

APPENDIX A

Part 150 NEM and NCP Checklists

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PART 150 NEM CHECKLIST – PART I

PROGRAM REQUIREMENT	YES	NO	SUPPORTING PAGES/REVIEW COMMENTS
I. Submitting And Identifying The NEM:			
A. Submission is properly identified:			
1. 14 C.F.R. Part 150 NEM?	✓		Chapter 1
2. NEM and NCP together?	✓		Letter of Transmittal, Sponsor Certification
3. Revision to NEMs FAA previously determined to be in compliance with Part 150?	✓		Chapter 1, Section 1.2
B. Airport and Airport Operator's name are identified?	✓		Letter of Transmittal, Sponsor Certification, Chapter 1, Section 1.4
C. NCP is transmitted by airport operator's dated cover letter, describing it as a Part 150 submittal and requesting appropriate FAA determination?	✓		Letter of Transmittal
II. Consultation: [150.21(b), A150.105(a)]			
A. Is there a narrative description of the consultation accomplished, including opportunities for public review and comment during map development?	✓		Chapter 6, Appendix E
B. Identification of consulted parties:			
1. Are the consulted parties identified?	✓		Chapter 6
2. Do they include all those required by 150.21(b) and A150.105(a)?	✓		Chapter 6
3. Agencies in 2, above, correspond to those indicated on the NEM?	✓		Chapter 6
C. Does the documentation include the airport operator's certification, and evidence to support it, that interested persons have been afforded adequate opportunity to submit their views, data, and comments during map development and in accordance with 150.21(b)?	✓		Sponsor Certification, Chapter 6 and Appendix E
D. Does the document indicate whether written comments were received during consultation and, if there were comments, that they are on file with the FAA regional airports division manager?	✓		Chapter 6, Appendix E
III. General Requirements: [150.21]			

A. Are there two maps, each clearly labeled on the face with year (existing condition year and one that is at least 5 years into the future)?	✓		Figures 4-1 and 4-2, Figures NEM-1 and NEM-2
B. Map currency:			
1. Does the year on the face of the existing condition map graphic match the year on the airport operator's NEM submittal letter?	✓		Sponsor Certification, Figure 4-1, Figure NEM-1
2. Is the forecast year map based on reasonable forecasts and other planning assumptions and is it for at least the fifth calendar year after the year of submission?	✓		Section 2.3 and 4.3, Figure 4-2, Figure NEM-2
3. If the answer to 1 and 2 above is no, the airport operator must verify in writing that data in the documentation are representative of existing condition and at least 5 years' forecast conditions as of the date of submission?			N/A
C. If the NEM and NCP are submitted together:			
1. Has the airport operator indicated whether the forecast year map is based on either forecast conditions without the program or forecast conditions if the program is implemented?	✓		Chapter 4
2. If the forecast year map is based on program implementation:			
a. Are the specific program measures that are reflected on the map identified?	✓		Chapter 5
b. Does the documentation specifically describe how these measures affect land use compatibilities depicted on the map?	✓		Chapter 5
3. If the forecast year NEM does not model program implementation, the airport operator must either submit a revised forecast NEM showing program implementation conditions [B150.3(b), 150.35(f)] or the sponsor must demonstrate the adopted forecast year NEM with approved NCP measures would not change by plus/minus 1.5 DNL? (150.21(d))			N/A
IV. Map Scale, Graphics, And Data Requirements: [A150.101, A150.103, A150.105, 150.21(a)]			
A. Are the maps of sufficient scale to be clear and readable (they must not be less than 1" to 2,000'), and is the scale indicated on the maps? <i>(Note (1) if the submittal uses separate graphics to depict flight tracks and/or noise monitoring sites, these must be of the same</i>	✓		Figures 4-1 and 4-2, Figures NEM-1 and NEM-2

