

## **REQUESTS AND RECOMMENDATIONS FOR BLOCK 2**

### **DISPERSED RUNWAY 4L AND 4R ARRIVAL PATH TESTS**

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# FAA LAW 101

# **The federal government has exclusive jurisdiction over the national airspace.**

(49 U.S.C. § 40103 (the United States government has exclusive authority of airspace of the United States))

**1. Airport sponsors and state or local governments cannot modify or restrict flight procedures.**

**2. The Airport Noise and Capacity Act of 1990 requires prior approval either from FAA or from all affected air carriers in order to restrict commercial jet aircraft flight paths.**

**3. That statute has never been challenged successfully to restrict airport operations or flight paths.**

**4. FAA has **plenary authority** to adopt regulations governing the national airspace, including flight rules, procedures and Orders.**

49 U.S.C. §§ 47521 et seq.

**5. And so, under the Federal Administrative Procedure Act, when RNAV was proposed, airports and/or residents had only **60 days** to challenge its adoption, **yet its implementation and effects** post-dated that 60-day time limit.**

**6. NextGen GPS-based paths now number more than 9300.**

**7. FAA may adopt **new** paths or procedures that have environmental impact (noise or pollution) **without** National Environmental Policy Review (so-called categorical exclusion) **if:****

**> 3000 feet above ground, or**

**< below 3000 feet but not routinely passing over “noise sensitive areas”, or**

**/ increased altitudes or landing minima.**

**8. Also, **no** NEPA review is needed for new ATC procedures that do not fundamentally change a track, altitude or flight concentration on the track - -or place flights over non-noise sensitive areas.**

A **noise sensitive area**, as defined in Paragraph 11-5.b(8) of FAA Order 1050.1F, is: ... Normally, **noise sensitive areas** include [residential](#), educational, health, and religious structures and sites, and parks, recreational **areas**, **areas** with wilderness characteristics, wildlife refuges, and cultural and historical sites.

**9. Therefore, an Environmental Assessment is required for new paths over residential areas.**

**But** NEPA is deemed complied with if there is a “Finding of No Significant Impact.” (FONSI)

10. Otherwise a full environmental impact statement (EIS) is needed, which can take year(s).

11. Unfortunately, FAA is permitted by Congress to measure noise by the Yearly Day-Night Average Sound Level (**DNL**), the FAA’s principal noise metric. **DNL cannot capture multiple, serial continual, enduring overflight noise impacts.**

**And a path change that **does not itself increase the number of aircraft operations** can be deemed to have no air quality impact.**

**12. Challenges to new paths must be made in the Federal Court of Appeals under those standards but only AFTER administrative challenge at the FAA itself, again, within 60 days of the FAA order approving the new path.**



AMENDMENT NO. \_\_\_\_\_ Calendar No. \_\_\_\_\_

Purpose: To restore dispersion and altitude of arriving and departing aircraft.

IN THE SENATE OF THE UNITED STATES—115th Cong., 2d Sess.

### H. R. 4

To reauthorize programs of the Federal Aviation Administration, and for other purposes.

Referred to the Committee on \_\_\_\_\_ and ordered to be printed

Ordered to lie on the table and to be printed

AMENDMENT intended to be proposed by \_\_\_\_\_

Viz:

1 At the end of subtitle A of title IV, add the following:

2 SEC. \_\_\_\_ . **RESTORING DISPERSION AND ALTITUDE OF AR-**  
3 **RIVING AND DEPARTING AIRCRAFT.**

4 (a) IN GENERAL.—**Notwithstanding any other provi-**  
5 **sion of law,** it shall be the **purpose and policy** of the Ad-  
6 ministrator to ensure that it protects the safety of aircraft  
7 and efficiency of air traffic operations for the benefit of  
8 passengers and crew, while also **protecting the public from**  
9 **overflight noise, pollution, and other detrimental effects.**

10 In order to comply with the preceding sentence, the Ad-  
11 ministrator shall take the following actions:

1 (1) RESTORING DISPERSION OF ARRIVING, AP-  
2 PROACHING, AND DEPARTING AIRCRAFT OVER RESI-  
3 DENTIAL AREAS WITHIN 25 MILES OF AIRPORTS.—

4 (A) IN GENERAL.—Not later than 18  
5 months after the date of enactment of this Act,  
6 the Administrator shall implement measures  
7 that restore dispersion of aircraft flying within  
8 25 miles of each airport and over, or in the  
9 proximate vicinity of residential areas while ar-  
10 riving at, approaching, or departing from such  
11 airport to the same level of dispersion existing  
12 at such airport during the year commencing on  
13 the dispersion equivalent date.

14 (B) DEFINITION OF DISPERSION EQUIVA-  
15 LENT DATE.—For purposes of subparagraph  
16 (A), the term “dispersion equivalent date”  
17 means the earlier of—

18 (i) January 1 of the year prior to the  
19 year in which the earlier of first testing or  
20 first use of Wide Area Augmentation Sys-  
21 tem (WAAS) enabled Area Navigation  
22 (RNAV) Global Positioning System (GPS)  
23 guidance, including Required Navigation  
24 Performance guidance, technologies oc-  
25 curred in connection with the adoption of

1 one or more new Performance Based Navi-  
2 gation procedures or routes for arriving or  
3 departing flights at an airport runway; or

4 (ii) January 1, 2010, if then applica-  
5 ble procedures and routes produced greater  
6 dispersion of flights arriving on or depart-  
7 ing from such runway than the year de-  
8 fined under clause (i).

9 (C) REQUIREMENTS.—In carrying out sub-  
10 paragraph (A), the Administrator shall—

11 (i) use both the full range of currently  
12 and historically available solutions (includ-  
13 ing, but not limited to, instrument ap-  
14 proach procedures and air traffic control  
15 vectoring procedures in effect during the  
16 year commencing with the dispersion  
17 equivalent date);

18 (ii) if necessary to carry out subpara-  
19 graph (A), develop and implement addi-  
20 tional geographic dispersion procedures  
21 (including, but not limited to, serial and  
22 sequential alternative paths to a given run-  
23 way at an affected airport);

24 (iii) require airport operators and air-  
25 lines to install new systems and tech-



**ANDREA J. CAMPBELL**  
**BOSTON CITY COUNCILOR**  
**DISTRICT 4**

June 25, 2018

Senator Ed Markey  
975 JFK Federal Building  
15 New Sudbury Street  
Boston, Massachusetts 02203

Senator Elizabeth Warren  
2400 JFK Federal Building  
15 New Sudbury Street  
Boston, Massachusetts 02203

Dear Senators Markey and Warren:

We write to express our support for including the enclosed draft amendment as part of the U.S. Senate's upcoming Federal Aviation Administration (FAA) Budget Reauthorization Bill deliberations. In short, this draft amendment would mandate that flights over residential areas within 25 miles of U.S. commercial airports return to the dispersion of flight paths and altitude levels that prevailed prior to FAA's Next Generation Air Transportation System (NextGen) Area Navigation (RNAV) current system implementation.

Hour after hour, day after day, week after week, many Boston residents suffer through the ear-splitting noise, annoying vibrations, and polluting dangers of constant low-flying aircraft coming from and going to Logan Airport. The cause of this torment is the lack of dispersion of flights under the current RNAV system, which has the effect of sending a disproportionate number of planes on narrow flight paths over certain Boston neighborhoods. Directly under those narrow flight paths are schools, parks and playgrounds.

The approach of the enclosed draft amendment is not to undo the NextGen technology or any of its benefits, but rather to use that technology to restore the dispersion of flight paths in effect prior to the current RNAV system by creating a family of RNAV paths. Our understanding is that Maryland Senators Cardin and Van Hollen have informed residents affected by the RNAV flight paths around Baltimore/Washington International Thurgood Marshall Airport that they support this approach and are discussing introducing it in the Senate as well.

We view this approach as the best hope to save Boston residents, and especially their children, from the polluting effects of the narrow dispersion of flight paths under the current RNAV system. We hope that you will sponsor this amendment as part of the U.S. Senate's upcoming Federal Aviation Administration (FAA) Budget Reauthorization Bill deliberations and support its adoption.



**ANDREA J. CAMPBELL**  
**BOSTON CITY COUNCILOR**  
**DISTRICT 4**

Thank you for your consideration, and please contact us if you have any questions or need any additional information.

