

**Independent Consultant Review**

**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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**October 12, 2006**

## Evaluation Considerations and Informational Thresholds

The information provided in these tables is summarized from large volumes of noise level information computed for each alternative assessed in Phase 1 of the BONS. It is intended to provide CAC members who do not have a broad background in noise or airport operations planning with information that will supplement the reports provided by the Project Consultant for each proposed Phase 1 alternative.

This information seeks to provide a visual and narrative summary of the notable effects of each of the various alternatives on the many communities within the BONS area of investigation. It is important to recognize that the degrees of change reported here do not reflect changes that are considered to be environmentally significant under federal guidelines (except in the single case where such significance is noted). Rather, the Independent Consultant has attempted to respond to the principal noise effect issues reported by the membership of the CAC early during the planning process:

- the balance/equity (fairness) of the distribution of aircraft noise across the area
- the loudness of aircraft
- the number of flight noise events, and
- the duration of exposure to aircraft noise.

To evaluate the effect of the various alternatives on the communities surrounding Boston Logan International Airport, information is provided regarding the degree of **CHANGE** each alternative would generate from the Baseline condition represented by the 2003 EDR noise model distributions, adjusted to include high altitude activity (above 10,000 feet for departures and above 6,000 feet for approaches).

Both the absolute numbers of operations increase or decrease associated with the alternative, as well as the percentage of change from the baseline condition, are presented for every grid point for which noise information was computed. Because change over time, and over varying operating conditions is difficult to equate from one situation to the next, only changes that exceed more than 5% growth or 5% reduction in the measure assessed and at locations will experience a change in numbers of +/- 10 operations per average annual day in excess of 50 SEL are highlighted in color on the accompanying graphic matrix. Locations that will experience increases are indicated in yellow and those that will experience decreases

are indicated in green. Those locations which experience change by between +/- 1% to 5% of the measure assessed, or have absolute changes of less than +/- 10 operations per average annual day above 50 SEL as a result of the alternative are indicated by a shaded gray tone on the exhibit. Locations that do not experience a change of more than +/- 1% in the measure assessed are not considered to experience enough difference to be perceived by the individual, and are not noted on the matrix.

The change in number of operations is a critical component in the evaluation of whether a measure creates a noteworthy effect for any one community or area. For example, consider a location that experiences an increase of 1/2 event per day over a baseline of 10 flights shows a 5% growth, while a location that experiences a reduction of 35 events a day from a baseline of 700 flights shows a 5% decline. The CAC has historically expressed that, to the extent practicable, the noise effects from Boston Logan Airport should not be inequitably or unfairly distributed across the communities. In the case cited above, one could argue that although the shift in percentage of noise is the same, albeit in opposite directions, the overall effect would be a substantial benefit to one community and a barely perceptible negative effect on the other because the changes in numbers of events are so different.

The information is summarized on a matrix that compares the effects of each alternative at each of 130 noise assessment locations within the region. A listing of the geographic coordinates of each of the grid points, as graphically displayed on **Exhibit 1**, is provided in **Table 1**. The area tables on the following pages have been developed to summarize the effects of the Phase 1 alternatives on seven different areas of the region. The accompanying exhibit indicates the evaluation locations that are included within these areas. They are:

- **Runway 27 Departure corridor** – those communities/locations that fall under the procedural departure course from Runway 27, located generally southwest of the airport.
- **Runway 4R/L Instrument Approach corridor** – those communities that fall along the extended centerline of the straight-in approach course leading to landings on Runways 4R/L, located generally south, southwest of the airport.
- **Close-in communities** – those communities located near the airport that are not within the first two areas, located generally east, north, northwest and west of the airport, extending from Brookline around the airport through Revere to Winthrop.

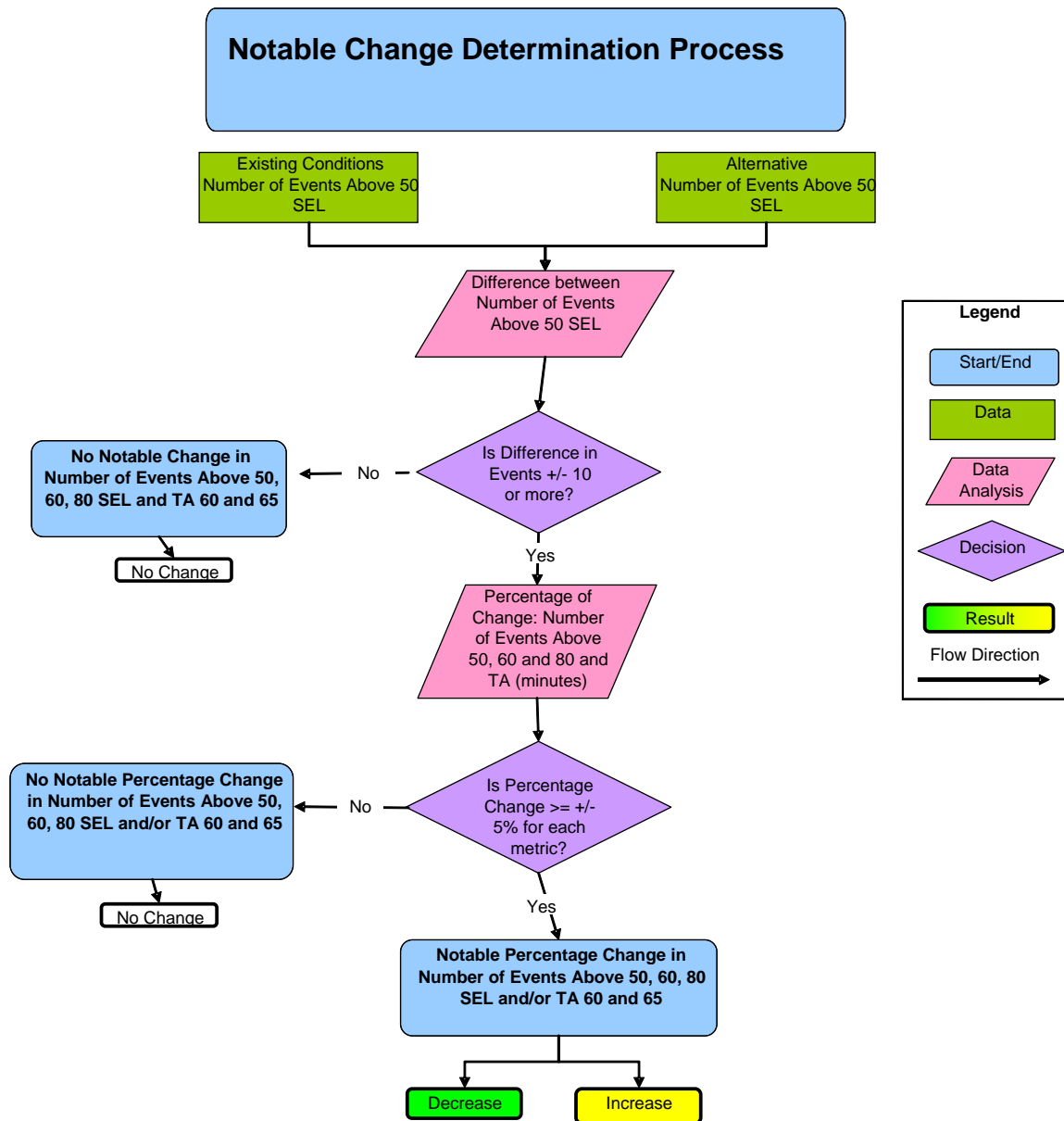
- **Far North Shore** – those communities located northeast of the Salem/Marblehead area.
- **Near North Shore** – those communities north of the airport located between Saugus and Marblehead.
- **South Shore** – those communities located east of the Runway 4R/L instrument approach corridor and extending to Cohasset and including .
- **Southeast Shore** – those communities located southeast of Cohasset, extending from Scituate to Duxbury and including Halifax.

The information reported for each community includes the following.

