV	1,056
		LEAR35	616
		MU3001	556
	Turboprop	CNA208	185
		CNA441	49
	Helicopter	B407	106
		S76	106
		SA355F	186
	Piston	GASEPV	50
		General Aviation Total	***7,102***
All Aircraft			**387,234**

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

SOURCES: *LaGuardia Airport Aircraft Fleet Mix and Annual Aircraft Operations Forecast 2014-2033*. Port Authority of New York and New Jersey. March 23, 2016. Adapted by ESA, 2016, and KB Environmental Sciences, Inc., 2017 and 2020.

TABLE 2-2
2021 REVISED NEM AIRCRAFT OPERATIONS (ALL AIRCRAFT) BY TIME OF DAY

	Arrivals		Departures	
Study Year	**Day**	**Night**	**Day**	**Night**
2021	91.49%	8.51%	91.76%	8.24%

SOURCE: *LaGuardia Airport Aircraft Fleet Mix and Annual Aircraft Operations Forecast 2014-2033*. Port Authority of New York and New Jersey. March 23, 2016. Adapted by ESA, 2016, and KB Environmental Sciences, Inc., 2017 and 2020.

2.2.3 Runway Use

Runway use refers to the frequency of when aircraft use a particular runway end for departures and arrivals. The runway utilization data were derived from LGA ANOMS data for calendar year 2014. The rates are forecast to remain constant for the 2021 study year. **Table 2-3** provides a summary of arrival and departure runway utilization as used in the production of the 2021 Revised NEM. These runway use assumptions are identical to those used in the 2021 FAA-accepted NEM.

TABLE 2-3
2021 REVISED NEM RUNWAY USE (ALL FIXED-WING AIRCRAFT)

	Runway 4	Runway 22	Runway 13	Runway 31
Arrivals (Time of Day)				
Daytime Arrivals	20.36%	47.88%	2.61%	29.15%
Nighttime Arrivals	18.64%	45.76%	6.12%	29.49%
Departures (Time of Day)				
Daytime Departures	26.17%	1.18%	47.35%	25.30%
Nighttime Departures	25.75%	1.67%	45.01%	27.57%

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

SOURCES: KB Environmental Sciences, Inc., 2016 and 2020; Port Authority of New York and New Jersey, ANOMS data for calendar year 2014.

2.2.4 Flight Tracks and Utilization

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 LGA, aircraft arrival and departure data from the Port Authority's ANOMS were reviewed for calendar year 2014. The 2014 data were used to develop the flight tracks for use in the INM. Flight corridors used 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 in Maps 2 through 6 of **Appendix I-1**. The INM flight track locations and utilization percentages used in the 2021 Revised NEM are identical to those developed for the 2021 FAA-accepted NEM.

2.2.5 Departure and Arrival Profiles

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 LGA 14 CFR Part 150 Study, to better represent how aircraft operate to and from LGA. Discussions with representatives of various airlines that operate at LGA indicated that slower than INM default climb rates are observed partly because aircraft are departing with weights that are higher than the INM default takeoff weights, and partly because the takeoff thrust values identified by the airline personnel are lower than the default INM thrust values. These modifications result in a better depiction of the noise exposure around LGA and are identical to those used in the 2021 FAA-accepted NEM.

2.3 2021 Revised NEM Contours

The 2021 Revised NEM contours are depicted in **Figure 2-1** and are superimposed over a future land use map. The 2021 FAA-accepted NEM contours are also depicted in **Figure 2-1** to permit a visual comparison with the 2021 Revised NEM contours. In accordance with 14 CFR Part 150, the 2021 Revised NEM contours reflect the anticipated noise conditions based on Airport and operational data that are representative of the year 2021. The types and amounts of land uses within the DNL 65 and higher contours are provided in **Table 2-4**. The NYC Department of City Planning is the sole land use agency for all land within the 2021 Revised NEM DNL 65 contour. **Table 2-5** presents the estimated land area, number of dwelling units, and population exposed to DNL 65 and higher for the 2021 Revised NEM and the 2021 FAA-accepted NEM. **Table 2-6** presents historic sites, non-residential noise-sensitive sites, and total land area exposed to DNL 65 and higher for the 2021 Revised NEM and the 2021 FAA-accepted NEM. **Table 2-7** lists the historic sites and non-residential noise-sensitive sites exposed to DNL 65 and higher for the 2021 Revised NEM and the 2021 FAA-accepted NEM. Several schools within the DNL 65 contour have already been sound-insulated and are therefore considered compatible with aircraft noise levels of DNL 65 and higher, as indicated in the table. The full map set of the 2021 Revised NEM is included in **Appendix I-1**.

2.4 Stakeholder Engagement and Opportunities for Public Comment

The removal of MD-88 aircraft types from Delta Air Lines' fleet was discussed with the TAC and the public during TAC Meeting #12 on April 20, 2017. At that time, the Port Authority stated that any changes in the 2021 NEM would be reflected in the LGA NCP. The draft revised 2021 NEM DNL contours were presented during TAC Meeting #14 on October 19, 2017. Questions raised during the meetings were answered by the Port Authority and Study Team; the presentation slides and summary notes (including comments and responses) can be found in **Appendix D-7**. The draft 2021 Revised NEM will be provided at the LGA NCP public information workshops and public hearing described in Section 6.2.2. During the comment period for the Draft NCP, interested stakeholders had the opportunity to review and comment on the 2021 Revised NEM. Comments will receive written responses in the Final NCP.

TABLE 2-4
LAND USES EXPOSED TO DNL 65 AND HIGHER – 2021 REVISED NEM

Land Use Category	Land Uses Exposed to DNL 65 and Higher (acres)			
	DNL 65-70	DNL 70-75	DNL 75+	Total
Single- and Two-Family Residential	40.5	0.0	0.0	40.5
Multi-Family Residential	35.3	0.0	0.0	35.3
Mixed Residential and Commercial	6.8	0.0	0.0	6.8
Commercial and Office	39.5	2.6	0.0	42.1
Industrial and Manufacturing	56.9	11.4	0.0	68.3
Transportation, Right of Way, Parking, and Utilities	210.2	13.4	3.4	227.0
Public Facilities and Institutions	197.0	6.8	0.0	203.8
Open Space, Cemeteries, and Outdoor Recreation	25.3	4.9	0.0	30.2
Vacant	29.6	5.5	0.0	35.2
Airport Property	171.1	151.3	269.0	591.4
Water (Off Airport Property)	694.5	284.7	49.7	1028.8
Total	**1506.7**	**480.6**	**322.1**	**2309.4**

NOTE: Numbers may not add up due to rounding.

SOURCE: Planning Technology, Inc. and KB Environmental Sciences, Inc., 2018 and 2020.

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; KB Environmental Sciences, Inc., 2016; ESA, 2016 and 2020; ESRI Mapping Services, 2019; Google Earth Aerial Imagery Research, Image © 2020 CNES/Airbus.

*The PLUTO Transportation land use designations on LGA were updated to reflect new airport facilities that were constructed during the LGA Redevelopment Project.

ESA

LaGuardia Airport 14 CFR Part 150 Study . 140037

Figure 2-1

2021 FAA-Accepted and Revised Noise Exposure Map DNL Contours LaGuardia Airport

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TABLE 2-5
RESIDENTIAL LAND USES, DWELLING UNITS, AND POPULATION EXPOSED TO DNL 65 AND HIGHER – 2021 FAA-ACCEPTED NEM AND 2021 REVISED NEM

Land Use Category	Land Area Exposed to DNL 65 and Higher (acres)			Number of Dwelling Units			Population		
	2021 FAA-Accepted NEM	2021 Revised NEM	Difference	2021 FAA-Accepted NEM	2021 Revised NEM	Difference	2021 FAA-Accepted NEM	2021 Revised NEM	Difference
Single-Family and Two-Family Residential	40.4	40.5	0.1	1,207	1,215	8	3,556	3,582	26
Multi-Family Residential	35.2	35.3	0.1	1,739	1,742	3	4,436	4,444	8
Mixed Residential and Commercial	6.5	6.8	0.3	860	833	-27	2,275	2,208	-67
Total	**82.1**	**82.6**	**0.5**	**3,806**	**3,790**	**-16**	**10,267**	**10,234**	**-33**

NOTE: Numbers may not add up due to rounding. Differences were computed by subtracting the 2021 FAA-accepted NEM results from the 2021 Revised NEM results. 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.

SOURCE: Planning Technology, Inc., KB Environmental Sciences, Inc., and ESA, 2017 and 2020.

TABLE 2-6
HISTORIC SITES, NON-RESIDENTIAL NOISE-SENSITIVE SITES, AND TOTAL LAND AREA EXPOSED TO DNL 65 AND HIGHER – 2021 FAA-ACCEPTED NEM AND 2021 REVISED NEM

Noise Exposure Map	Total Land Area (acres)	Places of Worship	Schools[1]	Hospitals and Residential Healthcare	Historic Sites	Day Care Facilities
2021 FAA-Accepted NEM	2,389.4	7	3	2	13	3
2021 Revised NEM	2,309.4	7	3	1	13	3
Difference	**-80.0**	0	**0**	**-1**	**0**	**0**

NOTE: Differences were computed by subtracting the 2021 FAA-accepted NEM from the 2021 Revised NEM results.

1. These schools were included in the School Soundproofing Program and are compatible with DNL 65 and higher (see Section 2.6.1 of the LGA NEM Report).

SOURCE: Planning Technology, Inc., KB Environmental Sciences, Inc., and ESA, 2017 and 2020.

TABLE 2-7
HISTORIC SITES AND NON-RESIDENTIAL NOISE-SENSITIVE SITES EXPOSED TO AIRCRAFT NOISE LEVELS OF DNL 65 AND HIGHER – 2021 FAA-ACCEPTED NEM AND 2021 REVISED NEM

Name	Address	Facility Type	Within 2021 FAA-Accepted NEM DNL 65 and Higher?	Within 2021 Revised NEM DNL 65 and Higher?
Idara Tableegh Ul-Islam	23-38 81st St	Place of Worship	Y	Y
Roman Catholic Church Our Lady of Fatima Convent	25-56 80th St	Place of Worship	Y	Y
Our Lady of Fatima Roman Catholic Church	25-02 80th St	Place of Worship	Y	Y
The Korean Church of Queens	23-27 89th St	Place of Worship	Y	Y
Ebenezer Baptist Church	36-12 Prince St	Place of Worship	Y	Y
Ebenezer Baptist Church	36-06 Prince St	Place of Worship	Y	Y
Gospel Calvary Church	134-28 Northern Blvd	Place of Worship	Y	Y
Monsignor McClancy Memorial High School	71-06 31st Ave	School[1]	Y	Y
Our Lady of Fatima School	25-38 80th St	School[1]	Y	Y
Vaughn College of Aeronautics & Technology	86-01 23rd Ave	School[1]	Y	Y
Independence Residences, Inc.	33-23 69th St	Health Care-Residential	Y	Y
New York Foundling Hospital	153 Stephens Ave	Health Care-Residential	Y	N
Jackson Heights Historic District	33-11 70th St, Queens	Historic Site	Y	Y
Jackson Heights Historic District	33-12 70th St, Queens	Historic Site / Attached Residence	Y	Y
Jackson Heights Historic District	33-14 70th St, Queens	Historic Site / Attached Residence	Y	Y
Jackson Heights Historic District	33-16 70th St, Queens	Historic Site / Attached Residence	Y	Y
Jackson Heights Historic District	33-18 70th St, Queens	Historic Site / Attached Residence	Y	Y
Jackson Heights Historic District	33-20 70th St, Queens	Historic Site / Attached Residence	Y	Y
Jackson Heights Historic District	33-22 70th St, Queens	Historic Site / Attached Residence	Y	Y
Empire Millworks Building, 1938	128-50 Willets Point Blvd	Historic Site	Y	Y
Hangar 3 (1939; Delano & Aldrich)	La Guardia Airport	Historic Site	Y	Y
Hangar 5 (1939; Delano & Aldrich)	La Guardia Airport	Historic Site	Y	Y
Hangar 7 (former sea plane hangar, ca. 1939)	La Guardia Airport	Historic Site	Y	Y
Marine Air Terminal	La Guardia Airport	Historic Site	Y	Y
Jackson Heights Historic District	Jackson Heights	Historic District[2]	Y	Y
Flushing Day Care Center, Inc.	36-06 Prince St	Day Care-Assisted Living	Y	Y
Grace Day Care Center, Inc.	89-00 23rd Ave	Day Care-Assisted Living	Y	Y
Metro Family Residence	87-02 23rd Ave	Day Care-Assisted Living	Y	Y

NOTES:

[1] This school was included in the School Soundproofing Program and is compatible with DNL 65+ (see Section 2.6.1 of the LGA NEM Report for additional information).

[2] To calculate the DNL value for the Jackson Heights Historic District, an INM noise receptor location point was placed at the northwest corner of the land use polygon representing the District.

SOURCES: KB Environmental Sciences, Inc., 2020; ESA, 2020.

CHAPTER 3
Noise Compatibility Program – Noise Abatement Measures

Introduction

The Port Authority has implemented noise abatement measures at its airports for several decades; this implementation process substantially predates the Port Authority's 14 CFR Part 150 Studies. Noise abatement measures are those that control noise at the source. Such strategies include airport layout modifications, flight path changes, preferential runway use, and arrival and departure flight procedures. The intention of noise abatement in the NCP is to reduce the number of people and noise-sensitive sites exposed to aircraft noise levels of DNL 65 and higher.[16]

The 14 CFR Part 150 process requires a complete review of existing and potential noise abatement measures that could reduce the number of people exposed to DNL 65 and higher. This includes, at a minimum, a review of the following measures:[17]

- Changes in flight tracks
- Implementation of preferential runway use
- Changes in arrival and departure procedures
- Implementation of airport layout modifications
- Implementation of airport use restrictions

As presented in the LGA NEM Report (Section 2.2.4), LGA is located in one of the most highly congested airspaces in the country. LGA is within 25 miles of two other large-hub airports (JFK and EWR) and the airport with the most domestic business jet operations in the country (TEB[18]), and is within 50 miles of three other general aviation airports that serve the New York–New Jersey metropolitan area.[19] The number and types of noise abatement measures that can be implemented are consequently limited by the congested airspace and the need to prevent conflicts in the use of airspace.

16 14 CFR Part 150, Appendix A, Table 1.

17 14 CFR Part 150, Appendix B, Sec. 150.7(b).

18 FAA Business Jet Report: October 2019 Issue. Available: https://aspm.faa.gov/apmd/sys/bjpdf/b-jet-201910.pdf.

19 Large Hub airports are those airports that each account for at least 1 percent of total U.S. passenger enplanements. General aviation airports primarily serve civil aircraft that are not engaged in commercial air transport operations.

This chapter details the following eight noise abatement measures recommended for inclusion in this NCP:

- Modify NTHNS and GLDMN Runway 13 RNAV SIDs to Direct Aircraft Away from Flushing, New York
- Create New Runway 13 Departure Procedure with an Immediate Left Turn over Compatible Land Uses
- Implement Offset Approach to Runway 22 to Reduce Noise Exposure Over Clason Point.
- Reduce Runway 4 Departure Noise Over Clason Point
- Reduce Runway 13 Departures at Night
- Implement Noise Abatement Departure Profiles on a Voluntary Basis for Runways 4 and 13
- Implement Nighttime Optimized Profile Descent Procedures
- Continue Existing Mandatory Departure Noise Limit

3.1 Existing Aircraft Noise Abatement Program

The Port Authority has pursued aircraft noise abatement measures for several decades. In 1959, it established a mandatory aircraft departure noise limit of 112 Perceived Noise Decibels (PNdB) for aircraft departures.[20] PNdB expresses the perceived loudness of an individual aircraft noise event. To enforce the departure noise limit, the Port Authority installed an airport noise monitoring system, which originally consisted of three monitors. Currently, 10 monitors are located near LGA (**Figure 3-1**). The original system required manual correlation of measured noise levels with individual aircraft operations, but a system upgrade in 1992 added flight tracking and automated this process. The mandatory departure noise limit is a measure that was established before such measures were restricted by the Airport Noise and Capacity Act of 1990 (ANCA). Aircraft operators that violate the mandatory aircraft departure noise limit are contacted by the Port Authority and informed of the violation.

The passage of ANCA subsequently prohibited operation of Stage 2 aircraft, with a maximum weight above 75,000 pounds, in the United States after December 31, 1999. This prohibition provided noise benefits nationwide, including the communities surrounding LGA. ANCA also prevented the Port Authority from establishing additional operational restrictions on Stage 2 (or quieter, such as Stage 3) 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) prohibited operation of Stage 2 aircraft, with weights of 75,000 pounds or lower, within the 48 contiguous United States after December 31, 2015.

[20] United States Environmental Protection Agency. "Legal and Institutional Analysis of Aircraft and Airport Noise and Apportionment of Authority Between Federal, State, and Local Governments." July 27, 1973. Page 2-57.

SOURCE: https://aircraftnoise.panynj.gov/aircraft-noise-monitors/lga-noise-monitor-locations, 2020; ESRI Mapping Services; ESA 2020.

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Figure 3-1

Noise Monitor Locations Proximate to the Airport
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On December 23, 1976, the FAA promulgated Noise Abatement Operating Restrictions in 14 CFR Part 91, which prohibit the operation of most domestic Stage 1 aircraft after January 1, 1985.[21,22] Consistent with the FAA's amendment to 14 CFR Part 91, the Port Authority prohibited[23] the use of Stage 1 aircraft at LGA, JFK, and EWR after January 1, 1985. In 1989, the Port Authority also prohibited the scheduling of additional nighttime flights of Stage 2 aircraft at LGA, JFK, and EWR.[24] Stage 3 aircraft operating at LGA, JFK, and EWR are not subject to the Stage 1 and Stage 2 use restrictions, as they meet the noise standards set forth in 14 CFR Part 36, Appendix B, Sec. 36.5(c).

Table 3-1 presents a timeline of noise abatement actions taken by the Port Authority, U.S. Congress, and the FAA. The table also highlights the Port Authority and federal actions that have provided noise benefits to communities in the vicinity of LGA.

Section 3.2 describes the Port Authority's noise abatement recommendations and analyzes these recommendations. **Section 3.3** identifies the noise abatement strategies that the Port Authority considered, but does not recommend including in this NCP, and explains why those strategies are not being recommended. **Section 3.4** presents a 2021 NEM representing the noise environment in the vicinity of LGA as a result of noise abatement measures that will be implemented in the year 2021, referred to as the "2021 With Program NEM."

To determine the potential benefits of the recommended noise abatement measures presented in **Section 3.2** of this NCP, the INM was used to model each measure by assigning the INM inputs as described in **Section 3.2**. As previously noted, the LGA 14 CFR Part 150 Study was initiated in October 2014, prior to the FAA's release of the AEDT on May 29, 2015. When the study began, INM 7.0d was the most current FAA-approved model for determining aircraft noise exposure around airports, and it was identified as the model required for use in this study. The FAA's approval of the use of INM 7.0d for this study can be found in Appendix G of the LGA NEM Report.

The INM uses data on aircraft operational counts, operating times of day, fleet mix, and altitude profiles to develop noise exposure contours. The INM accounts for each aircraft flight along flight tracks departing from, or arriving to, an airport during an annual average day. The flight tracks are coupled with information in the model's database relating to noise frequencies and magnitudes at varying distances and flight performance data for each type of aircraft. In general, the model computes and sums noise exposure at grid locations at ground level around an 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 exposure at user-defined points.[25]

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21 "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).

