RICONDO & ASSOCIATES

MEMORANDUM **VIA E-MAIL**

Date: May 9, 2008

To: Terry English
FAA, ATO, BLANS Project Manager

From: Stephen Culberson

Subject: DEFINITION OF TERMS

The Logan Airport Community Advisory Committee (CAC) has requested that the Federal Aviation Administration (FAA) provide a definition of some terms as they discuss and recommend criteria to be used in evaluating noise abatement measures during Phase 2 of the Boston Logan Airport Noise Study (BLANS). The terms for which they requested definitions are:

- Community
- Concentrate
- Disperse
- Equal
- Fairness
- Impact
- Share
- Significant

Specifically, the CAC has requested FAA guidance on the definition of these terms and/or how they may have been used in other similar studies. Because these terms may have different meanings depending on the resource being evaluated and the agency applying the terms, this memo focuses solely on defining the terms in the context of FAA regulations and policies and FAA-sponsored noise abatement studies and noise analyses.

With the exception of the term "Significant," none of the terms have been formally defined by FAA in their Orders or Advisory Circulars related to noise analyses. Another term, "Impact," has been defined by the Council for Environmental Quality (CEQ) in their regulations implementing the National Environmental Policy Act (NEPA). The CEQ definition for "Impact" should be used because it has a specific meaning in NEPA environmental documents, and this term will need to be consistent with that definition in the next phase of the BLANS process.

Lacking relevant specific definitions for the other six terms, the following documents and sources were reviewed to provide context and to formulate a suggested definition for consideration by the CAC.

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- FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*, March 20, 2006
- FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*, April 28, 2006
- FAA Office of Airports, Office of Airport Planning and Programming, Airports Planning and Environmental Division, APP-400, *Environmental Desk Reference for Airport Actions*, October 2007
- FAA, Noise Integrated Routing System (NIRS) and NIRS Screening Tool (NST), http://www.faa.gov/about/office_org/headquarters_offices/aep/models/nirs_nst/
- Record of Decision for the Airside Improvements Planning Project at Logan International Airport (August 2, 2002)
- Phase 1 BLANS Reports
- Other noise abatement studies and FAA NEPA environmental documents that involved aircraft noise analysis including:
    - *Ronald Reagan Washington National Airport, FAR Part 150 Noise Exposure Maps and Noise Compatibility Program*, September 2004
    - *Port of Portland, Portland International Airport, FAR Part 150 Noise Compatibility Study*, August 2005
    - *Record of Approval, Bradley International Airport, Windsor Locks, Connecticut, FAR Part 150 Noise Compatibility Program*, October 18, 2004
    - *FAR Part 150 Noise Compatibility Program Update, San Antonio International Airport*, November 2001
    - *Nashville International Airport, Airport Noise Compatibility Study*, 1988
    - *Final Environmental Impact Statement, Chicago Terminal Airspace Project,* August 2001
    - *Midwest Airspace Enhancement (MASE) Environmental Assessment,* December 2005
    - *Final Environmental Impact Statement, New York/New Jersey/Philadelphia Metropolitan Area Airspace Redesign*, July 2007
    - *Little Rock National Airport, FAR Part 150 Noise Compatibility Study Update*, April 2003
    - *O'Hare Modernization Final Environmental Impact Statement & Section 4(f) and Section 6(f) Evaluation & General Conformity Determination*, July 2005

While the CAC does not necessarily have to accept the suggested definitions for these terms (with the exception of "Significant" and "Impact"), definitions adopted by the CAC can not be inconsistent with existing FAA regulations and policies, the FAA's mission, or any applicable laws and regulations for which the FAA must demonstrate compliance. Once the CAC has agreed upon a definition for these terms that FAA determines is acceptable, FAA will utilize them when reviewing

evaluation criteria proposed by the CAC to ensure that the terms are being used consistently and that the evaluation criteria are consistent with FAA regulations and policies and the FAA's mission.

Community

Neither FAA nor CEQ specifically define the term "community"; however, the term is used throughout FAA environmental guidance in reference to residential areas and municipalities surrounding airports. FAA Orders 1050.1E and 5050.4B uses "community disruption" as one way to evaluate the environmental effects of a proposed action. Community disruption is defined as:

> An action dividing or disrupting an established community or planned development, or that is inconsistent with plans or goals of a community where the project would occur.