**Number of operations** – The baseline number of total operations above 50 SEL as modeled for an average annual day at a location provides insight into the density of flights that pass over. The change in number of events associated with each alternative (described below) may be evaluated against the total number of events to assess the relevance of the reported percentage of change information. The positive or negative change of more than ten events in the number of events exceeding 50 SEL is the criteria for notable change. It may be that changes in the number of events above 60 or 80 SEL exceed the change in number of events above 50 SEL as various points. This process is illustrated by the flow chart on the following page. Such changes may be noted by maps of the number of events above the 60 SEL level provided by the Project Consultants summary noise analyses.

**Altitude Change** – Does the measure generally increase or decrease the average altitude of aircraft using the alternative measure and crossing over the area – a general statement is made for each alternative based on its intent or on the results of the operational analysis reported on 6/7/2006 to the BOS/TAC. Altitude information is not reported on the information matrix, but is presented in the narrative below.

**Change of DNL** – cumulative aircraft noise level change in the area – a change of more that +/- 3 decibels of DNL is noted



**Change of Number of Events** – a change of more than +/- 5% from baseline is noted at those locations where the number of events above 50 SEL (Sound Exposure Level) changes by more than +/-10 with the alternative

- Above 50 SEL – the level which begins to disrupt outdoor speech between people at distances of 8-10 feet. The 40 decibel level represented by 50 SEL approximates the ambient noise levels in a suburban environment.
- Above 60 SEL – the level which begins to disrupt outdoor speech between people at distances of 2-3 feet.
- Above 80 SEL – the level at which indoor speech between people at distances of 3-5 feet is likely to be disrupted when windows are open.

**Change of Time Above** – a change of more than +/- 5% from baseline is noted at those locations where the number of events above 50 SEL changes by more than +/- 10 with the alternative

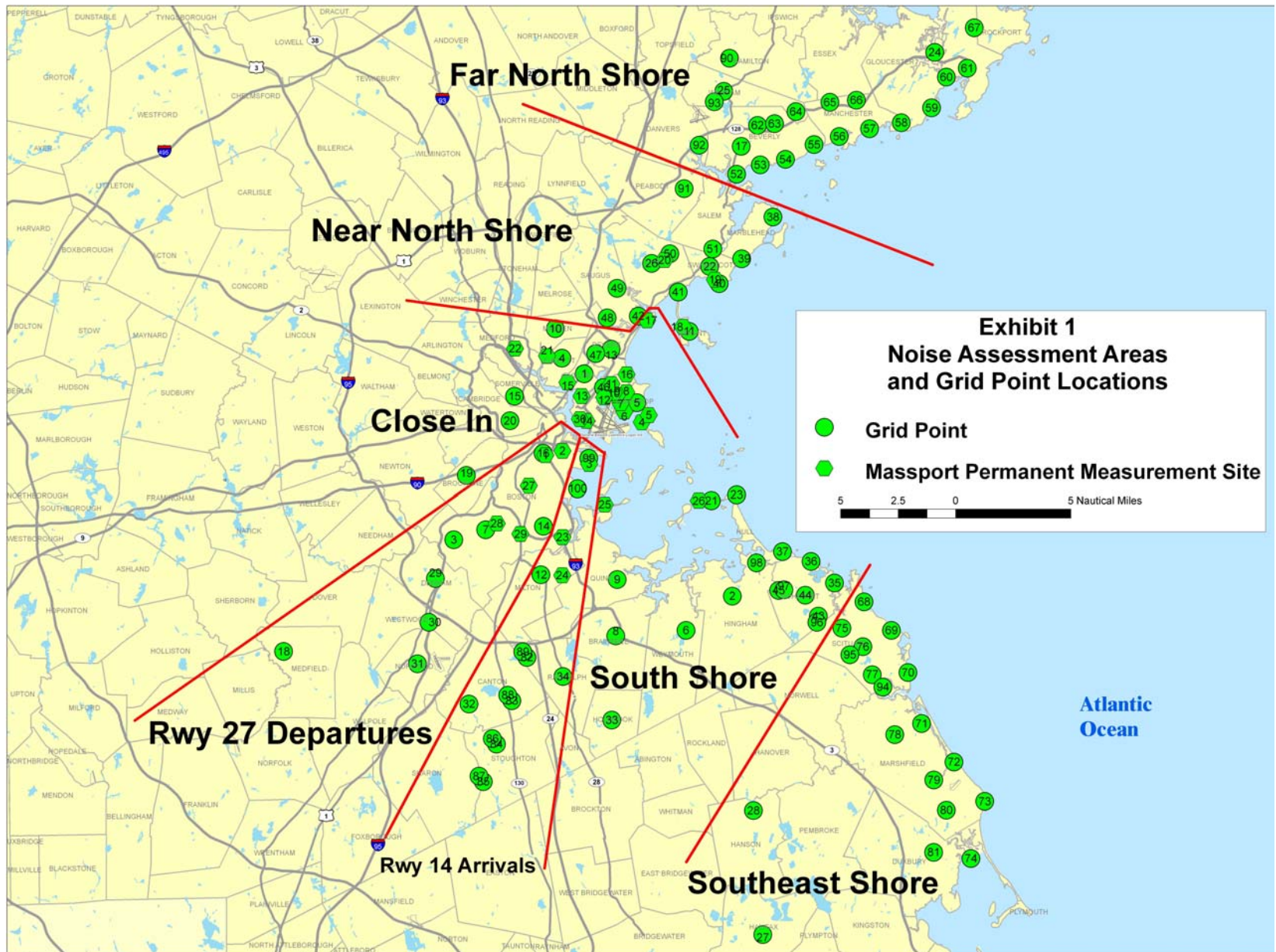
- 50 decibels – the level where aircraft events are typically easily heard above ambient levels
- 65 decibels – the level at which outdoor speech is disrupted at distances of 3-5 feet

**Change of Potential Awakenings** – (evaluated for night alternatives) – a change of more than +/- 5% from baseline is noted where the number +/- 1 operations

- Numbers of events above 70 SEL at night (equivalent to outdoor noise levels that are attenuated to 35 Lmax (maximum noise level) interior noise – the lowest end of awakening sensitivity curves)

There is no specific significance to the selection of 3 decibel of change in DNL other than that it represents a doubling or halving of the total noise energy present at a location. Similarly, the change of +/- 5% change of numbers of events above SEL thresholds or time above Lmax thresholds is not noted as being scientifically significant. The comparisons are used to provide an indication of the relative relationship in different areas between noise levels under baseline conditions and noise level changes that could be expected if any individual alternative were implemented.

It is important that in evaluating the effects of the various alternatives on an area that both the numbers of events and the degree of change, as measured by percentage shift, be considered. The data provided by the Project Consultant, taken in conjunction with the qualitative and quantitative reviews provided here by the Independent Consultant, should provide the membership of the CAC with the information necessary to determine the general effects of each alternative on their respective communities.



**Table 1**  
**Grid Point Locations for Noise Assessment (see Exhibit 1)**  
**Boston Logan Airport Noise Study, Phase One**

<b>Grid Point</b>	<b>Location</b>	<b>West Longitude</b>	<b>North Latitude</b>
PT001	Chelsea	-71.0308	42.3977
PT002	Hingham	-70.8876	42.2361
PT003	Boston	-71.1590	42.2781
PT004	Everett	-71.0524	42.4091
PT005	Winthrop	-70.9795	42.3765
PT006	Weymouth	-70.9330	42.2115
PT007	Boston	-71.1278	42.2853
PT008	Braintree	-71.0015	42.2078
PT009	Quincy	-70.9998	42.2487
PT010	Malden	-71.0588	42.4305
PT011	Nahant	-70.9279	42.4280
PT012	Milton	-71.0742	42.2524
PT013	Revere	-71.0044	42.4155
PT014	Boston	-71.0714	42.2876
PT015	Somerville	-71.0991	42.3817
PT016	Boston	-71.0714	42.3402
PT017	Beverly	-70.8757	42.5620
PT018	Medfield	-71.3252	42.1974
PT019	Brookline	-71.1465	42.3244
PT020	Cambridge	-71.1037	42.3639
PT021	Hull, Elementary School	-70.9073	42.3053
PT022	Swampscott	-70.9075	42.4750
PT023	Hull, Point Allerton	-70.8827	42.3094
PT024	Gloucester	-70.6851	42.6290
PT025	Wenham	-70.8924	42.6020
PT026	Lynn	-70.9643	42.4775
PT027	Halifax	-70.8603	41.9904
PT028	Hanson, Under DRUNK intersection north of Halifax	-70.8686	42.0804
PT029	Dedham	-71.1771	42.2500
PT030	Westwood	-71.1835	42.2183
PT031	Norwood	-71.1948	42.1882
PT032	Canton	-71.1448	42.1589