22 41 FR 56046, "Noise Abatement Operating Restrictions: Limitations for Certain Turbojets, Propeller-Driven Small Airplanes, and Agricultural-Operation and Fire Fighting Propeller-Driven Aircraft," December 23, 1976.

23 Available: https://aircraftnoise.panynj.gov/aircraft-noise-engagement-history/.

24 "Stage 2" aircraft meet the noise standards in 14 CFR Part 36, Appendix B, Sec. 36.5(b), originally established in 1969.

25 For the LGA 14 CFR Part 150 Study, the locations of non-residential noise-sensitive sites were represented as user-defined points.

TABLE 3-1
TIMELINE OF LGA NOISE ABATEMENT ACTIONS

Timeline of LGA Noise Abatement Actions

Event	1959	1976	1979	1984	1985	1989	1990	1991	1992	2000	2012	2014	2016	2017	2018
Port Authority establishes a noise limit at LGA of 112 Perceived Noise Decibels (PNdB) for aircraft departures and installs an airport noise monitoring system[1]	Port Authority														
FAA promulgates Noise Abatement Operating Restrictions in 14 CFR Part 91 prohibiting the operation of most domestic Stage 1 aircraft after January 1, 1985.[2,3]		FAA													
Congress passes the Aviation Safety and Noise Abatement Act (ASNA), requiring the FAA to establish processes for aircraft noise measurement and noise compatibility planning			Congress												
FAA promulgates 14 CFR Part 150, Airport Noise Compatibility Planning, in response to requirements of ASNA				FAA											
Consistent with the FAA's December 23, 1976 amendment to 14 CFR Part 91, Port Authority prohibits the use of Stage 1 aircraft at JFK, LGA, and EWR					Port Authority										
Port Authority prohibits the scheduling of nighttime flights of Stage 2 aircraft at JFK, LGA, and EWR[4]						Port Authority									
Congress passes the Airport Noise and Capacity Act of 1990 (ANCA), preventing airports nationwide from establishing additional operational restrictions on Stage 2 (or quieter) aircraft in flight without FAA approval							Congress								
FAA promulgates 14 CFR Part 161, Notice and Approval of Airport Noise and Access Restrictions, in response to requirements of ANCA								FAA							
Port Authority adds flight tracking to noise monitoring system, enabling automatic correlation of flights with noise events									Port Authority						
ANCA prohibits U.S. operations of Stage 1 and 2 aircraft with maximum weight above 75,000 pounds, providing noise benefits nationwide										Congress					
Congress passes the FAA Modernization and Reform Act of 2012 (FMRA)											Congress				
Port Authority initiates 14 CFR Part 150 Studies for JFK, LGA, EWR, and TEB												Port Authority			
FMRA prohibits U.S. operations of Stage 1 and Stage 2 aircraft with maximum weight at or below 75,000 pounds within the 48 contiguous United States													Congress		
FAA promulgates the Stage 5 noise standard; this standard is effective December 31, 2017 for new airplanes with a maximum takeoff weight of at least 121,254 pounds, and December 31, 2020 for new airplanes with a maximum takeoff weight of less than 121,254 pounds														FAA	
Congress passes the FAA Reauthorization Act of 2018															Congress

1. PNdB expresses the perceived loudness of an individual aircraft noise event. 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.
2. 41 FR 56046, "Noise Abatement Operating Restrictions: Limitations for Certain Turbojets, Propeller-Driven Small Airplanes, and Agricultural-Operation and Fire Fighting Propeller-Driven Aircraft," December 23, 1976.
3. "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).
4. "Stage 2" aircraft met the noise standards in 14 CFR Part 36, Appendix B, Section 36.5(b), originally established in 1969.

Note: Timeline is not to scale

For the analysis of noise abatement measures in this NCP, the INM-computed noise exposure associated with each measure was combined with demographic data from the U.S. Census Bureau and land parcel data provided by New York City to determine the land use and population potentially exposed to noise levels of DNL 65 and higher. To determine the potential benefits of each noise abatement measure, the 2021 Revised NEM was used for comparison. The 2021 Revised NEM is presented in **Chapter 2**. The potential benefits of each noise abatement measure were determined by calculating the changes in land use and population exposed to noise levels of DNL 65 and higher associated with each noise abatement measure in comparison with the 2021 Revised NEM.

3.2 Recommended Noise Abatement Measures

This section describes noise abatement measures recommended by the Port Authority, the potential benefits and implementation requirements (e.g., the party responsible for implementing a measure) for each measure, the estimated cost to implement, funding sources for the cost of implementation, and requirements to implement such measures, such as potential environmental review requirements. While many parties were involved in arriving at these recommendations, as discussed in **Section 1.3** and **Chapter 6**, the recommendations are solely those of the Port Authority and not those of the TAC, consultants, or other stakeholders.

Each recommended noise abatement measure in this NCP is a notional design that was developed in order to determine potential noise benefits. Any approved noise abatement measures would need to be developed in detail by the FAA. Precise implementation details, such as flight track locations and altitudes, developed by the FAA may differ from the notional noise abatement measure designs presented in this NCP, in order to adequately address safety, efficiency, and aircraft performance considerations. Detailed noise abatement measure designs may require environmental review under NEPA, which may yield different noise results than the results presented in this NCP. Contradictory results arising from subsequent environmental review efforts may be due to differences in approaches to noise abatement measure design or noise modeling methodology. Any NEM updates performed by the Port Authority in the future, in accordance with LGA Program Management Measure 9 (presented in **Section 5.2**), would reflect actual implementation of the NCP measures as of the date of those NEM updates.

The noise abatement measures being recommended by the Port Authority for the LGA NCP are discussed in detail below.

LGA Noise Abatement Measure 1: Modify NTHNS and GLDMN Runway 13 RNAV SIDs to Direct Aircraft Away from Flushing, New York

Description

NTHNS FOUR DEPARTURE (NTHNS procedure) and GLDMN FIVE DEPARTURE (GLDMN procedure) are existing Area Navigation (RNAV)[26] Standard Instrument Departure (SID)[27] procedures at LGA for turbojet aircraft. In both procedures, aircraft departing Runway 13 initially fly a magnetic heading of 134 degrees, then turn right toward the south (185 degrees) and fly toward the first waypoint (KIWIE), located approximately four nautical miles (NM) south of LGA. After reaching the KIWIE waypoint, aircraft then continue either to the south (toward the NTHNS waypoint) or turn back to the north (toward the GLDMN waypoint) and then on to other locations, as directed by Air Traffic Control (ATC). **Figure 3-2** provides a sample of historical flight tracks for aircraft flying these procedures, while the FAA diagrams for these procedures can be found on **pages C-2** and **C-3** of **Appendix C**.

The intention for the modification to the NTHNS and GLDMN procedures is for aircraft to turn to the south sooner after departure than they currently turn when following the existing NTHNS and GLDMN procedures, thereby reducing the likelihood that departing aircraft would overfly the populated areas of Flushing. This would be accomplished by adding a new waypoint at a location approximately 0.4 NM east of LGA, which would serve to direct aircraft away from populated areas of Flushing. The modification of the NTHNS and GLDMN procedures could reduce noncompatible land uses in Flushing. An illustration of the modification is provided in Figure 3-2.

Type of Measure

This measure is a flight procedure modification that could be used to achieve noise benefits within the airspace constraints and reduce exposure of noise-sensitive parcels and people to aircraft noise in the area around LGA. This flight procedure was implemented in May 2020.

Analysis

The FAA provided a draft description of the NTHNS and GLDMN procedure modifications in a Terminal Area Route Generation and Traffic Simulation (TARGETS) software file. The NY TRACON indicated that all aircraft currently flying the NTHNS and GLDMN procedures would be directed to fly the new procedure if it were to be implemented. It was assumed that aircraft that do not currently fly the NTHNS or GLDMN procedures would not be required to do so in the future. Using this information, the Study Team calculated the potential noise benefits of this procedure.

[26] RNAV procedures are flight procedures that typically use satellite navigation capabilities in RNAV-equipped aircraft, so that aircraft can be guided to precise locations without the need to use ground-based navigational aids. Most commercial aircraft are equipped with navigational systems that can follow RNAV procedures.

[27] SIDs are preplanned air traffic control procedures printed for pilot/controller use in graphic form to provide information regarding obstruction clearance and transition from the terminal area to the appropriate en route structure. SIDs are primarily designed for system enhancement and to reduce pilot/controller workload.

Potential Noise Benefits

Figure 3-3 shows the DNL 65, 70, and 75 contours from the modified NTHNS and GLDMN procedure analysis overlaid on residential land use with the 2021 Revised NEM contours. As shown in **Tables 3-2**, **3-3**, and the close-up contour plot in **Figure 3-4**, implementation of this NCP measure may shift the noise contours in the neighborhood westward, reducing the numbers of noncompatible land uses within the DNL 65 contour in Flushing. The shift in noise contours may also remove up to 750 people and 266 dwelling units from the DNL 65 contour. No new people or dwelling units would be added to the contours as a result of the shift, as the noise contours move closer toward compatible land uses. The tables compare the numbers of historic sites, non-residential noise-sensitive sites, and total land area exposed to noise levels of DNL 65 and higher for this NCP measure to the 2021 Revised NEM.

TABLE 3-2
RESIDENTIAL LAND USES EXPOSED TO DNL 65 AND HIGHER – 2021 REVISED NEM AND MODIFY NTHNS AND GLDMN RUNWAY 13 RNAV SIDS TO DIRECT AIRCRAFT AWAY FROM FLUSHING, NEW YORK (NOISE ABATEMENT MEASURE 1)

	Land Area Exposed to DNL 65 and Higher (acres)			Number of Dwelling Units			Population		
Land Use Category	**2021 Revised NEM**	**Noise Abatement Measure 1**	**Difference**	**2021 Revised NEM**	**Noise Abatement Measure 1**	**Difference**	**2021 Revised NEM**	**Noise Abatement Measure 1**	**Difference**
Single-Family and Two-Family Residential	40.5	40.3	-0.2	1,215	1,206	-9	3,582	3,551	-31
Multi-Family Residential	35.3	34.9	-0.4	1,742	1,682	-60	4,444	4,275	-169
Mixed Residential and Commercial	6.8	1.6	-5.2	833	636	-197	2,208	1,658	-550
Total	**82.6**	**76.8**	**-5.8**	**3,790**	**3,524**	**-266**	**10,234**	**9,484**	**-750**

NOTE: Numbers may not add up because of rounding. Differences were computed by subtracting the 2021 Revised NEM results from the noise abatement measure results. 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 in the different areas within the DNL 65 and higher contours.

SOURCES: Planning Technology, Inc., KB Environmental Sciences, Inc., and ESA, 2017 and 2020.

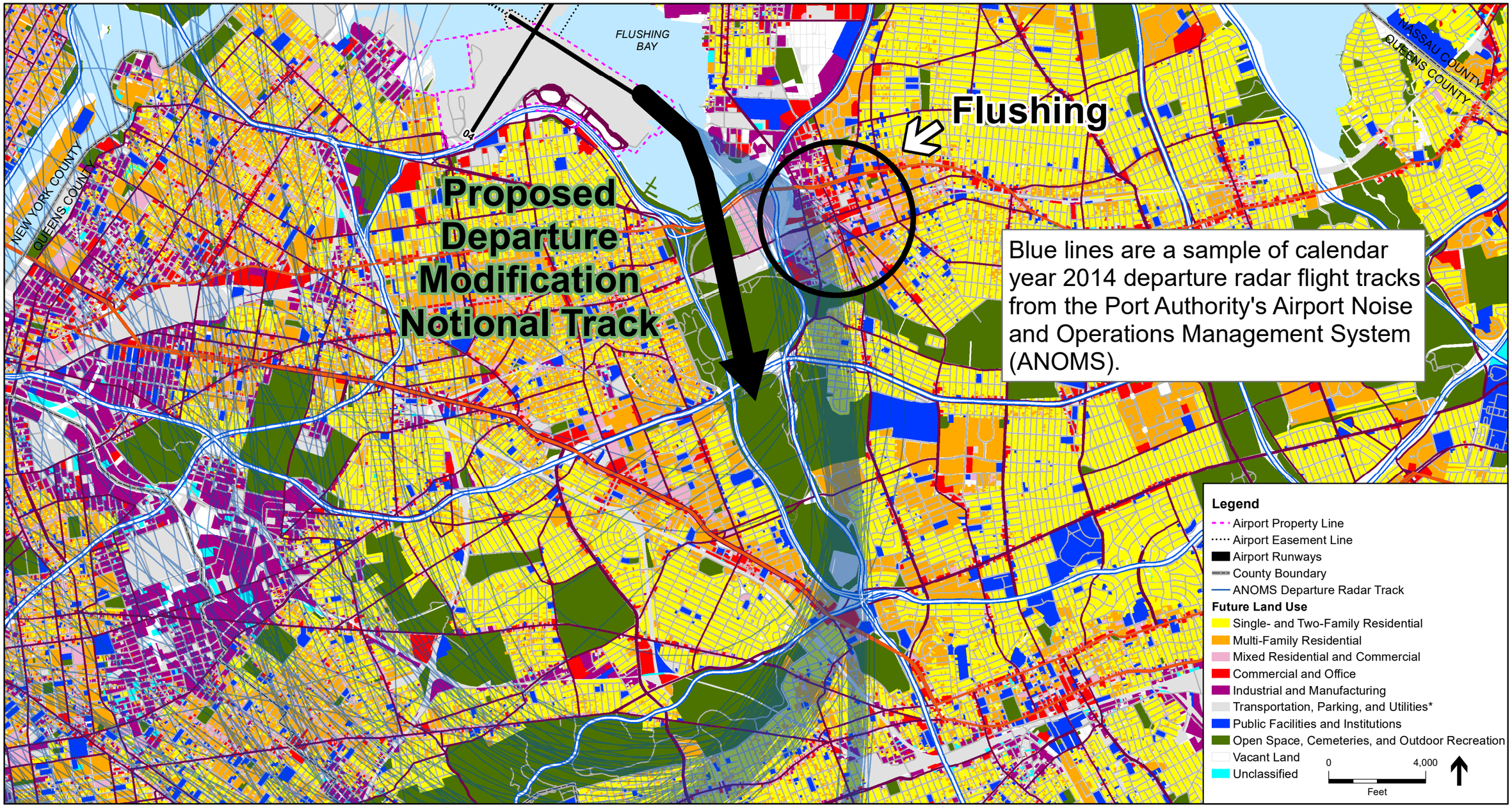
TABLE 3-3
HISTORIC SITES, NON-RESIDENTIAL NOISE-SENSITIVE SITES, AND TOTAL LAND AREA EXPOSED TO DNL 65 AND HIGHER – 2021 REVISED NEM AND MODIFY NTHNS AND GLDMN RUNWAY 13 RNAV SIDS TO DIRECT AIRCRAFT AWAY FROM FLUSHING, NEW YORK (NOISE ABATEMENT MEASURE 1)

Scenario	**Total Land Area (acres)**	**Places of Worship**	**Schools[1]**	**Hospitals and Residential Healthcare**	**Historic Sites**	**Day Care Facilities**
2021 Revised NEM	**2,389.4**	7	3	1	13	3
Noise Abatement Measure 1	**2309.4**	4	3	1	13	2
Difference	**-80.0**	**-3**	**0**	**0**	**0**	**-1**

NOTE: Differences were computed by subtracting the 2021 Revised NEM results from the noise abatement measure results.

1 These schools were included in the School Soundproofing Program and are compatible with DNL 65 and higher (see Section 2.6.1 of the LGA NEM Report).

SOURCES: Planning Technology, Inc., KB Environmental Sciences, Inc., and ESA, 2017 and 2020.



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; KB Environmental Sciences, Inc., 2016; ESA, 2016 and 2020; ESRI Mapping Services, 2019; Google Earth Aerial Imagery Research, Image © 2020 CNES/Airbus.

*The PLUTO Transportation land use designations on LGA were updated to reflect new airport facilities that were constructed during the LGA Redevelopment Project.

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Figure 3-2

Sample of Existing NTHNS and GLDMN Flight Tracks with Proposed NTHNS and GLDMN Modifications
LaGuardia Airport

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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; KB Environmental Sciences, Inc., 2016; ESA, 2016 and 2020; ESRI Mapping Services, 2019; Google Earth Aerial Imagery Research, Image © 2020 CNES/Airbus.

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Figure 3-3

DNL 65, 70, and 75 Contours - 2021 Baseline and Modify NTHNS and GLDMN Runway 13 RNAV SIDs to Direct Aircraft Away from Flushing, New York
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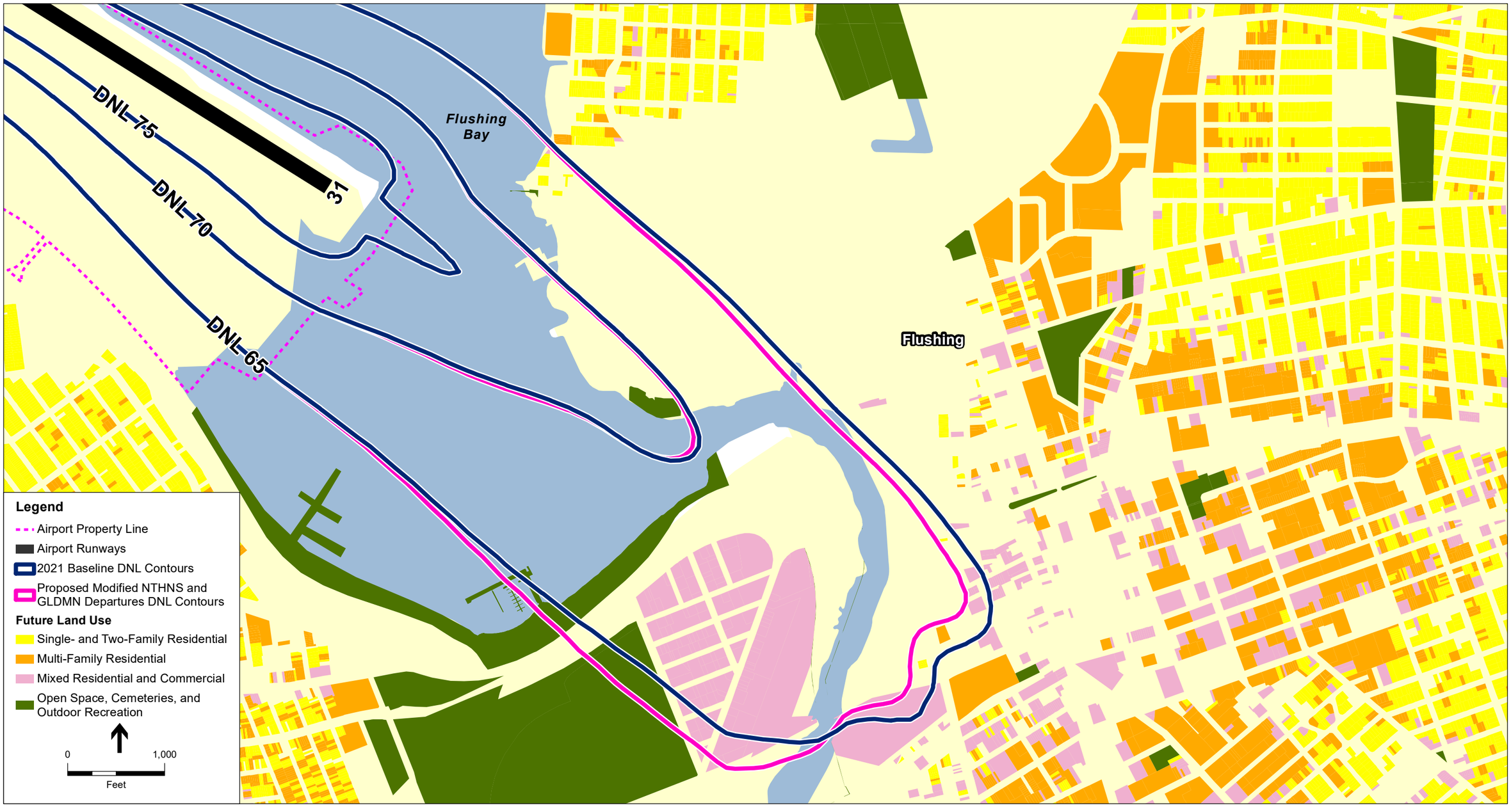

SOURCE: New York City Department of City Planning, MapPLUTO 15V1 - Tax lot/land use geographic information database, March 2015 - June 2015; Nassau County Department of Public Works Planning Division; Property classification and geographic information database, September 2015; INM 7.0d; KB Environmental Sciences, Inc., 2016; ESA, 2016 and 2020; ESRI Mapping Services, 2019; Google Earth Aerial Imagery Research, Image © 2020 CNES/Airbus.