Sincerely,  
The Boston City Council

Andrea J. Campbell  
Boston City Councilor, President

Michelle Wu  
Boston City Councilor, At-Large

Annissa Essaibi-George  
Boston City Councilor, At-Large

Michael Flaherty  
Boston City Councilor, At-Large

Ayanna Pressley  
Boston City Councilor, At-Large

Lydia Edwards  
Boston City Councilor, District 1

Ed Flynn  
Boston City Councilor, District 2

Frank Baker  
Boston City Councilor, District 3

Timothy McCarthy  
Boston City Councilor, District 5

Matt O'Malley  
Boston City Councilor, District 6

Kim Janey  
Boston City Councilor, District 7

Josh Zakim  
Boston City Councilor, District 8

Mark Ciommo  
Boston City Councilor, District 9



4L  
2019

4R  
2019

CSPR

4R PRE-RNAV

Map data ©2019 Google 500 ft

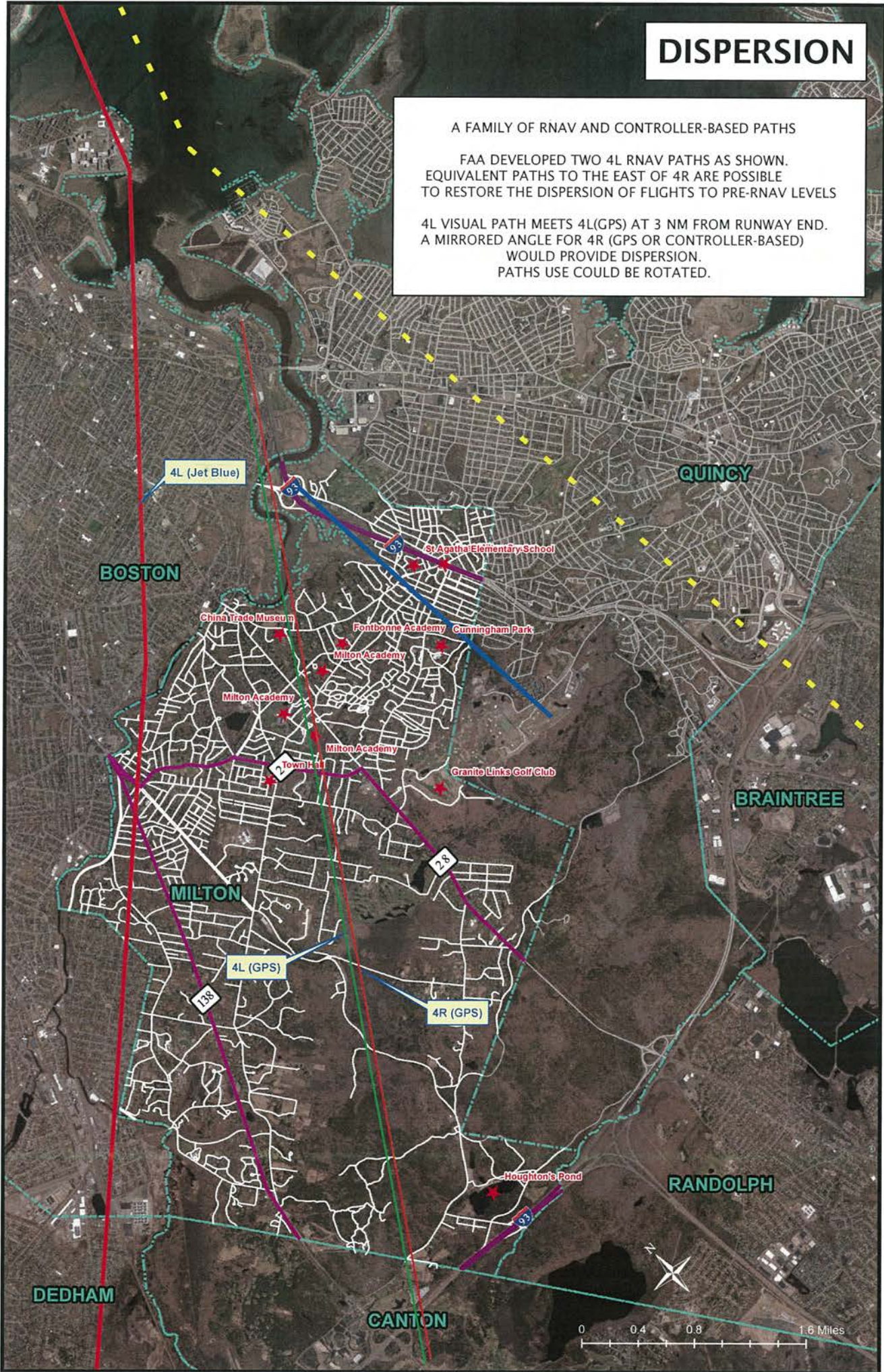
C.P.F. Noise Monitor

# DISPERSION

A FAMILY OF RNAV AND CONTROLLER-BASED PATHS

FAA DEVELOPED TWO 4L RNAV PATHS AS SHOWN. EQUIVALENT PATHS TO THE EAST OF 4R ARE POSSIBLE TO RESTORE THE DISPERSION OF FLIGHTS TO PRE-RNAV LEVELS

4L VISUAL PATH MEETS 4L(GPS) AT 3 NM FROM RUNWAY END. A MIRRORRED ANGLE FOR 4R (GPS OR CONTROLLER-BASED) WOULD PROVIDE DISPERSION. PATHS USE COULD BE ROTATED.



# BOS N Above Thresholds

- **50 N<sub>Above</sub>** 60dB L<sub>A,max</sub> day, 50dB L<sub>A,max</sub> night on a **peak day** appears to capture complaint threshold in dispersion analysis

33L Departures Peak Day N Above



4L/R Arrivals Peak Day N Above



27 Departures Peak Day N Above



Peak Day N Above	Complaints Captured
25x	90.0%
50x	83.8%
100x	59.9%

Peak Day N Above	Complaints Captured
25x	91.3%
50x	81.3%
100x	70.6%

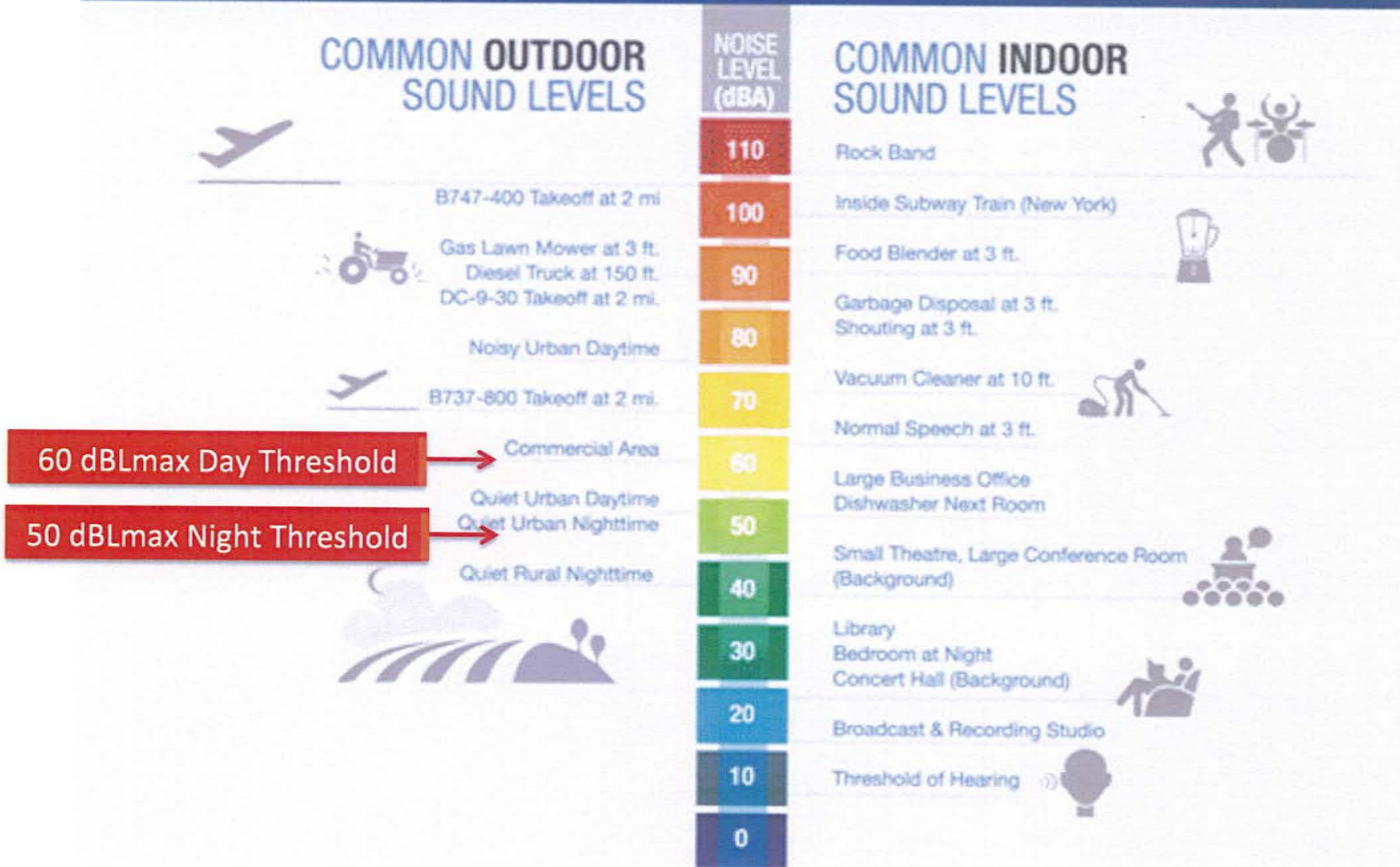
Peak Day N Above	Complaints Captured
25x	94.6%
50x	90.2%
100x	76.8%

2017 Data



# Comparative Noise Levels

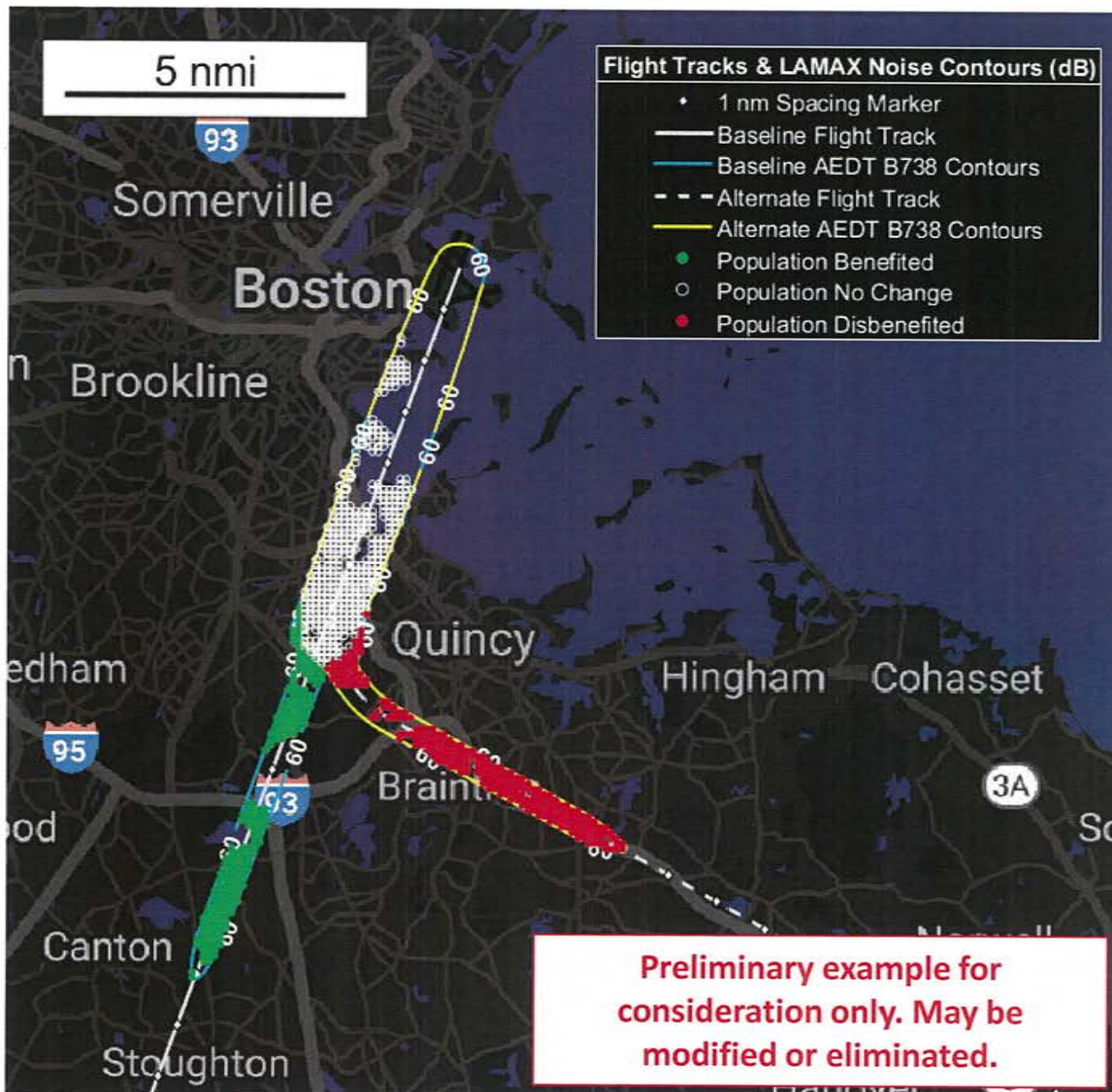
## COMPARATIVE NOISE LEVELS (dBA)