<b>Grid Point</b>	<b>Location</b>	<b>West Longitude</b>	<b>North Latitude</b>
PT033	Holbrook	-71.0059	42.1467
PT034	Randolph	-71.0532	42.1785
PT035	Cohasset, South shoreline	-70.7878	42.2450
PT036	Cohasset, South shoreline	-70.8106	42.2608
PT037	Hull, South shoreline	-70.8383	42.2681
PT038	Marblehead, North shoreline	-70.8452	42.5105
PT039	Marblehead, North shoreline	-70.8761	42.4804
PT040	Swampscott, North shoreline	-70.8982	42.4625
PT041	Lynn, North shoreline	-70.9383	42.4566
PT042	Saugus, North shoreline	-70.9776	42.4393
PT043	Cohasset, South shoreline (Inset 2 miles)	-70.8039	42.2211
PT044	Cohasset, South shoreline (Inset 2 miles)	-70.8164	42.2364
PT045	Cohasset, South shoreline (Inset 2 miles)	-70.8424	42.2400
PT046	Boston, North shoreline (Inset 2 miles)	-71.0120	42.3877
PT047	Revere, North shoreline (Inset 2 miles)	-71.0194	42.4123
PT048	Saugus, North shoreline (Inset 2 miles)	-71.0081	42.4381
PT049	Saugus, North shoreline (Inset 2 miles)	-70.9982	42.4596
PT050	Lynn, North shoreline (Inset 2 miles)	-70.9464	42.4844
PT051	Salem, North shoreline (Inset 2 miles)	-70.9043	42.4877
PT052	Beverly, North shoreline	-70.8804	42.5418
PT053	Beverly, North shoreline	-70.8572	42.5484
PT054	Beverly, North shoreline	-70.8324	42.5523
PT055	Beverly, North shoreline	-70.8043	42.5628
PT056	Manchester, North shoreline	-70.7795	42.5686
PT057	Manchester, North shoreline	-70.7498	42.5740
PT058	Manchester, North shoreline	-70.7186	42.5782
PT059	Gloucester, North shoreline	-70.6888	42.5887
PT060	Gloucester, North shoreline	-70.6740	42.6109
PT061	Gloucester, North shoreline	-70.6534	42.6172
PT062	Beverly, North shoreline (Inset 2 miles)	-70.8596	42.5771
PT063	Beverly, North shoreline (Inset 2 miles)	-70.8429	42.5782
PT064	Wenham, North shoreline (Inset 2 miles)	-70.8218	42.5868
PT065	Manchester, North shoreline (Inset 2 miles)	-70.7884	42.5934
PT066	Manchester, North shoreline (Inset 2 miles)	-70.7625	42.5948
PT067	Gloucester, North shoreline (Inset 2 miles)	-70.6461	42.6465
PT068	Scituate, South shoreline	-70.7592	42.2312
PT069	Scituate, South shoreline	-70.7327	42.2103

<b>Grid Point</b>	<b>Location</b>	<b>West Longitude</b>	<b>North Latitude</b>
PT070	Scituate, South shoreline	-70.7171	42.1796
PT071	Marshfield, South shoreline	-70.7042	42.1425
PT072	Marshfield, South shoreline	-70.6730	42.1144
PT073	Marshfield, South shoreline	-70.6435	42.0856
PT074	Duxbury, South shoreline	-70.6574	42.0443
PT075	Scituate, South shoreline (Inset 2 miles)	-70.7809	42.2122
PT076	Scituate, South shoreline (Inset 2 miles)	-70.7607	42.1986
PT077	Scituate, South shoreline (Inset 2 miles)	-70.7518	42.1782
PT078	Marshfield, South shoreline (Inset 2 miles)	-70.7304	42.1347
PT079	Marshfield, South shoreline (Inset 2 miles)	-70.6929	42.1015
PT080	Marshfield, South shoreline (Inset 2 miles)	-70.6809	42.0795
PT081	Duxbury, South shoreline (Inset 2 miles)	-70.6936	42.0490
PT082	Randolph, 4R ILS approach course	-71.0881	42.1925
PT083	Canton, 4R ILS approach course	-71.1031	42.1611
PT084	Stoughton, 4R ILS approach course	-71.1182	42.1297
PT085	Stoughton, 4R ILS approach course	-71.1312	42.1025
PT086	Stoughton, 4L approach	-71.1222	42.1337
PT087	Sharon, 4L approach	-71.1353	42.1065
PT088	Canton, 4L approach	-71.1071	42.1652
PT089	Randolph, 4L approach	-71.0921	42.1966
PT090	Hamilton, 22L ILS approach course	-70.8866	42.6259
PT091	Peabody, 22L ILS approach course	-70.9320	42.5316
PT092	Danvers, 22L ILS approach course	-70.9169	42.5630
PT093	Wenham, 22L ILS approach course	-70.9018	42.5944
PT094	Scituate, 33L ILS approach course	-70.7416	42.1692
PT095	Scituate, 33L ILS approach course	-70.7735	42.1929
PT096	Cohasset, 33L ILS approach course	-70.8053	42.2166
PT097	Cohasset, 33L ILS approach course	-70.8373	42.2404
PT098	Hull, 33L ILS approach course	-70.8638	42.2601
PT099	Boston, Runway 4R/L approach	-71.0268	42.3364
PT100	Boston, Runway 4R/L approach	-71.0380	42.3145
S01	Boston, Noise Monitoring Site 1	-71.069224	42.338692
S02	Boston, Noise Monitoring Site 2	-71.052545	42.341813
S03	Boston, Noise Monitoring Site 3	-71.026476	42.332333
S04	Winthrop, Noise Monitoring Site 4	-70.974824	42.362203
S05	Winthrop, Noise Monitoring Site 5	-70.967964	42.367433
S06	Winthrop, Noise Monitoring Site 6	-70.991906	42.370172

<b>Grid Point</b>	<b>Location</b>	<b>West Longitude</b>	<b>North Latitude</b>
S07	Winthrop, Noise Monitoring Site 7	-70.995284	42.376053
S08	Winthrop, Noise Monitoring Site 8	-70.989816	42.384024
S09	Boston, Noise Monitoring Site 9	-70.998895	42.382004
S10	Boston, Noise Monitoring Site 10	-71.002086	42.383553
S11	Boston, Noise Monitoring Site 11	-71.004306	42.390103
S12	Boston, Noise Monitoring Site 12	-71.011524	42.380543
S13	Boston, Noise Monitoring Site 13	-71.033489	42.381534
S14	Boston, Noise Monitoring Site 14	-71.029005	42.363483
S15	Chelsea, Noise Monitoring Site 15	-71.047085	42.391413
S16	Revere, Noise Monitoring Site 16	-70.989385	42.396953
S17	Revere, Noise Monitoring Site 17	-70.968995	42.436123
S18	Nahant, Noise Monitoring Site 18	-70.933886	42.431183
S19	Swampscott, Noise Monitoring Site 19	-70.902356	42.465373
S20	Lynn, Noise Monitoring Site 20	-70.951604	42.479823
S21	Everett, Noise Monitoring Site 21	-71.066955	42.410653
S22	Medford, Noise Monitoring Site 22	-71.098394	42.416233
S23	Boston, Noise Monitoring Site 23	-71.052904	42.279643
S24	Milton, Noise Monitoring Site 24	-71.053184	42.251863
S25	Quincy, Noise Monitoring Site 25	-71.011355	42.303012
S26	Hull, Noise Monitoring Site 26	-70.919806	42.305263
S27	Boston, Noise Monitoring Site 27	-71.085505	42.316673
S28	Boston, Noise Monitoring Site 28	-71.116971	42.289722
S29	Boston, Noise Monitoring Site 29	-71.094024	42.281974
S30	Boston, Noise Monitoring Site 30	-71.035215	42.364822

Source: Landrum & Brown, from Project Consultant noise analyses, Phase One, October 2006

The following tables provide, for each area defined above, a review of each alternative remaining under consideration from the Phase One analyses. It is intended that these tables allow community residents to more efficiently evaluate the effects of each alternative, when assessed in conjunction with the Alternatives Matrix, on the geographic area they represent. The information also presents the important effects of each alternative for each other area of the region.