Figure 3-4

DNL 65, 70, and 75 Contours - 2021 Baseline and Modify NTHNS and GLDMN Runway 13 RNAV SIDs to Direct Aircraft Away from Flushing, New York

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Conclusion: *LGA Noise Abatement Measure 1: Modify NTHNS and GLDMN Runway 13 RNAV SIDs (Departures) to Direct Aircraft Away from Flushing, New York* could reduce the population exposed to noise levels of DNL 65 and higher by 750 in the neighborhood of Flushing, Queens, because the procedure would direct flights over areas that are not as densely populated. The analysis of this measure assumed that all aircraft currently flying the NTHNS and GLDMN procedures would fly the modified versions.

Table 3-4 summarizes implementation requirements along with the benefits and rationale for the recommendation of LGA Noise Abatement Measure 1.

TABLE 3-4
IMPLEMENTATION SUMMARY FOR LGA NOISE ABATEMENT MEASURE 1: MODIFY NTHNS AND GLDMN RUNWAY 13 RNAV SIDS TO DIRECT AIRCRAFT AWAY FROM FLUSHING, NEW YORK

Implementation Item	Discussion
Benefits	Potential reduction of up to 750 people in 266 dwelling units exposed to DNL 65 with implementation of the proposed procedure modifications.
Rationale	The Port Authority is recommending LGA Noise Abatement Measure 1 because it could cause aircraft departing from Runway 13 to turn earlier than they currently do to avoid the populated areas of Flushing, Queens, thereby reducing noise levels over residential land uses in that neighborhood.
Responsible Parties	Development and implementation of flight procedures is the sole responsibility of the FAA. This procedure was published in May 2020.
Estimated Costs	The expected costs associated with the development and implementation of this procedure are internal to the FAA (e.g., ATO) and other coordinating agencies. These costs are unknown, and an FAA AIP grant would not be required.
Funding Sources	The FAA.
Requirements	Not applicable; this procedure was published in May 2020.
Estimated Schedule	The procedure was published in May 2020.

SOURCES: Port Authority, KB Environmental Sciences, Inc., and ESA, 2018 and 2020.

LGA Noise Abatement Measure 2: Create New Runway 13 Departure Procedure with an Immediate Left Turn over Compatible Land Uses

Description

This NCP measure involves implementing a new departure procedure for Runway 13 that would direct aircraft to make a left turn shortly after takeoff. Aircraft would initiate the turn before reaching the Whitestone Expressway. This measure is intended to place aircraft over predominantly commercial and industrial land uses while avoiding residential areas in Flushing. This could reduce noncompatible land uses in Flushing. An illustration of the proposed procedure is shown in **Figure 3-5**.

Type of Measure

This measure is a flight procedure that would be used to achieve noise benefits within the airspace constraints and reduce exposure of noise-sensitive parcels and people to aircraft noise in the area around LGA.

Analysis

For the purposes of modeling, the Study Team prepared a departure flight track that would direct aircraft to the north before reaching the Whitestone Expressway; the track is centered over an area of compatible land use just east of LGA. A review of the airspace in the immediate vicinity of LGA identified that this procedure can be used only on a limited basis, so as not to conflict with other operating conditions. The procedure cannot be used by aircraft departing Runway 13 while other aircraft are arriving on Runway 22. This procedure can be used only when aircraft are departing Runway 13 and other aircraft are arriving on either Runway 4 or 13.

For modeling purposes, the total number of Runway 13 departures flying either the TNNIS RNAV or Flushing conventional departure procedures while LGA is in these operating configurations was quantified based on the 2014 ANOMS data. These operations were then assigned to the proposed new Runway 13 departure procedure. All other departure tracks remained unchanged. Using this information, the Study Team calculated the potential noise benefits of this procedure.

Potential Noise Benefits

Figure 3-6 shows the DNL 65, 70, and 75 contours from implementation of the NCP measure overlaid on residential land use, with the 2021 Revised NEM contours. As shown in **Tables 3-5** and **3-6** and the close-up contour plot in **Figure 3-7**, implementation of this NCP measure may shift the noise contours in the neighborhood of Flushing westward, resulting in a reduction of the numbers of noncompatible land uses within the DNL 65 contour in downtown Flushing, toward the lower-right-hand side of the figure. However, the measure may also shift the noise contours to the north in other parts of Flushing, as shown in the upper left-hand side of the figure, resulting in a slight increase in noise in that area. Additionally, as shown in the close-up contour plot in **Figure 3-8**, implementation of this NCP measure may shift the noise contours northward in the neighborhoods of Clason Point and Castle Hill in the Bronx, resulting in a slight increase in noise. Aircraft altitudes on the new procedure could range from 2,000 feet to 4,500 feet near Clason Point.

The shift in noise contours may remove a net number of 309 people and 114 dwelling units from the DNL 65 contour. **Table 3-5** compares the acres of residential land uses, numbers of dwelling units, and population exposed to noise levels of DNL 65 and higher for this NCP measure to the 2021 Revised NEM noise levels. **Table 3-6** compares the acres of total land uses, numbers of historic sites, and numbers of non-residential noise-sensitive sites exposed to noise levels of DNL 65 and higher for this NCP measure to the 2021 Revised NEM noise levels. **Table 3-7** compares the population and numbers of dwelling units exposed to DNL 65 and higher to the 2021 Revised NEM separately for Queens and the Bronx, showing that the measure may add 18 people and 6 dwelling units to the DNL 65 contour in the Bronx, while removing 327 people and 120 dwelling units from the DNL 65 contour in Queens.

TABLE 3-5
RESIDENTIAL LAND USES EXPOSED TO DNL 65 AND HIGHER – 2021 REVISED NEM AND CREATE NEW RUNWAY 13 DEPARTURE PROCEDURE WITH AN IMMEDIATE LEFT TURN OVER COMPATIBLE LAND USES (NOISE ABATEMENT MEASURE 2)

	Land Area Exposed to DNL 65 and Higher (acres)			Number of Dwelling Units			Population		
Land Use Category	**2021 Revised NEM**	**Noise Abatement Measure 2**	**Difference**	**2021 Revised NEM**	**Noise Abatement Measure 2**	**Difference**	**2021 Revised NEM**	**Noise Abatement Measure 2**	**Difference**
Single-Family and Two-Family Residential	40.5	40.7	0.2	1,215	1,214	-1	3,582	3,576	-6
Multi-Family Residential	35.3	35.1	-0.2	1,742	1,754	12	4,444	4,488	44
Mixed Residential and Commercial	6.8	2.1	-4.7	833	708	-125	2,208	1,861	-347
Total	**82.6**	**77.9**	**-4.7**	**3,790**	**3,676**	**-114**	**10,234**	**9,925**	**-309**

NOTE: Numbers may not add up because of rounding. Differences were computed by subtracting the 2021 Revised NEM results from the noise abatement measure results. 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 in the different areas within the DNL 65 and higher contours.

SOURCES: Planning Technology, Inc., KB Environmental Sciences, Inc., and ESA, 2017 and 2020.

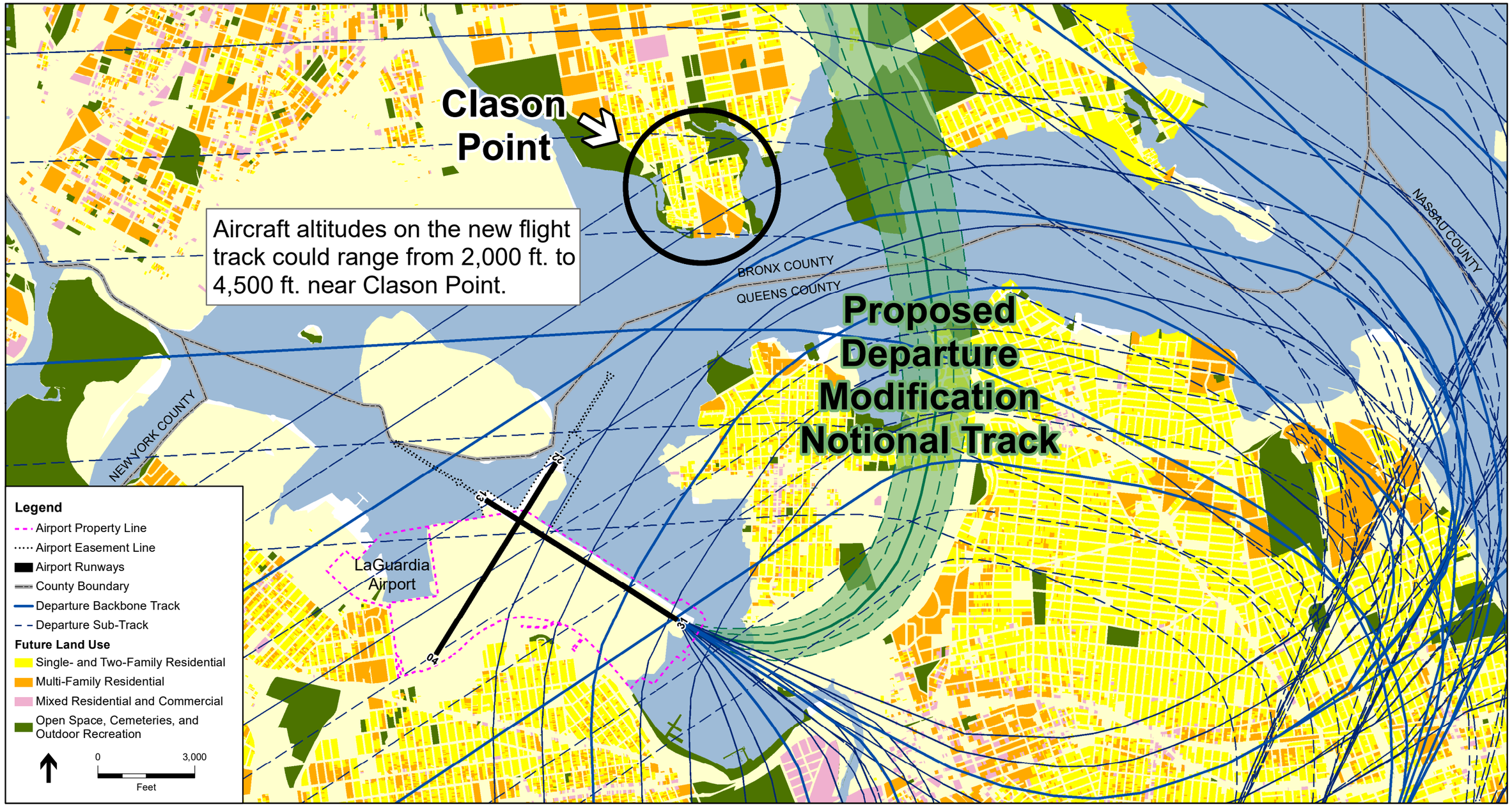
TABLE 3-6
HISTORIC SITES, NON-RESIDENTIAL NOISE-SENSITIVE SITES, AND TOTAL LAND AREA EXPOSED TO DNL 65 AND HIGHER – 2021 REVISED NEM AND CREATE NEW RUNWAY 13 DEPARTURE PROCEDURE WITH AN IMMEDIATE LEFT TURN OVER COMPATIBLE LAND USES (NOISE ABATEMENT MEASURE 2)

Scenario	**Total Land Area (Acres)**	**Places of Worship**	**Schools[1]**	**Hospitals and Residential Healthcare**	**Historic Sites**	**Day Care Facilities**
2021 Revised NEM	**2,309.4**	7	3	1	13	3
Noise Abatement Measure 2	**2,290.1**	4	3	1	13	2
Difference	**-19.3**	**-3**	**0**	**0**	**0**	**-1**

NOTE: Differences were computed by subtracting the 2021 Revised NEM results from the noise abatement measure results.

1. These schools were included in the School Soundproofing Program and are compatible with DNL 65 and higher (see Section 2.6.1 of the LGA NEM Report).

SOURCES: Planning Technology, Inc., KB Environmental Sciences, Inc., and ESA, 2017 and 2020.



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; KB Environmental Sciences, Inc., 2016; ESA, 2016 and 2020; ESRI Mapping Services, 2019; Google Earth Aerial Imagery Research, Image © 2020 CNES/Airbus.

Figure 3-5

Runway 13 INM Departure Tracks and Proposed New Runway 13 Departure Procedure with an Immediate Left Turn over Compatible Land Uses
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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; KB Environmental Sciences, Inc., 2016; ESA, 2016 and 2020; ESRI Mapping Services, 2019; Google Earth Aerial Imagery Research, Image © 2020 CNES/Airbus.

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Figure 3-6

DNL 65, 70, and 75 Contours - 2021 Baseline and Proposed New Runway 13 Departure Procedure with an Immediate Left Turn over Compatible Land Uses
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DNL 75
DNL 70
DNL 65
31
Flushing Bay
Flushing

Legend

- Airport Property Line
- Airport Runways
- 2021 Baseline DNL Contours
- Proposed New Runway 13 Departure Procedure with an Immediate Left Turn DNL Contours

Future Land Use

- Single- and Two-Family Residential
- Multi-Family Residential
- Mixed Residential and Commercial
- Open Space, Cemeteries, and Outdoor Recreation

0 1,000
Feet

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; KB Environmental Sciences, Inc., 2016; ESA, 2016 and 2020; ESRI Mapping Services, 2019; Google Earth Aerial Imagery Research, Image © 2020 CNES/Airbus.

Figure 3-7

DNL 65, 70, and 75 Contours - 2021 Baseline and Proposed New Runway 13 Departure Procedure with an Immediate Left Turn over Compatible Land Uses
Flushing

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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, 2017, 2018, and 2019; ESRI Mapping Services, 2019.

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Figure 3-8

DNL 65, 70, and 75 Contours - 2021 Baseline and Proposed New Runway 13 Departure Procedure with an Immediate Left Turn over Compatible Land Uses
Clason Point and Castle Hill

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TABLE 3-7
QUEENS AND BRONX DWELLING UNITS AND POPULATION EXPOSED TO DNL 65 AND HIGHER – 2021 REVISED NEM AND CREATE NEW RUNWAY 13 DEPARTURE PROCEDURE WITH AN IMMEDIATE LEFT TURN OVER COMPATIBLE LAND USES (NOISE ABATEMENT MEASURE 2)

	2021 Revised NEM			Noise Abatement Measure 2			Difference		
Category	**Queens**	**Bronx**	**Total**	**Queens**	**Bronx**	**Total**	**Queens**	**Bronx**	**Total**
Dwelling Units									
Single-Family and Two-Family Residential	712	503	**1,215**	705	509	**1,214**	-7	6	**-1**
Multi-Family Residential	689	1,053	**1,742**	701	1,053	**1,754**	12	0	**12**
Mixed Residential and Commercial	830	3	**833**	705	3	**708**	-125	0	**-125**
Total	**2,231**	**1,559**	**3,790**	**2,111**	**1,565**	**3,676**	**-120**	**6**	**-114**
Population									
Single-Family and Two-Family Residential	2,078	1,504	**3,582**	2,054	1,522	**3,576**	-24	18	**-6**
Multi-Family Residential	1,959	2,485	**4,444**	2,003	2,485	**4,488**	44	0	**44**
Mixed Residential and Commercial	2,199	9	**2,208**	1,852	9	**1,861**	-347	0	**-347**
Total	**6,236**	**3,998**	**10,234**	**5,909**	**4,016**	**9,925**	**-327**	**18**	**-309**

NOTE: Numbers may not add up because of rounding. Differences were computed by subtracting the 2021 Revised NEM results from the noise abatement measure results. 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 in the different areas within the DNL 65 and higher contours.

SOURCES: Planning Technology, Inc., KB Environmental Sciences, Inc., and ESA, 2017 and 2020.

Conclusion: *LGA Noise Abatement Measure 2: Create New Runway 13 Departure Procedure with an Immediate Left Turn over Compatible Land Uses* could reduce the population exposed to noise levels of DNL 65 and higher by 327 in the neighborhood of Flushing, Queens, by directing flights over areas that are less densely populated, but may increase the population exposed to noise levels of DNL 65 and higher in the Bronx by 18. The net reduction in people exposed may be 309.

The analysis assumes that aircraft currently departing Runway 13 and flying either the TNNIS RNAV or Flushing conventional departure procedures would be reassigned to the new proposed procedure only when aircraft are landing on Runway 4 or Runway 13 at LGA.

Table 3-8 summarizes implementation requirements along with the benefits and rationale for the recommendation of LGA Noise Abatement Measure 2.

TABLE 3-8
IMPLEMENTATION SUMMARY FOR LGA NOISE ABATEMENT MEASURE 2: CREATE A NEW RUNWAY 13 DEPARTURE PROCEDURE WITH AN IMMEDIATE LEFT TURN OVER COMPATIBLE LAND USES

Implementation Item	Discussion
Benefits	Potential net reduction of up to 309 people in 114 dwelling units exposed to DNL 65 with implementation of the proposed procedure.
Rationale	The Port Authority is recommending LGA Noise Abatement Measure 2 because it could reduce noise exposure over residential land uses in Flushing, Queens.
Responsible Parties	Development and implementation of flight procedures is the sole responsibility of the FAA. The Port Authority will request that the development process be initiated, and then will work with NY TRACON and other FAA personnel to further study and develop this procedure. Implementation of this measure may require an environmental study under NEPA; the FAA would be the responsible party to complete such a study.
Estimated Cost	The expected costs associated with the development and implementation of this procedure are internal to the FAA (e.g., ATO) and other coordinating agencies. These costs are unknown, and an FAA AIP grant would not be required.
Funding Sources	The FAA.
Requirements	FAA approval. Implementation may require an environmental study under NEPA.
Estimated Schedule	The Port Authority will submit a request for procedure development within 6–12 months of the FAA's Record of Approval for the NCP. FAA design, testing, and implementation of the procedure typically could take 18–24 months, potentially up to 3 years, once the Port Authority requests initiation of the development process.