# 4R RNAV Approach – Route 3 Initial

B737-800 60dB  $L_{A,max}$  Noise Exposure



**B737-800**  
Population Exposure ( $L_{A,MAX}$ )

	60dB
Straight In	32,232
RNP	38,353
Difference (Straight In – RNP)	-6,121

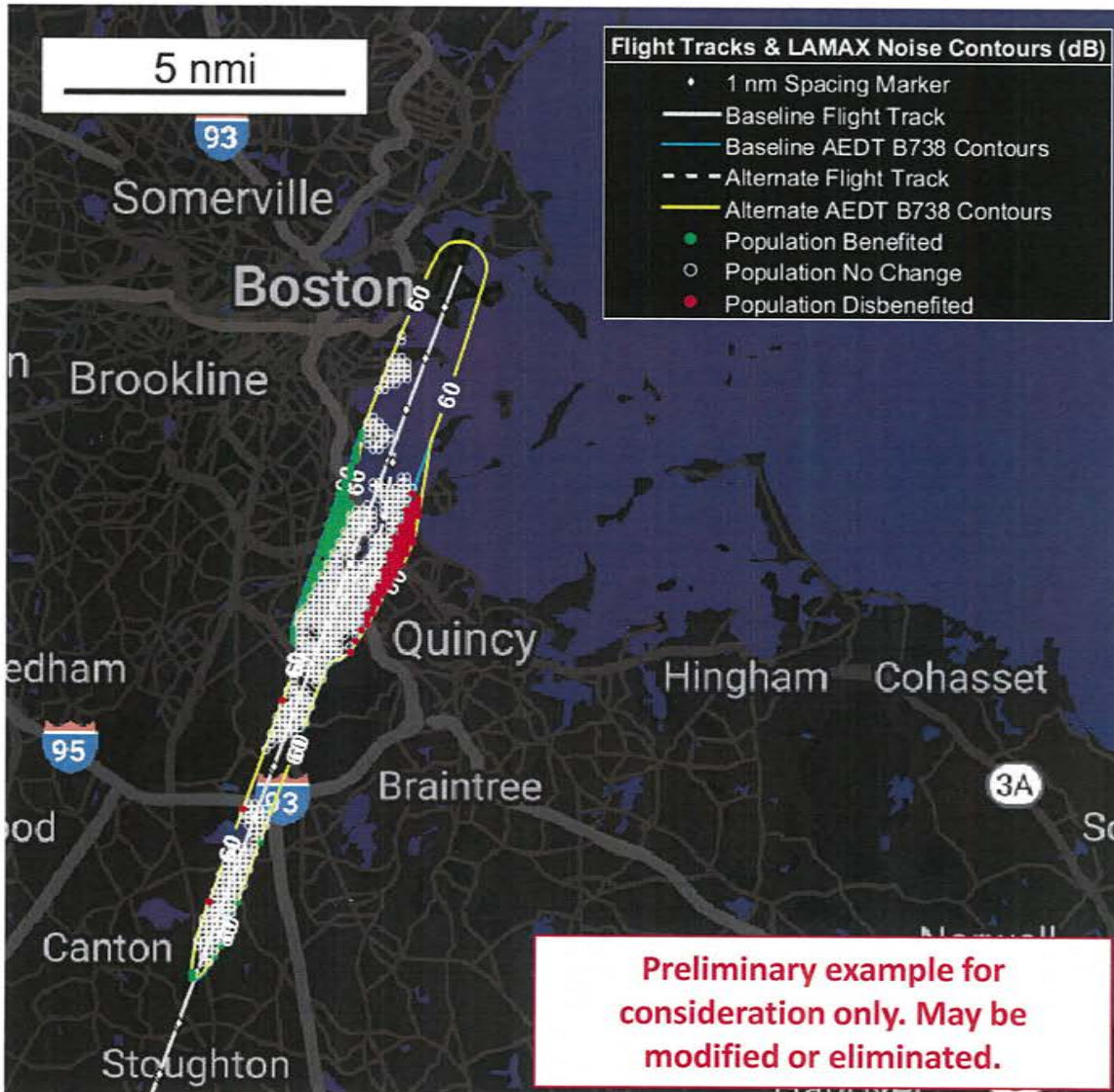
5.5nmi final segment  
80° 2nmi radius-to-fix turn

Population exposure calculations do not take advantage of noise masking

- Procedure within RNAV criteria.
- Air traffic control concerns with merging with straight-in flight track.
- Community support unclear.

# 4R RNAV Approach – Minimum Population Exposure From South

B737-800 60dB  $L_{A,max}$  Noise Exposure



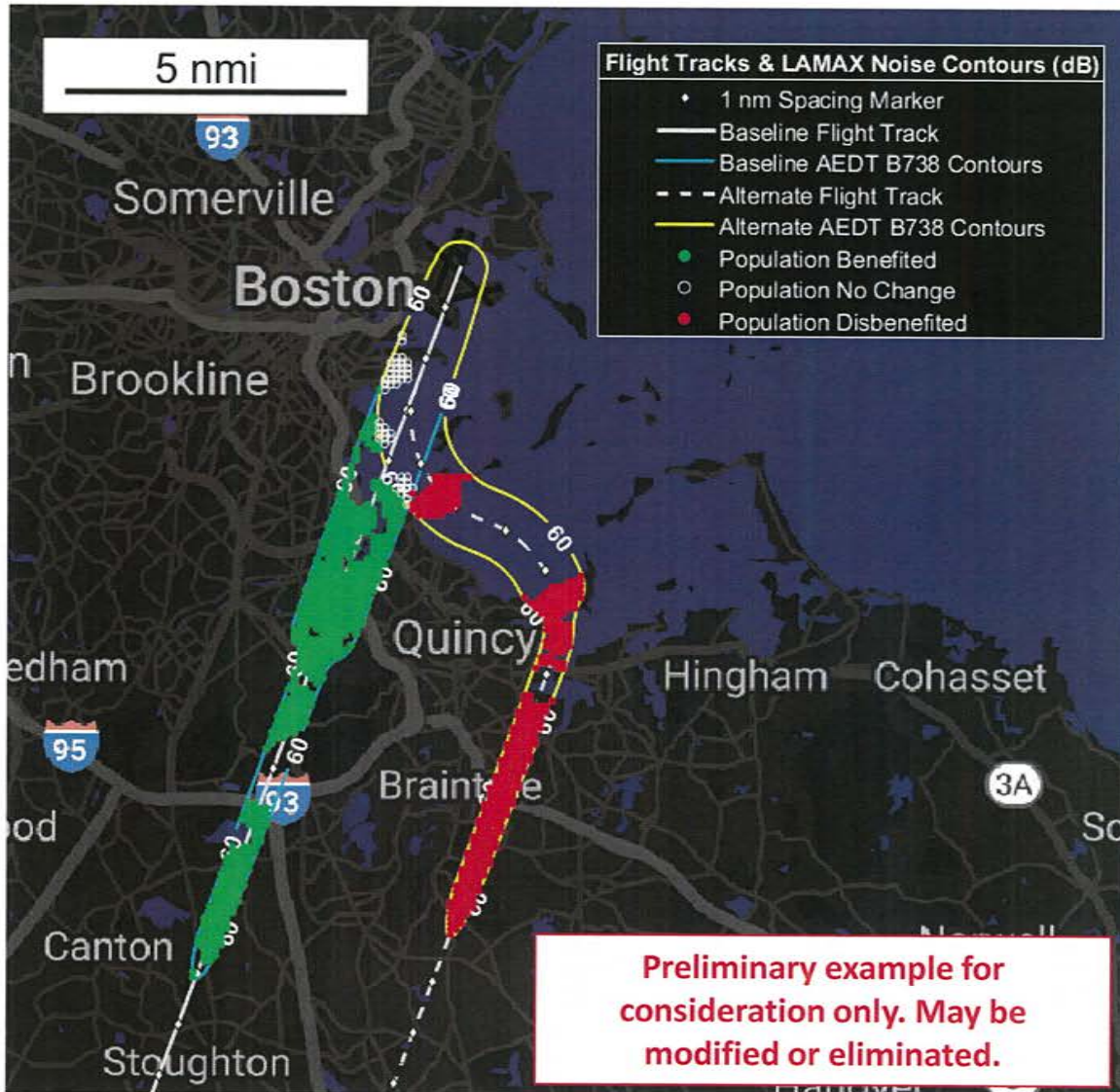
**B737-800  
Population Exposure ( $L_{A,max}$ )**

	60dB
Straight In	32,232
RNP	32,018
Difference (Straight In – RNP)	214

- Procedure within RNAV criteria.
- Community support unclear.

