PORT AUTHORITY NY NJ

Fly Quiet Programs

TECHNICAL MANUAL

FINAL

SEPTEMBER 2024

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Introduction

The Port Authority of New York and New Jersey (PANYNJ) has established a voluntary noise abatement program, known as the PANYNJ "Fly Quiet Program" (FQP) to showcase, along with partners in the airline industry and the Federal Aviation Administration (FAA), on-going efforts to be good neighbors by operating quietly and sustainably. The goal of the FQP is to encourage aircraft operators flying into and out of the PANYNJ's Newark Liberty International Airport (EWR), John F. Kennedy International Airport (JFK), and LaGuardia Airport (LGA) to adhere to noise abatement procedures, utilize preferential runway programs, and utilize the quietest available aircraft.

The FQP was first envisioned during the development of the 14 CFR Part 150 Programs, during which PANYNJ conducted extensive stakeholder engagement with airlines, operators, FAA, and the public. The PANYNJ also studied FQPs at other airports nationwide to determine best practices and lessons learned. Technical Focus Group meetings were held throughout the FQP design and development including FAA representatives and airlines operating at EWR, JFK, and LGA. In addition, similar meetings were held with Teterboro Airport (TEB), which has had its own FQP for several years. Airline input and feedback were a key point in the development of the program measures, scoring criteria, and rating system ultimately devised for the FQP.

As detailed in this technical manual, the FQP measures aircraft operator participation through a 100-point scoring system, equally weighted between fleet noise quality (50 points) and operator engagement (50 points). The overarching message received through airline coordination was to make community engagement, communication, and pilot training the focus of the scoring system. Also, it was recognized that many factors are not typically in an airline or pilot's control (for example, runway selection and flight procedure selection). The PANYNJ desired to recognize achievements while giving the airlines the ability to show progress and improvement over time, on noise and sustainability performance.

The New York/New Jersey airports and airspace are a unique operating environment. This is due to the proximity of its most heavily utilized airports at EWR, JFK, LGA, and TEB, constraints on flight schedules due to slot controls, and flight procedures required to safely separate aircraft within the nation's busiest airspace. Accordingly, the Fly Quiet Program is designed uniquely to fit the requirements of the New York/New Jersey aviation environment.

Program Overview

Domestic and International commercial passenger and cargo air carriers serving EWR, JFK, and LGA airports that operate a minimum of 365 operations[1] per year at a given airport are eligible to participate in the FQP for that airport. Categories of participating carriers are:

- Domestic major air carrier
- North American regional air carrier
- International air carrier
- Cargo carrier

[1] An operation is defined as one takeoff (departure) or one landing (arrival).

Scoring Methodology

Airline scores are calculated annually based on two categories, and the maximum possible score is 100 points.

- Fleet noise quality – maximum 50 points
- Engagement points – maximum 50 points

Fleet Noise Quality Calculations

Fleet noise metrics are computed quarterly for each airline and operator separately for EWR, JFK, and LGA, based on operations reported by the PANYNJ Airport Noise and Operations Monitoring System (ANOMS). Aircraft "Noise Stages" are defined by the FAA in 14 CFR Part 36 for every model of aircraft when they are first manufactured and entered into service. The FAA classifies aircraft as follows:

- Stage 3 – These are the loudest aircraft currently allowed to operate in the U.S.
- Stage 4 – These aircraft are at least 10 EPNdb[2] quieter than Stage 3 aircraft.
- Stage 5 – These aircraft are at least 7 EPNdb quieter than Stage 4 aircraft.
- Stage 5 Plus – This is not a formal noise rating in 14 CFR Part 36, however, the FQP gives extra points to the newest aircraft that are 5 or 10 EPNdb quieter than Stage 5.

The sources of certificated noise for each aircraft are:

- Federal Aviation Administration, Advisory Circular (AC) 36-1H - *Noise Levels for U.S. Certificated and Foreign Aircraft*, Change 1 (May 2012).
- European Union Aviation Safety Agency, EASA Certification *Noise Levels – Jet Aeroplanes Noise Database*, Issue 41 (February 2023).