SOURCES: Port Authority, KB Environmental Sciences, Inc., and ESA, 2018 and 2020.

LGA Noise Abatement Measure 3: Implement Offset Approach to Runway 22 to Reduce Noise Exposure Over Clason Point

Description

This NCP measure involves increasing the time that aircraft arriving to Runway 22 remain over water rather than overflying Clason Point and Castle Hill in the Bronx. Aircraft flying an Instrument Landing System[28] (ILS) approach to Runway 22 follow a path aligned with the runway for the last several miles of the approach (heading 224 degrees). An existing procedure, identified as the Localizer-type Directional Aid Alpha (LDA-A) approach to Runway 22, places aircraft arrivals on an offset path approximately 10 degrees (heading 234 degrees) until they are approximately 1 NM from the end of the runway. At this point, aircraft align with the runway and fly a straight-in approach. This procedure is known as an "offset approach" because for the majority of the approach, aircraft are not precisely aligned with the extended runway centerline. The FAA diagram for the procedure can be found on **page C-7** of **Appendix C**. This approach generally keeps aircraft east of Clason Point and Castle Hill in the Bronx.

The LDA-A approach to Runway 22 uses a navigational beacon to direct the aircraft on approach and is flown only in certain weather conditions. Developing an RNAV overlay of this current LDA-A offset approach may allow this procedure to be used more often and may reduce noncompatible land uses in the Clason Point and Castle Hills areas of the Bronx.

Type of Measure

This measure is a flight procedure that would be used to achieve noise benefits within the airspace constraints and reduce exposure of noise-sensitive parcels and people to aircraft noise in the area around LGA.

Analysis

The FAA provided a draft description of an RNAV approach, overlaying the existing LDA-A approach to Runway 22, which depicted the proposed approach following a 234-degree heading until approximately 4 NM from the runway end, then turning to a heading of 239 degrees at a point approximately 1.75 NM from the runway end. From this point, aircraft continue on to intercept the extended runway centerline and then fly straight in to Runway 22 for the remainder of the approach.

The INM flight tracks representing this procedure are shown in **Figure 3-9**. The backbone track represents the procedure centerline and the sub-tracks represent potential variation of aircraft flight paths to the left or right of the procedure centerline. The Study Team, with input from the FAA, modeled 40 percent of arrivals (both day and night) to Runway 22 following this procedure. The FAA input is provided on **page E-208** of **Appendix E-8**. All other arrival track use remained unchanged.

[28] Instrument Landing System is a precision runway approach aid using two radio beams, which together provide pilots with both vertical and horizontal guidance during an approach to land.

Potential Noise Benefits

Figure 3-10 shows the DNL 65, 70, and 75 contours for this NCP measure overlaid on residential land use, with the 2021 Revised NEM contours. As shown in **Tables 3-9** and **3-10** and the close-up contour plot in **Figure 3-11**, implementation of this NCP measure may shift the noise contours southward, reducing the numbers of noncompatible land uses in the DNL 65 contour in the neighborhoods of Clason Point and Castle Hill in the Bronx. The shift in noise contours may also remove up to 1,580 people and 544 dwelling units from the DNL 65 contour. **Table 3-9** compares the acres of residential land uses, numbers of dwelling units, and population exposed to noise levels of DNL 65 and higher for this NCP measure to the 2021 Revised NEM noise levels. **Table 3-10** compares the acres of total land uses, numbers of historic sites, and numbers of non-residential noise-sensitive sites exposed to noise levels of DNL 65 and higher for this NCP measure to the 2021 Revised NEM noise levels.

LONG ISLAND SOUND

BRONX COUNTY

QUEENS COUNTY

EAST RIVER

Rikers Island

NEW YORK COUNTY

QUEENS COUNTY

BOWERY BAY

FLUSHING BAY

LaGuardia Airport

04

13

22

31

Legend

- Airport Property Line
- Airport Easement Line
- County Boundary
- Airport Runways
- Arrival Backbone Track
- Arrival Sub-Track

Future Land Use

- Single- and Two-Family Residential
- Multi-Family Residential
- Mixed Residential and Commercial
- Open Space, Cemeteries, and Outdoor Recreation

0 2,800

Feet

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; KB Environmental Sciences, Inc., 2016; ESA, 2016 and 2020; ESRI Mapping Services, 2019; Google Earth Aerial Imagery Research, Image © 2020 CNES/Airbus.

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Figure 3-9

Proposed Offset Approach to Runway 22
LaGuardia Airport

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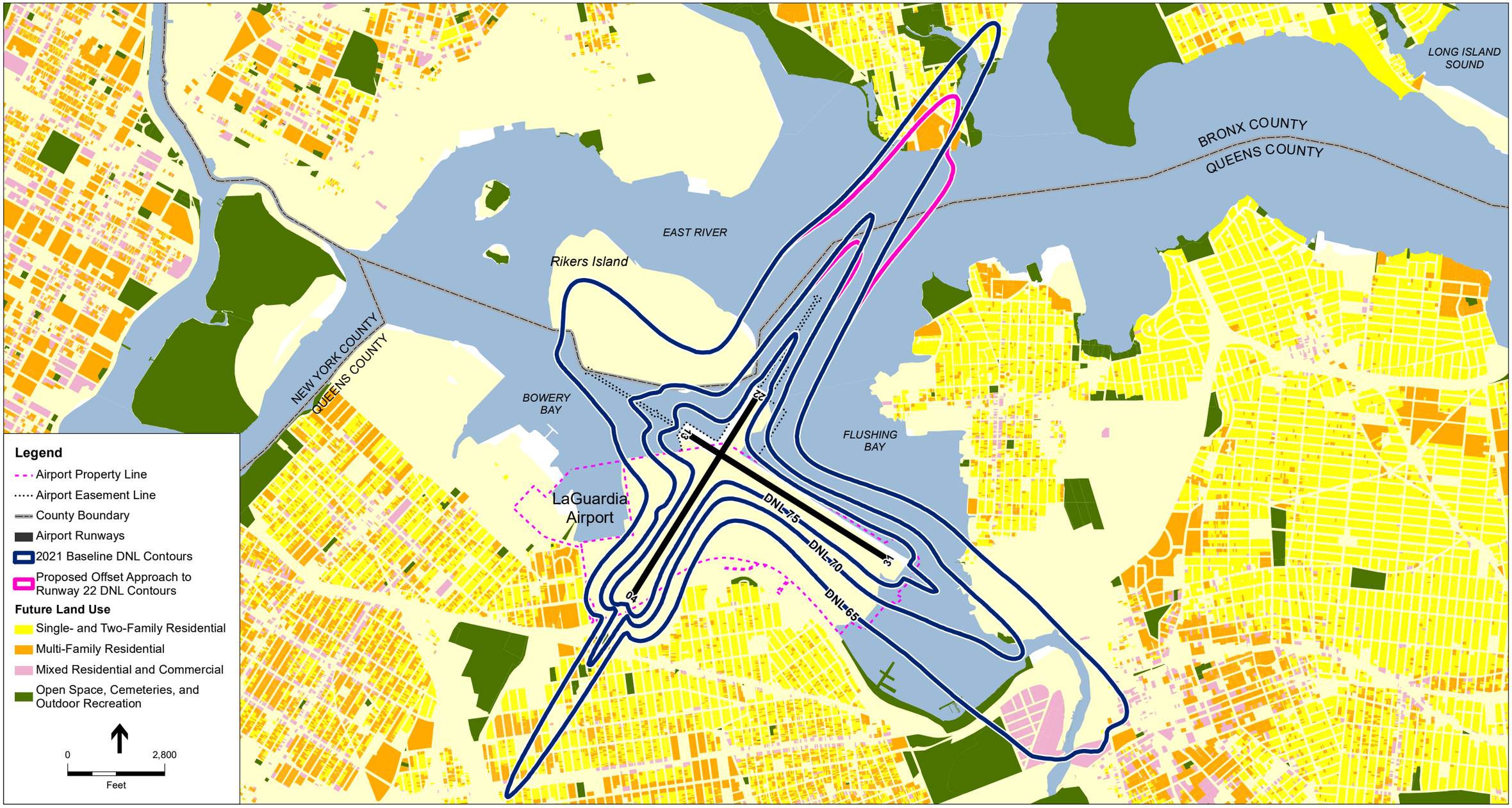

SOURCE: New York City Department of City Planning, MapPLUTO 15V1 - Tax lot/land use geographic information database, March 2015 - June 2015; Nassau County Department of Public Works Planning Division; Property classification and geographic information database, September 2015; INM 7.0d; KB Environmental Sciences, Inc., 2016; ESA, 2016 and 2020; ESRI Mapping Services, 2019; Google Earth Aerial Imagery Research, Image © 2020 CNES/Airbus.

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Figure 3-10

DNL 65, 70, and 75 Contours - 2021 Baseline and Proposed Offset Approach to Runway 22 to Reduce Noise Exposure over Clason Point
LaGuardia Airport

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Castle Hill

Clason Point

Bronx River

Westchester Creek

East River

DNL 65

DNL 65

DNL 70

BRONX COUNTY

QUEENS COUNTY

Legend

- County Boundary
- 2021 Baseline DNL Contours
- Proposed Offset Approach to Runway 22 DNL Contours

Future Land Use

- Single- and Two-Family Residential
- Multi-Family Residential
- Mixed Residential and Commercial
- Open Space, Cemeteries, and Outdoor Recreation

0 1,000

Feet

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, 2017 and 2019; ESRI Mapping Services, 2019.

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Figure 3-11

DNL 65, 70, and 75 Contours - 2021 Baseline and Proposed Offset Approach to Runway 22 to Reduce Noise Exposure over Clason Point
Clason Point and Castle Hill

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TABLE 3-9
RESIDENTIAL LAND USES EXPOSED TO DNL 65 AND HIGHER – 2021 REVISED NEM AND IMPLEMENT OFFSET APPROACH TO RUNWAY 22 TO REDUCE NOISE EXPOSURE OVER CLASON POINT (NOISE ABATEMENT MEASURE 3)

	Land Area Exposed to DNL 65 and Higher (acres)			Number of Dwelling Units			Population		
Land Use Category	**2021 Revised NEM**	**Noise Abatement Measure 3**	**Difference**	**2021 Revised NEM**	**Noise Abatement Measure 3**	**Difference**	**2021 Revised NEM**	**Noise Abatement Measure 3**	**Difference**
Single-Family and Two-Family Residential	40.5	22.8	-17.7	1,215	807	-408	3,582	2,370	-1,212
Multi-Family Residential	35.3	29.2	-6.1	1,742	1,609	-133	4,444	4,085	-359
Mixed Residential and Commercial	6.8	6.6	-0.2	833	830	-3	2,208	2,199	-9
Total	**82.6**	**58.6**	**-24.0**	**3,790**	**3,246**	**-544**	**10,234**	**8,654**	**-1,580**

NOTE: Numbers may not add up because of rounding. Differences were computed by subtracting the 2021 Revised NEM results from the noise abatement measure results. 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 in the different areas within the DNL 65 and higher contours.

SOURCES: Planning Technology, Inc., KB Environmental Sciences, Inc., and ESA, 2017 and 2020.

TABLE 3-10
HISTORIC SITES, NON-RESIDENTIAL NOISE-SENSITIVE SITES, AND TOTAL LAND AREA EXPOSED TO DNL 65 AND HIGHER – 2021 REVISED NEM AND IMPLEMENT OFFSET APPROACH TO RUNWAY 22 TO REDUCE NOISE EXPOSURE OVER CLASON POINT (NOISE ABATEMENT MEASURE 3)

Scenario	**Total Land Area (Acres)**	**Places of Worship**	**Schools[1]**	**Hospitals and Residential Healthcare**	**Historic Sites**	**Day Care Facilities**
2021 Revised NEM	2,309.4	7	3	1	13	3
Noise Abatement Measure 3	2,273.1	7	3	1	13	3
Difference	**-36.3**	**0**	**0**	**0**	**0**	**0**

NOTE: Differences were computed by subtracting the 2021 Revised NEM results from the noise abatement measure results.

1 These schools were included in the School Soundproofing Program and are compatible with DNL 65 and higher (see Section 2.6.1 of the LGA NEM Report).

SOURCES: Planning Technology, Inc., KB Environmental Sciences, Inc., and ESA, 2017 and 2020.

Conclusion: *LGA Noise Abatement Measure 3: Implement Offset Approach to Runway 22 to Reduce Noise Exposure Over Clason Point* could reduce the population exposed to noise levels of DNL 65 and higher by 1,580 in the neighborhoods of Clason Point and Castle Hill in the Bronx by directing more flights over water. The analysis of this measure assumed that 40 percent of arrivals (both day and night) to Runway 22 would use the proposed offset approach.

Table 3-11 summarizes implementation requirements along with the benefits and rationale for the recommendation of LGA Noise Abatement Measure 3.

TABLE 3-11
IMPLEMENTATION SUMMARY FOR LGA NOISE ABATEMENT MEASURE 3:
IMPLEMENT OFFSET APPROACH TO RUNWAY 22 TO REDUCE NOISE EXPOSURE OVER CLASON POINT

Implementation Item	Discussion
Benefits	Potential reduction of up to 1,580 people in 544 dwelling units exposed to DNL 65 with implementation of the proposed procedure.
Rationale	The Port Authority is recommending LGA Noise Abatement Measure 3 because aircraft arriving to Runway 22 would remain over water longer, thereby reducing noise levels over residential land uses in Clason Point and Castle Hill, in the Bronx.
Responsible Parties	Development and implementation of flight procedures is the sole responsibility of the FAA. The Port Authority will request that the development process be initiated, and then will work with NY TRACON and other FAA personnel to further study and develop this procedure. Implementation of this measure may require an environmental study under NEPA; the FAA would be the responsible party to complete such a study.
Estimated Costs	The expected costs associated with the development and implementation of this procedure are internal to the FAA (e.g., ATO) and other coordinating agencies. These costs are unknown, and an FAA AIP grant would not be required.
Funding Sources	The FAA.
Requirements	FAA approval. Implementation may require the FAA to perform an environmental study under NEPA.
Estimated Schedule	The Port Authority will submit a request for procedure development within 6–12 months of the FAA's Record of Approval for the NCP. FAA design, testing, and implementation of the procedure typically could take 18–24 months, potentially up to 3 years once the Port Authority requests initiation of the development process.

SOURCES: Port Authority, KB Environmental Sciences, Inc., and ESA, 2018 and 2020.

LGA Noise Abatement Measure 4: Reduce Runway 4 Departure Noise Over Clason Point

Description

This NCP measure involves increasing the use of an existing Runway 4 departure procedure to result in a reduced number of departures overflying Clason Point in the Bronx. The current LAGUARDIA FIVE DEPARTURE procedure indicates that aircraft departing Runway 4 are to initiate a right turn to a magnetic heading of 055 degrees shortly after takeoff. This places aircraft to the east of Clason Point to overfly water, and then compatible land use, while gaining altitude. Increasing the use of this turn may reduce noncompatible land uses in the Bronx. The FAA diagram for the procedure is shown on **page C-4** of **Appendix C**, while flight tracks of aircraft flying the procedure are shown in **Figure 3-12**.

Type of Measure

This measure is a flight procedure that could be used to achieve noise benefits within the airspace constraints and reduce exposure of noise-sensitive parcels and people to aircraft noise in the area around LGA.

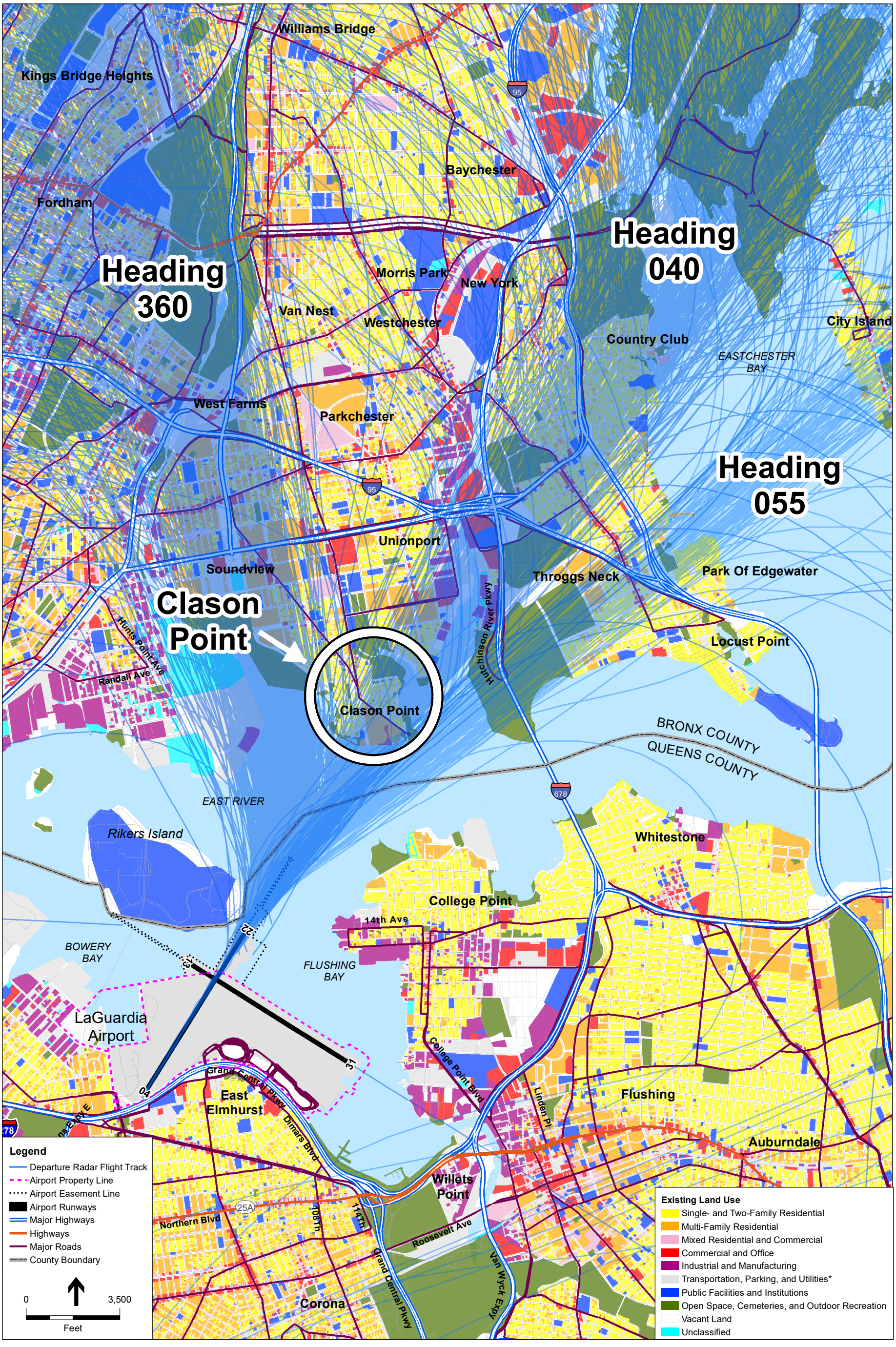
Analysis

The Study Team analyzed LGA Runway 4 departure flight tracks using 2014 ANOMS data to determine the percentage of aircraft that flew the 040 and 055 headings for both daytime and nighttime. The 2014 ANOMS data indicated that the departure track use for heading 040 at LGA was 8.4 percent of all departures in the daytime and 9.5 percent of all departures at night, while the track use for heading 055 was 1.4 percent in the daytime and 4.2 percent at night. In coordination with the Port Authority, the Study Team assumed that aircraft flying the 040 heading and then continuing to the northeast could likely fly a 055 heading. From a review of ANOMS data, it was determined that 2.5 percent of all departing aircraft at LGA flew the 040 heading and then continued on to the northeast in the daytime and nighttime. Therefore, aircraft that flew the 040 heading and ultimately continued on to the northeast were reassigned to the 055 heading, for the purposes of modeling this NCP measure. The track use for the 040 heading was therefore changed to 5.9 percent in the daytime and 7.0 percent at night for modeling purposes, while the track use for the 055 heading was changed to 3.9 percent in the daytime and 4.2 percent at night. All other departure track use remained unchanged.