# 4R RNP Approach – Offset Initial

B737-800 60dB  $L_{A,max}$  Noise Exposure



**B737-800  
Population Exposure ( $L_{A,MAX}$ )**

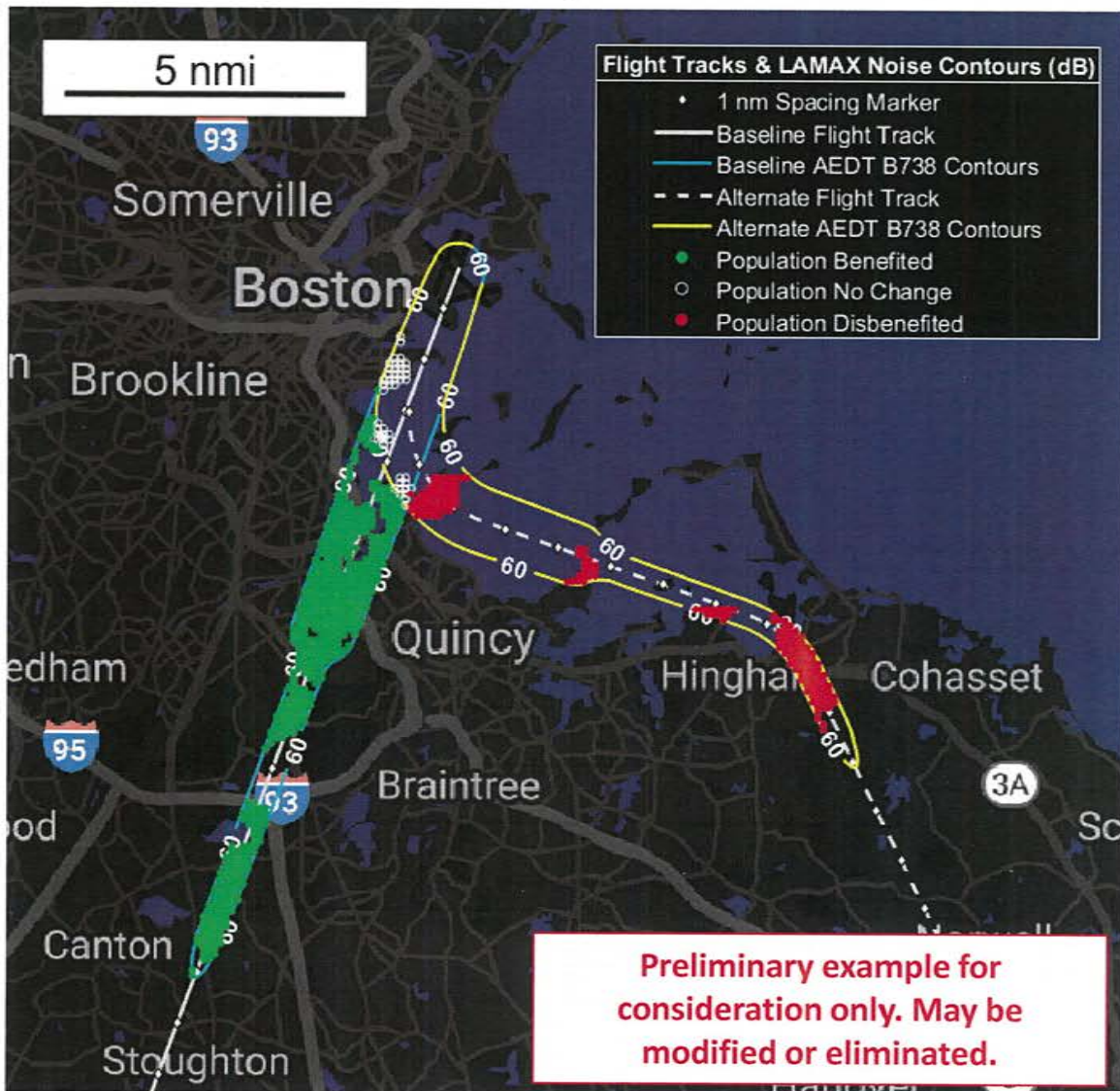
	60dB
Straight In	32,232
RNP	25,106
Difference (Straight In – RNP)	7,126

1.5nmi final segment  
 $90^\circ$  2nmi radius-to-fix turn  
 $90^\circ$  2nmi radius-to-fix turn

- Procedure within RNP criteria.
- Community support unclear.

# 4R RNP Approach – Min Population Exposure from South

B737-800 60dB  $L_{A,max}$  Noise Exposure



**B737-800  
Population Exposure ( $L_{A,MAX}$ )**

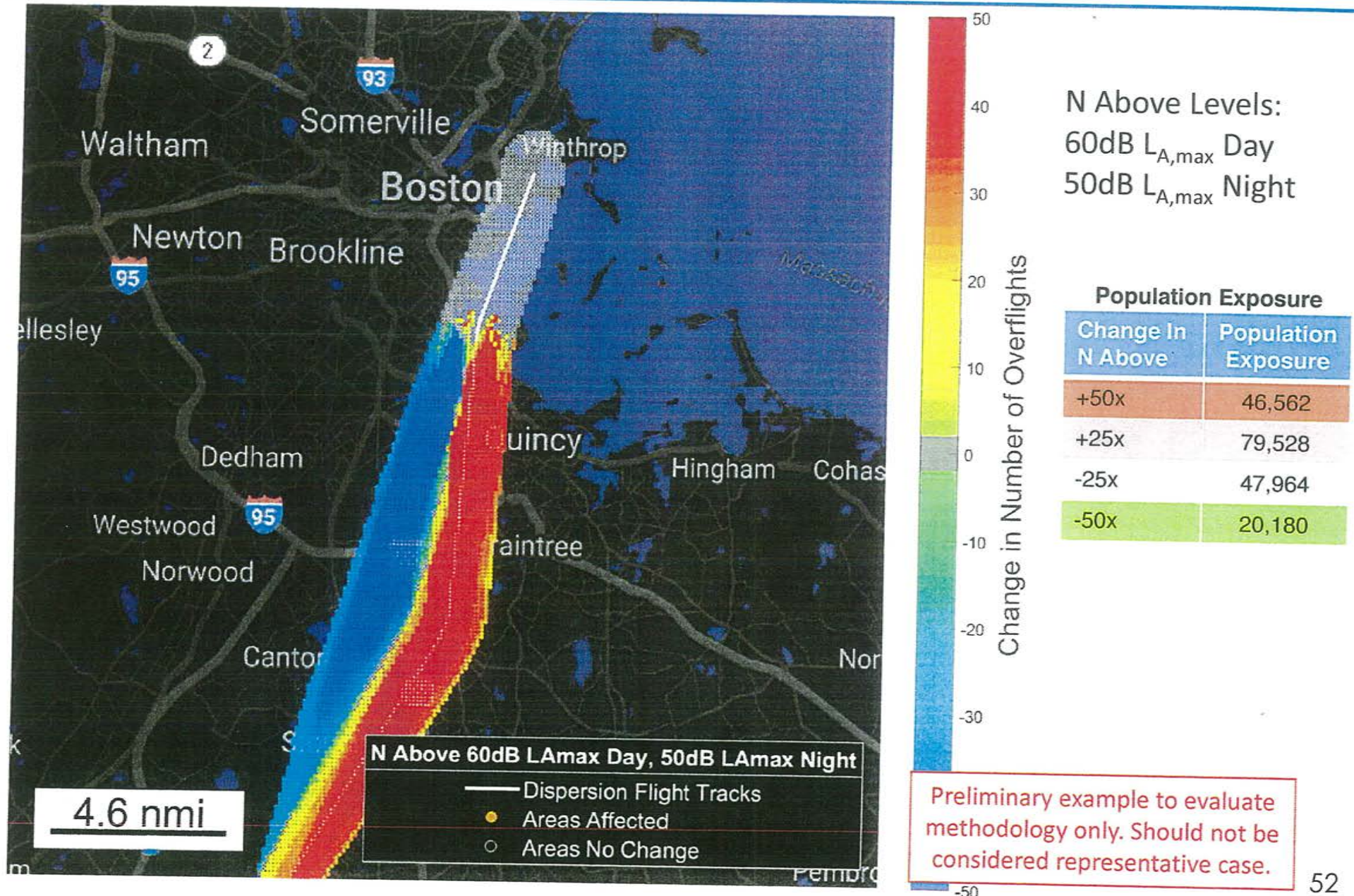
	60dB
Straight In	32,232
RNP	11,682
Difference (Straight In – RNP)	20,550

1.5nmi final segment  
 90° 2nmi radius-to-fix turn  
 5nmi straight segment  
 45° 2nmi radius-to-fix turn

- Procedure within RNP criteria.
- Community support unclear.
- Possible flyability issues need to be tested.
- Air traffic merging concern with straight-in traffic.



# Example of Deterministic 4R Arrival Dispersion Change in N Above





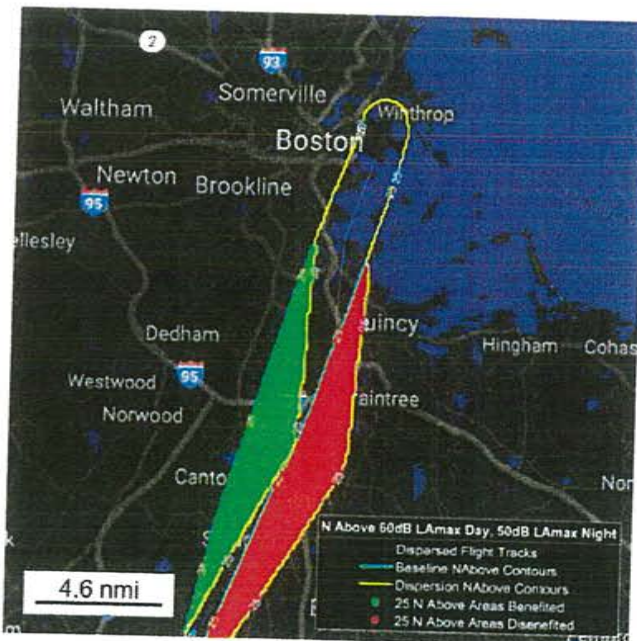
# Example of Deterministic 4R Arrival Dispersion N Above Exposure

## Population Exposure

N Above	25x	50x	100x
Baseline	104,460	56,419	30,665
Dispersion	138,826	91,372	44,803
Baseline - Dispersion	-34,366	-34,953	-14,138