<b>Area: Runway 27 Takeoff Corridor</b>		
<b>Communities:</b> Dedham, Jamaica Plain, Medfield, Norwood, Roslindale, Roxbury, South Boston, South End, West Roxbury, Westwood		
<b>Data points:</b> PT003, PT007, PT016, PT018, PT029, PT030, PT031, S01, S02, S21, S27, S28		
<b>Independent Consultant Overview of Results:</b> Under baseline conditions this area experiences between 40 and 750 flights per average annual day with the greatest concentration in the area immediately west and southwest of the airport. All but Alternative 9 would result in scattered small reductions in the number of operations above 50 SEL over the area, while Alternative 9 would result in notable increases of the numbers by the introduction of more traffic onto the proposed west downwind approach. The four Phase 1 departure alternatives for jets would have little effect on noise levels in the area, nor would arrival Alternatives 6 and 7. Nighttime approach modifications (Alternatives 12A, B and C) will have no effect. Alternative 13 will have mixed results in the area, with little to no change in the numbers of nighttime overflights.		
<b>Alternative</b>	<b>Brief Description</b>	<b>Specific Effects in Area Relative to Baseline Condition</b>
1	RNAV and conventional departure procedures from Runway 4R with traffic directed to the east before turning to cross the shoreline. Coupled with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Light.	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable changes in DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA</li> </ul>
2	RNAV and conventional departure procedures from Runway 9 with traffic directed to fly farther to the east before turning back over land. Coupled with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Light.	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA</li> </ul>
3	RNAV and conventional	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> </ul>

	departure procedures from Runway 15 with traffic directed to fly farther to the east before turning back over land. Coupled with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Light.	<ul style="list-style-type: none"> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA</li> </ul>
5	RNAV and conventional departure procedures from Runway 22R/L with traffic directed to fly farther to the east before turning back over land. Coupled with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Light.	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA</li> </ul>
6	Establish point to point navigation and relocate conventional approaches to Runway 22R/L from east downwind position to way point location over Drunk intersection in Marshfield.	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA</li> </ul>
7	Establish point to point navigation and relocate conventional approaches to Runway 27 from wide dispersion across the South Shore to way point location over Drunk intersection in Marshfield.	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA</li> </ul>
8	Establish RNAV approach east of the airport landing Runway	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> </ul>

	15 to reduce arrival dispersion over Nahant	<ul style="list-style-type: none"> <li>No notable change of numbers of events at any SEL level</li> <li>No notable change of Time Above 50 or 65 dBA</li> </ul>
9	Allow use of west downwind approach by aircraft larger than regional jets (75,000 to 255,000#) when landing Runways 4R/L	<ul style="list-style-type: none"> <li>No change in average approach altitudes over the area, but larger aircraft are introduced.</li> <li>No changes of DNL by more than 3 dBA in the area</li> <li>Notable increases of &gt;5% of numbers of events at 50 and 60 SEL level in Dedham, Jamaica Plain, Norwood, Roslindale, West Roxbury and Westwood where the increase in operations above 50 SEL exceeds 10 per average annual day. No notable changes of NEA 50 or 60 SEL in Medfield, Roxbury, South Boston or the South End. No changes of number of events above 80 SEL.</li> <li>Increase of &gt;5% Time Above 50 dBA in Dedham, Norwood, West Roxbury and Westwood. No other notable changes of TA</li> </ul>
11	Establish charted visual approach to Runway 33L off-shore of Cohasset/Hull	<ul style="list-style-type: none"> <li>No change of altitude below 15000 feet</li> <li>No notable change of DNL</li> <li>No notable change of numbers of events at any SEL level</li> <li>No notable change of Time Above 50 or 65 dBA</li> </ul>
12A	Raise Runways 4R/L ILS approach intercept altitude from 3 to 4,000 feet between midnight and 6 a.m.	<ul style="list-style-type: none"> <li>No change of altitude below 15000 feet</li> <li>No notable change of DNL</li> <li>No notable change of numbers of events at 70 SEL level potential awakening level</li> </ul>
12B	Raise Runways 22R/L ILS approach intercept altitude from 3 to 4,000 feet between midnight and 6 a.m.	<ul style="list-style-type: none"> <li>No change of altitude below 15000 feet</li> <li>No notable change of DNL</li> <li>No notable change of numbers of events at 70 SEL level potential awakening level</li> </ul>
12C	Raise Runways 33L ILS approach intercept altitude from 3 to 4,000 feet between midnight and 6 a.m.	<ul style="list-style-type: none"> <li>No change of altitude below 15000 feet</li> <li>No notable change of DNL</li> <li>No notable change of numbers of events at 70 SEL level potential awakening level</li> </ul>
13	Prop aircraft departures from Runways 22R/L and 15R between midnight and 6 a.m. follow jet departure routes of alternatives 1-5	<ul style="list-style-type: none"> <li>No change of altitude below 15000 feet</li> <li>No change of nighttime number of events above 70 SEL in area</li> <li>No notable changes in nighttime TA 50 or 65.</li> </ul>

<b>Area: Runway 4R/L Instrument Approach Corridor</b>		
<b>Communities:</b> Canton, Dorchester, Milton, Randolph, Sharon, South Boston, Stoughton		
<b>Data points:</b> PT012, PT032, PT034, PT082, PT083, PT084, PT085, PT086, PT087, PT088, PT089, PT099, PT100, S01, S03, S23, S24		
<b>Independent Consultant Overview of Results:</b>		
<p>Under baseline conditions this area experiences between 110 and 850 flights per average day with the greatest concentration in the area immediately south, southwest of the airport. The Phase 1 departure alternatives would result in reductions of noise events above 50 SEL at a number of locations in the area, but only Alternatives 2 and 5 would present notable reductions exceeding more than 10 per day. On the other hand, Alternatives 9 and 12A would result in scattered increases in the number of operations above 50 SEL over the area, while Alternative 9 would result in notable increases of the numbers by the introduction of more traffic onto the proposed west downwind approach leading to Runway 4L. In fact, Alternative 9 results in the only <b>environmentally significant</b> effect under federal environmental rules found during the alternative evaluations at site PT099. This significance will require preparation of an EIS if the alternative is recommended for adoption. Arrival Alternatives 6, 7 and 8 have little to no effect on the area. Nighttime approach modifications to Alternative 12A will increase notable noise effects along the extended approaches to Runway 4R/L, although the operational numbers increase by only one flight above awakening levels per site per night. Alternatives 12B and C will not effect the area. Alternative 13 will have little effect in the area.</p>		
<b>Alternative</b>	<b>Description</b>	<b>Specific Effects in Area Relative to Baseline Condition</b>
1	RNAV and conventional departure procedures from Runway 4R with traffic directed to the east before turning to cross the shoreline. Coupled with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Light.	<ul style="list-style-type: none"> <li>• Departure altitudes increased above 12,000 feet by alternative</li> <li>• No notable changes in DNL.</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA</li> </ul>
2	RNAV and conventional departure procedures from Runway 9 with traffic directed to fly farther to the east before turning back over land. Coupled	<ul style="list-style-type: none"> <li>• Departure altitudes increased above 12,000 feet by alternative</li> <li>• No notable change of DNL</li> <li>• Reduction of &gt;5% in numbers of events at 60 SEL in Milton. No other notable changes</li> <li>• No notable change of Time Above 50 or 65 dBA</li> </ul>

	with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Light.	
3	RNAV and conventional departure procedures from Runway 15 with traffic directed to fly farther to the east before turning back over land. Coupled with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Light.	<ul style="list-style-type: none"> <li>• Departure altitudes increased above 12,000 feet by alternative</li> <li>• No notable change of DNL.</li> <li>• No notable changes in NEA</li> <li>• No notable changes in TA</li> </ul>
5	RNAV and conventional departure procedures from Runway 22R/L with traffic directed to fly farther to the east before turning back over land. Coupled with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Light.	<ul style="list-style-type: none"> <li>• Departure altitudes increased above 12,000 feet by alternative</li> <li>• No notable changes of DNL.</li> <li>• Reductions of &gt;5% of numbers of events at above 50 SEL levels in Canton, Milton and Randolph. Reductions of &gt;5% of numbers of events at above 60 SEL levels in Milton and Randolph. No other notable changes in NEA</li> <li>• Reductions of &gt;5% at of Time Above 50 at two sites in Randolph. No other notable changes in TA</li> </ul>
6	Establish point to point navigation and relocate conventional approaches to Runway 22R/L from east downwind position to way point location over Drunk intersection in Marshfield.	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA</li> </ul>
7	Establish point to point navigation and relocate conventional approaches to Runway 27 from wide dispersion across the South	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA</li> </ul>