As part of the FQP fleet noise quality scoring methodology, each aircraft type is given an associated Noise Quality Rating, ranging from a low of 3.0 points for the loudest (Stage 3) aircraft to a high of 6.0 points for the quietest aircraft. A summary of the FQP point allocation per aircraft type is presented in Table 1.

Table 1: FQP Noise Quality Ratings used to calculate Fleet Noise Quality Score

NOISE QUALITY RATING (FQP points)	14 CFR PART 36 AIRCRAFT TYPE
3.0	FAA-certificated Stage 3
3.5	At least 5 EPNdB quieter than Stage 3
4.0	FAA-certificated Stage 4
4.5	At least 5 EPNdB quieter than Stage 4
5.0	FAA-certificated Stage 5
5.5	At least 5 EPNdB quieter than Stage 5
6.0	At least 10 EPNdB quieter than Stage 5

[2] Effective Perceived Noise in decibels: A formulated measure of human annoyance to aircraft noise (ref: ICAO Annex 16)

Appendix A provides a sample of aircraft noise ratings by operator, category, and aircraft make and model for those aircraft that frequently operate at the PANYNJ airports. The noise quality score is computed for each airline based on its annual number of operations, the type of aircraft used for each flight, and each aircraft's noise quality rating. A weighted average is then calculated for the year. Specifically, the operator's fleet noise quality score is calculated by:

1. Summing the product of each aircraft's number of annual operations by its FQP noise score and dividing this sum by the operator's total annual operations, giving a weighted average score.
2. Dividing the weighted average by 6.0 and multiplying by 50.

The maximum possible fleet noise quality score is 50 (which would be the result if an operator is performing its operations entirely with a fleet of aircraft with a noise rating of 6.0). The minimum possible fleet noise quality score is 25 (which would be the result if an operator is performing its operation entirely with a fleet of aircraft with a noise rating of 3.0).

Fleet Score Calculation Example

As an example, consider the case where an international air carrier performs 2,300 operations in a given year with the following fleet mix:

- Airbus A350-900 300 annual operations
- Boeing B787-900 2,000 annual operations

The Airbus A350-900 has an FAA-certified noise stage 5 and operates at more than 10 EPNdb quieter than the Stage 5 minimum requirement. Thus, it is considered a Stage 5+ and given an FQP noise score of 6.0.

The Boeing B787-900 has an FAA-certified noise stage 5 and operates at more than 5 EPNdb quieter than the Stage 5 minimum requirement. Thus, it is considered a Stage 5+ and given an FQP noise score of 5.5.

Step 1: Weighted Average Score

- (Airbus A350 annual operations * FQP noise score) + (B787 annual operations * FQP noise score) / Total annual operations
- (300 * 6.0) + (2000 * 5.5) / 2,300 = 1,800 + 11,000 / 2,300
- **Weighted Average Score = 5.6**

Step 2: Fleet Noise Quality Score

- (Weighted Average Score / 6) * 50
- (5.6 / 6) * 50 = 0.92 * 50
- **Fleet Noise Quality Score** = **46.4**

Engagement Points Calculations

Engagement points are earned by an airline when it demonstrates the following categories are met during the calendar year. Attendance records and other documentation from the airlines are collected by the PANYNJ throughout the year. The scoring system for calculating engagement points is found in Table 2.

Table 2: Engagement Points Calculations

Engagement Category	Maximum Points
Participate in FQP Focus Group annual virtual briefing(s).	10
Participate in quarterly roundtable meetings (JFK & LGA) held virtually. Attendees must sign in on the Zoom Meeting chat and remain online for at least 60 minutes.	2.5 points per meeting, up to 4 meetings per year. Maximum 10 points
Access and review the FQP Dashboard reporting site once per quarter.	Tracked quarterly, 2.5 points per login. Maximum 10 points.
Provide copies of pilot training / educational materials on PANYNJ noise abatement and fly quiet policies, procedures, and practices along with the date(s) training was conducted.[1]	10
Provide information/documentation on airline fleet noise reductions (vortex generators installed on the aircraft, pilot operating techniques, NADP, etc.)	5
Provide information/documentation on any annual airline sustainability practices/offsets/etc.	5
Total	50

Notes: [1] Training points are allocated based on the quality and quantity of information provided. The PANYNJ will assess the information provided on a case-by-case basis and allocate points accordingly.