<i>scale, because they are part of the documentation required for NEMs.)</i> <i>(Note (2) supplemental graphics that are not required by the regulation do not need to be at the 1" to 2,000' scale)</i>			
B. Is the quality of the graphics such that required information is clear and readable? (Refer to C. through G., below, for specific graphic depictions that must be clear and readable)	✓		Figures 4-1 and 4-2, Figures NEM-1 and NEM-2
C. Depiction of the airport and its environs:			
1. Is the following graphically depicted to scale on both the existing condition and forecast year maps?			
a. Airport boundaries	✓		NEM-1, NEM-2
b. Runway configurations with runway end numbers	✓		NEM-1, NEM-2
2. Does the depiction of the off-airport data include?			
a. A land use base map depicting streets and other identifiable geographic features	✓		NEM-1, NEM-2
b. The area within the DNL ¹ 65 dB (or beyond, at local discretion)	✓		NEM-1, NEM-2
c. Clear delineation of geographic boundaries and the names of all jurisdictions with planning and land use control authority within the DNL 65 dB (or beyond, at local discretion)	✓		NEM-1, NEM-2
D. 1. Continuous contours for at least the DNL 65, 70, and 75 dB?	✓		NEM-1, NEM-2
2. Has the local land use jurisdiction(s) adopted a lower local standard and if so, has the sponsor depicted this on the NEMs?		✓	
3. Based on current airport and operational data for the existing condition year NEM, and forecast data representative of the selected year for the forecast NEM?	✓		NEM-1, NEM-2, Chapter 2
E. Flight tracks for the existing condition and forecast year timeframes (these may be on supplemental graphics which must use the same land use base map and scale as the existing condition and forecast year NEM), which are numbered to correspond to accompanying narrative?	✓		Figure Noise Model Flight Tracks, Chapter 2, Figures 2-3 through 2-6
F. Locations of any noise monitoring sites <i>(these may be on</i>			N/A

<i>supplemental graphics which must use the same land use base map and scale as the official NEMs)</i>			
G. Noncompatible land use identification:			
1. Are noncompatible land uses within at least the DNL 65 dB noise contour depicted on the map graphics?	✓		NEM-1, NEM-2
2. Are noise sensitive public buildings and historic properties identified? (Note: If none are within the depicted NEM noise contours, this should be stated in the accompanying narrative text.)			None within 65 DNL contour, Section 4.2 and 4.3
3. Are the noncompatible uses and noise sensitive public buildings readily identifiable and explained on the map legend?	✓		None within 65 DNL contour, NEM-1, NEM-2
4. Are compatible land uses, which would normally be considered noncompatible, explained in the accompanying narrative?	✓		Section 4.2, previously acquired properties
V. Narrative Support Of Map Data: [150.21(a), A150.1, A150.101, A150.103]			
A. 1. Are the technical data and data sources on which the NEMs are based adequately described in the narrative?	✓		Chapter 2
2. Are the underlying technical data and planning assumptions reasonable?	✓		Sponsor Certification
B. Calculation of Noise Contours:			
1. Is the methodology indicated?	✓		Chapter 2
a. Is it FAA approved?	✓		Section 2.2
b. Was the same model used for both maps? <i>(Note: The same model also must be used for NCP submittals associated with NEM determinations already issued by FAA where the NCP is submitted later, unless the airport sponsor submits a combined NEM/NCP submittal as a replacement, in which case the model used must be the most recent version at the time the update was started.)</i>	✓		Section 2.2
c. Has AEE approval been obtained for use of a model other than those that have previous blanket FAA approval?			N/A
2. Correct use of noise models:			
a. Does the documentation indicate, or is there evidence, the airport operator (or its consultant) has adjusted or calibrated	✓		Section 2.2, Appendix C

FAA-approved noise models or substituted one aircraft type for another that was not included on the FAA's pre-approved list of aircraft substitutions?			
b. If so, does this have written approval from AEE, and is that written approval included in the submitted document?	✓		Section 2.2, Appendix C
3. If noise monitoring was used, does the narrative indicate that Part 150 guidelines were followed?			N/A
4. For noise contours below DNL 65 dB, does the supporting documentation include an explanation of local reasons? <i>(Note: A narrative explanation, including evidence the local jurisdiction(s) have adopted a noise level less than DNL 65 dB as sensitive for the local community(ies), and including a table or other depiction of the differences from the Federal table, is highly desirable but not specifically required by the rule. However, if the airport sponsor submits NCP measures within the locally significant noise contour, an explanation must be included if it wants the FAA to consider the measure(s) for approval for purposes of eligibility for Federal aid.)</i>			N/A
C. Noncompatible Land Use Information:			
1. Does the narrative (or map graphics) give estimates of the number of people residing in each of the contours (DNL 65, 70 and 75, at a minimum) for both the existing condition and forecast year maps?	✓		No residents residing in the contours, Section 4.2 and 4.3
2. Does the documentation indicate whether the airport operator used Table 1 of Part 150?	✓		Section 3.1.1
a. If a local variation to table 1 was used:			
(1) Does the narrative clearly indicate which adjustments were made and the local reasons for doing so?			N/A
(2) Does the narrative include the airport operator's complete substitution for table 1?			N/A
3. Does the narrative include information on self-generated or ambient noise where compatible or noncompatible land use identifications consider non-airport and non-aircraft noise sources?			N/A
4. Where normally noncompatible land uses			N/A