	Shore to way point location over Drunk intersection in Marshfield.	
8	Establish RNAV approach east of the airport landing Runway 15 to reduce arrival dispersion over Nahant	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA</li> </ul>
9	Allow use of west downwind approach by aircraft larger than regional jets (75,000 to 255,000#) when landing Runways 4R/L	<ul style="list-style-type: none"> <li>• No change in average approach altitudes over the area</li> <li>• As a result in a shift in the proximity of events, DNL increases of &gt; 3 dBA would occur at sites PT099 and PT100 under the approach to Runway 4L.</li> <li>• Notable increases of &gt;5% of numbers of events at 50 and 60 SEL level in Canton, with a similar reduction of &gt;5% of numbers of events above 50 and 60 SEL at a site in Randolph. No other notable changes above 50, 60, or 80 SEL.</li> <li>• Increase of &gt;5% Time Above 50 dBA in Canton, with a similar reduction in Randolph. No other notable changes in TA 50 or 65 Lmax.</li> </ul>
11	Establish charted visual approach to Runway 33L off-shore of Cohasset/Hull	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA</li> </ul>
12A	Raise Runways 4R/L ILS approach intercept altitude from 3 to 4,000 feet between midnight and 6 a.m.	<ul style="list-style-type: none"> <li>• Altitudes along the approach beyond 10 miles from the airport will increase by up to 1000 feet.</li> <li>• No notable change of DNL</li> <li>• Locations in Canton and Randolph will experience increases of more than 5% above the 70 SEL potential awakening levels at least once per night.</li> </ul>
12B	Raise Runways 22R/L ILS approach intercept altitude from 3 to 4,000 feet between midnight and 6 a.m.	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at 70 SEL level potential awakening level</li> </ul>
12C	Raise Runways 33L ILS approach intercept altitude	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> </ul>

	from 3 to 4,000 feet between midnight and 6 a.m.	<ul style="list-style-type: none"> <li>• No notable change of numbers of events at 70 SEL level potential awakening level</li> </ul>
13	Prop aircraft departures from Runways 22R/L and 15R between midnight and 6 a.m. follow jet departure routes of alternatives 1-5	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of number of events above 70 SEL</li> <li>• No notable changes in TA 50 or 65.</li> </ul>

<b>Area: Close-in Communities</b>		
<b>Communities:</b> Brookline, Cambridge, Chelsea, Dorchester, East Boston, Everett, Malden, Mattapan, Medford, Revere, Somerville, Winthrop		
<b>Data points:</b> 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		
<b>Independent Consultant Overview of Results:</b> Under baseline conditions this area experiences between 200 and 1000 flights per day exceeding 50 SEL, but only Alternative 9 will have a notable effect within the area.		
<b>Alternative</b>	<b>Description</b>	<b>Specific Effects in Area Relative to Baseline Condition</b>
1	RNAV and conventional departure procedures from Runway 4R with traffic directed to the east before turning to cross the shoreline. Coupled with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Light.	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA</li> </ul>
2	RNAV and conventional departure procedures from Runway 9 with traffic directed to fly farther to the east before turning back over land. Coupled with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Light.	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA</li> </ul>
3	RNAV and conventional departure procedures from Runway 15 with traffic directed to fly farther to the east before turning back over land. Coupled with Alternative 14 to increase	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA</li> </ul>

	crossing altitudes and 15 to move south flow east of Minot's Light.	
5	RNAV and conventional departure procedures from Runway 22R/L with traffic directed to fly farther to the east before turning back over land. Coupled with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Light.	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA</li> </ul>
6	Establish point to point navigation and relocate conventional approaches to Runway 22R/L from east downwind position to way point location over Drunk intersection in Marshfield.	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA</li> </ul>
7	Establish point to point navigation and relocate conventional approaches to Runway 27 from wide dispersion across the South Shore to way point location over Drunk intersection in Marshfield.	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA</li> </ul>
8	Establish RNAV approach east of the airport landing Runway 15 to reduce arrival dispersion over Nahant	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA</li> </ul>
9	Allow use of west downwind approach by aircraft larger than regional jets (75,000 to	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• Increase of &gt;5% above 50 SEL in Brookline; and above 60 SEL</li> </ul>

	255,000#) when landing Runways 4R/L	<p>in Brookline, Cambridge and Somerville. No other notable changes in NEA.</p> <ul style="list-style-type: none"> <li>Increases &gt;5% of Time Above 50 dBA in Brookline. No other notable changes in TA.</li> </ul>
11	Establish charted visual approach to Runway 33L off-shore of Cohasset/Hull	<ul style="list-style-type: none"> <li>No change of altitude below 15000 feet</li> <li>No notable change of DNL</li> <li>No notable change of numbers of events at any SEL level</li> <li>No notable change of Time Above 50 or 65 dBA</li> </ul>
12A	Raise Runways 4R/L ILS approach intercept altitude from 3 to 4,000 feet between midnight and 6 a.m.	<ul style="list-style-type: none"> <li>No change of altitude below 15000 feet</li> <li>No notable change of DNL</li> <li>No notable change of numbers of events above 70 SEL</li> </ul>
12B	Raise Runways 22R/L ILS approach intercept altitude from 3 to 4,000 feet between midnight and 6 a.m.	<ul style="list-style-type: none"> <li>No change of altitude below 15000 feet</li> <li>No notable change of DNL</li> <li>No notable change of numbers of events above 70 SEL</li> </ul>
12C	Raise Runways 33L ILS approach intercept altitude from 3 to 4,000 feet between midnight and 6 a.m.	<ul style="list-style-type: none"> <li>No change of altitude below 15000 feet</li> <li>No notable change of DNL</li> <li>No notable change of numbers of events above 70 SEL</li> </ul>
13	Prop aircraft departures from Runways 22R/L and 15R between midnight and 6 a.m. follow jet departure routes of alternatives 1-5	<ul style="list-style-type: none"> <li>No change of altitude below 15000 feet</li> <li>No notable change of number of events above 70 SEL</li> <li>No notable changes in TA 50 or 65.</li> </ul>