The awarding of points for each engagement category will be scored by way of evaluation by the PANYNJ staff, based on the quantity, substance, quality, currency, and relevancy of participation, materials, and documented practices that contribute to the program.

For example, an airline that participates in the annual FQP Focus group virtual briefing, attends two quarterly roundtable meetings, visits the FQP dashboard reporting in three quarters, and provides information on the airline's sustainability practices would earn: 10+5+7.5+5 = **27.5** engagement points.

Operational Runway Use

Runway selection is another factor that can influence community noise levels. The assignment of a runway by the FAA to an individual aircraft operation depends on several factors but is always prioritized by safety, based on runway use compatibility for given aircraft, winds, and other meteorological and operational conditions. These factors include runway length versus the weight of the aircraft; which runways are available for use; wind direction; weather conditions; and air traffic control operational needs. However, runway use is not a part of an airline's FQP score – it is published for the sake of transparency and data sharing by the PANYNJ noise office.

Late-Night Runway Use

"Late-night" hours are defined as 12AM-6AM local time for the FQP. It is sometimes possible to use runways that direct noise away from communities during late-night hours when there are fewer operations. The preferential runways for late-night arrivals and departures are listed below for EWR, JFK, and LGA. While not calculated in an airline's FQP score, documentation of preferred late-night runway use will be included in FQP annual reports.

Late-Night Runway Use at EWR

At EWR the preferred night-time runway utilizations are:

- South flow operations: Arrivals to utilize Runways RWY 22L and 29
  Departures to utilize Runway 22L and 29
- North flow operations: Arrivals to utilize Runways 4R and 29
  Departures to utilize 4R and 29

Late-Night Runway Use at JFK

At JFK the preferred night-time runway utilizations are:

- South flow operations: Arrivals to utilize Runways 13R and 13L
  Departures to utilize Runway 13R and 22R
- North flow operations: Arrivals to utilize Runways 4L and 4R
  Departures to utilize 13R

Late-Night Runway Use at LGA

At LGA the preferred night-time runway utilizations are:

- South flow operations: Arrivals to utilize Runway 22
  Departures to utilize Runway 31
- North flow operations: Arrivals to utilize Runway 13
  Departures to utilize Runway 4

Although there is a voluntary restraint on scheduled airline flights from 12AM to 6AM at LGA, there are still some flights that occur during these hours (for example, delayed flights or rescheduled flights). The assignment of a runway to an individual aircraft operation depends on several factors: which runways are available for use; wind direction; weather conditions; air traffic control operational needs; and runway length versus the weight of the aircraft.

Flight Procedure Use

Flight procedure use is not a part of an airline's FQP score. Instead, the data is provided in the FQP Annual Report to inform the public and airport stakeholders. Flight procedure use captures the annual utilization of the arrival and departure procedures described below. However, similar to runway use selection, the selection of a flight procedure for use by arriving and departing aircraft at the airport is determined by several factors: FAA air traffic control's assignment of a procedure to an aircraft; which runways are in use at the time; operations at nearby airports; wind and weather patterns; efficiency and safety; and noise abatement when operationally feasible.

Noise Abatement Departure Profiles

The FQP encourages voluntary use of Noise Abatement Departure Profiles (NADP) for certain runway ends[3]. These profiles have been devised to redirect noise impacts of departing aircraft away from noise-sensitive areas. As part of the Part 150 Noise Compatibility Program (NCP), NADP's were recommended for specific runway ends per-airport. These runway ends are listed in Table 3 for each of the three airports.

Table 3: Noise Abatement Departure Profiles

JFK	
4L	NADP 1
4R	NADP 1
22L	NADP 2
22R	NADP 2
31L	NADP 1
31R	NADP 1

LGA	
4	NADP 2
13	NADP 1

EWR	
4L	NADP 2
4R	NADP 2
11	NADP 2
22L	NADP 2
22R	NADP 2
29	NADP 2

In addition, new procedures for tracking and reporting may be added once they are implemented.