The FAA's Noise Integrated Routing System (NIRS) Screening Tool (NST) divides populations within the study area into three categories: (1) those receiving an increase in noise exposure relative to the baseline, (2) those receiving a decrease, and (3) those having no change.[1]

The Record of Decision (ROD) for the Airside Improvements Planning Project, references communities surrounding Logan Airport mostly in terms of the CAC, which is also primarily how the term was used in Phase 1 of the BLANS, i.e., the communities that are members of the CAC, which are political jurisdictions.

The U.S. Census Bureau aggregates data by communities which they mostly define along political jurisdictions (city, town, or county) or by U.S. zip codes. The Department of Housing and Urban Development (HUD) provides programming and funding to entitlement communities, which are defined as large- and medium-sized cities and counties.[2]

In FAA NEPA documents, community typically refers to political jurisdictions, such as towns and cities. In certain cases, where an airport is encompassed by a single political jurisdiction, such as a city, communities may be defined as distinct neighborhoods or areas of that city (e.g., Nashville International Airport, Midway International Airport).

Recommendation: Because the CAC's membership is based on political jurisdictions, it is suggested that for purposes of the BLANS, the term "community" refer to distinct political jurisdictions around Logan International Airport.

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[1] FAA, Noise Integrated Routing System (NIRS) & NIRS Screening Tool (NST), http://www.faa.gov/about/office_org/headquarters_offices/aep/models/nirs_nst/, accessed May 19, 2008.

[2] U.S. Department of Housing and Urban Development, *Building Communities and New Markets for the New Century, 1998 Consolidated Report*.

Concentrate and Disperse

The FAA does not specifically define "concentrate" or "disperse" in its environmental guidance documents. The Record of Decision (ROD) for the Airside Improvements Planning Project at Logan also does not define or reference these terms. In Phase 1 of the BLANS, these terms were used to describe how aircraft fly a particular route: each aircraft either following essentially the same path (concentrated) or each aircraft following that route flying along many different paths, usually spread out over a large (i.e., several miles) area (dispersed) due to Air Traffic Control radar vectoring and traffic management techniques. For example, if a published procedure directs aircraft to fly north from Logan International Airport along a defined route aided by precise means of navigation (e.g., Global Positioning Satellite) and operate over the same specific locations in a predictable and repeatable manner, the flights are concentrated. If, however, the aircraft flying along a route based on air traffic control issued headings or less precise means of navigation, and all cross within 5 miles east or west of a point, then the flights are dispersed over that point. This is also how these terms are used in other noise studies reviewed for this memorandum.

Area Navigation or RNAV procedures are designed to have aircraft follow a specific flight route with little deviation, a good example of the term "concentrate." If aircraft are equipped with a Flight Management System (FMS), these RNAV procedure routes can be conducted in a repeatable and more predictable manner. These procedures are developed to enhance safety, increase capacity, improve efficiency, and reduce the environmental impact of aviation.[3] Conversely, use of divergent headings, or fanning, of aircraft flight paths by air traffic controllers are used to prevent the concentration of aircraft over a particular area, a good example of the term "disperse." From a noise abatement perspective, divergent headings allow for a distribution of noise over a wider area by dispersing aircraft that might otherwise utilize a narrower corridor, while RNAV procedures are designed and implemented to have aircraft follow a designated corridor, thus concentrating noise in a particular area.[4] Use of either of these techniques for noise abatement purposes depends upon the land use below the air traffic procedure. The main intent is to either distribute noise levels over noise-sensitive areas (disperse) or keep aircraft noise levels over non-noise sensitive areas (concentrate).

Suggestions: For purposes of the BLANS, the term "concentrate" could be defined as aircraft that are flying the same flight route along a repeatable and predictable flight path (both horizontally and vertically) when they fly over a specified area. The term "disperse" could be defined as aircraft that are flying the same flight procedure, but result in different flight paths (both horizontally and

[3] FAA website, RNAV/RNP Group, http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/systemops/aaim/organizations/rnav_rnp/, accessed May 8, 2008.
[4] Ricondo & Associates, Inc., Memorandum to Jon Woodward, Landrum & Brown, *BOS – Response to Question on Divergent Departure Heading Procedures*, December 5, 2007.

vertically) so that they are spread out when they fly over a specified area. A geographic point of reference is required when referring to these terms.