The NY TRACON did indicate that this measure would require implementation of a new LGA RNAV arrival route to ensure safe separation between departing and arriving aircraft. Details of this potential arrival route were not available for modeling at the time of this analysis. Therefore, arrival flight tracks and flight track use remained unchanged from the 2021 Revised NEM for the purposes of modeling, and the noise contours associated with this recommended noise abatement measure do not reflect the potential implementation of a new LGA RNAV arrival route.

Potential Noise Benefits

Figure 3-13 shows the DNL 65, 70, and 75 contours for this NCP measure overlaid on residential land use, with the 2021 Revised NEM contours. As shown in **Tables 3-12** and **3-13** and the close-up contour plot in **Figure 3-14**, implementation of this NCP measure would shift the noise contours in the neighborhoods to the southwest, resulting in a reduction in the numbers of noncompatible land uses in the DNL 65 contour in the neighborhoods of Clason Point and Castle Hill in the Bronx. The shift in noise contours may also remove up to 159 people and 53 dwelling units from the DNL 65 contour. **Table 3-12** compares the acres of residential land uses, numbers of dwelling units, and population exposed to noise levels of DNL 65 and higher for this NCP measure versus the 2021 Revised NEM noise levels. **Table 3-13** compares the acres of total land uses, numbers of historic sites, and numbers of non-residential noise-sensitive sites exposed to noise levels of DNL 65 and higher for this NCP measure to the 2021 Revised NEM noise levels.



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; KB Environmental Sciences, Inc., 2016; ESA, 2016 and 2020; ESRI Mapping Services, 2019; Google Earth Aerial Imagery Research, Image © 2020 CNES/Airbus.

*The PLUTO Transportation land use designations on LGA were updated to reflect new airport facilities that were constructed during the LGA Redevelopment Project.

Figure 3-12
Runway 4 Departures from Calendar Year 2014
ANOMS Data - All Headings Magnetic
LaGuardia Airport

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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; KB Environmental Sciences, Inc., 2016; ESA, 2016 and 2020; ESRI Mapping Services, 2019; Google Earth Aerial Imagery Research, Image © 2020 CNES/Airbus.

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Figure 3-13

DNL 65, 70, and 75 Contours - 2021 Baseline and Proposed Reduce Runway 4 Departure Noise over Clason Point
LaGuardia Airport

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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; KB Environmental Sciences, Inc., 2016; ESA, 2016 and 2020; ESRI Mapping Services, 2019; Google Earth Aerial Imagery Research, Image © 2020 CNES/Airbus.

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Figure 3-14

DNL 65, 70, and 75 Contours - 2021 Baseline and Proposed Reduce Runway 4 Departure Noise over Clason Point
Clason Point and Castle Hill

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TABLE 3-12
RESIDENTIAL LAND USES EXPOSED TO DNL 65 AND HIGHER – 2021 REVISED NEM AND REDUCE RUNWAY 4 DEPARTURE NOISE OVER CLASON POINT (NOISE ABATEMENT MEASURE 4)

	Land Area Exposed to DNL 65 and Higher (acres)			Number of Dwelling Units			Population		
Land Use Category	**2021 Revised NEM**	**Noise Abatement Measure 4**	**Difference**	**2021 Revised NEM**	**Noise Abatement Measure 4**	**Difference**	**2021 Revised NEM**	**Noise Abatement Measure 4**	**Difference**
Single-Family and Two-Family Residential	40.5	38.4	-2.1	1,215	1,162	-53	3,582	3,423	-159
Multi-Family Residential	35.3	35.0	-0.4	1,742	1,742	0	4,444	4,444	0
Mixed Residential and Commercial	6.8	6.8	0.0	833	833	0	2,208	2,208	0
Total	**82.6**	**80.2**	**-2.5**	**3,790**	**3,737**	**-53**	**10,234**	**10,075**	**-159**

NOTE: Numbers may not add up because of rounding. Differences were computed by subtracting the 2021 Revised NEM results from the noise abatement measure results. 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 in the different areas within the DNL 65 and higher contours.

SOURCES: Planning Technology, Inc., KB Environmental Sciences, Inc., and ESA, 2017 and 2020.

TABLE 3-13
HISTORIC SITES, NON-RESIDENTIAL NOISE-SENSITIVE SITES, AND TOTAL LAND AREA EXPOSED TO DNL 65 AND HIGHER – 2021 REVISED NEM AND REDUCE RUNWAY 4 DEPARTURE NOISE OVER CLASON POINT (NOISE ABATEMENT MEASURE 4)

Scenario	**Total Land Area (Acres)**	**Places of Worship**	**Schools[1]**	**Hospitals and Residential Healthcare**	**Historic Sites**	**Day Care Facilities**
2021 Revised NEM	2,309.4	7	3	1	13	3
Noise Abatement Measure 4	2,300.4	7	3	1	13	3
Difference	**-9.0**	**0**	**0**	**0**	**0**	**0**

NOTE: Differences were computed by subtracting the 2021 Revised NEM results from the noise abatement measure results.
1 These schools were included in the School Soundproofing Program and are compatible with DNL 65 and higher (see Section 2.6.1 of the LGA NEM Report).

SOURCES: Planning Technology, Inc., KB Environmental Sciences, Inc., and ESA, 2017 and 2020.

Conclusion: *LGA Noise Abatement Measure 4: Reduce Runway 4 Departure Noise over Clason Point* could reduce the population exposed to noise levels of DNL 65 and higher by 159 in the neighborhoods of Clason Point and Castle Hill in the Bronx by directing more flights over water. The analysis of the measure assumed that aircraft flying the 040 heading and continuing on to the northeast would be reassigned to the 055 heading, avoiding overflight of residential land use.

Table 3-14 summarizes implementation requirements along with the benefits and rationale for the recommendation of LGA Noise Abatement Measure 4.

TABLE 3-14
IMPLEMENTATION SUMMARY FOR LGA NOISE ABATEMENT MEASURE 4: REDUCE RUNWAY 4 DEPARTURE NOISE OVER CLASON POINT

Implementation Item	Discussion
Benefits	Potential reduction of up to 159 people in 53 dwelling units exposed to DNL 65 with implementation of the proposed procedure modifications.
Rationale	The Port Authority is recommending LGA Noise Abatement Measure 4 because aircraft departing from Runway 4 would remain over water longer, thereby reducing noise exposure over residential land uses in Clason Point and Castle Hill, in the Bronx.
Responsible Parties	Development and implementation of flight procedures is the sole responsibility of the FAA. The Port Authority will request that the development process be initiated, and then will work with NY TRACON and other FAA personnel to further study and develop this procedure. Implementation of this measure may require an environmental study under NEPA; the FAA would be the responsible party to complete such a study.
Estimated Cost to Implement	The expected costs associated with the development and implementation of this procedure are internal to the FAA (e.g., ATO) and other coordinating agencies. These costs are unknown, and an FAA AIP grant would not be required.
Funding Sources	The FAA.
Requirements to Implement	FAA approval. Implementation may require the FAA to perform an environmental study under NEPA.
Estimated Schedule	The Port Authority will submit a request for procedure development within 6–12 months of the FAA's Record of Approval for the NCP. FAA design, testing, and implementation of the procedure typically could take 18–24 months, potentially up to 3 years once the Port Authority requests initiation of the development process.

SOURCES: Port Authority, KB Environmental Sciences, Inc., and ESA, 2018 and 2020.

LGA Noise Abatement Measure 5: Reduce Runway 13 Departures at Night

Description

This NCP measure involves reducing the number of departures from Runway 13 at night (10:00:00 P.M. to 6:59:59 A.M.). If a portion of aircraft currently departing Runway 13 were instead assigned to depart Runway 31, there would be a reduction in noise for noncompatible land uses to the east in Flushing and an increase in noise over compatible land uses immediately west of LGA. Elimination of all nighttime Runway 13 departures is not feasible because certain wind and weather conditions necessitate the use of Runway 13 for departures to meet aircraft safety and performance requirements.

Type of Measure

This measure is a type of preferential runway use program that would be used to reduce the exposure of individuals (or specific noise-sensitive areas) to noise in the area around LGA. Airport operators, however, do not have the authority to mandate which runways are used, but they do have an obligation to inform the FAA which runways are available, so that the FAA can then select among available runways for use by aircraft. In general, preferential runway use measures are recommended to the FAA with the understanding that they can only be implemented when operating conditions permit.

Analysis

The Study Team analyzed LGA runway use using 2014 ANOMS data to determine the percentage of aircraft that departed from Runways 13 and 31 at night. Hourly weather data for 2014 were reviewed and the identification of the weather conditions (wind speed and direction) for the maximum allowable use of Runway 31 departures was quantified. The wind speed and direction criteria for maximum allowable Runway 31 use were obtained from the FAA and are provided on **page C-8** of **Appendix C**. The analysis indicated that approximately three-fourths of the departures in 2014 from Runway 13 at night could be assigned to Runway 31. Therefore, for modeling purposes, approximately 75 percent of modeled Runway 13 departures at night were reassigned to Runway 31. All other runway use remained unchanged. It should be noted that weather conditions change from year to year, and this analysis quantified only the conditions in 2014.

Potential Noise Benefits

Figure 3-15 shows the DNL 65, 70, and 75 contours from implementation of the NCP measure overlaid on residential land use, with the 2021 Revised NEM contours. As shown in **Tables 3-15** and **3-16** and the close-up contour plot in **Figure 3-16**, implementation of this NCP measure may shift the noise contours to the northwest, resulting in a reduction in the numbers of noncompatible land uses in the DNL 65 contour in the Flushing neighborhood of Queens. The shift in noise contours may also remove up to 2,062 people and 730 dwelling units from the DNL 65 contour. **Table 3-15** compares the acres of residential land uses, numbers of dwelling units, and population exposed to noise levels of DNL 65 and higher for this NCP measure to the 2021 Revised NEM noise levels. **Table 3-16** compares the acres of total land uses, numbers of historic sites, and numbers of non-residential noise-sensitive sites exposed to noise levels of DNL 65 and higher for this NCP measure to the 2021 Revised NEM noise levels.

TABLE 3-15
RESIDENTIAL LAND USES EXPOSED TO DNL 65 AND HIGHER – 2021 REVISED NEM AND REDUCE RUNWAY 13 DEPARTURES AT NIGHT (NOISE ABATEMENT MEASURE 5)

	Land Area Exposed to DNL 65 and Higher (acres)			Number of Dwelling units			Population		
Land Use Category	**2021 Revised NEM**	**Noise Abatement Measure 5**	**Difference**	**2021 Revised NEM**	**Noise Abatement Measure 5**	**Difference**	**2021 Revised NEM**	**Noise Abatement Measure 5**	**Difference**
Single-Family and Two-Family Residential	40.5	39.7	-0.8	1,215	1,195	-20	3,582	3,517	-65
Multi-Family Residential	35.3	34.9	-0.4	1,742	1,682	-60	4,444	4,275	-169
Mixed Residential and Commercial	6.8	0.5	-6.3	833	183	-650	2,208	380	-1,828
Total	**82.6**	**75.1**	**-7.5**	**3,790**	**3,060**	**-730**	**10,234**	**8,172**	**-2,062**

NOTE: Numbers may not add up because of rounding. Differences were computed by subtracting the 2021 Revised NEM results from the noise abatement measure results. 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 in the different areas within the DNL 65 and higher contours.

SOURCES: Planning Technology, Inc., KB Environmental Sciences, Inc., and ESA, 2017 and 2020.

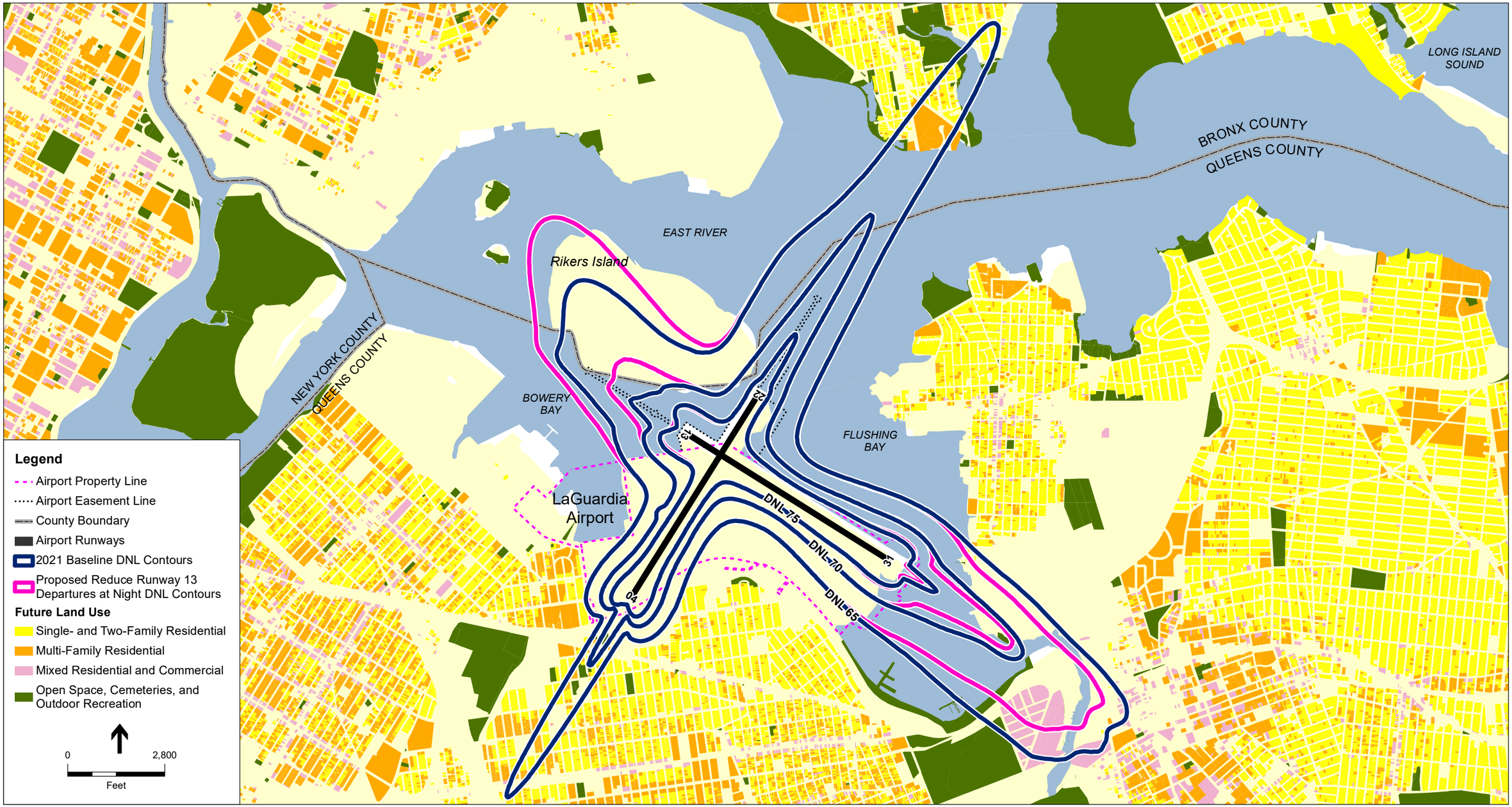
TABLE 3-16
HISTORIC SITES, NON-RESIDENTIAL NOISE-SENSITIVE SITES, AND TOTAL LAND AREA EXPOSED TO DNL 65 AND HIGHER – 2021 REVISED NEM AND REDUCE RUNWAY 13 DEPARTURES AT NIGHT (NOISE ABATEMENT MEASURE 5)

Scenario	**Total Land Area (Acres)**	**Places of Worship**	**Schools[1]**	**Hospitals and Residential Healthcare**	**Historic Sites**	**Day Care Facilities**
2021 Revised NEM	2,309.4	7	3	1	13	3
Noise Abatement Measure 5	2,324.2	4	3	1	13	2
Difference	**14.8**	**-3**	**0**	**0**	**0**	**-1**

NOTE: Differences were computed by subtracting the 2021 Revised NEM results from the noise abatement measure results.

1 These schools were included in the School Soundproofing Program and are compatible with DNL 65 and higher (see Section 2.6.1 of the LGA NEM Report).

SOURCES: Planning Technology, Inc., KB Environmental Sciences, Inc., and ESA, 2017 and 2020.



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; KB Environmental Sciences, Inc., 2016; ESA, 2016 and 2020; ESRI Mapping Services, 2019; Google Earth Aerial Imagery Research, Image © 2020 CNES/Airbus.