N Above Levels:  
60dB  $L_{A,max}$  Day  
50dB  $L_{A,max}$  Night

25 N Above



50 N Above

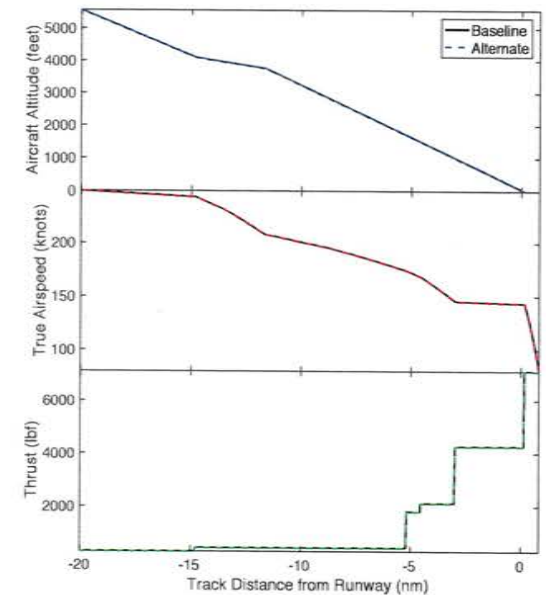
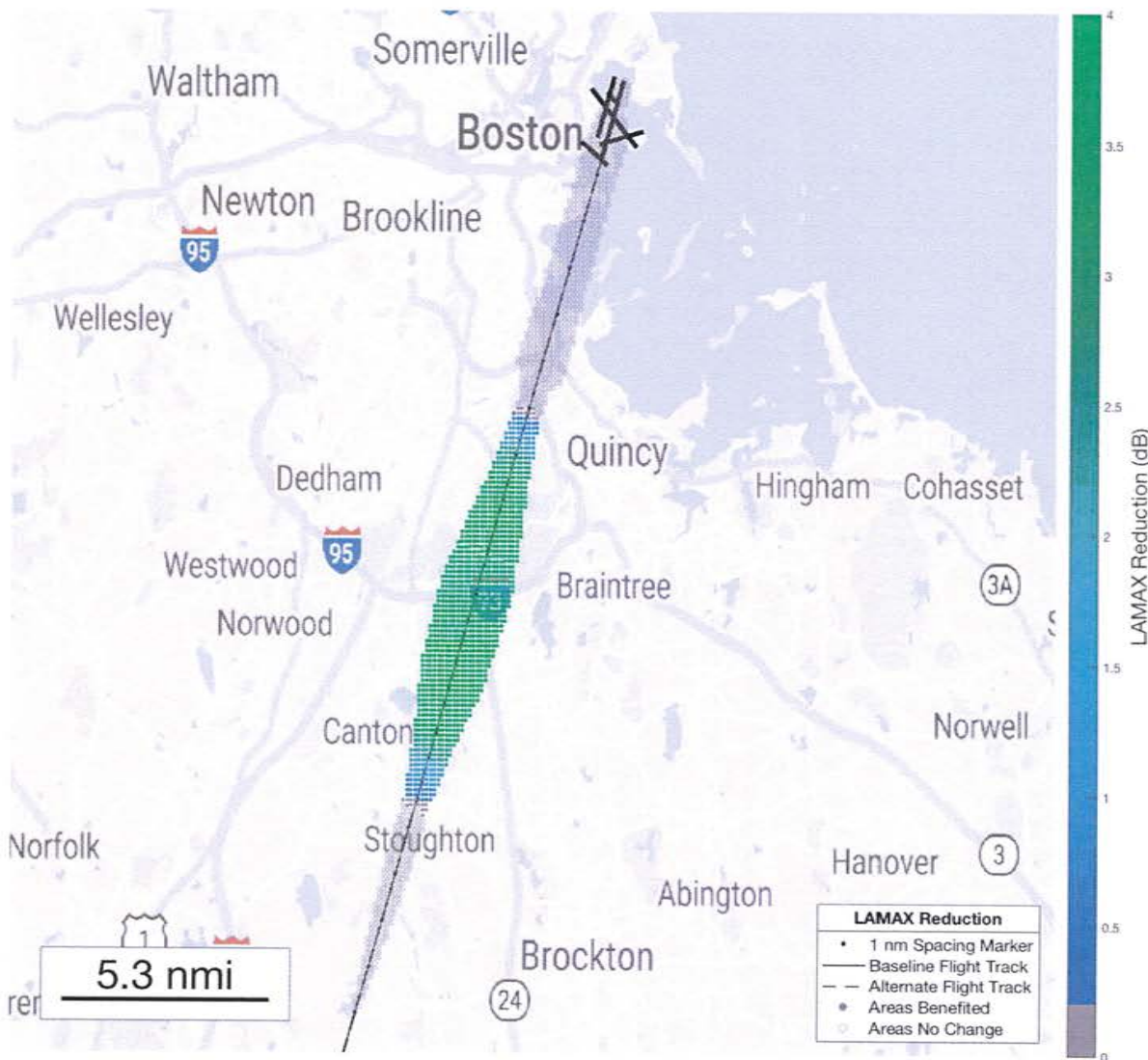


100 N Above



Preliminary example to evaluate methodology only. Should not be considered representative case.

# Example Impact of Vortex Generators for A320s on 4R



## Population Exposure

LAMAX Reduction	Population Exposure
4dB	6,916
3dB	8,482
2dB	9,964
1dB	11,723

Preliminary example to evaluate methodology only. Should not be considered representative case.

# **FAA LAW 101**

## **PART TWO**

**If all airlines at an airport agree, a procedure may be adopted:**

**Lower Landing Gear at  
FAF:MILTT (5.1 nm)**

**\*\*\*\*\***

## **Landing Gear accounts for about 40% of the total noise emissions of long range aircraft in approach conditions**

**Landing gear are required to be in lowered position at the FAF (final approach fix) which for 4L and 4R is the MILTT fix located at the Granite Ave entrance to the Expressway heading north. MILTT is 5.1 nm from 4L/4R.**

**Yet, aircraft landing gear are often lowered well before MILTT.**

**We see it as flights pass overhead.** This is an operational issue that airlines and pilots could address. Lowered landing gear increase fuel burn, so associated operational cost savings to airlines would accrue if early gear lowering were avoided or reduced. Right-time-landing-gear-lowering should be an element of any fly quiet initiative. See the short discussion excerpt and graphics below:

Source: Airbus Engineering 2015 White Paper Published by American Institute of Aeronautics and Astronautics

**Landing Gear accounts for about 40% of the total noise emissions of long range aircraft in approach conditions**

. [EU's ACARE](#) (Advisory Council for Aviation Research in Europe) is aiming to reduce noise emission of flying aircraft by 65% in 2050 relative to the capabilities of typical new aircraft in 2000.

In terms of noise impact for the residential areas surrounding airports, takeoff and landing are the most critical phases of the flight. While noise emissions at takeoff are mainly dominated by engines, contributions of all other noise sources are evenly balanced during landing. For a typical long-range airplane during the approach phase, around 54% of the noise stems from the

airframe. Out of these 54%, 76% originate from the landing gear alone (see Figure 2 and Figure 3).

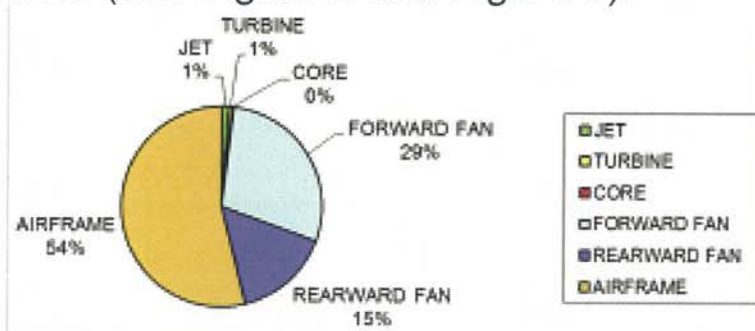


Figure 2 – Contribution to the overall noise emission of a typical long-range jet airplane during the landing phase

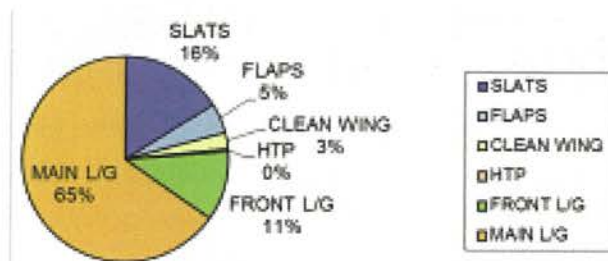
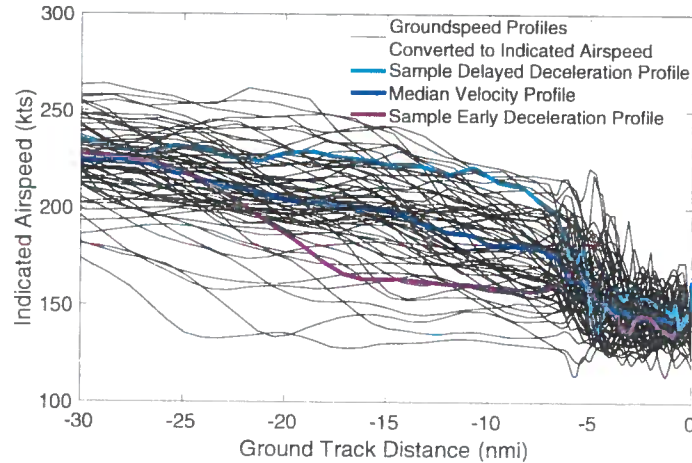


Figure 3 – Decomposition of airframe noise of a typical long-range jet airplane during the landing phase

In total, the landing gear accounts for about 40% of the total noise emissions of a long-range airplane in approach conditions.

