Independent Consultant Review – Supplement II

Cumulative Noise Related Effects Associated with Phase One Alternatives
Of the
Boston Logan Airport Noise Study
On
Boston Area Communities

Distributed to the Community Advisory Committee

By

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Cumulative Noise Evaluation Considerations and Informational Thresholds

This document supplements two previous Independent Consultant reviews of the noise related effects of the Phase 1 alternatives prepared for the Boston Logan Airport Noise Study. Those reviews provided to the members of the BOS/TAC and the Logan Community Advisory Committee (CAC) its review of the Project Consultant's extensive noise analyses for each individual alternative.

On January 17, 2007 the CAC reviewed and voted to endorse the implementation of a series of alternatives for noise abatement. Those alternatives called for RNAV and conventional departures from Runways 4R (Alternative 1), Runway 9 (Alternative 2), Runway 15R (Alternative 3), and Runway 22R/L (Alternative 5), as well as for conventional (albeit rerouted with point-to-point navigation) approaches to Runways 22R/L (Alternative 6), Runway 27 (Alternative 7) and a charted visual Runway 33L (Alternative 11).

Subsequent to those decisions, an assessment of the cumulative noise effects of the recommended alternatives was prepared. That cumulative evaluation provided information, for selected locations, about the changes to number of events above various noise levels (NA), changes to the amount of time noise exceed specific thresholds (TA), and changes to the overall average noise level (DNL).

Among the maps provided by the Project Consultant's cumulative noise report are those which indicate the areas where the number of events above 60 dBA of SEL are projected to be changed by each alternative. In keeping with that presentation, the matrix of data prepared by the Independent Consultant was revised to eliminate alternatives not endorsed, and expanded to present information about cumulative noise effects. Additionally, the Independent Consultant's narrative describing the effects is supplemented to provide information about the cumulative noise levels in each of the geographic areas previously assessed. All information within the original Independent Consultant report and its first supplement remains valid.

The supplemental information provides an overview of the cumulative noise results in two ways. First, it replicates the previous matrix by indicating metric/noise level specific change results for individual grid points. It is important to note that a single flight will affect many grid points at different noise levels. For

example, a single loud flight to the south from Runway 22R may contribute to the number of single events above 50 SEL at most of the individual grid points on the south and southeast shore. These individual point data are most useful in assessing the specific effects of individual noise abatement alternatives. Second, the matrix summarizes the specific change results of the various noise level metrics for each community.

The Independent Consultant understands the CAC to be an organization of individual community representatives who are charged with the representation of whole communities, rather than parts of communities, as reflected by the individual grid points. Therefore, the Independent Consultant has summarized the community-wide results for cumulative conditions to provide the average metric/noise level changes associated with the cumulative condition across all grid points located within the individual communities assessed.

To place the noise levels in perspective, the matrix reports data for the projected change in number of events above 50 SEL, 60 SEL, the change in minutes of exposure above 65 dBA, and the projected change in DNL. The 50 SEL level generally equates to a level of 40 dBA, or the amount of noise common in a quiet suburban neighborhood or the inside of a quiet home. The 60 SEL equates to a level of 50 dBA, the level of quiet conversation or a quiet street. The 65 dBA level is equivalent to the noise of a busy restaurant and will normally disrupt moderate conversation. Typically, non-aircraft ambient noise levels in the area will range from approximately 35-40 dBA in very quiet semi-rural areas to 65-70 dBA in densely built-up urban areas. Consequently, a cumulative noise level of 50 SEL (40 dBA) will approximate the ambient noise level without aircraft in the quiet areas of the region.

In addition to the data provided in the matrix and in the following summaries, Graphs 1 through 5 accompany this narrative to demonstrate the relationship of the baseline to cumulative effects of the various alternatives for the average number of events above 50, 60, 65, 70, and 75 SEL within all communities in which grid points were evaluated.

The following pages describe the findings of this supplemental analysis of the information. Previously reported information regarding effects above 60 SEL is not obsolete and this data supplements it.

Area: Runway 27 Takeoff Corridor
Communities: Dedham, Jamaica Plain, Medfield, Norwood, Roslindale, Roxbury, South Boston, South End, West Roxbury, Westwood
Data points: PT003, PT007, PT016, PT018, PT029, PT030, PT031, S01, S02, S21, S27, S28
Independent Consultant Overview of Cumulative Results: Baseline Noise Under baseline conditions this area experiences between 40 and 750 flights per average annual day above typical suburban ambient noise levels (50 SEL). Between 19 and 481 flights per day exceed the typical level required to begin to disrupt speech (60 SEL) per average annual day. The greatest concentration of these events is in the area immediately west and southwest of the airport. Cumulative Noise Five grid points (in the communities of Dedham, Jamaica Plain, Roslindale, West Roxbury and Westwood) would experience reductions of 5% and 10\[1] or more events per day above ambient noise levels with the recommended measures, and all grid points and communities would experience reductions of events above low speech thresholds. Although several communities in the Runway 27 takeoff corridor would experience reductions in the various noise levels or event metrics, no community would experience an average increase in any metric/noise level in the area.

\[1] A "notable" effect, as defined by the Independent Consultant, is the presence of both a 5% and 10 event change (positive or negative) from baseline conditions (see *Independent Consultant Review - Noise Related Effects Associated with Phase One Alternatives*, October 12, 2006). The term "notable" has no basis in federal or Massachusetts environmental guidance, but rather is a term selected by the Independent Consultant to distinguish areas that are affected by changes associated with alternatives that may be noted by the average person residing in the areas indicated.