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Figure 3-15

DNL 65, 70, and 75 Contours - 2021 Baseline and Proposed Reduce Runway 13 Departures at Night
LaGuardia Airport

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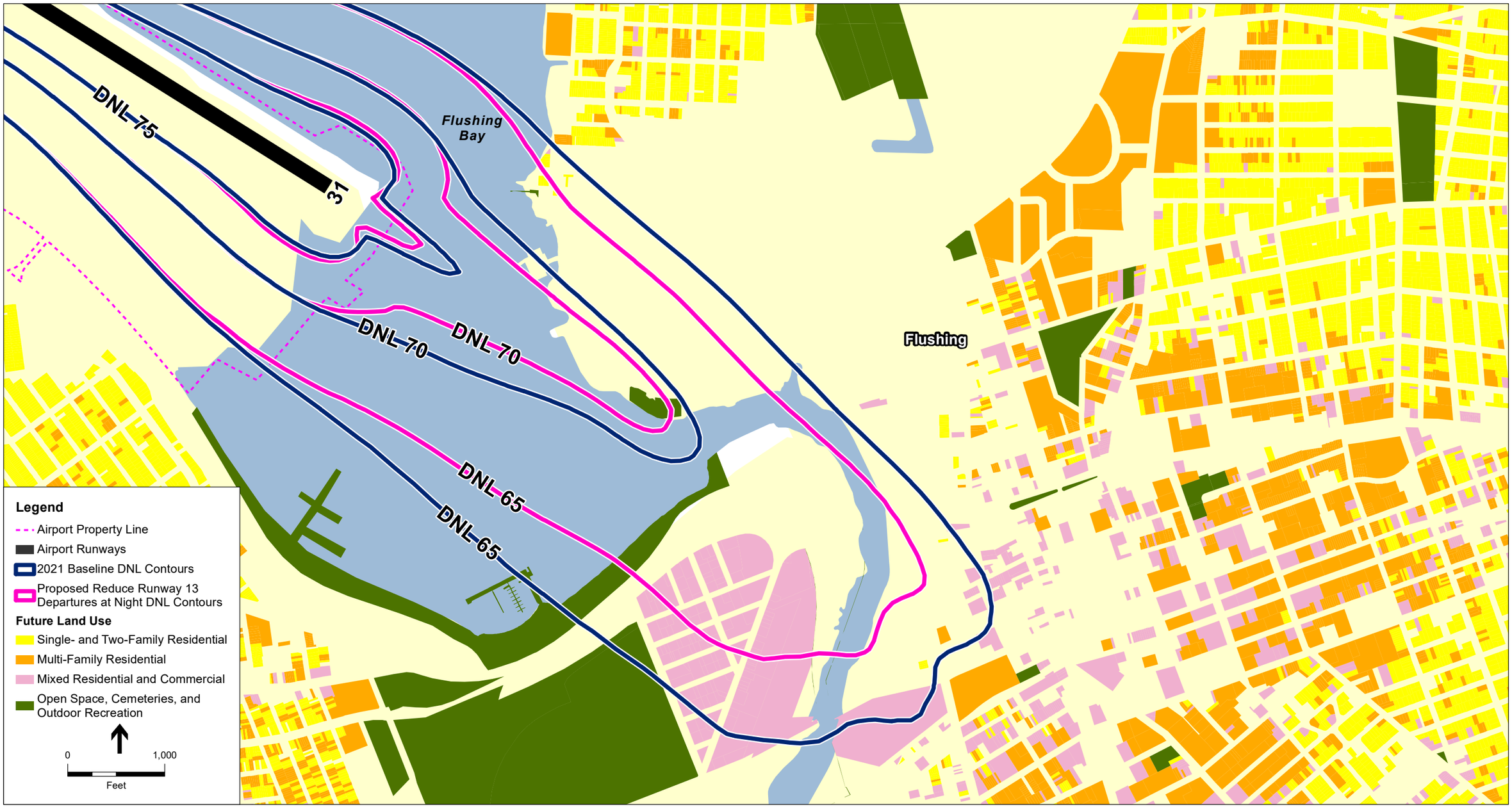

SOURCE: New York City Department of City Planning, MapPLUTO 15V1 - Tax lot/land use geographic information database, March 2015 - June 2015; Nassau County Department of Public Works Planning Division; Property classification and geographic information database, September 2015; INM 7.0d; ESA, 2017, 2018, and 2020; ESRI Mapping Services, 2019.

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Figure 3-16

DNL 65, 70, and 75 Contours - 2021 Baseline and Proposed Reduce Runway 13 Departures at Night
Flushing

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Conclusion: *LGA Noise Abatement Measure 5: Reduce Runway 13 Departures at Night* could reduce the population exposed to noise levels of DNL 65 and higher by 2,062 in the neighborhood of Flushing, Queens, by reducing the frequency of nighttime overflights. Analysis of the measure assumed that approximately 75 percent of Runway 13 nighttime departures could be reassigned to Runway 31.

Table 3-17 summarizes implementation requirements along with the benefits and rationale for the recommendation of LGA Noise Abatement Measure 5.

TABLE 3-17
IMPLEMENTATION SUMMARY FOR LGA NOISE ABATEMENT MEASURE 5: REDUCE RUNWAY 13 DEPARTURES AT NIGHT

Implementation Item	Description
Benefits	Potential reduction of up to 2,062 people in 730 dwelling units exposed to DNL 65 with implementation of the proposed measure.
Rationale	The Port Authority is recommending LGA Noise Abatement Measure 5 because it could reduce noise exposure over residential land uses in Flushing, Queens, at night by redirecting aircraft over compatible land uses.
Responsible Parties	Selection among available runways for use by aircraft is the sole responsibility of the FAA. The Port Authority will request that the development process for this measure be initiated, and then will work with NY TRACON and other FAA personnel to further study and develop the measure. Implementation of this measure may require an environmental study under NEPA; the FAA would be the responsible party to complete such a study.
Estimated Costs	The expected costs associated with the development and implementation of this procedure are internal to the FAA (e.g., ATO) and other coordinating agencies. These costs are unknown, and an FAA AIP grant would not be required.
Funding Sources	The FAA.
Requirements	FAA approval. Implementation may require the FAA to perform an environmental study under NEPA.
Estimated Schedule	The Port Authority will submit a request for procedure development within 6–12 months of the FAA's Record of Approval for the NCP. FAA design, testing, and implementation of the procedure typically could take 18–24 months, potentially up to 3 years once the Port Authority requests initiation of the development process.

SOURCES: Port Authority, KB Environmental Sciences, Inc., and ESA, 2018 and 2020.

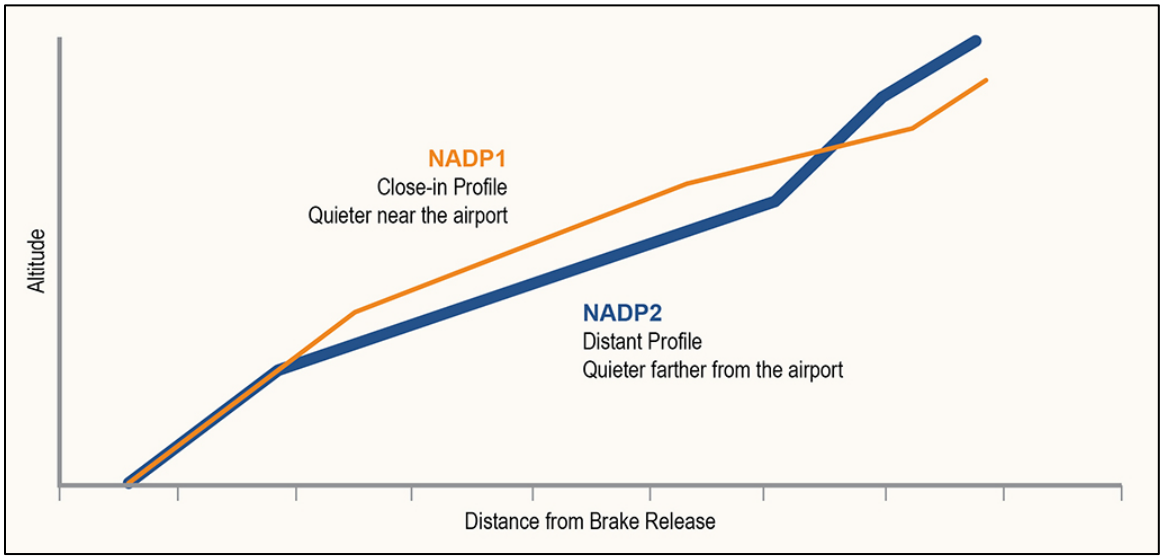
LGA Noise Abatement Measure 6: Implement Noise Abatement Departure Profiles on a Voluntary Basis for Runways 4 and 13

Description

This NCP measure involves the voluntary implementation of noise abatement departure profiles (NADPs), which are aircraft climb-out profiles that can provide noise reduction benefits. In 1993, the FAA published acceptable criteria for two safe NADPs for commercial jet aircraft: the close-in NADP, also known as NADP1, and the distant NADP, also known as NADP2 (FAA Advisory Circular [AC] 91-53A).[29] The close-in NADP provides noise reduction benefits to areas adjacent to an airport, whereas the distant NADP provides noise reduction benefits farther from an airport.

Figure 3-17 gives a general, comparative overview of both types of NADPs. The NADPs outline criteria for speed, thrust settings, and airplane configurations used in connection with the NADPs. The designs of NADPs and their frequencies of use are specific to individual aircraft operators and aircraft types. Airport operators cannot mandate the use of NADPs at an airport because airport operators do not have the authority to require specific operating profiles for aircraft in flight; implementation of NADPs is voluntary and at the choice of aircraft operators. However, FAA AC 91-53A encourages aircraft operators "to use the appropriate NADP when an airport operator requests its use to abate noise for either a close-in or distant community."

Figure 3-17
General Overview of NADP1 (Close-In) and NADP2 (Distant)



NOTE: Graphic is not to scale.

SOURCES: Civil Air Navigation Services Organization and Airports Council International, "Managing the Impacts of Aviation Noise – A Guide for Airport Operators and Air Navigation Service Providers," September 2015; ESA, 2020.

[29] The International Civil Aviation Organization's Doc 8168, *Procedures for Air Navigation Services – Aircraft Operations* (also known as PANS-OPS), provides international standards for designing instrument approach and departure procedures. These standards also cover two types of NADPs. NADP1 is intended to reduce noise for noise-sensitive communities located close to an airport, while NADP2 is intended to reduce noise for noise sensitive communities located farther from the airport. Within the United States, FAA AC 91-53A describes these types of NADPs as the "close-in NADP" and the "distant NADP," respectively.

Type of Measure

This measure is a flight procedure that could be used to achieve noise benefits within the airspace constraints and reduce exposure of noise-sensitive parcels and people to aircraft noise in the area around LGA.

Analysis

NADPs are specific to aircraft types and aircraft operators; therefore, they must be developed by aircraft operators themselves through detailed analyses and pilot training. The Study Team used the Port Authority's ANOMS data to develop aircraft vertical profiles used in the 2016 and 2021 FAA-accepted NEMs, as well as the 2021 Revised NEM. Throughout the LGA 14 CFR Part 150 Study process, aircraft operators participated in the TAC and provided input on their aircraft vertical profiles, including the use of NADPs. Therefore, these NEMs already reflect any existing use of NADPs by aircraft operators. Because NADP implementations vary by aircraft operator and aircraft type, the use of specific NADPs cannot be identified solely using ANOMS data. For the purposes of determining the potential noise reduction benefits of specific NADP1 or NADP2 implementations in the LGA 14 CFR Part 150 Study, the potential noise benefits of implementing NADP1 or NADP2 were estimated using FAA AC 91-53A and guidance from the INM User Guide. The INM User Guide provides guidance for modeling potential noise effects of generic NADP designs by specifying user-defined departure profiles in INM input files.

With this guidance, two separate modeling scenarios were created using the INM: (1) generic NADP1 departure profiles for the top nine aircraft types expected to operate most frequently at LGA in the year 2021 (which compose approximately 90 percent of Airport operations), and (2) generic NADP2 departure profiles for those same aircraft types. For all other aircraft types in both NADP modeling scenarios, the departure vertical profiles were kept identical to those used in the 2021 Revised NEM. See Appendix E of the LGA NEM Report for details of the baseline vertical profiles.

Potential Noise Benefits

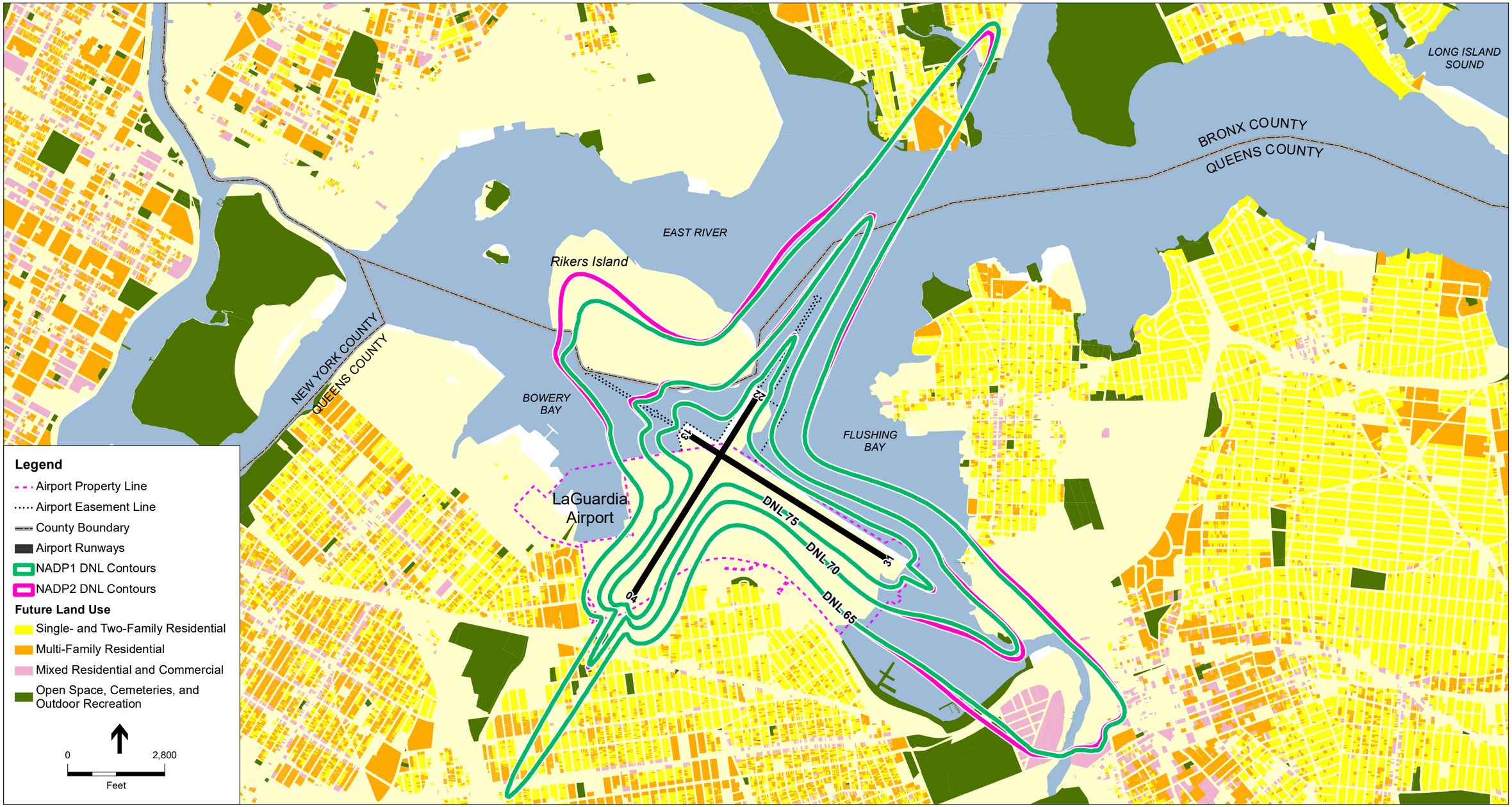
Figure 3-18 illustrates the noise contours associated with the implementation of NADP1 and NADP2 overlaid on residential land use. The DNL 65, 70, and 75 contours are plotted for both NADPs. The 2021 Revised NEM contours are not shown because they cannot be compared with the NADP1- and NADP2-related contours. This is because the 2021 Revised NEM contours were produced using an analysis of actual aircraft departure vertical profiles using historic radar data, while the NADP1- and NADP2-related contours were produced using generic NADP vertical profiles based on FAA AC 91-53A. Presenting the 2021 Revised NEM contours on the same figure would be misleading because they already include detailed departure profiles, while detailed departure profiles were not developed for the NADP1- and NADP2-related contours. NADPs are specific to aircraft type and aircraft operator, and the Port Authority cannot mandate their use at an airport; therefore, only generic NADP1 and NADP2 profiles are available for analysis.

As shown by the close-up NADP1- and NADP2-related DNL 65, 70, and 75 contours for Flushing, Queens, in **Figure 3-19**, implementation of NADP1 for Runway 13 departures may be more beneficial than implementation of NADP2 for this runway end. This is because NADP1 features a steeper climb close to the Airport, resulting in aircraft being at a higher altitude over Flushing than they would be if using the NADP2 profile.

As shown by the DNL 65 contour over the neighborhood of Clason Point in the Bronx in **Figure 3-20**, implementation of NADP2 for Runway 4 departures may be more beneficial than implementation of NADP1 for this runway end. This is because of the distance of Clason Point from LGA and the nature of NADP2, which is intended to reduce noise for communities farther from an airport. Aircraft flying the NADP2 profile when departing Runway 4 may be at higher altitudes and/or lower engine power levels over Clason Point than if they were to fly the NADP1 profile.

Modeling indicated negligible differences in NADP1 and NADP2 for Runway 22 departures, as shown in the close-up contour plot for Jackson Heights and Ditmars Steinway in **Figure 3-21**. This is because a minimal number of aircraft depart Runway 22 and the noise exposure in these neighborhoods is influenced mostly by aircraft arriving to Runway 4.

Table 3-18 compares the acres of residential land uses, numbers of dwelling units, and population exposed to noise levels of DNL 65 and higher for both the NADP1 and NADP2 profiles. **Table 3-19** compares the acres of total land uses, numbers of historic sites, and numbers of non-residential noise-sensitive sites exposed to noise levels of DNL 65 and higher for both the NADP1 and NAPD2 profiles.



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; KB Environmental Sciences, Inc., 2016; ESA, 2016 and 2020; ESRI Mapping Services, 2019; Google Earth Aerial Imagery Research, Image © 2020 CNES/Airbus.

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Figure 3-18

DNL 65, 70, and 75 Contours - NADP1 and NADP2
LaGuardia Airport

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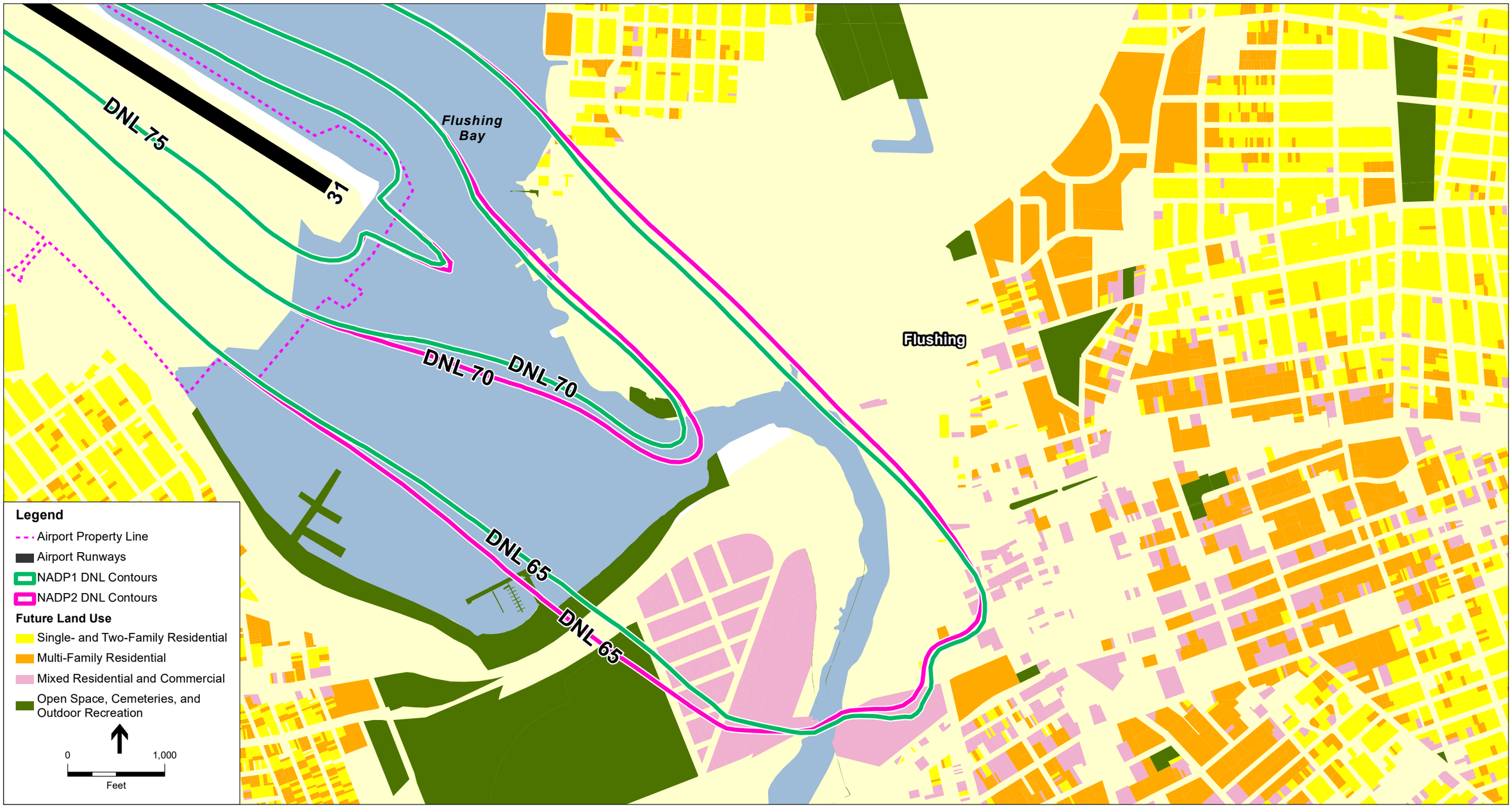

SOURCE: New York City Department of City Planning, MapPLUTO 15V1 - Tax lot/land use geographic information database, March 2015 - June 2015; Nassau County Department of Public Works Planning Division; Property classification and geographic information database, September 2015; INM 7.0d; KB Environmental Sciences, Inc., 2016; ESA, 2016 and 2020; ESRI Mapping Services, 2019; Google Earth Aerial Imagery Research, Image © 2020 CNES/Airbus.