are not depicted as such on the NEMs, does the narrative satisfactorily explain why, with reference to the specific geographic areas?			
5. Does the narrative describe how forecast aircraft operations, forecast airport layout changes, and forecast land use changes will affect land use compatibility in the future?	✓		Section 4.3
VI. Map Certifications: [150.21(b), 150.21(e)]			
A. Has the operator certified in writing that interested persons have been afforded adequate opportunity to submit views, data, and comments concerning the correctness and adequacy of the draft maps and forecasts?	✓		Sponsor Certification
B. Has the operator certified in writing that each map and description of consultation and opportunity for public comment are true and complete under penalty of 18 U.S.C. § 1001?	✓		Sponsor Certification

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PART 150 NCP CHECKLIST – PART I

PROGRAM REQUIREMENT	YES	NO	SUPPORTING PAGES/REVIEW COMMENTS
I. Submitting And Identifying The NCP:			
A. Submission is properly identified:			
1. 14 C.F.R. Part 150 NCP?	✓		Letter of Transmittal, Sponsor Certification, Chapter 1
2. NEM and NCP together?	✓		Letter of Transmittal, Sponsor Certification
3. Program revision? (To what extent has it been revised?)	✓		Letter of Transmittal
B. Airport and Airport sponsor's name are identified?	✓		Letter of Transmittal, Sponsor Certification, Chapter 1, Section 1.4
C. NCP is transmitted by airport sponsor's cover letter?	✓		Letter of Transmittal
II. Consultation: (including public participation): [150.23]			
A. Documentation includes narrative of public participation and consultation process?	✓		Chapter 6, Appendix E
B. Identification of consulted parties:			
1. All parties in 150.23(c) consulted?	✓		Chapter 6
2. Public and planning agencies identified?	✓		Chapter 6
3. Agencies in 2, above, correspond to those affected by the NEM noise contours?	✓		Chapter 6
C. Satisfies 150.23(d) requirements by:			
1. Documentation shows active and direct participation of parties in B., above?	✓		Chapter 6
2. Active and direct participation of general public and opportunity to submit their views, data, and comments on the formulation and adequacy of the NCP?	✓		Chapter 6
3. Participation was prior to and during development of NCP and prior to submittal to FAA?	✓		Chapter 6
4. Indicates adequate opportunity afforded to all consulted parties to submit views, data, etc.?	✓		Chapter 6
D. Evidence is included there was notice and opportunity for a public hearing on the final NCP?	✓		Chapter 6
E. Documentation of comments:			
1. Includes summary of public hearing comments, if hearing was	✓		Chapter 6