<b>Area: Far North Shore Communities</b>		
<b>Communities:</b> Beverly, Danvers, Gloucester, Hamilton, Manchester, Rockport, and Wenham		
<b>Data points:</b> PT017, PT024, PT052, PT053, PT054, PT055, PT056, PT057, PT058, PT059, PT060, PT061, PT062, PT065, PT066, PT067, PT090, PT092		
<b>Independent Consultant Overview of Results:</b> Under baseline conditions, no community in this area receives more than 140 over flights per average day. Although many locations experience increases of Numbers of Events Above selected SEL values or Time Above (TA) selected maximum noise levels, only Alternative 2 will introduce increases of more than ten more flights to any individual community. In general, the extended departure courses from Runway 9 that turn back to the north to fly west or north will cross the area. Danvers and a site in Wenham will generally benefit from alternative 9. The remaining jet departure alternatives will have small negative consequences for Beverly, Manchester and Wenham, but at noise and event levels that are quite low. While Alternative 12B indicates increases of NEA 70 SEL, the absolute numbers of operations changes are by 1 flight per night or less at awakening loudness. . Approach alternatives 6, 7, 8, 9, 12A and 12C will have little effect on the noise levels in the area. Alternative 13 will have little effect on the area, with virtually no change in the number of flights above 50 SEL.		
<b>Alternative</b>	<b>Description</b>	<b>Specific Effects in Area Relative to Baseline Condition</b>
1	RNAV and conventional departure procedures from Runway 4R with traffic directed to the east before turning to cross the shoreline. Coupled with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Light.	<ul style="list-style-type: none"> <li>• Altitudes of aircraft in northeast flow as they cross the shoreline will increase by approximately 300 feet, to an average latitude of nearly 10,000 feet. Those in northwest flow will cross the shoreline at altitudes 1000 feet higher than the baseline at an average of approximately 9,000 feet.</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA</li> </ul>
2	RNAV and conventional departure procedures from Runway 9 with traffic directed to fly farther to the east before turning back over land. Coupled with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's	<ul style="list-style-type: none"> <li>• Altitudes of aircraft in northeast flow will cross the shoreline through the area will increase by approximately 2,100 feet to an average latitude of nearly 13,400 feet. Those in northwest flow will cross the shoreline at altitudes 5,300 feet higher than the baseline at an average of approximately 13,900 feet.</li> <li>• No notable change of DNL</li> <li>• Increase of &gt;5% NEA of 50 SEL at one site in Beverly and across all of Manchester, with reductions of &gt;5% at sites in</li> </ul>

	Light.	<p>Danvers and Wenham. Increases of &gt;5% above 60 SEL at four sites in Beverly and Manchester and reductions of &gt;5% in Danvers. No other notable changes in NEA.</p> <ul style="list-style-type: none"> <li>• Reductions of TA 50 by &gt;5% in Danvers and increases of TA 50 by &gt;5% at a site in Beverly. No other notable change of TA</li> </ul>
3	RNAV and conventional departure procedures from Runway 15 with traffic directed to fly farther to the east before turning back over land. Coupled with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Light.	<ul style="list-style-type: none"> <li>• Altitudes for northeast flow traffic increased by an average of 1800 feet with an average shore crossing altitude of 13,000 feet and northwest flow by an average of 2800 feet with average crossing altitudes above 15,000 feet.</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA</li> </ul>
5	RNAV and conventional departure procedures from Runway 22R/L with traffic directed to fly farther to the east before turning back over land. Coupled with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Light.	<ul style="list-style-type: none"> <li>• Altitudes of aircraft in northeast flow that cross the shoreline through the area will increase by approximately 1300 feet to an average altitude of above 15,000 feet. Those in northwest flow will cross the shoreline at altitudes 3400 feet higher than the baseline at an average of approximately 15,000 feet.</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA</li> </ul>
6	Establish point to point navigation and relocate conventional approaches to Runway 22R/L from east downwind position to way point location over Drunk intersection in Marshfield.	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA.</li> </ul>
7	Establish point to point navigation and relocate conventional approaches to Runway 27 from wide	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA.</li> </ul>

	dispersion across the South Shore to way point location over Drunk intersection in Marshfield.	
8	Establish RNAV approach east of the airport landing Runway 15 to reduce arrival dispersion over Nahant	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA.</li> </ul>
9	Allow use of west downwind approach by aircraft larger than regional jets (75,000 to 255,000#) when landing Runways 4R/L	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA.</li> </ul>
11	Establish charted visual approach to Runway 33L off-shore of Cohasset/Hull	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA.</li> </ul>
12A	Raise Runways 4R/L ILS approach intercept altitude from 3 to 4,000 feet between midnight and 6 a.m.	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events above awakening level</li> </ul>
12B	Raise Runways 22R/L ILS approach intercept altitude from 3 to 4,000 feet between midnight and 6 a.m.	<ul style="list-style-type: none"> <li>• Altitude along and leading to the final approach course beyond ten miles from landing will be raised by up to 1000 feet.</li> <li>• No notable change of DNL</li> <li>• Increase of &gt;5% potential awakening events with more than one daily event in Danvers. No notable change of potential awakening level events.</li> </ul>
12C	Raise Runways 33L ILS approach intercept altitude from 3 to 4,000 feet between midnight and 6 a.m.	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events above awakening level</li> </ul>
13	Prop aircraft departures from Runways 22R/L and 15R between midnight and 6 a.m.	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of numbers of events above awakening level</li> </ul>

	follow jet departure routes of alternatives 1-5	
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<b>Area: Near North Shore Communities</b>		
<b>Communities:</b> Dedham, Lynn, Marblehead, Nahant, Peabody, Salem, Saugus, Swampscott		
<b>Data points:</b> PT011, PT021, PT025, PT026, PT029, PT038, PT039, PT040, PT041, PT042, PT048, PT049, PT050, PT051, PT064, PT091, PT093, S18, S19, S20		
<b>Independent Consultant Overview of Results:</b> Under baseline conditions this area experiences from about 170 operations in Peabody to nearly 550 operations in Saugus. For the most part, the entire area benefits from the departure alternatives through reductions in the number of flights creating noise in excess of 50 SEL. Owing to the greater number of operations associated with their use, Alternatives 2 and 5 will result in decreases of >5% in the noise events above 50 SEL several of the communities in the area. The only negative effect of note across the entire area and alternatives is a small increase (one or two per night) of the number of awakenings events >70 SEL by one site in Peabody and two in Danvers.		
<b>Alternative</b>	<b>Description</b>	<b>Specific Effects in Area Relative to Baseline Condition</b>
1	RNAV and conventional departure procedures from Runway 4R with traffic directed to the east before turning to cross the shoreline. Coupled with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Light.	<ul style="list-style-type: none"> <li>• Altitudes of aircraft in northwest flow will cross the shoreline at altitudes 1000 feet higher than the baseline at an average of approximately 9,000 feet.</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA.</li> </ul>
2	RNAV and conventional departure procedures from Runway 9 with traffic directed to fly farther to the east before turning back over land. Coupled with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Light.	<ul style="list-style-type: none"> <li>• Altitudes of aircraft in northwest flow will cross the shoreline at altitudes 5,300 feet higher than the baseline at an average of approximately 13,900 feet.</li> <li>• No notable change of DNL</li> <li>• Lynn would experience notable decreases of &gt;5% NEA of 60 SEL. No notable changes in NEA elsewhere in the area.</li> <li>• Reductions of TA 50 and 65 by &gt;5% at sites in Lynn. No notable change of Time Above 50 or 65 dBA</li> </ul>
3	RNAV and conventional departure procedures from	<ul style="list-style-type: none"> <li>• Altitudes for northwest flow will increase crossing the shoreline by an average of 2800 feet with average crossing altitudes</li> </ul>

	Runway 15 with traffic directed to fly farther to the east before turning back over land. Coupled with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Light.	<p>above 15,000 feet.</p> <ul style="list-style-type: none"> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA.</li> </ul>
5	RNAV and conventional departure procedures from Runway 22R/L with traffic directed to fly farther to the east before turning back over land. Coupled with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Light.	<ul style="list-style-type: none"> <li>• Altitudes of aircraft in northwest flow will cross the shoreline at altitudes 3400 feet higher than the baseline at an average of approximately 15,000 feet.</li> <li>• No notable change of DNL</li> <li>• Notable decrease of &gt;5% NEA of 50 SEL at sites in Lynn and Peabody, and above 60 SEL in Lynn, Peabody, Salem and Swampscott and above 80 SEL at sites in Swampscott</li> <li>• Notable reductions of &gt;5% Time Above 50 Lmax in Lynn, Peabody, Salem and Swampscott and of 65 Lmax in Lynn and Swampscott. No other notable change of Time Above 50 or 65 dBA Lmax.</li> </ul>
6	Establish point to point navigation and relocate conventional approaches to Runway 22R/L from east downwind position to way point location over Drunk intersection in Marshfield.	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA.</li> </ul>
7	Establish point to point navigation and relocate conventional approaches to Runway 27 from wide dispersion across the South Shore to way point location over Drunk intersection in Marshfield.	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of TA 50 or 65 dBA at any site</li> </ul>
8	Establish RNAV approach east	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> </ul>