Figure 3-19

DNL 65, 70, and 75 Contours - NADP1 and NADP2
Flushing

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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; KB Environmental Sciences, Inc., 2016; ESA, 2016 and 2020; ESRI Mapping Services, 2019; Google Earth Aerial Imagery Research, Image © 2020 CNES/Airbus.

Figure 3-20
DNL 65 and 70 Contours - NADP1 and NADP2
Clason Point and Castle Hill

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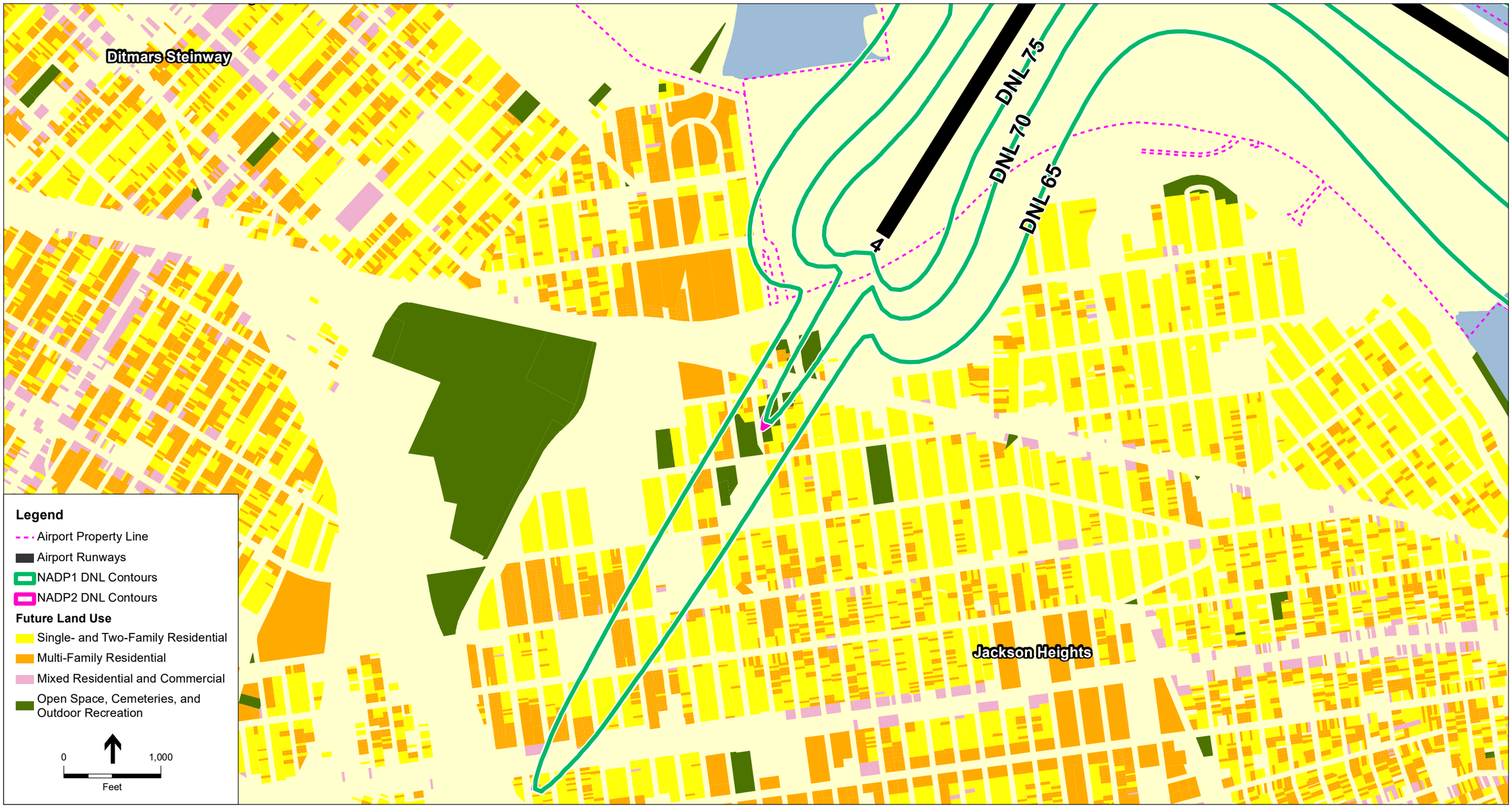

SOURCE: New York City Department of City Planning, MapPLUTO 15V1 - Tax lot/land use geographic information database, March 2015 - June 2015; Nassau County Department of Public Works Planning Division; Property classification and geographic information database, September 2015; INM 7.0d; KB Environmental Sciences, Inc., 2016; ESA, 2016 and 2020; ESRI Mapping Services, 2019; Google Earth Aerial Imagery Research, Image © 2020 CNES/Airbus.

Figure 3-21
DNL 65, 70, and 75 Contours - NADP1 and NADP2
Jackson Heights and Ditmars Steinway

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TABLE 3-18
RESIDENTIAL LAND USES EXPOSED TO DNL 65 AND HIGHER – NADP1 AND NADP2

Land Use Category	Land Area Exposed to DNL 65 and Higher (acres)			Number of Dwelling Units			Population		
	NADP1	NADP2	Difference	NADP1	NADP2	Difference	NADP1	NADP2	Difference
Single-Family and Two-Family Residential	40.5	36.9	-3.6	1,225	1,156	-69	3,611	3,401	-210
Multi-Family Residential	35.3	35.0	-0.3	1,748	1,766	18	4,471	4,527	56
Mixed Residential and Commercial	5.3	3.1	-2.2	770	770	0	2,039	2,039	0
Total	**81.1**	**75.0**	**-6.1**	**3,743**	**3,692**	**-51**	**10,121**	**9,967**	**-154**

NOTE: Numbers may not add up because of rounding. Differences were computed by subtracting the NADP1 results from the NADP2 results. 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 in the different areas within the DNL 65 and higher contours.

SOURCES: Planning Technology, Inc. and KB Environmental Sciences, Inc., and ESA, 2017 and 2020.

TABLE 3-19
HISTORIC SITES, NON-RESIDENTIAL NOISE-SENSITIVE SITES, AND TOTAL LAND AREA EXPOSED TO DNL 65 AND HIGHER – NADP1 AND NADP2

Scenario	Total Land Area (Acres)	Places of Worship	Schools[1]	Hospitals and Residential Healthcare	Historic Sites	Day Care Facilities
NADP1	2,297.1	6	3	1	13	3
NADP2	2,412.9	7	3	1	13	3
Difference	115.8	1	0	0	0	0

NOTE: Differences were computed by subtracting the NADP1 results from the NADP2 results.

1 These schools were included in the School Soundproofing Program and are compatible with DNL 65 and higher (see Section 2.6.1 of the LGA NEM Report).

SOURCES: Planning Technology, Inc., KB Environmental Sciences, Inc., and ESA, 2017 and 2020.

Conclusion: *LGA Noise Abatement Measure 6: Implement Noise Abatement Departure Profiles on a Voluntary Basis for Runways 4 and 13* could reduce the number of noise-sensitive parcels and people exposed to noise levels of DNL 65 and higher in both Queens and the Bronx. The NADP selected for each runway end would be the NADP that provides the most benefit to nearby communities. NADP1 is the recommended procedure for departures from Runway 13, while NADP2 is the recommended procedure for departures from Runway 4 at LGA.

Table 3-20 summarizes implementation requirements along with the benefits and rationale for the recommendation of LGA Noise Abatement Measure 6.

TABLE 3-20
IMPLEMENTATION SUMMARY FOR LGA NOISE ABATEMENT MEASURE 6:
IMPLEMENT NOISE ABATEMENT DEPARTURE PROFILES ON A VOLUNTARY BASIS FOR RUNWAYS 4 AND 13

Implementation Item	Discussion
Benefits	Potential reduction of people and dwelling units in the DNL 65 contour in the Bronx and in Queens with implementation of the proposed profiles.
Rationale	The Port Authority is recommending LGA Noise Abatement Measure 6 because it could reduce noise exposure over residential land uses in both Queens and the Bronx. The NADP selected for each runway end would be the NADP that provides the most benefit to nearby communities. NADP1 is the recommended procedure for departures from Runway 13, while NADP2 is the recommended procedure for departures from Runway 4.
Responsible Parties	Pilots are responsible for the operation of their aircraft. The Port Authority will request that aircraft operators begin development of this measure and then will work with aircraft operators, NY TRACON, and other FAA personnel to further study and develop the measure. Implementation of this measure may require an environmental study under NEPA; the FAA would be the responsible party to complete such a study.
Estimated Costs	The expected costs associated with the development and implementation of this procedure are internal to the FAA (e.g., ATO), other coordinating agencies, and aircraft operators. These costs are unknown, and an FAA AIP grant would not be required.
Funding Sources	FAA funding, aircraft operator internal funding.
Requirements	FAA approval. Implementation of this measure may require the FAA to perform an environmental study under NEPA.
Estimated Schedule	Dependent on aircraft operators designing and implementing NADPs. Within 6–12 months of the FAA's Record of Approval for the NCP, the Port Authority will submit a request for profile development.

SOURCES: Port Authority, KB Environmental Sciences, Inc., and ESA, 2018 and 2020.

LGA Noise Abatement Measure 7: Implement Nighttime Optimized Profile Descent Procedures

Description

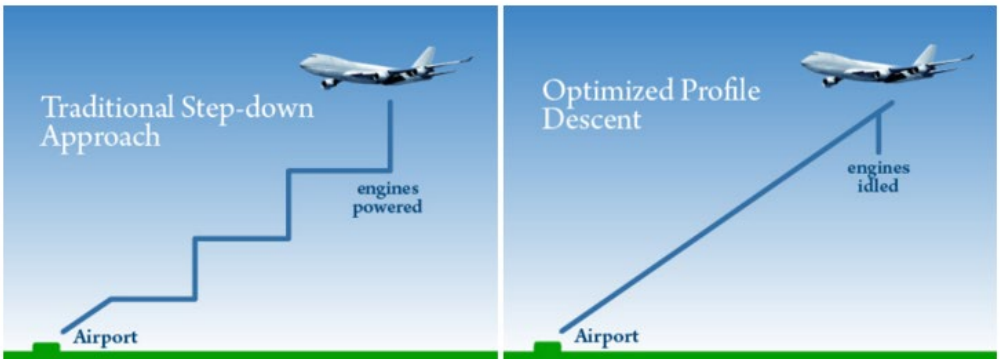
This NCP measure involves the implementation of Optimized Profile Descent (OPD) arrival profiles at LGA. An OPD is an arrival procedure that optimizes reduction of noise and air pollutant emissions by minimizing changes in thrust using a favorable initial flight path angle, and through strategic management of flaps and landing gear. Aircraft on an OPD are generally configured with flaps and landing gear, airspeed, and approach angle before they are five miles from the runway, mostly benefitting areas outside of the DNL 65 contour.

Because of the busy and complex nature of the region's airspace as a whole, aircraft are typically directed by air traffic controllers to hold at a constant altitude for a certain period of time and then directed to drop to a lower altitude and hold for a certain period of time. In congested airspace, aircraft may be required to follow a number of these steps prior to landing. OPDs are being recommended only during nighttime hours, given that the airspace is much less busy during the nighttime. The FAA ATO could examine whether the "step-downs" can be eliminated or reduced during these hours. **Figure 3-22** illustrates the OPD concept by comparing a notional OPD to a descent with hold-downs, where aircraft increase power and fly at constant altitude when instructed by ATC.

Type of Measure

This measure is a flight procedure that could be used to achieve noise benefits within the airspace constraints.

Figure 3-22
Comparison of a Notional OPD and Descent with Level Segments



NOTE: Graphic is not to scale.

SOURCE: Federal Aviation Administration, https://www.faa.gov/nextgen/library/media/getSmart_PBN.pdf.

Analysis

OPDs direct aircraft to descend to the runway with the minimal amount of engine power needed to land safely. Hold-downs that require high power settings for the level flight segments with conventional arrival procedures are generally eliminated. As a result, less noise is heard on the ground.

Potential Noise Benefits

The extent of the noise reduction on the ground compared to conventional arrival procedures varies by the specific airframe/engine combination and distance from the runway. OPDs generally reduce noise exposure in areas beyond the DNL 65 contour.

Conclusion: *LGA Noise Abatement Measure 7: Implement Nighttime Optimized Profile Descent Procedures* could reduce the aircraft noise levels for areas beyond the limit of the DNL 65 contour.

Table 3-21 summarizes implementation requirements along with the benefits and rationale for the recommendation of LGA Noise Abatement Measure 7.

TABLE 3-21
IMPLEMENTATION SUMMARY FOR LGA NOISE ABATEMENT MEASURE 7: IMPLEMENT NIGHTTIME OPTIMIZED PROFILE DESCENT PROCEDURES

Implementation Item	Discussion
Benefits	No reduction of people or dwelling units exposed to DNL 65 with the proposed nighttime use of OPD procedures. However, this measure could reduce noise exposure in residential areas beyond the contours under the arrival flight paths.
Rationale	The Port Authority is recommending LGA Noise Abatement Measure 7 because it may be an effective way to reduce noise exposure in residential areas under the arrival flight path upon approach.
Responsible Parties	Development and implementation of flight procedures is the sole responsibility of the FAA. The Port Authority will request that the development process be initiated, and then will work with NY TRACON and other FAA personnel to further study and develop this procedure. Implementation of this measure may require an environmental study under NEPA; the FAA would be the responsible party to complete such a study.
Estimated Costs	The expected costs associated with the development and implementation of this procedure are internal to the FAA (e.g., ATO) and other coordinating agencies. These costs are unknown, and an FAA AIP grant would not be required.
Funding Sources	The FAA.
Requirements	FAA approval. Implementation may require an environmental study under NEPA.
Estimated Schedule	The Port Authority will submit a request for procedure development within 6–12 months of the FAA's Record of Approval for the NCP. FAA design, testing, and implementation of the procedure typically could take 18–24 months, potentially up to 3 years once the Port Authority requests initiation of the development process.

SOURCES: Port Authority, KB Environmental Sciences, Inc., and ESA, 2018 and 2020.

LGA Noise Abatement Measure 8: Continue Existing Mandatory Departure Noise Limit

The Port Authority has pursued aircraft noise abatement measures for several decades. In 1959, the Port Authority established a mandatory aircraft departure noise limit of 112 PNdB for aircraft departures at LGA. Operators of aircraft that violate the departure noise limit at LGA are contacted by the Port Authority and notified of the violation. The existing monitoring system at LGA, which currently consists of 10 monitors, supports the Port Authority's enforcement of this departure noise limit. The departure noise limit is a measure that was established before such measures were restricted by ANCA in 1990 and is therefore "grandfathered," permitting the Port Authority to continue the measure. The Port Authority is recommending continuation of the existing departure noise limit, with no changes, to continue restricting operational activity that violates the limit. This provides benefits to communities in the vicinity of LGA.

Conclusion: *LGA Noise Abatement Measure 8: Continue Existing Mandatory Departure Noise Limit* provides noise benefits to communities in the vicinity of LGA by continuing enforcement of the mandatory 112 PNdB departure noise limit at LGA.

Table 3-22 provides a summary of implementation requirements along with the benefits and rationale for the recommendation of LGA Noise Abatement Measure 8.

TABLE 3-22
IMPLEMENTATION SUMMARY FOR LGA NOISE ABATEMENT MEASURE 8: CONTINUE EXISTING MANDATORY DEPARTURE NOISE LIMIT

Implementation Item	Description
Benefits	Continuation of the existing mandatory departure noise limit provides noise benefits to communities in the vicinity of LGA by continuing enforcement of the mandatory 112 PNdB departure noise limit at LGA.
Rationale	The Port Authority is recommending LGA Noise Abatement Measure 9 because it is the continuation of an existing mandatory noise abatement measure with no changes, and the existing measure provides benefits to communities in the vicinity of LGA.
Responsible Parties	The Port Authority.
Estimated Costs	No funding is required to implement this measure, and the Port Authority will continue to enforce the existing mandatory departure noise limit.
Funding Sources	No funding required.
Requirements	Not applicable.
Estimated Schedule	This measure is already implemented; the Port Authority will continue to enforce the existing mandatory departure noise limit.

SOURCES: Port Authority, KB Environmental Sciences, Inc., and ESA, 2018 and 2020.

3.3 Noise Abatement Strategies Considered but Not Recommended for Inclusion in This NCP

This section describes noise abatement strategies that the Port Authority considered but is not recommending for LGA. During development of the NCP, the Port Authority and Study Team reviewed 72 suggested noise abatement strategies raised by stakeholders that participated in the 14 CFR Part 150 Study process. As described below, the individual strategies fell within four major categories: (1) develop new or modify existing flight tracks, (2) modify the airfield layout or build noise barriers, (3) modify pilot procedures for operating aircraft, and (4) change operating frequencies by modifying runway use or imposing operating restrictions. A full list of suggested noise abatement strategies can be found in **Appendix G**.

Develop New or Modify Current Flight Tracks (Routes)

Numerous suggestions to create new flight tracks or modify current flight tracks for noise abatement purposes were reviewed. In general, adjustments to flight tracks for noise abatement can either concentrate noise over an area or disperse noise over a larger area.

The NY TRACON staff determined that some suggested modifications to aircraft flight track locations were not feasible to implement because they would require airspace and procedure modifications that are incompatible with other airports in the New York–New Jersey area. Such strategies are not recommended for inclusion in this NCP.