held?			
2. Includes copy of all written material submitted to operator?	✓		Chapter 6, Appendix E
3. Includes operator's responses/disposition of written and verbal comments?	✓		Chapter 6, Appendix E
F. Is there written evidence from the appropriate office within the FAA that the sponsor received informal agreement to carry out proposed flight procedures?			N/A
III. Noise Exposure Maps: [150.23, B150.3; 150.35(f)] <i>(This section of the checklist is not a substitute for the Noise Exposure Map checklist. It deals with maps in the context of the Noise Compatibility Program submission.)</i>			
A. Inclusion of NEMs and supporting documentation:			
1. Map documentation either included or incorporated by reference?	✓		Chapter 4
2. Maps previously found in compliance by FAA?			NEMs submitted with NCP
3. FAA's compliance determination still valid?			
a. Existing condition NEM represents conditions at the airport at the time of submittal of the NCP for FAA approval?	✓		Letter of Transmittal, NEM-1, Chapter 4
b. Forecast condition NEM represents conditions at the airport at least 5 years into the future from the date of submittal of the NCP to the FAA for approval?	✓		Letter of Transmittal, NEM-2, Chapter 4
c. Sponsor letter confirming elements (a) and (b), above, if date of submission is either different than the year of submittal of the previously approved NEMs or over 12 months from the date shown on the face of the NEM?			N/A
d. If (a) through (c) cannot be validated, the NEMs must be redone and resubmitted as per 150.21.			N/A
4. Does 180-day period have to wait for map compliance finding?	✓		
B. Revised NEMs submitted with program: (Review using NEM checklist if map revisions included in NCP submittal. Report the applicable findings in the spaces below after a full review using the NEM checklist and narrative.)			
1. Revised NEMs included with program?	✓		NEM-1, NEM-2
2. Has airport sponsor requested in writing that FAA make a determination on the NEM(s), showing NCP measures in place, when NCP	✓		Letter of Transmittal

approval is made?			
C. If program analysis uses noise modeling:			
1. INM, HNM, or FAA-approved equivalent?	✓		AEDT, Chapter 4
2. Monitoring in accordance with A150.5?			N/A
D. One existing condition and one forecast-year map clearly identified as the official NEMs?	✓		NEM-1, NEM-2
IV. Consideration of Alternatives: [B150.7, 150.23(e)(2)]			
A. At a minimum, were the alternatives below considered, or if they were rejected was the reason for rejection reasonable and based on accurate technical information and local circumstances?			
1. Land acquisition and interests therein, including air rights, easements, and development rights?	✓		NCP Update only, Section 5.2.2
2. Barriers, acoustical shielding, public building soundproofing		✓	NCP Update only, Chapter 5
3. Preferential runway system	✓		NCP Update only, Section 5.2.1
4. Voluntary flight procedures	✓		NCP Update only, Section 5.2.1
5. Restrictions described in B 150.7 (taking into account Part 161 requirements)		✓	NCP Update only, Chapter 5
6. Other actions with beneficial impact not listed in the regulation		✓	NCP Update only, Chapter 5
7. Other FAA recommendations (see D, below)		✓	NCP Update only, Chapter 5
B. Responsible implementing authority identified for each considered alternative?	✓		Chapter 5
C. Analysis of alternative measures:			
1. Measures clearly described?	✓		Chapter 5
2. Measures adequately analyzed?	✓		Chapter 5
3. Adequate reasoning for rejecting alternatives?	✓		Chapter 5
D. Other actions recommended by the FAA: As the FAA staff person familiar with the local airport circumstances, determine whether other actions should be added? <i>(List separately, or on back, actions and describe discussions with airport sponsor to have them included prior to the start of the 180-day cycle. New measures recommended by the airport sponsor must meet applicable public participation and consultation with officials before they can be submitted to the FAA for action. See E., below.)</i>			N/A

V. Alternatives Recommended for Implementation: [150.23(e), B150.7(c); 150.35(b), B150.5]			
A. Document clearly indicates:			
1. Alternatives that are recommended for implementation?	✓		Chapter 5
2. Final recommendations are airport sponsor's, not those of consultant or third party?	✓		Letter of Transmittal
B. Do all program recommendations:			
1. Relate directly or indirectly to reduction of noise and noncompatible land uses? <i>(Note: All program recommendations, regardless of whether previously approved by the FAA in an earlier Part 150 study, must demonstrate a noise benefit if the airport sponsor wants FAA to consider the measure for approval in a program update. See E., below.)</i>	✓		Chapter 5
2. Contain description of each measure's relative contribution to overall effectiveness of program?	✓		Chapter 5
3. Noise/land use benefits quantified to extent possible to be quantified? <i>(Note: some program management measures cannot be readily quantified and should be described in other terms to show their implementation contributes to overall effectiveness of the program.)</i>	✓		Chapter 5
4. Does each alternative include actual/anticipated effect on reducing noise exposure within noncompatible area shown on NEM?	✓		Chapter 5
5. Effects based on relevant and reasonable expressed assumptions?	✓		Chapter 5
6. Does the document have adequate supporting data that the measure contributes to noise/land use compatibility?	✓		Chapter 5
C. Analysis appears to support program standards set forth in 150.35(b) and B150.5?	✓		Chapter 5
D. When use restrictions are recommended for approval by the FAA:			
1. Does (or could) the restriction affect Stage 2 or Stage 3 aircraft operations <i>(regardless of whether they presently operate at the airport)? (If the restriction affects Stage 2 helicopters, Part 161 also applies.)</i>			N/A
2. If the answer to D.1 is yes, has the			N/A