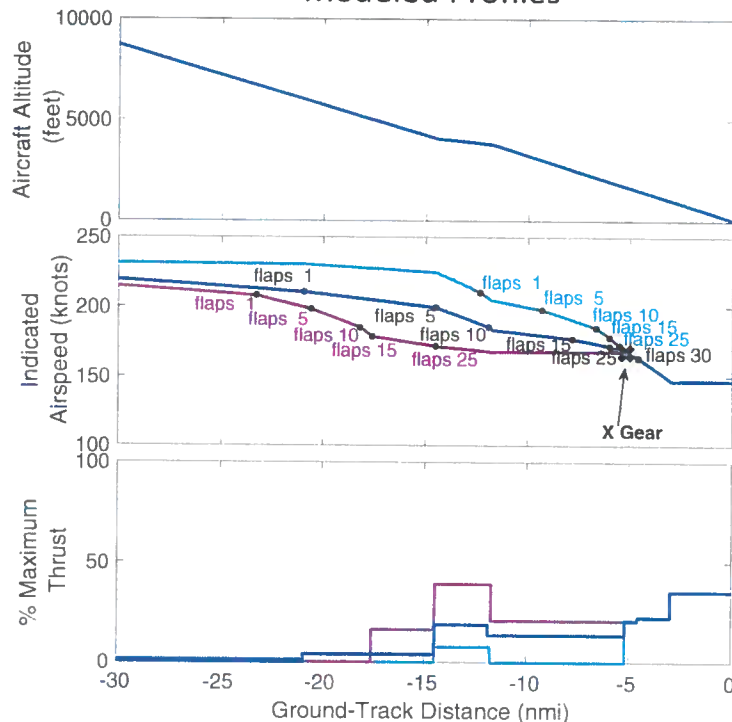
# Delayed Deceleration Approaches

Velocity Radar Data for B737-800 4000ft Level Offs into 4R

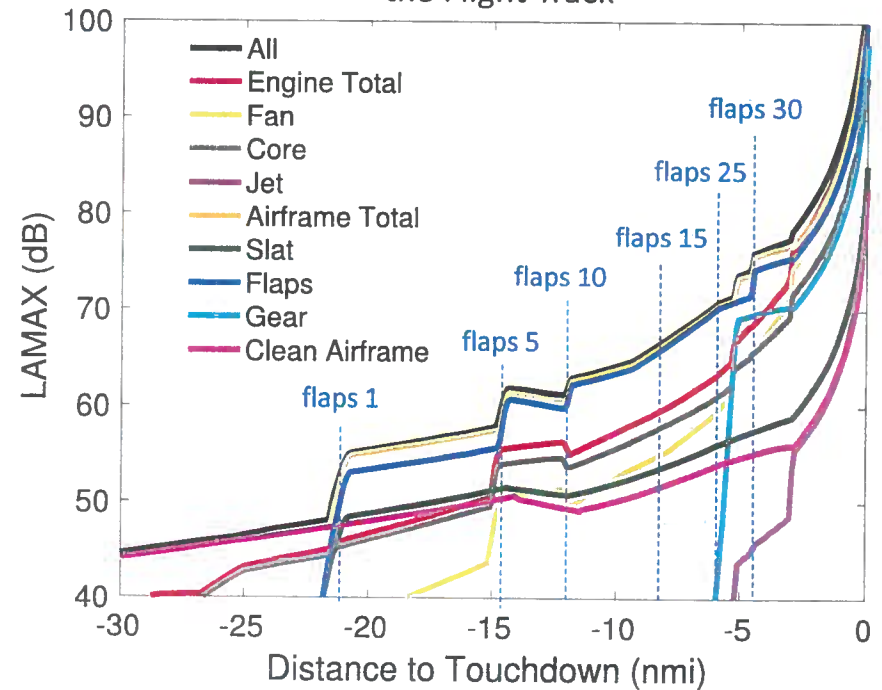


- Reduce noise by delaying extension of flaps
- Potential concerns from ATC and pilots regarding different deceleration rates and managing traffic
- Must decelerate early enough to assure stable approach criteria

Modeled Profiles

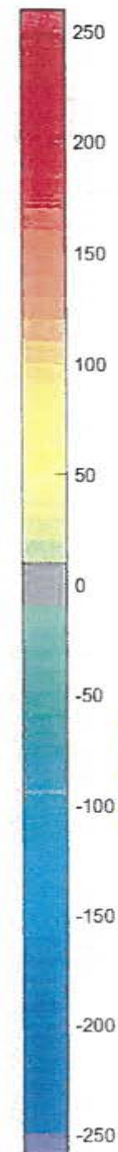
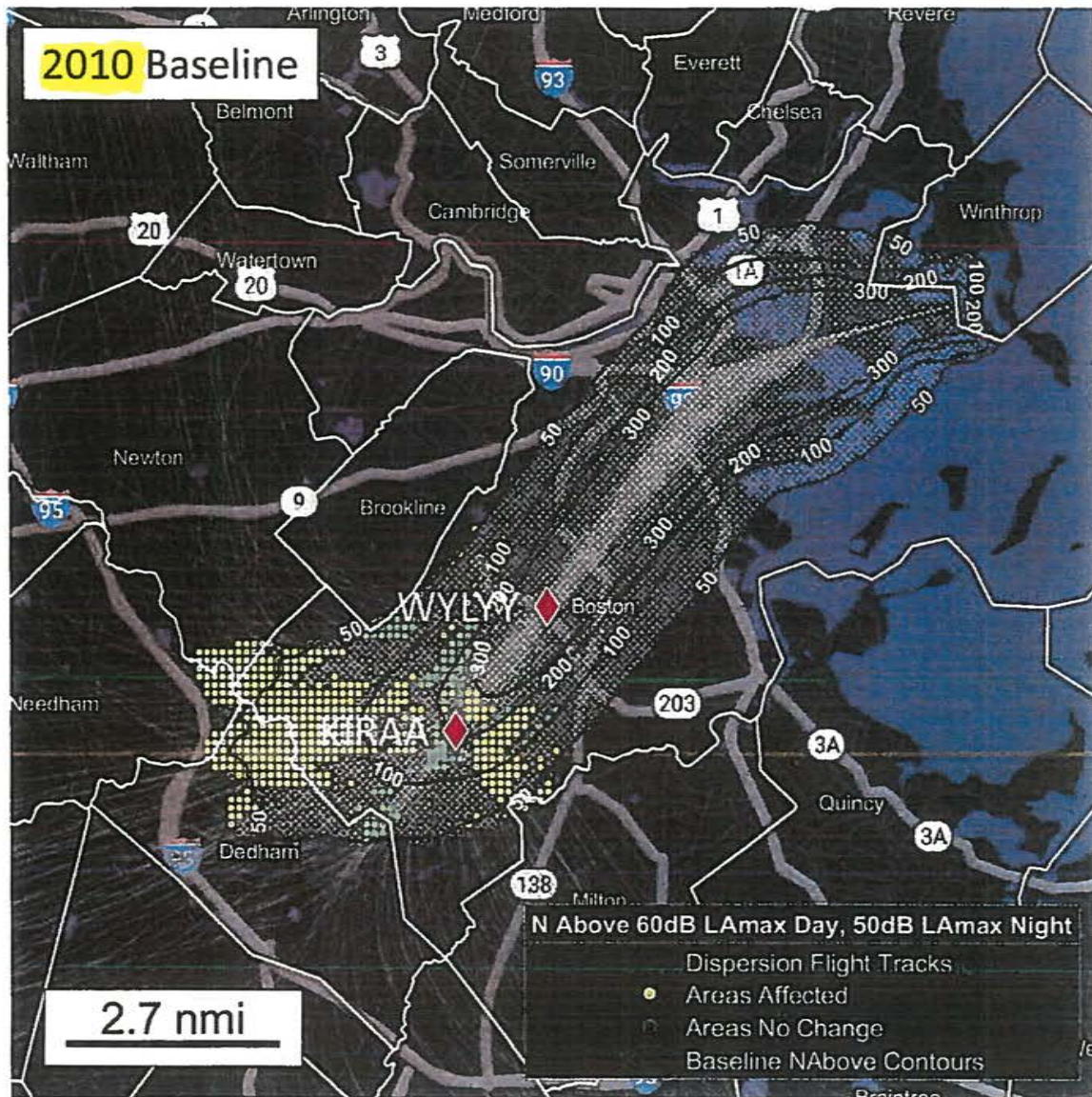


Example Noise Component Breakdown Under the Flight Track



# Effect of RNAV Concentration on 27 Departures

## 2010 to 2017



**Population Exposure**

$N_{60}$	50x
Dispersion	407,001
RNAV	407,357
<b>RNAV Benefit</b>	<b>-356</b>

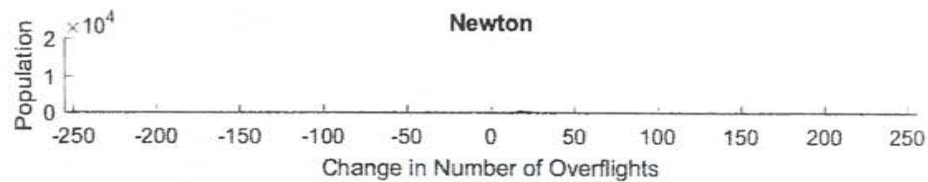
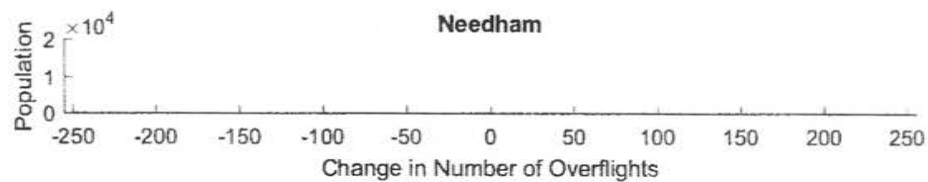
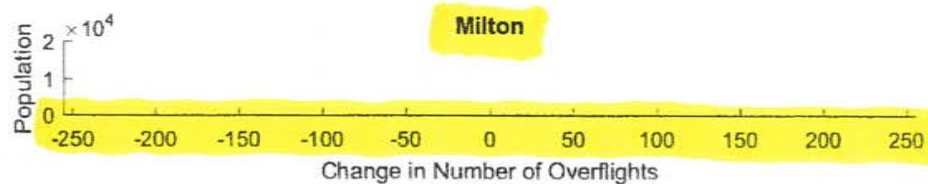
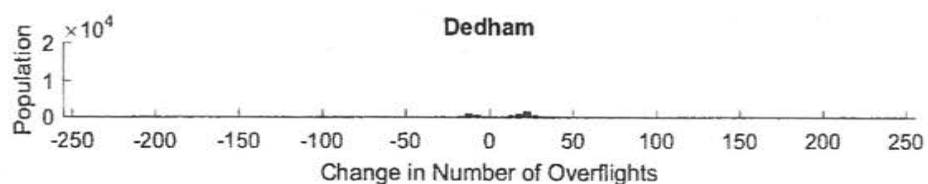
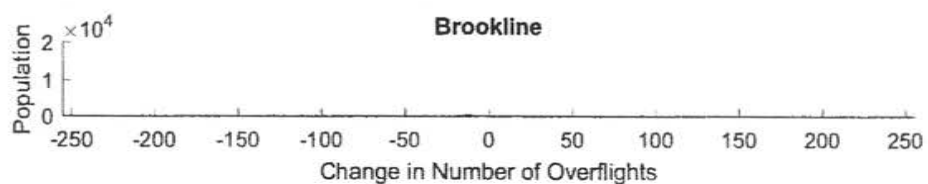
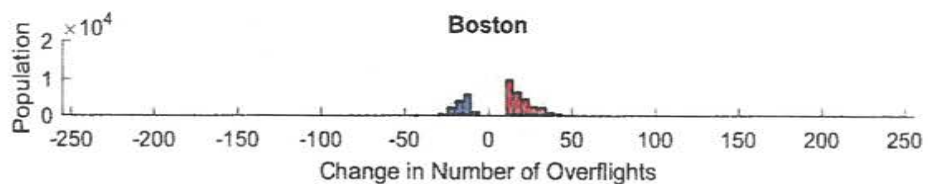
Analysis updated Dec 4 2018 to correct for discretization differences