Equal, Fairness, and Share

The FAA does not specifically define "equal," "fairness," or "share" in its environmental guidance documents. However, the terms are used to describe similar concepts. "Equal" is used in terms of comparing two or more things or alternatives to each other and determining whether they would have the same effect. "Fairness" is used in terms of just consideration, such as "fair market value" or "fair treatment." The U.S. Environmental Protection Agency Office of Environmental Justice uses "share" to describe a portion of an affected population, specifically, "no group of people, including racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental effects…"[5] These concepts are used by FAA to evaluate potential environmental justice impacts, which are defined as "disproportionately high and adverse human health or environmental effects on minority and low-income populations."[6]

The ROD for the Airside Improvements Planning Project does not specifically use these terms in relation to the noise abatement study; however, it does state that, "Noise abatement proposals that FAA considers safe and efficient and that will not adversely affect other communities will be implemented." Similarly, Phase 1 of the BLANS also did not specifically use these terms.

The FAR Part 150 Noise Compatibility Study for Portland International Airport used these terms to identify goals for the Part 150 Study. Some goals identified in this study included "minimizing noise impacts and distributing noise equally on either side of flight paths over the Columbia River," "creating a more equal dispersal of noise," and "resulting in shared noise." It should be noted that while these were the defined goals of the sponsor (Port of Portland), the measures that were approved by FAA[7] were based on the measures' abilities to maintain safety, capacity, and efficiency, and reduce noise impacts. In fact, the goals as stated by the sponsor were not submitted to FAA for approval; instead RNAV procedures to establish flight routes over the Columbia River were submitted and approved.

[5] U.S. Environmental Protection Agency, Office of Environmental Justice, as quoted in *Environmental Desk Reference for Airport Actions*, FAA, Office of Airports, Office of Airport Planning and Programming, Airports Planning and Environmental Division, APP-400, October 2007.
[6] FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*, March 20, 2006.
[7] FAA, *Record of Approval, Federal Aviation Regulation Part 150 Noise Compatibility Program, Portland International Airport, Portland, Oregon*, June 6, 2007.

Other studies[8] reviewed for this memorandum used these terms similar to those identified by the FAA for evaluating environmental justice impacts. "Equal" is most often applied in terms of a measurement being equal, less than, or greater than a set standard.

Suggestions: For purposes of the BLANS, "equal" could be defined as the same or comparable when discussing effects at specific noise levels (see discussion of "significant" below); "fairness" could be defined in terms of not improving the noise environment for one area at the expense of another area, when examining comparable noise levels; and "share" could be defined as the proportion of population for each community affected by noise at a specific noise level.

For example, if there are 10 households located within the DNL 65 noise contour under a No Action Alternative and the same 10 households would be located within the DNL 65 noise contour under a measure proposed for consideration, then the measure would be considered "equal" with the No Action Alternative. Shifting noise from one place to another would not be considered "fair," unless it would result in fewer total households and population being impacted by the noise levels being evaluated and would also not cause a disproportionate "share" of negative effects on a community or population. This is consistent with "…the FAA policy that operational changes made for noise abatement reasons must reduce the number of people affected by noise and the severity of the effect, without increasing noise effects in natural environments with unique noise sensitivities."[9]

Impact

The FAA does not specifically define "impact" in its environmental guidance documents, but it uses the term frequently in the context of evaluating and determining effects of proposed projects on resources. CEQ regulations[10] state that "effects and impacts as used in these regulations are synonymous." Effects are defined in the regulations as follows:

(a) Direct effects, which are caused by the action and occur at the same time and place.
(b) Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

[8] See page 2 for a list of other studies reviewed.
[9] FAA, *Proposed Aviation Noise Abatement Policy 2000*, *Federal Register*, Vol. 65, No. 136, July 14, 2000.
[10] Council on Environmental Quality, *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act*, 40 CFR Parts 1500-1508.

> Effects and impacts as used in these regulations are synonymous. Effects include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historical, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial.

The regulations also define "cumulative impact" as:

> "Cumulative impact" is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Finally, the regulations define "affecting" as meaning will or may have an effect on.