[3] NADPs may be referenced from the JFK and LGA Noise Compatibility Program (NCP) reports, available from the PANYNJ at: https://aircraftnoise.panynj.gov/aircraft-noise-compatibility-planning-study, a summary of which is in Appendix C.

JFK Flight Procedures

At JFK, the particular flight procedures that are being tracked have been either approved and implemented according to the airport's NCP or requested by the community roundtable or community members, as described in the section below.

In future years, new noise abatement flight procedures could be added for tracking and reporting once they are implemented.

Runway 31L SKORR Early Turn Departure Procedure

Aircraft make the left turn earlier after departing from Runway 31L, keeping noise over the Jamaica Bay instead of over land to the extent possible. This flight procedure was approved in the JFK Part 150 NCP[4] and is currently under development by the FAA (anticipated publication in April 2025). As an interim measure, the FAA has asked pilots to turn left earlier when safe and feasible.

Figure 1: JFK RWY 31L SKORR Early Turn Departure Procedure

Runway 22L RNAV "Offset" Approach

Aircraft approach the runway at an angle instead of lined up directly with the runway, shifting noise away from the straight-in flight path. This flight procedure was developed during the NCP to provide an alternate approach path to the runway flying over different areas.

[4] See https://aircraftnoise.panynj.gov/aircraft-noise-compatibility-planning-study.

Figure 2: JFK RWY 22L RNAV Offset Approach versus ILS Approach

Additional Recommended Procedures

While not tracked as part of the FQP scoring, the following procedures have been recommended for the reduction of noise in the 2022 JFK Noise Compatibility Program (NCP) report.

Runway 22L and 22R Departures to Heading of 240

Aircraft departing Runways 22L and 22R at night (between 10:00 pm and 6:59:59 AM) on the RNAV RWY 22L and 22R would be directed to make a right turn to magnetic heading 240 shortly after takeoff, then make a left turn to overfly the Rockaways. This would reduce noise impacts on the developed areas of the Rockaways.