Analysis based on peak day operations; only includes 33L departures

$N_{60}$  Thresholds:  
60dB  $L_{A,max}$  Day, 50dB  $L_{A,max}$  Night

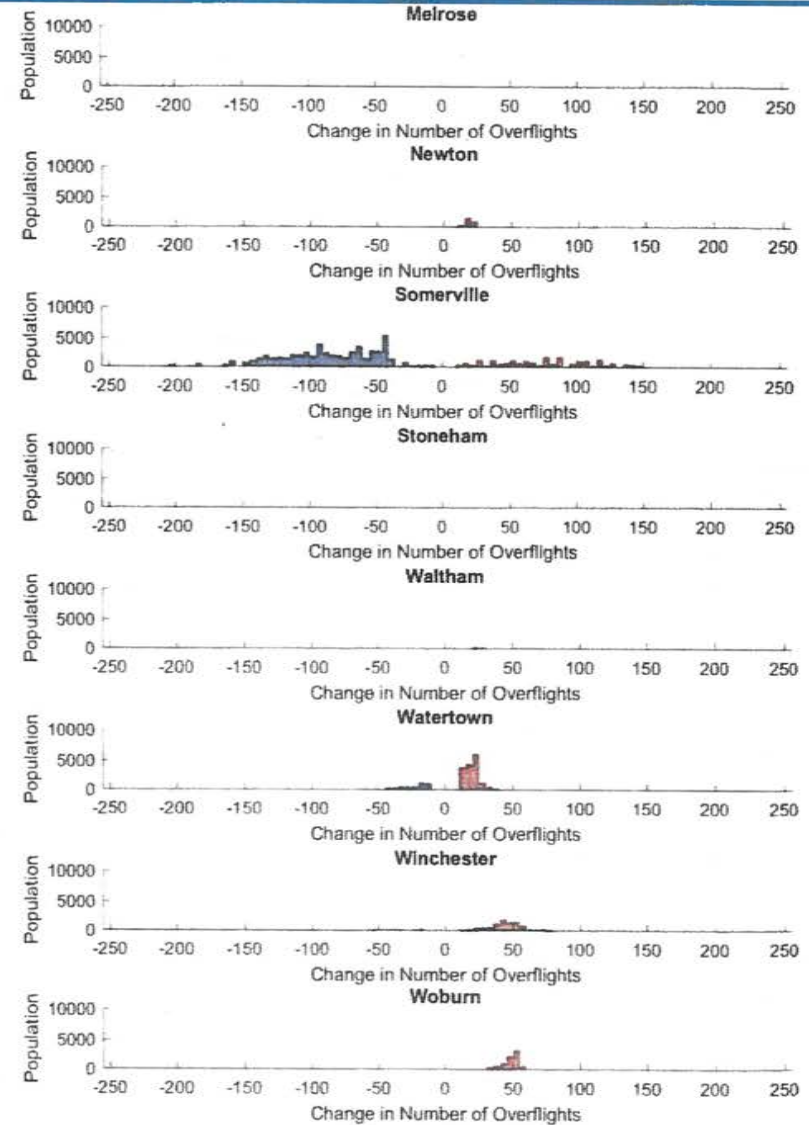
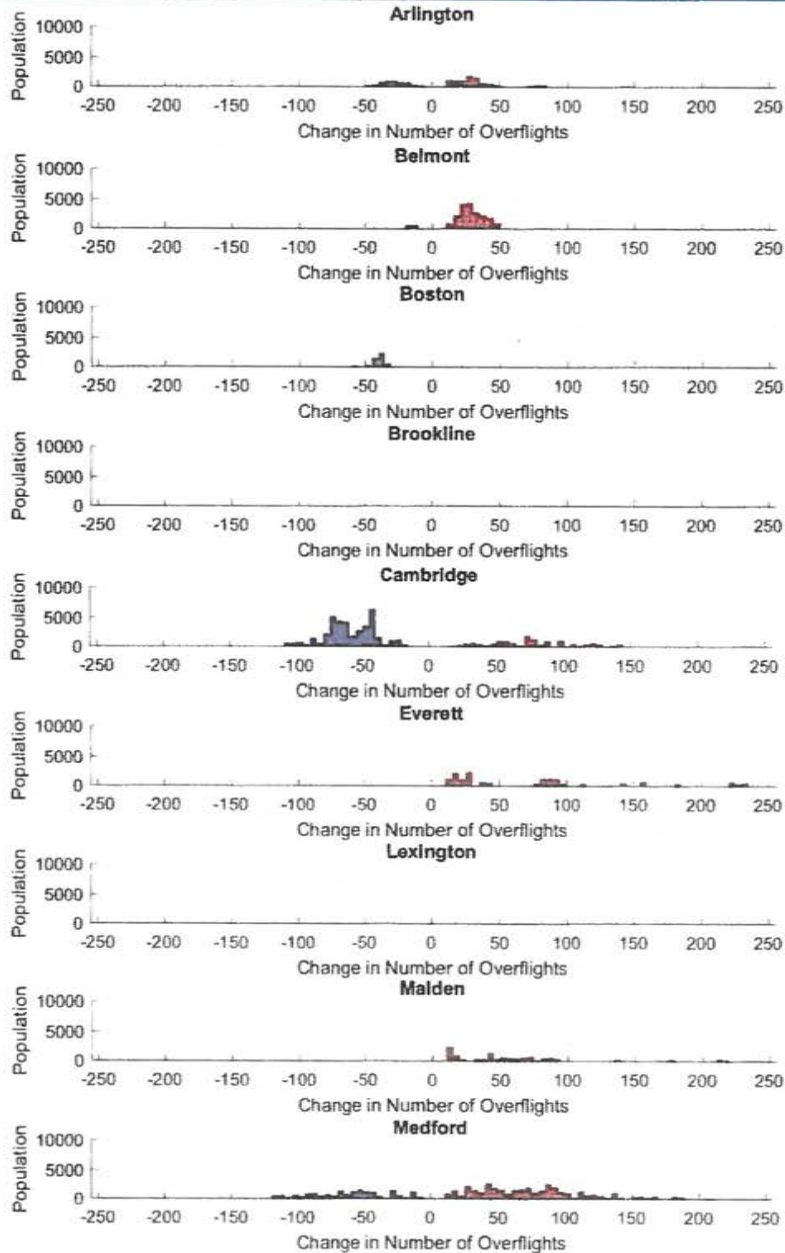
# Effect of RNAV Concentration on 27 Departures

## 2010 to 2017





# Effect of RNAV Concentration on 33L Departures 2010 to 2017



## **COVER PAGE STATEMENT RE MIT SLIDES**

**We strongly urge the Massport CAC and its members to avoid drawing any specific conclusions from this preliminary material or using the material to advocate for or against any specific idea.**

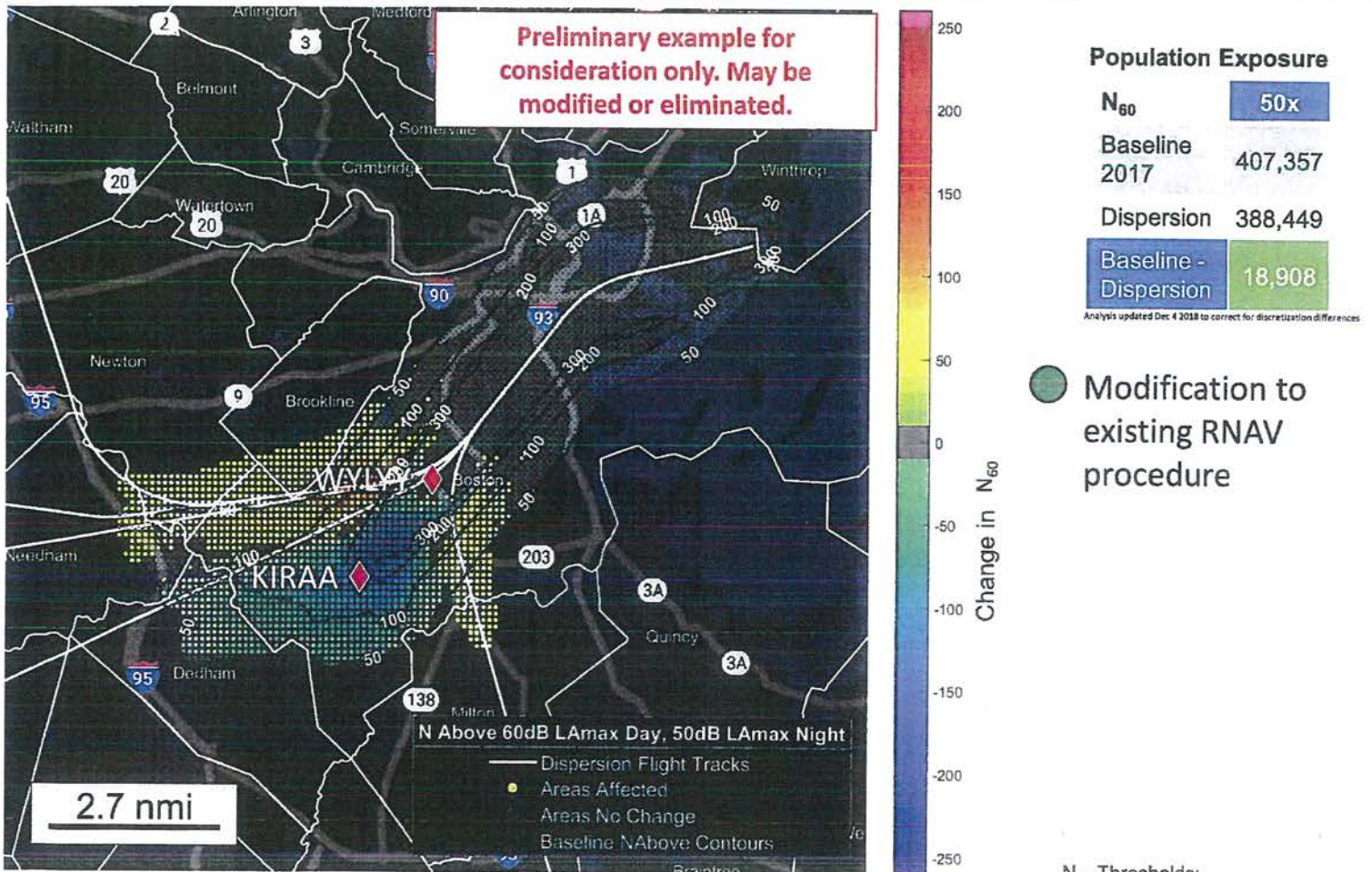
**The material is identified by MIT as "preliminary examples to evaluate methodology only and should not be considered a representative case." We look forward to feedback and further suggestions for evaluation as Block 2 progresses.**

**PRELIMINARY EXAMPLE  
TO EVALUATE METHODOLOGY ONLY**

**SHOULD NOT BE CONSIDERED A REPRESENTATIVE  
CASE**



## 27 Departures RNAV Waypoint Relocation Change in $N_{60}$ Compared to 2017



Analysis based on peak day operations; only includes 27 departures

## **TEXT OF THE 27 ROD**

**"THE FAA HAS SELECTED THE FINAL ALTERNATIVE (PREFERRED PROCEDURE) OF THE FINAL ENVIRONMENTAL IMPACT STATEMENT.**

**THIS ALTERNATIVE IS EXPRESSED IN LAND USE AS FOLLOWS:**

**MAINTAIN RUNWAY HEADING UNTIL REACHING THE WORLD TRADE CENTER, THEN LEFT TO OVERFLY:**

**THE SOUTHERN END OF FT. POINT CHANNEL,**

**THE MASSACHUSETTS AVENUE INTERSECTION OF THE SOUTHEAST EXPRESSWAY,**

**AREAS OF ROXBURY,**

**THE CENTER OF FRANKLIN PARK, AND FOREST HILLS CEMETERY,**

**AND THEN TURN NORTHERLY, WESTERLY, OR SOUTHERLY IN ACCORDANCE WITH THE DESTINATION AIRPORT."**

## COVER PAGE STATEMENT RE MIT SLIDES

We strongly urge the Massport CAC and its members to **avoid drawing any specific conclusions** from this preliminary material or using the material to advocate for or against any specific idea.