	of the airport landing Runway 15 to reduce arrival dispersion over Nahant	<ul style="list-style-type: none"> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of TA 50 or 65 dBA at any site</li> </ul>
9	Allow use of west downwind approach by aircraft larger than regional jets (75,000 to 255,000#) when landing Runways 4R/L	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• One point in Saugus will experience a notable decrease of &gt;5% of NEA 50 SEL. No other notable change in NEA at any level</li> <li>• No notable change of TA 50 or 65 dBA at any site</li> </ul>
11	Establish charted visual approach to Runway 33L off-shore of Cohasset/Hull	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA.</li> </ul>
12A	Raise Runways 4R/L ILS approach intercept altitude from 3 to 4,000 feet between midnight and 6 a.m.	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No other notable changes in potential awakening level events.</li> </ul>
12B	Raise Runways 22R/L ILS approach intercept altitude from 3 to 4,000 feet between midnight and 6 a.m.	<ul style="list-style-type: none"> <li>• Altitude of final approach course intercept will be raised by 1000 feet in the north end of the area.</li> <li>• No notable change of DNL</li> <li>• Increase of &gt;5% of potential awakening events at two sites in Lynn and one in Peabody. No other notable change of potential awakening level events.</li> </ul>
12C	Raise Runways 33L ILS approach intercept altitude from 3 to 4,000 feet between midnight and 6 a.m.	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No other notable changes in potential awakening level events.</li> </ul>
13	Prop aircraft departures from Runways 22R/L and 15R between midnight and 6 a.m. follow jet departure routes of alternatives 1-5	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No other notable changes in potential awakening level events</li> <li>• No notable change of Time Above 50 or 65 dBA..</li> </ul>

<b>Area: South Shore Communities</b>		
<b>Communities:</b> Braintree, Cohasset, Hingham, Holbrook, Hull, Quincy and Weymouth		
<b>Data points:</b> PT002, PT006, PT008, PT009, PT021, PT023, PT033, PT035, PT036, PT037, PT043, PT044, PT045, PT096, PT097, PT098, S25, S26		
<b>Independent Consultant Overview of Results:</b> 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. Nearly all locations within the area notably benefit from the introduction of the RNAV departure alternatives 2 and 5. Approach alternatives 6, 7 and 8 will not have a notable effect on the area. Alternative 9 would notably benefit Braintree, Holbrook, Hull, Quincy and Weymouth by moving traffic from east to west downwind courses. Alternative 12C will increase the percentage of nighttime awakening events in Cohasset and Hingham under the extended instrument approach, although the absolute number of events will increase by 3 or fewer on an average night.		
<b>Alternative</b>	<b>Description</b>	<b>Specific Effects in Area Relative to Baseline Condition</b>
1	RNAV and conventional departure procedures from Runway 4R with traffic directed to the east before turning to cross the shoreline. Coupled with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Light.	<ul style="list-style-type: none"> <li>• Altitude for west flow traffic crossing the South Shore increases by an average of 1300 feet to 12800 feet. Communities west of Cohasset and Scituate will experience commensurate increases in the altitudes of departing aircraft above them.</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA.</li> </ul>
2	RNAV and conventional departure procedures from Runway 9 with traffic directed to fly farther to the east before turning back over land. Coupled with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Light.	<ul style="list-style-type: none"> <li>• Altitude for west flow traffic crossing the South Shore increases by an average of 5000 feet to 13800 feet. Communities west of Cohasset and Scituate will experience commensurate increases in the altitudes of departing aircraft above them.</li> <li>• No notable change of DNL</li> <li>• All communities in the area would experience notable decreases of &gt;5% NEA of 50 and 60 SEL. Six sites in Cohasset, Hingham, Hull and Quincy would experience notable decreases of &gt;5% NEA 80 SEL.</li> <li>• Reductions of TA 50 by &gt;5% in all communities but Holbrook.</li> </ul>

		Reduction of >5% TA 65 at sites Cohasset, Hingham and Hull.
3	RNAV and conventional departure procedures from Runway 15 with traffic directed to fly farther to the east before turning back over land. Coupled with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Lights.	<ul style="list-style-type: none"> <li>Altitude for west flow traffic crossing the South Shore increases by an average of 3700 feet to 11800 feet. Communities west of Cohasset and Scituate will experience commensurate increases in the altitudes of departing aircraft above them. The average altitude of departing aircraft passing north of Hull would not change appreciably, averaging about 4400 feet north of Point Allerton .</li> <li>No notable change of DNL</li> <li>No notable change of numbers of events at any SEL level</li> <li>No notable change of Time Above 50 or 65 dBA.</li> </ul>
5	RNAV and conventional departure procedures from Runway 22R/L with traffic directed to fly farther to the east before turning back over land. Coupled with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Light.	<ul style="list-style-type: none"> <li>Altitude for west flow traffic crossing the South Shore increases by an average of 3600 feet to 12300 feet. Communities west of Cohasset and Scituate will experience commensurate increases in the altitudes of departing aircraft above them. The average altitude of departing aircraft passing north of Hull would not change appreciably, averaging about 5700 feet north of Point Allerton.</li> <li>No notable change of DNL</li> <li>Notable decreases of &gt;5% NEA 50 and 60 SEL would occur in Braintree, Cohasset, Hingham, Holbrook, Quincy and Weymouth. Cohasset, Hingham and Quincy would also experience notable decreases of NEA 80 SEL. No locations in the area would experience notable increases of NEA at any level of SEL.</li> <li>Across the area, decreases of &gt;5% TA 50 would occur in Braintree, Cohasset, Hingham, Quincy and Weymouth. Reductions above TA 65 would appear in Cohasset, Hingham and Weymouth.</li> </ul>
6	Establish point to point navigation and relocate conventional approaches to Runway 22R/L from east downwind position to way point	<ul style="list-style-type: none"> <li>No appreciable change in altitude of aircraft, but many fewer arrivals would over fly the area</li> <li>No notable change of DNL</li> <li>No notable change of numbers of events at any SEL level</li> <li>No notable change of Time Above 50 or 65 dBA.</li> </ul>

	location over Drunk intersection in Marshfield.	
7	Establish point to point navigation and relocate conventional approaches to Runway 27 from wide dispersion across the South Shore to way point location over Drunk intersection in Marshfield.	<ul style="list-style-type: none"> <li>• No appreciable change in altitude of aircraft, but many fewer arrivals would over fly the area</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA.</li> </ul>
8	Establish RNAV approach east of the airport landing Runway 15 to reduce arrival dispersion over Nahant	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA.</li> </ul>
9	Allow use of west downwind approach by aircraft larger than regional jets (75,000 to 255,000#) when landing Runways 4R/L	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• Holbrook would experience a reduction of &gt; ½ DNL. No notable change of DNL</li> <li>• Braintree, Holbrook, Quincy and Weymouth will experience &gt;5% notable decrease in NEA at 50 and 60 SEL level, while two points in Hull will experience a notable decrease of &gt;5% of NEA 50 SEL. No other notable change in NEA at any level</li> <li>• Reductions of &gt;5% Time Above 50 dBA in Braintree and Holbrook, while one site in Hull would experience a reduction of &gt;5% TA 65. No other notable change in TA at 50 or 65 dBA</li> </ul>
11	Establish charted visual approach to Runway 33L off-shore of Cohasset/Hull	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA.</li> </ul>
12A	Raise Runways 4R/L ILS approach intercept altitude from 3 to 4,000 feet between midnight and 6 a.m.	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable changes in potential awakening level events.</li> </ul>
12B	Raise Runways 22R/L ILS approach intercept altitude	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> </ul>

	from 3 to 4,000 feet between midnight and 6 a.m.	<ul style="list-style-type: none"> <li>• No notable changes in potential awakening level events.</li> </ul>
12C	Raise Runways 33L ILS approach intercept altitude from 3 to 4,000 feet between midnight and 6 a.m.	<ul style="list-style-type: none"> <li>• Altitude of final approach course intercept will be raised by 1000 feet over southern Cohasset.</li> <li>• No notable change in DNL.</li> <li>• Increase of &gt;5% of potential awakening events at four sites in Cohasset and one in Hingham. No other notable change of potential awakening level events.</li> </ul>
13	Prop aircraft departures from Runways 22R/L and 15R between midnight and 6 a.m. follow jet departure routes of alternatives 1-5	<ul style="list-style-type: none"> <li>• Propeller aircraft relocated onto jet routes will fly over the South Shore at lower altitudes of approximately 5-6000 feet.</li> <li>• No notable changes in potential awakening level events.</li> <li>• No notable change of Time Above 50 or 65 dBA.</li> </ul>