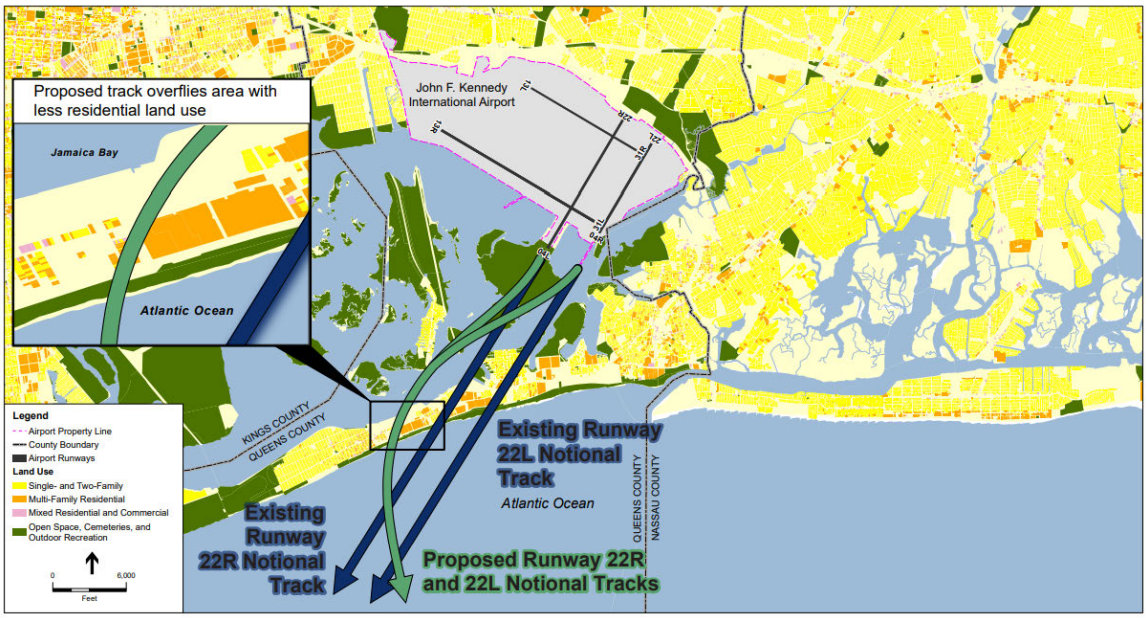


Figure 3: 240 degrees heading on departure from 22L and 22R

Runway 31L Reduction of Nighttime Intersection Departures

Aircraft departing Runway 31L at night (between 10:00 pm and 6:59:59 am) are encouraged to use the full length of the runway for departures, rather than departing at the Taxiway KD intersection, as illustrated in Figure 4. This will result in aircraft being at a higher altitude over the noise-sensitive areas of Howard Beach, Old Howard Beach, and Hamilton Beach.

Figure 4: Location of Taxiway KD to JFK RWY 31L

LGA Flight Procedures

At LGA, the particular flight procedures that are being tracked have been either approved and implemented according to the airport's NCP or requested by the community roundtable or community members, as described in the section below.

In future years, new noise abatement flight procedures could be added for tracking and reporting once they are implemented.

Runway 22 RNAV "Offset" Approach

When utilizing this procedure, aircraft approach Runway 22 at an angle instead of lining up directly with the runway, shifting noise away from the straight-in flight path. This flight procedure was developed as part of the NCP to provide an alternate approach path to the runway flying over different areas.

Figure 5: LGA RWY 22 Offset Approach

Runway 13 Departures

The FQP monitors the use of each satellite-based navigation flight procedure for Runway 13: TNNIS, GLDMN, and NTHNS. "All other procedures" include the Whitestone climb and flights that are vectored by air traffic control instead of following satellite-based procedures. These procedures are tracked in response to community and roundtable requests.

Figure 6: LGA RWY 13 Departures

EWR Flight Procedures

Currently, no flight procedures are tracked at EWR because there are no NCP measures that have been implemented yet, and also there have been no specific requests from the community members to report on flight procedures.

In future years, new noise abatement flight procedures could be added for tracking and reporting once they are implemented.

Airline Rankings and Awards

In each year's annual report, the FQP will recognize those carriers that earned a total score of at least 70 points. In a given year, airlines will be recognized as "gold" or "silver" participants should they earn the following points over a calendar year:

- Gold award recognition: Greater than 85 points
- Silver award recognition: Between 70 and 85 points

Gold and silver awarded participants will be recognized in the year's FQP Annual Report.

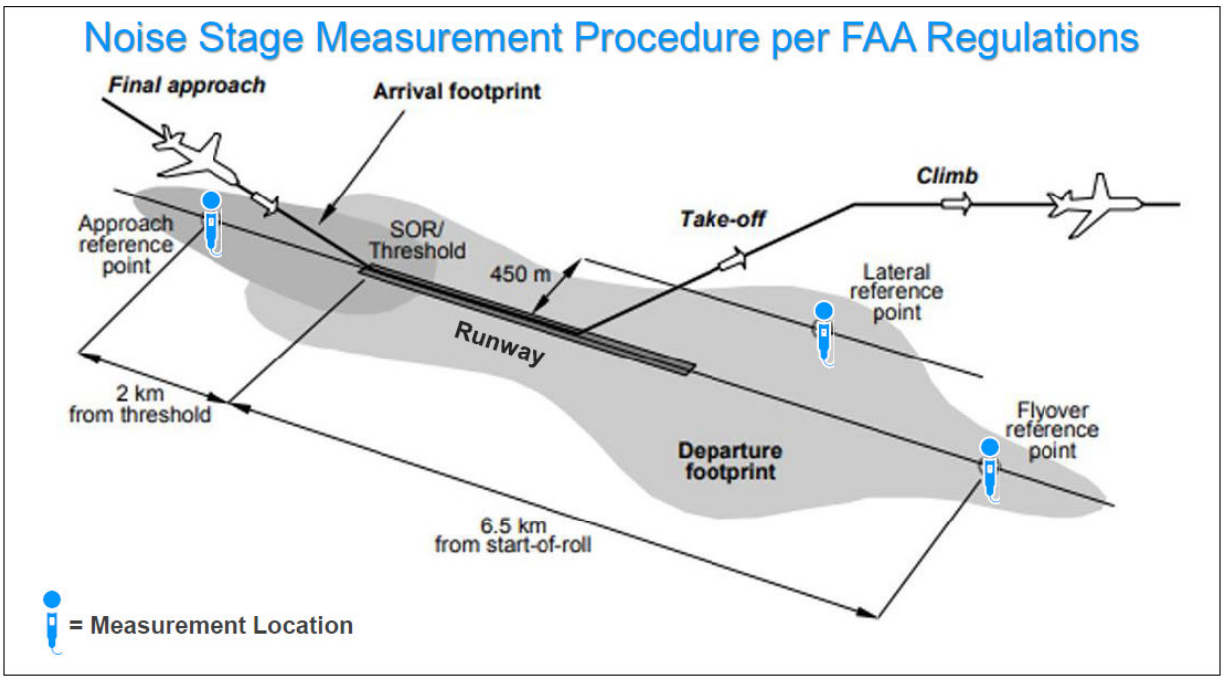
From the above examples, a carrier that earned a 46.4 fleet quality score and 27.5 engagement points would have a total score of 74.9. Based on this score, the carrier would be recognized as a silver award participant for the year.