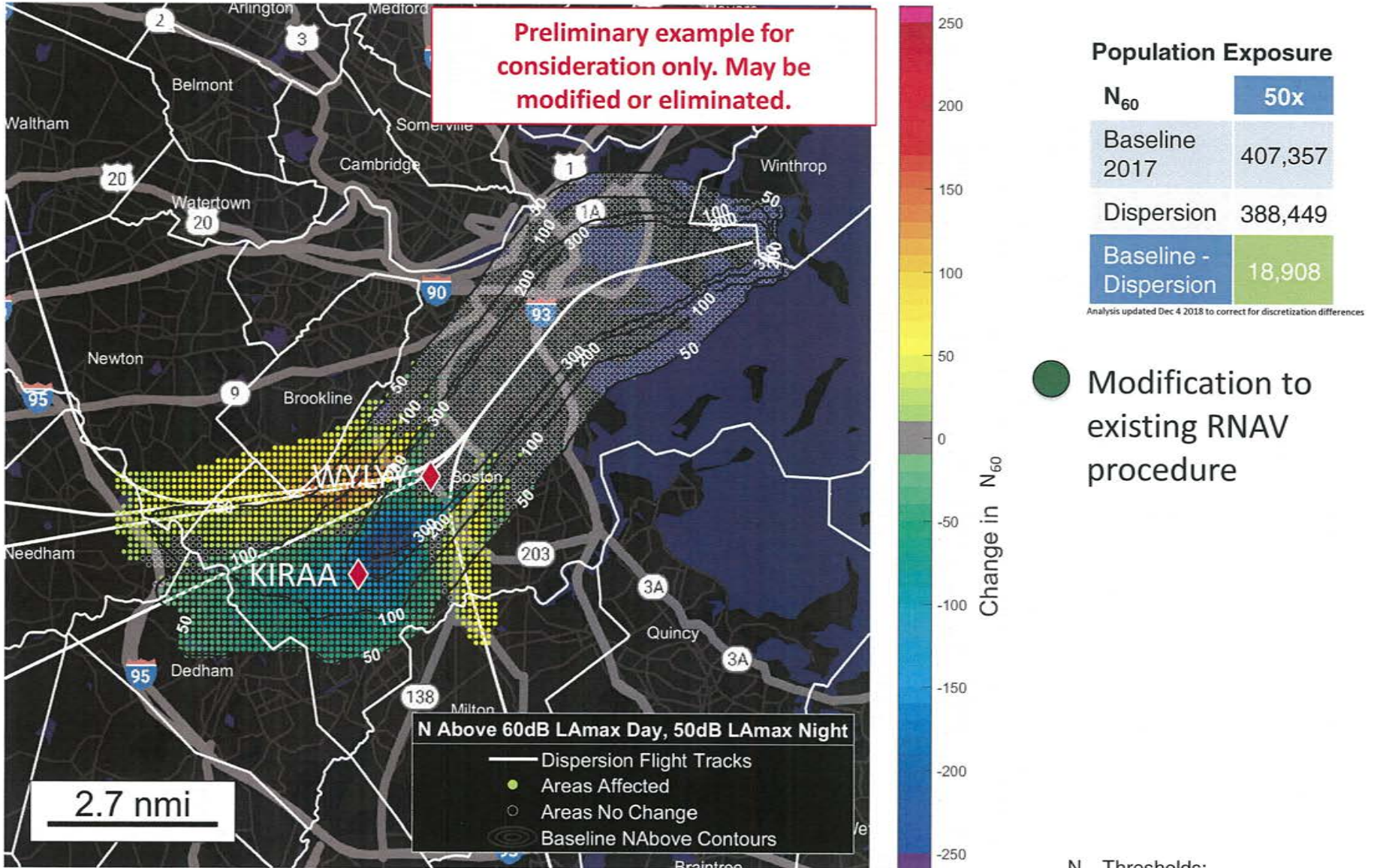
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**PRELIMINARY EXAMPLE  
TO EVALUATE METHODOLOGY ONLY**

**SHOULD NOT BE CONSIDERED A REPRESENTATIVE  
CASE**

**MAY BE MODIFIED OR ELIMINATED**

# 27 Departures RNAV Waypoint Relocation Change in $N_{60}$ Compared to 2017



Analysis based on peak day operations; only includes 27 departures

# **Title VI of the Civil Rights Act of 1964 and Executive Order 12898:**

**Require** Federal agencies to **achieve** Environmental Justice: by identifying and addressing **disproportionately high and adverse** human health and environmental **effects**, including interrelated social and economic effects, of FAA programs, policies, and activities on **minority populations and low-income populations.**

**BLOCK 2 RUNWAY 27 TESTS  
MUST NOT FURTHER  
BURDEN MATTAPAN FOR THE  
BENEFIT OF OTHERS.**

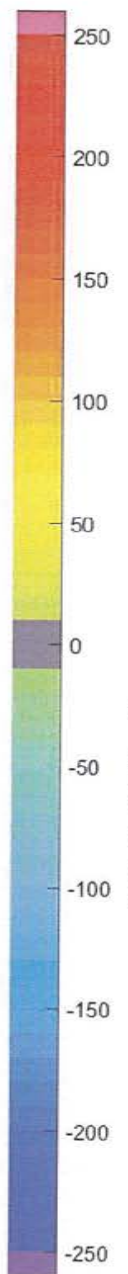
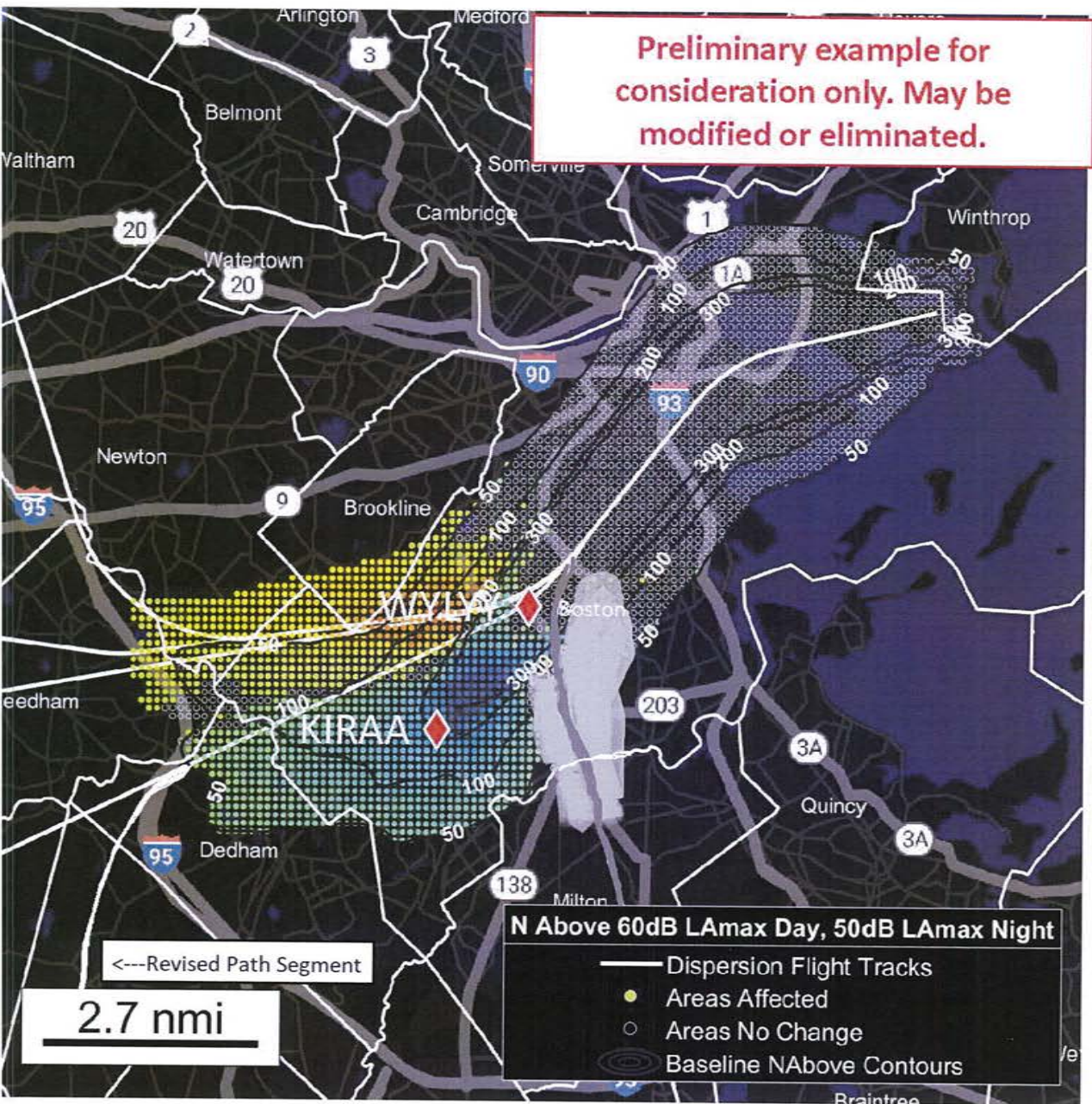
**THAT IS A NON-STARTER.**

**A CIVIL RIGHTS VIOLATION.**



# 27 Departures RNAV Waypoint Relocation

## Change in $N_{60}$ Compared to 2017



### Population Exposure

$N_{60}$	50x
Baseline 2017	407,357
Dispersion	388,449
Baseline - Dispersion	18,908

Analysis updated Dec 4 2018 to correct for discretization differences

● Modification to existing RNAV procedure

### Revised Methology

For Consideration Only  
Prepared by T. Dougherty

$N_{60}$  Thresholds:  
60dB  $L_{A,max}$  Day, 50dB  $L_{A,max}$  Night

Analysis based on peak day operations; only includes 27 departures