Area: Runway 4R/L Instrument Approach Corridor
Communities: Canton, Dorchester, Milton, Randolph, Sharon, South Boston, Stoughton
Data points: PT012, PT032, PT034, PT082, PT083, PT084, PT085, PT086, PT087, PT088, PT089, PT099, PT100, S01, S03, S23, S24
Independent Consultant Overview of Cumulative Results: <u>Baseline</u> Under baseline conditions this area experiences between 110 and 850 flights per average day above 50 SEL with the greatest concentration in the area immediately south, southwest of the airport. Between 35 and 700 flights per average annual day exceed the 60 SEL over the corridor. <u>Cumulative</u> Under cumulative conditions, eleven grid points in five communities will experience a notable reduction of more than 5% in the number of over flights above ambient levels, while six grid points in three communities will experience a notable decrease of more than 5% above 60 SEL. All seven communities within the area will experience a reduction in the average number of events above 50 or 60 SEL and in the DNL from baseline conditions. In five of these communities (Canton, Dorchester, Milton, Randolph and Stoughton) the reduction in one or more of the metric/noise level combinations is by a notable amount. Although several communities will experience reductions in the number of events above the selected noise levels or in the DNL, no location in the area will experience an increase in the average events or noise levels assessed.

Area: Close-in Communities
Communities: Brookline, Cambridge, Chelsea, Dorchester, East Boston, Everett, Malden, Mattapan, Medford, Revere, Somerville, Winthrop. Also included in this area are the downtown Boston communities of Beacon Hill, Charlestown, Back Bay, Bay Village, Chinatown, the Leather District and the rest of downtown Boston. Although no specific grid points have been located in these communities, the noise change analysis at grid points at nearby locations are, in our professional opinion, indicate that no notable change will be experienced from the any alternative other than Alternative 9 in these downtown Boston neighborhoods.
Data points: PT001, PT004, PT005, PT010, PT013, PT014, PT015, PT019, PT020, PT046, PT047, S04, S05, S06, S07, S08, S09, S10, S11, S12, S13, S14, S15, S16, S17, S21, S22, S29, S30
Independent Consultant Overview of Cumulative Results: Baseline Under baseline conditions this area experiences between 200 and 1000 flights per day exceeding 50 SEL, and between 81 and 833 flights per day exceeding 60 SEL. Cumulative Among the 29 grid points in 12 close-in communities, all will experience a small reduction or no change in the cumulative number of events above 50 or 60 SEL, Time Above 65 dBA or DNL, but only in Matapan and Dorchester will the average reduction be by greater than 5%. No community would experience an average increase in any of the metric/noise level factors in this area.

Area: Far North Shore Communities

Communities: Beverly, Danvers, Gloucester, Hamilton, Manchester by the Sea, Rockport, and Wenham

Data points: PT017, PT024, PT052, PT053, PT054, PT055, PT056, PT057, PT058, PT059, PT060, PT061, PT062, PT065, PT066, PT067, PT090, PT092

Independent Consultant Overview of Cumulative Results:

Baseline

Under baseline conditions, no community in this area receives more than 140 over flights above 50 SEL per average day. The communities in this area receive between 3 and 70 over flights above 60 SEL per average day. There is no exposure to time above 65 dBA and DNL in the area remains below 45 dBA at each site.

Cumulative

Under cumulative conditions, the noise level results on far north shore grid points will be mixed. Within that area are the flight corridors of the recommended RNAV procedures that will be used by aircraft bound to the north (and sometimes to the west). Consequently, one grid point in Beverly, one grid point in Gloucester and four points in Manchester by the Sea will experience increases of more than 5% and more than 10 events above 50 SEL on the average annual day. Two points in Beverly and two points in Manchester by the Sea will experiences similar increases above 60 SEL. In contrast, two locations in Beverly, one in Danvers and two in Wenham will experience notable reductions of the numbers of events above 50 or 60 SEL under the cumulative effects of the recommended alternatives.

An assessment of the averages across the individual communities indicates that Beverly and Wenham will experience a slight decrease in the number of events above 50 SEL and a slight increase in the number of events above 60 SEL. Danvers will experience a notable reduction of the number of events above both 50 and 60 SEL. Gloucester will experience a small increase in the number of events above 50 SEL and no change to the number of events above 60 SEL. Hamilton will experience a notable decrease of events above 50 SEL and a small increase of events above 60 SEL. Manchester by the Sea will experience a notable increase in the number of events above 50 SEL and a small increase in the number of events above 60 SEL. Rockport will experience no change.