Appendix A: Noise Quality Scores for Common JFK/LGA/EWR Aircraft

Operator Category	Aircraft Type	Description	FAA Noise Stage	Noise Score
Cargo	B788	Boeing 787-8	5	5.5
	A332	Airbus A330-200	4	4.0
	B748	Boeing 747-8	4	4.0
	B772	Boeing 777-200LR	4	4.0
	B752	Boeing 757-200	4	4.0
	MD11	Boeing (Douglas) MD11	4	4.0
	B744	Boeing 747-400	3	3.5
	A306	Airbus A300-600 Freighter	3	3.0
	B763	Boeing 767-300	3	3.0
Intl. Carrier	A359	Airbus A350-900	5	6.0
	BCS3	Airbus A220-300	5	5.5
	A21N	Airbus A321 neo	5	5.5
	B789	Boeing 787-9	5	5.5
	A339	Airbus A330-900 neo	5	5.5
	B789	Boeing 787-9	5	5.5
	A333	Airbus A330-300	4	4.0
	B772	Boeing 777-200LR	4	4.0
	B77W	Boeing 777300ER	4	4.0
	B744	Boeing 747-400	3	3.5
	B763	Boeing 767-300	3	3.0
Domestic Carrier	BCS1	Airbus A220-100	5	6.0
	B788	Boeing 787-8	5	5.5
	A20N	Airbus A320 neo	5	5.5
	A339	Airbus A330-900 neo	5	5.5
	A35K	Airbus A350-1041	5	5.5
	B38M	Boeing 737-700 MAX	5	5.0
	B712	Boeing 717-200	5	5.0
	A320	Airbus A320	4	4.0
	B738	Boeing 737-800	4	4.0
	E190	Embraer 190	4	4.0
	B764	Boeing 767-400	4	4.0
	B772	Boeing 777-200LR	4	4.0
	B752	Boeing 757-200	4	4.0
	A321	Airbus A321	3	3.5
	B763	Boeing 767-300	3	3.0
Regional Carrier	CRJ2	Canadair Regional Jet 200	5	5.5
	CL60	Canadair CL-600 series	5	5.0
	CRJ7	Canadair Regional Jet 700	4	4.5
	CRJ9	Canadair Regional Jet 900	4	4.5
	E170	Embraer ERJ 170-100	3	3.5

Appendix B: 14 CFR Part 36 Noise Stage Details

Below is a further discussion of 14 CFR Part 36 and the process used by the FAA to determine an aircraft's noise stage. When a new aircraft model is certified for flight in the U.S., part of the certification process is the noise rating. The aircraft is flown for a full circuit of takeoff and landing on a runway, as illustrated in Figure 7. Noise levels are measured at three microphone locations: during takeoff, at lateral and flyover points; and, on arrival at an approach reference point. The locations and flight characteristics are specified in 14 CFR Part 36 for consistency of all aircraft types certified at different times and locations. Adjustments for weather and atmospheric conditions at the time of the flight are made so that all aircraft are evaluated consistently. The FAA is involved in the oversight and approval of all certification test flight noise results.