Suggestions to implement steeper glide slopes for aircraft arrivals were also received. The glide slope set by the FAA for aircraft arriving to LGA ranges between 3.0 and 3.1 degrees relative to the ground surface. Increases in glide slope near the Airport may reduce the ability of aircraft operators to maintain stabilized approaches, posing a safety hazard. Therefore, increases in glide slope near LGA are not recommended for inclusion in this NCP. However, increasing the glide slope farther from the Airport may have noise benefits outside the DNL 65 contour, so the Port Authority is instead recommending the implementation of nighttime OPDs at LGA (described in Section 3.2). The Port Authority expects to further evaluate changes to the glide slope by engaging with the FAA through the NAC.[30]

Some of the suggested strategies recommended moving flight tracks with the goal of moving noise over compatible land uses and features (such as non-residential areas, industrial parks, waterways, and large expressways). Given that there are residential areas of various densities in the immediate vicinity of LGA, it is not possible to avoid overflying all residential areas. There are limited opportunities to move flight tracks in the vicinity of LGA. However, the Port Authority has worked, and will continue to work, with the FAA to identify and promote the use of aircraft flight track locations that place aircraft over compatible land uses to the extent possible, given the multitude of factors that affect the operation of LGA. A number of noise abatement measures recommended for inclusion in this NCP involve potentially feasible modifications to flight procedures with the goal of moving noise over compatible land uses.

[30] Available: https://www.faa.gov/about/office_org/headquarters_offices/ang/nac/. Last accessed March 20, 2019.

Suggestions to disperse flight tracks with the goal of spreading aircraft noise over a large area while not affecting the operational efficiency of the Airport were also received. The shifting or moving of noise from one populated area to another is inconsistent with the 14 CFR Part 150 requirement to develop an NCP that "reduces existing noncompatible uses and prevents or reduces the probability of the establishment of additional noncompatible uses."[31] Therefore, such strategies are not recommended for inclusion in this NCP. However, pursuant to Section 175 of the FAA Reauthorization Act of 2018,[32] the Port Authority, in consultation with the affected communities, will request that the FAA's NAC reevaluate all new or amended area navigation departure procedures that have the potential for using dispersal headings after this NCP has been approved.

Perform Construction to Modify the Airfield Layout or Add Noise Barriers

Suggested strategies that involve changing the LGA runway layout and other on-airfield modifications were reviewed. These included the construction of new runways, the realignment of the current runways, runway extensions, and the construction of noise barriers on LGA property or in neighborhoods.

Adding a new runway that is aligned to place more operations over water or changing the current runway layout for noise abatement is infeasible to implement at this time, as reconstructing/ changing the direction of the runways is not part of the existing LGA redevelopment plans and the analysis of the associated economic and environmental issues is outside the scope of this NCP. For the aforementioned reasons, adding a new runway is not being recommended for this NCP.

Under certain conditions, building noise barriers between noise sources and noise-sensitive land uses can reduce noise exposure. Noise barriers generally benefit only properties immediately adjacent to aircraft ground movements at an airport. There are no residential areas adjacent to LGA that would benefit from a noise barrier. Noise barriers deliver no noise benefit to noise-sensitive land uses that are exposed to noise from aircraft in flight. For a noise barrier to reduce noise, the line of sight between the source and receiver needs to be blocked. There is not a specific fixed distance from source to receiver where noise barriers are effective. However, the overall effectiveness of noise barriers depends on barrier construction and location, source location (including the height of aircraft engines above the ground), and atmospheric conditions. Additionally, noise barriers may also present an obstruction hazard to aircraft operations. The construction of barriers at airports also requires compliance with 14 CFR Part 77, "Safe, Efficient Use, and Preservation of the Navigable Airspace," the regulation that restricts the placement and height of structures near runways.

At LGA, the DNL 65 and higher contours over noise-sensitive areas result primarily from noise produced by aircraft in flight. Therefore, it is unlikely that the installation of a noise barrier would provide benefits to noncompatible land uses within the DNL 65 contour at LGA.

31 14 CFR Part 150, Appendix B, Sec. 150.5(a).

32 FAA Reauthorization Act of 2018, Public Law No. 115-254 (effective October 5, 2018).

For the aforementioned reasons, the construction of noise barriers is not recommended for inclusion in this NCP.

Modify Pilot Procedures for Operating Aircraft

The Study Team reviewed suggestions to modify the aircraft operating procedures that pilots follow. These included implementing speed reductions over residential areas, delaying the lowering of landing gear, and reducing engine thrust levels for departures. Pilot procedures such as thrust, speed, and landing gear schedules are aircraft- and operator-specific, and the Port Authority cannot mandate specific cockpit management procedures. The pilot-in-command has the sole authority to determine the procedures required for the safe operation of his or her aircraft, including speed, thrust and flap settings, and landing gear deployment. Certain voluntary modifications to pilot procedures could be discussed in the context of a voluntary Fly Quiet Program, presented in **Section 5.2**.

An analysis of departure thrust levels indicated that many aircraft already use reduced thrust levels for departures at LGA. This analysis is discussed in Section 4.5.3 of the LGA NEM Report.

Change Operating Frequencies by Modifying Runway Use or Imposing Operating Restrictions

The Study Team reviewed noise abatement strategies related to changing the runway use, limiting the times that a particular runway is in use, restricting aircraft from departing from a specific runway, and banning certain aircraft from operating at LGA altogether.

Changing the utilization rates for runways can direct noise exposure around an airport. Runway selection at an airport is dependent on several factors including wind speed and direction, cloud ceiling, airfield layout, operational efficiency, and the local airspace. Navigational aids and published arrival and departure procedures are also factors in runway selection. Permanently closing a runway to departures would be detrimental to airfield capacity and would not be consistent with the Port Authority's objective of meeting the needs of the traveling public. Nighttime runway use modifications are being recommended in the NCP to place aircraft over compatible land uses to the extent feasible, as shown in **Section 2.2**.

The Port Authority received suggestions to implement use restrictions for aircraft operating at LGA, including shifting operations to other airports, implementing or modifying landing fees based on aircraft noise characteristics, and limiting or prohibiting operations of certain aircraft. However, through the recommended noise abatement, land use, and programmatic measures set forth in this NCP, the Port Authority will have an NCP that, once approved and fully implemented, will eliminate noncompatible land uses without restricting aircraft operations. In addition, the Port Authority must abide by grant assurances in place with the FAA, one of which requires that no restrictions on operations be implemented by the airport authority.[33] Furthermore, no new restrictions can be implemented at LGA without successful completion of a 14 CFR Part 161 Study and approval by the FAA, which also requires that the Port Authority first implement noise control measures that do not require aircraft operating restrictions. Therefore, use restrictions are not

[33] 49 USC Section 47107(d).

recommended in this NCP. The Port Authority is instead recommending the continuation of the existing mandatory departure noise limit as LGA Noise Abatement Measure 9. This measure was established before passage of ANCA and the promulgation of 14 CFR Part 161.

3.4 2021 With Program Noise Exposure Map

14 CFR Part 150, Appendix B, Sec. 150.3(b) indicates that an NCP must include "appropriately revised maps" if "the proposed noise compatibility program would yield maps differing from those previously submitted to FAA." The FAA informed the Port Authority on December 12, 2019, that LGA Noise Abatement Measure 1, "Modify NTHNS and GLDMN Runway 13 RNAV SIDs to Direct Aircraft Away from Flushing, New York" (presented in **Section 3.2** of this NCP) is scheduled to be implemented by the FAA in May of 2020, in advance of the Final LGA NCP submittal. As such, in accordance with 14 CFR Part 150 guidance, the Study Team developed an NEM representing the noise environment in the vicinity of LGA due to implementation of LGA Noise Abatement Measure 1, referred to as the "2021 With Program NEM" in this NCP. The Port Authority is submitting the 2021 With Program NEM to the FAA for acceptance as the NEM representing aircraft operations at LGA in the year 2021.

This section presents the methods and data used to produce the noise contours that are depicted on the 2021 With Program NEM. Other recommended noise abatement measures in this NCP are not expected to be implemented in advance of the Final LGA NCP submittal and are, therefore, not represented in the 2021 With Program NEM. Any future NEM updates, as described in LGA Program Management Measure 9 in **Section 5.2**, would include changes in LGA's noise environment associated with noise abatement measures that are in place as of the date of NEM update.

3.4.1 Noise Model and Day-Night Average Sound Level

The LGA 14 CFR Part 150 Study was initiated when the FAA's INM Version 7.0d was the required model for preparing noise contours.[34] As the Study is still ongoing, this 2021 With Program NEM has also been prepared using this version of the INM. The INM was used to produce contours to delineate specific levels of noise exposure in DNL. DNL is described in **Section 1.4**. The DNL metric is the noise descriptor required by the FAA for aircraft noise exposure and land use compatibility planning under 14 CFR Part 150.

3.4.2 Data for Developing the 2021 With Program NEM

The following sections summarize the information used to develop the 2021 With Program NEM.

Forecast Annual Aircraft Operations and Fleet Mix

The Port Authority developed the *LaGuardia Airport (LGA) Aircraft Fleet Mix and Annual Aircraft Operations Forecast 2014-2033* (LGA NEM Forecast) through an independent consultant for use in

34 The FAA's AEDT replaced the INM and EDMS as the required tool for noise, fuel burn, and emissions modeling on May 29, 2015. Updating the aircraft noise exposure information in this 14 CFR Part 150 Study was not required because the Study and substantial work on the analysis of noise at LGA was initiated prior to May 29, 2015.

the LGA 14 CFR Part 150 Study. Using the LGA 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 March 28, 2016. The fleet mix used for the 2021 With Program NEM is identical to that used in the 2021 Revised NEM presented in **Chapter 2**. The number of forecast annual aircraft operations at LGA in 2021, by aircraft type, is summarized in **Table 2-1**.

Aircraft Operations by Time of Day

Aircraft operations modeled in the INM are assigned as occurring during daytime (7:00 A.M. to 9:59:59 P.M.) or nighttime (10:00 P.M. to 6:59:59 A.M.). The 2021 With Program NEM assumes identical daytime and nighttime activity levels as the 2021 Revised NEM presented in **Chapter 2**. **Table 2-2** summarizes the times of day in which aircraft arrivals and departures are expected to occur in 2021 (by percent of total operations). The Port Authority's 2014 ANOMS data served as the primary source for the types of operations (arrival or departure) and time-of-day information, since ANOMS captures actual arrival and departure times versus scheduled times.

Runway Use

Runway use refers to the frequency with which aircraft use each runway end for departures and arrivals. The runway utilization data were derived from LGA ANOMS data for calendar year 2014. The rates are forecast to remain constant for the 2021 study year. The runway use assumptions used to produce the 2021 With Program NEM are identical to those used in the 2021 Revised NEM presented in **Chapter 2**. **Table 2-3** provides a summary of arrival and departure runway utilization.

Flight Tracks and Utilization

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 LGA, aircraft arrival and departure data from the Port Authority's ANOMS were reviewed for calendar year 2014. The 2014 data were used to develop the flight tracks for use in the INM. Flight corridors used 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 track locations and utilization percentages used in the 2021 With Program NEM are identical to those developed for the 2021 Revised NEM presented in **Chapter 2**, with the exception of a modification to the NTHNS and GLDMN departure procedures. This modification is described in LGA Noise Abatement Measure 1, "Modify NTHNS and GLDMN Runway 13 RNAV SIDs to Direct Aircraft Away from Flushing, New York," presented in **Section 3.2** of this NCP. The modification was included in the 2021 With Program NEM because LGA Noise Abatement Measure 1 is the only noise abatement measure in NCP that is scheduled to be implemented in advance of the Final LGA NCP submittal. The modification is intended to reduce noncompatible land uses in Flushing. The INM flight tracks used in the production of the 2021 With Program NEM are depicted in maps 2 through 6 of **Appendix I-2**.

Departure and Arrival Profiles

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 LGA 14 CFR Part 150 Study, to better represent how aircraft operate to and from LGA. Discussions with representatives of various airlines that operate at LGA indicated that the slower climb rates are seen partly because aircraft are departing with weights that are higher than the INM default takeoff weights, and partly because the takeoff thrust values identified by the airline personnel are lower than the default INM thrust values. These modifications result in a better depiction of the noise exposure around LGA and are identical to those used in the 2021 Revised NEM presented in **Chapter 2**.

3.4.3 2021 With Program NEM Contours

The 2021 With Program NEM contours are depicted in **Figure 3-23** and are superimposed over a future land use map. In accordance with 14 CFR Part 150, the 2021 With Program NEM contours reflect the anticipated noise conditions based on Airport and operational data that are representative of the year 2021. The types and amounts of land uses within the DNL 65 and higher contours are provided in **Table 3-23**, while the historic sites and non-residential noise-sensitive sites within the DNL 65 and higher contours are listed in **Table 3-24**. Several schools within the DNL 65 contour have already been sound-insulated and are therefore considered compatible with aircraft noise levels of DNL 65 and higher, as indicated in the table. The NYC Department of City Planning is the sole land use agency for all land within the draft 2021 With Program DNL 65 contour. **Tables 3-2** and **3-3** present the estimated residential land area, number of dwelling units, population, and number of noise-sensitive sites exposed to DNL 65 and higher for the 2021 With Program NEM, referred to as Noise Abatement Measure 1 in those tables, in comparison with the 2021 Revised NEM. The full-size map set of the 2021 With Program NEM is included in **Appendix I-2**.

TABLE 3-23
LAND USES EXPOSED TO DNL 65 AND HIGHER – 2021 WITH PROGRAM NEM

Land Use Category	Land Uses Exposed to DNL 65 and Higher (acres)			
	DNL 65-70	DNL 70-75	DNL 75+	Total
Single- and Two-Family Residential	40.3	0.0	0.0	40.3
Multi-Family Residential	34.9	0.0	0.0	34.9
Mixed Residential and Commercial	1.6	0.0	0.0	1.6
Commercial and Office	35.9	2.3	0.0	38.2
Industrial and Manufacturing	53.2	10.8	0.0	64.0
Transportation, Right of Way, Parking, and Utilities	208.4	13.3	3.4	225.1
Public Facilities and Institutions	197.0	6.8	0.0	203.8
Open Space, Cemeteries, and Outdoor Recreation	33.7	4.9	0.0	38.6
Vacant	28.7	5.5	0.0	34.3
Airport Property	171.3	151.4	269.0	591.7
Water (Off Airport Property)	698.2	285.0	49.7	1032.8
Total	**1,503.1**	**479.9**	**322.1**	**2,305.1**

NOTE: Numbers may not add up due to rounding.
SOURCE: Planning Technology, Inc. and KB Environmental Sciences, Inc., 2018 and 2020.

TABLE 3-24
HISTORIC SITES AND NON-RESIDENTIAL NOISE-SENSITIVE SITES EXPOSED TO AIRCRAFT NOISE LEVELS OF DNL 65 AND HIGHER – 2021 REVISED NEM AND 2021 WITH PROGRAM NEM

Name	Address	Facility Type	Within 2021 Revised NEM DNL 65 and Higher?	Within 2021 With Program NEM DNL 65 and Higher?
Idara Tableegh Ul-Islam	23-38 81st St	Place of Worship	Y	Y
Roman Catholic Church Our Lady Of Fatima Convent	25-56 80th St	Place of Worship	Y	Y
Our Lady Of Fatima Roman Catholic Church	25-02 80th St	Place of Worship	Y	Y
The Korean Church of Queens	23-27 89th St	Place of Worship	Y	Y
Ebenezer Baptist Church	36-12 Prince St	Place of Worship	Y	N
Ebenezer Baptist Church	36-06 Prince St	Place of Worship	Y	N
Gospel Calvary Church	134-28 Northern Blvd	Place of Worship	Y	N
Monsignor McClancy Memorial High School	71-06 31st Ave	School[1]	Y	Y
Our Lady of Fatima School	25-38 80th St	School[1]	Y	Y
Vaughn College of Aeronautics & Technology	86-01 23rd Ave	School[1]	Y	Y
Independence Residences, Inc.	33-23 69th St	Health Care-Residential	Y	Y
New York Foundling Hospital	153 Stephens Ave	Health Care-Residential	N	N
Jackson Heights Historic District	33-11 70th St, Queens	Historic Site	Y	Y
Jackson Heights Historic District	33-12 70th St, Queens	Historic Site / Attached Residence	Y	Y
Jackson Heights Historic District	33-14 70th St, Queens	Historic Site / Attached Residence	Y	Y
Jackson Heights Historic District	33-16 70th St, Queens	Historic Site / Attached Residence	Y	Y
Jackson Heights Historic District	33-18 70th St, Queens	Historic Site / Attached Residence	Y	Y
Jackson Heights Historic District	33-20 70th St, Queens	Historic Site / Attached Residence	Y	Y
Jackson Heights Historic District	33-22 70th St, Queens	Historic Site / Attached Residence	Y	Y
Empire Millworks Building, 1938	128-50 Willets Point Blvd	Historic Site	Y	Y
Hangar 3 (1939; Delano & Aldrich)	La Guardia Airport	Historic Site	Y	Y
Hangar 5 (1939; Delano & Aldrich)	La Guardia Airport	Historic Site	Y	Y
Hangar 7 (former sea plane hangar, ca. 1939)	La Guardia Airport	Historic Site	Y	Y
Marine Air Terminal	La Guardia Airport	Historic Site	Y	Y
Jackson Heights Historic District	Jackson Heights	Historic District[2]	Y	Y
Flushing Day Care Center, Inc.	36-06 Prince St	Day Care-Assisted Living	Y	N
Grace Day Care Center, Inc.	89-00 23rd Ave	Day Care-Assisted Living	Y	Y
Metro Family Residence	87-02 23rd Ave	Day Care-Assisted Living	Y	Y

NOTES:

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

2 To calculate the DNL value for the Jackson Heights Historic District, an INM noise receptor location point was placed at the northwest corner of the land use polygon representing the District.

SOURCES: KB Environmental Sciences, Inc., 2020; ESA, 2020.

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; KB Environmental Sciences, Inc., 2016; ESA, 2016 and 2020; ESRI Mapping Services, 2019; Google Earth Aerial Imagery Research, Image © 2020 CNES/Airbus.

*The PLUTO Transportation land use designations on LGA were updated to reflect new airport facilities that were constructed during the LGA Redevelopment Project.

LaGuardia Airport 14 CFR Part 150 Study . 140037

Figure 3-23

2021 With Program Noise Exposure Map DNL Contours
LaGuardia Airport

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3.4.3 Stakeholder Engagement and Opportunities for Public Comment

The draft 2021 With Program NEM was provided at the LGA NCP public information workshop and public hearing described in Section 6.2.2. During the comment period for the LGA Draft NCP, interested stakeholders had the opportunity to review and comment on the 2021 With Program NEM. Comments received written responses in the Final NCP.

3.5 Summary of Recommended Noise Abatement Measures

Appendix H summarizes the full list of recommended noise abatement measures.

Measures Already in Place at LGA

- Continue Existing Mandatory Departure Noise Limit
- Modify NTHNS and GLDMN Runway 13 RNAV SIDs to Direct Aircraft Away from Flushing, New York

Measures to Be Initiated at LGA within One Year of FAA Record of Approval

- Create New Runway 13 Departure Procedure with an Immediate Left Turn over Compatible Land Uses
- Implement Offset Approach to Runway 22 to Reduce Noise Exposure Over Clason Point
- Reduce Runway 4 Departure Noise Over Clason Point
- Reduce Runway 13 Departures at Night
- Implement Noise Abatement Departure Profiles on a Voluntary Basis for Runways 4 and 13
- Implement Nighttime Optimized Profile Descent Procedures

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