airport sponsor completed the Part 161 process and received FAA Part 161 approval for a restriction affecting Stage 3 aircraft? Is the FAA's approval documented? For restrictions affecting only Stage 2 aircraft, has the airport sponsor successfully completed the Stage 2 analysis and consultation process required by Part 161 and met the regulatory requirements, and is there evidenced by letter from FAA stating this fact?			
3. Are non-restrictive alternatives with potentially significant noise/compatible land use benefits thoroughly analyzed so that appropriate comparisons and conclusions among all alternatives can be made?			N/A
4. Did the FAA regional or ADO reviewer coordinate the use restriction with APP-400 prior to making determination on start of 180-days?			N/A
E. Do the following also meet Part 150 analytical standards?			
1. Recommendations that continue existing practices and that are submitted for FAA re-approval? <i>(Note: An airport sponsor does not have to request FAA re-approval if noise compatibility measures are in place from previously approved Part 150 studies. If the airport has implemented the measures as approved in the previous NCP, the measures may be reported and modeled as baseline conditions at the airport.)</i>			N/A
2. New recommendations or changes proposed at the end of the Part 150 process?		✓	
F. Documentation indicates how recommendations may change previously adopted noise compatibility plans, programs, or measures?	✓		Chapter 5
G. Documentation also:			
1. Identifies agencies that are responsible for implementing each recommendation?	✓		Chapter 5
2. Indicates whether those agencies have agreed to implement?	✓		Chapter 5
3. Indicates essential government actions necessary to implement recommendations?	✓		Chapter 5

H. Timeframe:			
1. Includes agreed-upon schedule to implement alternatives?	✓		Chapter 5
2. Indicates period covered by the program?	✓		Chapter 5
I. Funding/Costs:			
1. Includes costs to implement alternatives?	✓		Chapter 5
2. Includes anticipated funding sources?	✓		Chapter 5
VI. Program Revision: [150.23(e)(9)] Supporting documentation includes provision for revision? <i>(Note: Revision should occur when it is likely a change has taken place at the airport that will cause a significant increase or decrease in the DNL noise contour of 1.5 dB or greater over noncompatible land uses. See §150.21(d))</i>	✓		Letter of Transmittal

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APPENDIX B

1996 and 2015

FAA Record of Approval (ROA)

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Part 150: Records of Approval

Westover Air Reserve Base, Chicopee Falls, Massachusetts

Approved on 1/26/96

1.0 INTRODUCTION

The Westover Metropolitan Development Corporation sponsored an Airport Noise Compatibility Planning Study under a Federal Aviation Administration (FAA) grant, in compliance with Federal Aviation Regulations (FAR), Part 150. The Noise Exposure Maps (NEM) were developed and submitted to FAA on January 26, 1994. The NEM was determined to be in compliance on July 31, 1995. The determination was announced in the Federal Register on August 11, 1995. The Noise Compatibility Program (NCP) was submitted to FAA for review and approval on June 2, 1995 and notice of FAA's review of the NCP was announced concurrently in the August 11, 1995, Federal Register.

The Part 150 Study was closely monitored by an advisory committee which represented area municipalities, airport users, and community residents. A series of advisory committee meetings was held, with the airport's consultant presenting material and findings. Two public information meetings were held. The consultant addressed comments at all of these meetings, and subsequent written comments as well.

The study focused on defining an optimum set of noise and land use mitigation measures to improve compatibility between airport operations and community land use, presently and in the future.