Source: FAA Regulations 14 CFR Part 36

Figure 7: Illustration of Noise Certification Measurement Procedure

Figure 8 presents a comparison of the noise certification levels of various common aircraft from the beginning of the Jet Age to the present. As shown in the figure, aircraft certification noise levels have decreased over time, from about 110 dB in the 1950's and 1960's to about 90 dB currently. New jet aircraft are required to have increasingly quieter engines, while older aircraft have been phased out per FAA regulations. When the older, lower-stage aircraft are phased out by the FAA, they are no longer allowed to operate in the U.S.

Therefore, today's aircraft models are significantly quieter than earlier models. This is due to the FAA lowering the acceptable noise limit each time a new certification standard, or noise stage, has been adopted. Stage 5 is the most current and stringent standard, and some of the newest aircraft can be as much as 10 dB quieter than Stage 5.

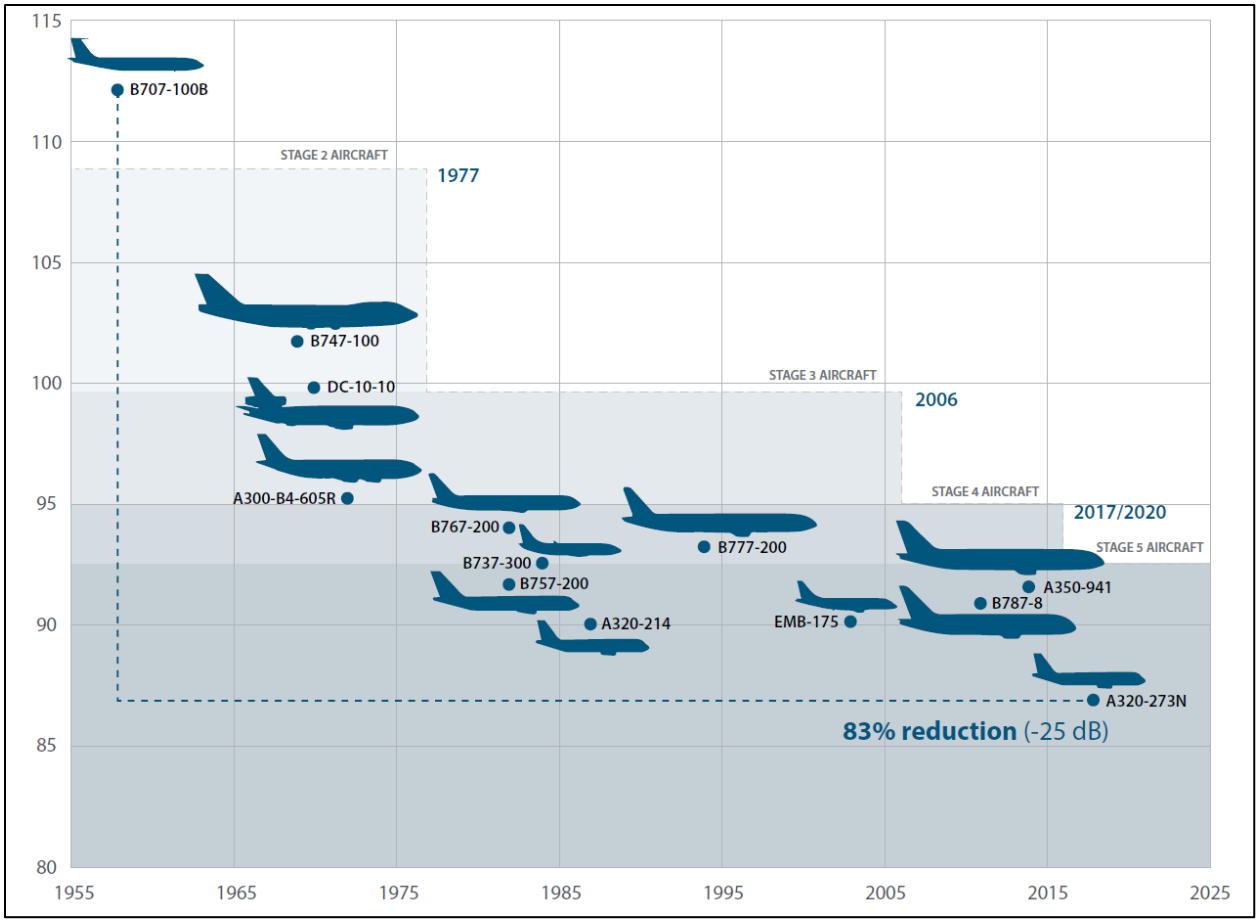


Figure 8: Comparison of certified aircraft noise levels in decibels from 1955-present
Source: San Francisco International Airport, 2024