The communities of the far north shore will experience slight changes in the DNL level (from -1.2 to +2.1), but at cumulative levels well-below those considered noteworthy for federal airspace studies.

Area: Near North Shore Communities
Communities: Dedham, Lynn, Marblehead, Nahant, Peabody, Salem, Saugus, Swampscott
Data points: PT011, PT021, PT025, PT026, PT029, PT038, PT039, PT040, PT041, PT042, PT048, PT049, PT050, PT051, PT064, PT091, PT093, S18, S19, S20
Independent Consultant Overview of Cumulative Results: Baseline Under baseline conditions the near north shore area experiences from about 170 operations over Peabody to nearly 550 operations over Saugus above 50 SEL and from about 80 events above 60 SEL at a site in Marblehead to 201 such events at a site in Saugus. Cumulative Among the near north shore communities, grid points in all but Saugus will experience notable reductions in the number of events above either 50 or 60 SEL. In Saugus, the noise events and levels are reduced, but at less than notable levels. All seven communities will on average, experience moderate to notable reductions in the number of events above either the 50 or 60 SEL levels, no change to the time above 65 dBA and reductions of the average DNL from 0.2 to 3.2 dBA.

Area: South Shore Communities
Communities: Braintree, Cohasset, Hingham, Holbrook, Hull, Quincy and Weymouth
Data points: PT002, PT006, PT008, PT009, PT021, PT023, PT033, PT035, PT036, PT037, PT043, PT044, PT045, PT096, PT097, PT098, S25, S26
Independent Consultant Overview of Cumulative Results: <u>Baseline</u> Under baseline conditions this area experiences average daily aircraft noise events above 50 SEL, ranging from lows of 164 at Holbrook to as many as 600 in Hull and 700 in Quincy. The area also experiences average daily aircraft noise events above 60 SEL ranging from lows of 64 at Holbrook to more than 400 in Quincy. Times Above 65 dBA ranges from 0 to 15 minutes and DNLs range from 39 dBA at a site in Holbrook to 56 dBA at a location in Hull. <u>Cumulative</u> Of the 18 grid points distributed across the south shore communities, all will experience a reduction of the number of events above 50 SEL (12 are notable reductions), and all but two of them will be exposed to notably fewer events above 60 SEL. The amount of time experienced above 65 dBA will not change or be reduced slightly at all sites, while the DNL level at the grid points will be reduced from 0.4 to 4.3 dBA. Across the seven communities, all will experience a notable average decrease in either 50 or 60 SEL, and in five cases, in both. The DNL in all communities is decreased by the cumulative recommendations, ranging from -0.8 in Holbrook to -4.0 in Hingham.

Area: Southeast Shore Communities
Communities: Duxbury, Halifax, Hanson, Marshfield, Scituate
Data points: PT027, PT028, PT068, PT069, PT070, PT071, PT072, PT073, PT074, PT075, PT076, PT077, PT078, PT079, PT080, PT081, PT094, PT095
Independent Consultant Overview of Cumulative Results: <u>Baseline</u> Under baseline conditions this area experiences average daily aircraft noise events above 50 SEL ranging from lows of 45 in Duxbury and Halifax, from 60 to 160 in Marshfield, 111 in Hanson, and from 190 to 262 per average annual day in Scituate. The grid points in the area experience daily aircraft noise events above 60 SEL ranging from lows of 11 in Halifax, up to 137 per average annual day at a site in Scituate. Times above 65 dBA are 0 across all sites, and the aircraft DNL ranges from the low to mid 40 decibels in Scituate and less than 40 dBA in all other southeast shore communities. <u>Cumulative</u> Of the 18 grid points in southeast shore communities, half will experience increases of more than 10 events in the number of events above 50 SEL (two in Duxbury, one in Halifax, four sites in Marshfield and two in Scituate) and the other half (Hanson, two in Marshfield, and six in Scituate) will experience notable of more than 10 events in the number of events above 50 SEL. Above 60 SEL, two sites in Marshfield and two sites in Scituate will experience increases of more than 10 events, while two sites in Marshfield and five in Scituate will experience decreases of more than 10 events. The averages for the southeast shore community indicate that Duxbury and Halifax will be exposed to notable increases of the number of events above 50 SEL, while Hanson and Scituate would be exposed to notable decreases of the number of events above 50 SEL. Marshfield would be exposed to a small increase in events above 50 SEL. Above 60 SEL, Hanson, Marshfield and Scituate would experience minor decreases in the number of events, while Duxbury and Halifax would experience minor increases in the number of events. None of the communities would experience a change in time above 65 dBA. DNL levels would decrease slightly in Duxbury, Hanson and Marshfield and increase slightly in Scituate and Halifax.