The resultant program is described in detail in the "Noise Compatibility Program" section of the study, sections 2 and 3. Section 2 describes the NCP elements and Section 3 analyzes alternatives and contains an implementation plan. The program elements below summarize as closely as possible the airport operator's recommendations in the noise compatibility program and are cross-referenced to the program. The statements contained within the summarized recommendations and before the indicated FAA approval, disapproval, or other determinations do not represent the opinions or decisions of the FAA.

The approvals which follow include actions which the Westover Metropolitan Development Corporation recommends be taken by FAA. It should be noted that these approvals indicate only that the actions would, if implemented, be consistent with the purposes of Part 150. These approvals do not constitute decisions to implement the actions. Later decisions concerning possible implementation of these actions may be subject to applicable environmental or other procedures or requirements.

2.0 PROGRAM ELEMENTS

2.1 Noise Abatement Elements

2.1.1. Extension of Existing Civil Aircraft Preferential Runway (Runway 5 for departures and Runway 23 for landings) when the tower begins operations on a full 24-hour schedule. Use from

11 pm to 7 am, until Forecasted 1998 operations of 3-4 nighttime turbojet (above 75,000 pounds) operations occur (sections 2.1.1 and 3.1.1) (identified as "Original 1998 Forecast" in Table 3.2). This measure is recommended in combination with the next noise abatement element.

Approved as voluntary. There are currently no civil operations between 11 pm and 7 am, since the airport is closed. The hours of operation of the ATCT and airport (7 am to 11 pm) are established by the Air Force Reserve. A noise abatement benefit of approximately 1.5 DNL would conservatively accrue to occur to up to 2400 people who reside in more densely populated areas to the south of the airport within the 65-75 DNL contour areas (Figure 3.1 and Tables 3.1 and 3.2). A reevaluation of this measure will be needed in order to compare continued preferential use with implementation of the related land use measure to acquire or soundproof residences.

2.1.2. Noise Abatement Departure Procedures for Military Aircraft on Runway 23 (sections 2.1.2 and 3.1.2). The Air Force operates mainly to the south due to placement of NAVAIDS. As part of noise mitigation for the flow of military operations for C-5s that remain in the local area, Air Force and Bradley Tower (the parent FAA air traffic control facility for Westover) would develop procedures for a right turn after take-off or missed approach to a heading of approximately 360 degrees at an altitude of 600 feet above ground level. Traffic permitting, Bradley would provide individual clearances through Westover Tower. After the initial right turn and upon positive radar contact, aircraft would be vectored by Bradley along a downwind leg and then cleared to turn inbound to intercept a final approach course of one of the instrument approaches used for training in the local area. For C-5s or other military aircraft departing the local area ATC would provide a clearance to turn after takeoff based on aircraft destination--either to a heading of 205 degrees (a 25 degree left turn) for aircraft departing towards the Hartford, Dream, Putnam, Norwich, Gardner, and Madison navigational fixes, or to an initial heading of 255 degrees (25 degree right turn) towards Keene, Pawling, Chester, and Barnes. As above, individual clearances would be through Westover Tower prior to take-off. Following positive radio and radar contact with Bradley, aircraft would be vectored on course. Noise abatement headings could be expected between 10 pm (2200) and 6 am (0600). During other hours, it is recommended that Westover Tower request a noise abatement heading, recognizing that each military jet aircraft cleared to turn will be left to the discretion of Bradley Approach Control.

Approved as voluntary. C-5 aircraft SEL contour analysis indicates that, given the Air Force Reserve right-hand local traffic pattern, noise exposure can be minimized with earlier turns (Figure 3.2). For traffic departing the local area, this analysis indicates that, given the need to avoid traffic conflicts within the Bradley Approach Control area and the need to vector aircraft somewhat in accordance with flight plan routes, earlier turns to the left or right can reduce population exposure (Figure 3.2).

2.1.3. Noise Abatement Departure Procedures for Civilian Aircraft on Runway 23. When civil aircraft operate to the south, the Air Force and Bradley Approach Control would develop IFR procedures that would permit civil aircraft to make early turns to 205 or 255 degrees after take-off from Runway 23. As in the previous noise abatement measure, assigned headings would be based on aircraft route of flight, issued to pilots by Westover Tower so that turns may be initiated prior to radar contact with Bradley, and expected between 10 pm (2200) and 6 am (0600). At other times Westover Tower would request the noise abatement headings for Stage 2 aircraft and it would be issued at Bradley's discretion, traffic permitting.