Appendix C: Noise Abatement Departure Profiles

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 (see FAA Advisory Circular (AC) 91-53A).[5] The close-in NADP provides noise reduction benefits to areas adjacent to the airport, whereas the distant NADP provides noise reduction benefits farther from the airport. Figure 9 gives a general overview of both types of NADPs. The NADPs outline criteria for speed, thrust settings, and airplane configurations used in the departure phase of flight. The designs of NADPs as well as 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 procedures for aircraft in flight; therefore, 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."

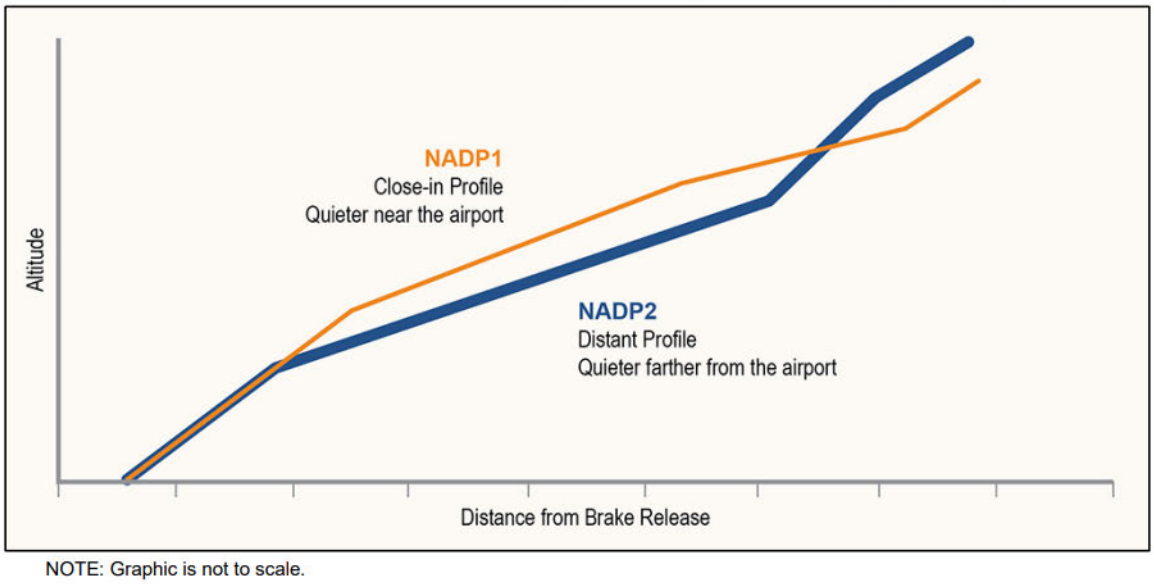


Figure 9: General Overview of NADP 1 and 2
Source: "Managing the Impacts of Aviation Noise" CANSO/ACI, 2015

More information on the NADPs for JFK, LGA, and EWR airport can be found in the Noise Compatibility Program (NCP) reports, available from the PANYNJ at: https://aircraftnoise.panynj.gov/aircraft-noise-compatibility-planning-study.

[5] 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.