FAA Order 1050.1E states that, "A significant noise impact would occur if analysis shows that the proposed action will cause noise sensitive areas to experience an increase in noise of DNL 1.5 dB or more at or above DNL 65 dB noise exposure when compared to the no action alternative for the same timeframe."[11] If an increase in noise of DNL 1.5 dB or more at or above DNL 65 dB noise exposure over noise sensitive land uses would occur, then additional analysis within the DNL 60 dB noise exposure is required. Additional analysis beyond this can be done to help further describe aircraft noise impacts for specific noise-sensitive locations or situations, to address various public concerns, and to help the public better understand noise impacts.[12]

The FAA's Noise Integrated Routing System (NIRS) is a noise-assessment program designed to provide an analysis of air traffic changes over broad areas. The NIRS Screening Tool (NST) provides guidance in evaluating potential noise impacts as a result of changes in airport arrivals and departures above 3,000 feet above ground level. The NST establishes screening criteria to compare a baseline and an alternative scenario and defines the level of impact associated with changes in noise exposure over communities beneath the aircraft route relative to the baseline.[13] These rules are provided below:

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[11] FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*, Section 14.3, March 20, 2006.
[12] FAA Office of Airports, Office of Airport Planning and Programming, Airports Planning and Environmental Division, APP-400, *Environmental Desk Reference for Airport Actions*, October 2007.
[13] FAA, Noise Integrated Routing System (NIRS) & NIRS Screening Tool (NST), http://www.faa.gov/about/office_org/headquarters_offices/aep/models/nirs_nst/, accessed May 19, 2008.

Table 1

NIRS Screening Tool Impact Criteria[14]

	DNL Noise Baseline Exposure Compared to Alternative Exposure		
	65 dB or higher	60 to 65 dB	45 to 60 dB
Minimum Change in DNL with Alternative	1.5 dB	3.0 dB	5.0 dB
Level of Impact	Significant	Slight to Moderate	Slight to Moderate

Source: FAA, Noise Integrated Routing System (NIRS) & NIRS Screening Tool (NST), http://www.faa.gov/about/office_org/headquarters_offices/aep/models/nirs_nst/, accessed May 19, 2008.
Prepared by: Ricondo & Associates, Inc.

As stated in the Chicago Terminal Airspace Project FEIS, "increase of 3 DNL between 60 and 65 DNL are considered 'slight to moderate impacts' as are increases of 5 DNL or greater at levels between 45 DNL to 60 DNL. The increase in noise at these levels is enough to be noticeable and potentially disturbing to some people, but the cumulative noise level is not high enough to constitute a 'significant' impact.'" (pages 4-8).

Definition: The definition for "impact" must be consistent with CEQ usage, which defines "impact" as being synonymous with "effect."

Significant

FAA Orders 1050.1E and 5050.4B provides specific guidance on how to define "significant" in the context of effects on resource categories. FAA has established "significant impact thresholds" for some, but not all, resource categories that FAA evaluates when assessing the potential environmental impacts of a proposed project. FAA Order 5050.4B states that a significant impact threshold is:

> The impact level or "threshold" that the responsible FAA official uses to determine if the environmental effects of a proposed action or its reasonable alternatives would cause significant environmental effects. If FAA has established a threshold for a resource, the responsible FAA [official] must use that threshold to determine severity and context.

FAA Order 1050.1E established the significant impact threshold for noise impacts, which includes the following:

[14] FAA established these criteria in accordance with FAA Order 1050.1E, the Federal Interagency Committee on Noise (FICON), and the Final EIS for the Expanded East Coast Plan.

> A significant noise impact would occur if analysis shows that the proposed action will cause noise sensitive areas to experience an increase in noise of DNL 1.5 dB or more at or above DNL 65 dB noise exposure when compared to the no action alternative for the same timeframe. [15]

DNL 65 has also been established as the threshold above which aircraft noise is normally considered to be incompatible with residential areas.[16]

Definition: The definition for "significant" must be consistent with FAA usage: a significant noise impact would occur if analysis shows that the proposed action will cause noise sensitive areas to experience an increase in noise of DNL 1.5 dB or more at or above DNL 65 dB noise exposure when compared to the no action alternative for the same timeframe.

[15] For example, an increase from 63.5 dB to 65 dB is considered a significant impact. Special considerations needs to be given to the evaluation of the significance of noise impacts on noise sensitive areas within national parks, national wildlife refuges and historic sites, including traditional cultural properties. For example, the DNL 65 dB threshold does not adequately address the effects of noise on visitors to areas within a national park or national wildlife refuge where other noise is very low and a quiet setting is a generally recognized purpose and attribute.
[16] 14 CFR, Federal Aviation Regulation, Part 150, *Airport Noise Compatibility Planning.*