<b>Area: Southeast Shore Communities</b>		
<b>Communities:</b> Duxbury, Halifax, Hanson, Marshfield, Scituate		
<b>Data points:</b> PT027, PT028, PT068, PT069, PT070, PT071, PT072, PT073, PT074, PT075, PT076, PT077, PT078, PT079, PT080, PT081, PT094, PT095		
<b>Independent Consultant Overview of Results:</b> Under baseline conditions this area experiences average daily aircraft noise events above 50 SEL ranging from lows of 45 in Duxbury and Halifax, up to 262 per average annual day in Scituate. The departure alternatives generally will result in a changes of overflights above 50 SEL, but generally by less than ten per day. Under departure alternative 2, the Minot's Light procedure would result in one site in Marshfield and another in Scituate receiving notable reductions in both numbers of events and time of exposure, while another site in Scituate would experience a notable increase in events above 50 SEL. The Minot's Light extension of Alternative 5 would result in a notable increase in both events above 50 or 60 SEL and time above at two locations in Scituate, while another location in the community would experience similar reductions. Alternative 7 will result in notable increases in noise events in Duxbury, Halifax and parts of Marshfield along the flight course leading to the Drunk intersection. Hanson and portions of Marshfield and Scituate would experience notable reductions of NEA 50 and 60 SEL and TA 65 as a result of the implementation of Alternative 6. Alternative 12C would result in single awakening event increases in Scituate.		
<b>Alternative</b>	<b>Description</b>	<b>Specific Effects in Area Relative to Baseline Condition</b>
1	RNAV and conventional departure procedures from Runway 4R with traffic directed to the east before turning to cross the shoreline. Coupled with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Light.	<ul style="list-style-type: none"> <li>• Average altitudes for south flow traffic crossing the southeast shore increases by approximately 3500 feet, to an average crossing altitude of approximately 15000 feet.</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA.</li> </ul>
2	RNAV and conventional departure procedures from Runway 9 with traffic directed to fly farther to the east before turning back over land. Coupled	<ul style="list-style-type: none"> <li>• Altitude for south flow traffic crossing the South Shore increases by an average of 6000 feet to an average crossing altitude of 15,300 feet.</li> <li>• No notable change of DNL</li> <li>• One site in Marshfield and one in Scituate would experience</li> </ul>

	with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Light.	<p>notable decreases of &gt;5% NEA of 50 and 60 SEL, while one site in Scituate would experience a notable increase of &gt;5% NEA 50. One sites in Scituate would experience a notable decrease of &gt;5% NEA 80 SEL. No other notable changes of TA.</p> <ul style="list-style-type: none"> <li>• Reductions of TA 50 by &gt;5% at sites in Marshfield and Scituate. Reduction of &gt;5% TA 65 at a site in Scituate. No other notable changes of TA</li> </ul>
3	RNAV and conventional departure procedures from Runway 15 with traffic directed to fly farther to the east before turning back over land. Coupled with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Lights.	<ul style="list-style-type: none"> <li>• Altitude for south flow traffic crossing the South Shore increases by an average of 1900 feet to an average crossing altitude of 12,800 feet.</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA.</li> </ul>
5	RNAV and conventional departure procedures from Runway 22R/L with traffic directed to fly farther to the east before turning back over land. Coupled with Alternative 14 to increase crossing altitudes and 15 to move south flow east of Minot's Light.	<ul style="list-style-type: none"> <li>• Average altitudes for south flow traffic crossing the southeast shore increases by approximately 4600 feet to an average altitude of approximately 14300 feet.</li> <li>• No notable change of DNL</li> <li>• Two sites along the shoreline in Scituate will experience notable increases of NEA at varying levels of SEL, while one inland site in Scituate will experience a notable decrease of NEA 60 SEL. No other notable changes of NEA at any level of SEL.</li> <li>• A notable decrease of &gt;5% TA 65 would occur in Scituate, while the two shoreline sites would experience increases of TA 50. No other notable changes are present for TA in the area.</li> </ul>
6	Establish point to point navigation and relocate conventional approaches to Runway 22R/L from east downwind position to way point location over Drunk intersection in Marshfield.	<ul style="list-style-type: none"> <li>• Relocated approaches from the south will cross the shoreline over Marshfield at or above 6000 feet.</li> <li>• No notable change of DNL</li> <li>• No notable change of numbers of events at any SEL level</li> <li>• No notable change of Time Above 50 or 65 dBA.</li> </ul>

7	Establish point to point navigation and relocate conventional approaches to Runway 27 from wide dispersion across the South Shore to way point location over Drunk intersection in Marshfield.	<ul style="list-style-type: none"> <li>Relocated approaches from the south will cross the Marshfield at or above 6000 feet.</li> <li>No notable change of DNL</li> <li>Seven sites in Hanson, Marshfield and Scituate will experience reductions of &gt;5% at 50 SEL of NEA, and six of them would experience notable reductions at 60 SEL. Six sites in Duxbury, Halifax and Marshfield would experience an increase of &gt;5% NEA at 50 SEL, while two of them would experience increases at the 60 SEL level. No other notable change of NEA in the area at the 80 SEL level</li> <li>Five sites in Hanson, Marshfield and Scituate will experience reductions of &gt;5% of TA50. Five sites in Duxbury, Halifax and Marshfield would experience an increase of &gt;5% of TA 50. No other notable changes in TA 50 or 65 dBA.</li> </ul>
8	Establish RNAV approach east of the airport landing Runway 15 to reduce arrival dispersion over Nahant	<ul style="list-style-type: none"> <li>No change of altitude below 15000 feet</li> <li>No notable change of DNL</li> <li>No notable change of numbers of events at any SEL level</li> <li>No notable change of Time Above 50 or 65 dBA.</li> </ul>
9	Allow use of west downwind approach by aircraft larger than regional jets (75,000 to 255,000#) when landing Runways 4R/L	<ul style="list-style-type: none"> <li>No change of altitude below 15000 feet</li> <li>No notable change of DNL</li> <li>No notable change of numbers of events at any SEL level</li> <li>No notable change of Time Above 50 or 65 dBA.</li> </ul>
11	Establish charted visual approach to Runway 33L off-shore of Cohasset/Hull	<ul style="list-style-type: none"> <li>While noise levels would not be notably changed by the alternative, much of the nighttime approach traffic would be moved off shore, and increased distances from noise sensitive locations on the ground and the aircraft in flight. Altitudes of flights would not change substantially with the alternative.</li> <li>No notable change of DNL</li> <li>No notable change of numbers of events at any SEL level</li> <li>No notable change of Time Above 50 or 65 dBA.</li> </ul>
12A	Raise Runways 4R/L ILS approach intercept altitude from 3 to 4,000 feet between	<ul style="list-style-type: none"> <li>No change of altitude below 15000 feet</li> <li>No notable change of DNL</li> <li>No notable change of potential awakenings.</li> </ul>

	midnight and 6 a.m.	
12B	Raise Runways 22R/L ILS approach intercept altitude from 3 to 4,000 feet between midnight and 6 a.m.	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable change of DNL</li> <li>• No notable change of potential awakenings.</li> </ul>
12C	Raise Runways 33L ILS approach intercept altitude from 3 to 4,000 feet between midnight and 6 a.m.	<ul style="list-style-type: none"> <li>• Altitude of final approach course intercept will be raised by 1000 feet over Scituate.</li> <li>• No notable change of DNL</li> <li>• One site in Scituate would experience an increase of one potential awakening level flight per night.</li> </ul>
13	Prop aircraft departures from Runways 22R/L and 15R between midnight and 6 a.m. follow jet departure routes of alternatives 1-5	<ul style="list-style-type: none"> <li>• No change of altitude below 15000 feet</li> <li>• No notable changes in potential awakening level events.</li> <li>• Increase of &gt;5% TA 50 at night at three sites in Scituate</li> </ul>