Approved as voluntary. This noise abatement element, in conjunction with the next noise abatement element, Noise Abatement Departure Procedures for Civilian Aircraft on Runway 5, would reduce noise exposure to approximately 200 people within the DNL 65-75 contour areas (Figure 3.3 and Table 3.3).

2.1.4. Noise Abatement Departure Procedures for Civilian Aircraft on Runway 5. This measure is proposed in conjunction with the voluntary acquisition and relocation program proposed below. It

would be applicable between 10 pm (2200) and 6 am (0600) and consists of a departure heading of 080 degrees, extended as practical to 205 or 255 degrees for traffic with clearance toward Hartford and Pawling, respectively. Traffic with clearance toward Chester would be given a subsequent left turn when at least 3 DME from the Westover VOR (in order to remain clear of the Acrebrook subdivision). Clearances would be issued by Westover Tower after agreement on departure clearance procedures with Bradley Approach Control. They would be issued by Westover Tower to pilots prior to take-off so that turns may be initiated as soon as possible , prior to radar contact with Bradley.

Approved as voluntary. As stated in the approval of the previous measure, this noise abatement element, in conjunction with Noise Abatement Departure Procedures for Civilian Aircraft on Runway 23, would reduce noise exposure to approximately 200 people within the 65-75 DNL contour areas (Figure 3.3 and Table 3.3).

2.2 Land Use Elements

2.2.1. Voluntary Land Acquisition and Relocation Program. For approximately 150 residences exposed to 70 DNL or above, the Westover Metropolitan Development Corporation (WMDC) proposes to implement a voluntary purchase and relocation program to eliminate or significantly reduce the number of people remaining in areas of high noise exposure after implementation of all other operational noise abatement elements. WMDC would consider including additional homes in the purchase program on a case-by-case basis. A noise easement would be secured on all acquired property.

Approved. It is not considered within the meaning of the Uniform Act, to be a “voluntary” transaction if the homeowners’ property is destroyed and converted to other compatible land uses. If the property’s use will be the same, it is considered a voluntary transaction under the Uniform Act, but the homeowner does not qualify for relocation payments. Only tenant occupants would be eligible for relocation payments.

2.2.2. Voluntary Sound Insulation Program. This measure would apply to approximately 900 residences within the 65 DNL contour, as well as those within the 70 DNL contour but not sold under the voluntary acquisition program. A noise easement would be acquired in exchange for sound insulation.

Approved.

2.2.3. Compatible Use Zoning. To minimize chances that new noncompatible land uses will be developed within the DNL 65 dB contour, it is proposed that each of the five communities of Chicopee, Granby, Ludlow, Springfield, and South Hadley consider adopting suitable zoning to limit residential use in high noise exposed areas. **Approved.** FAA strongly discourages new noncompatible development within the DNL 65 dB contour, and new development may not be eligible for future mitigation using Federal funding.

2.2.4. Airport Overlay District. WMDC would recommend that the communities of Chicopee and Granby adopt an airport overlay district which encompasses land within the 65 DNL contour. They would also recommend that the town of Ludlow change the boundaries of its airport overlay district to include all of the land within the forecasted 1998 contour.

Approved.

Subdivision Regulations. WMDC would recommend that the town of Granby amend its subdivision regulations to require noise easements on all newly created lots within the airport’s 65

DNL contour. WMDC would work with town officials in preparing amendments to the Bylaws of the Town of Granby, Volume IV, Chapter XXII.

Approved. FAA strongly discourages new noncompatible development within the DNL 65 dB contour, and new development may not be eligible for future mitigation using Federal funding.

2.3 Implementation, Monitoring, and Review Elements

2.3.1 Pilot Awareness Program. WMDC would publish a pamphlet of noise abatement practices to be distributed to civilian pilots through the Fixed Base Operator and WMDC's airport management. The pamphlet would include a map of noise sensitive areas around the airport and describe the operational measures which WMDC has adopted for noise abatement, including use of noise abatement departure procedures recommended by the National Business Aircraft Association or by individual aircraft manufacturers. WMDC would also install signs in all terminal areas frequented by civilian pilots and along ramp and taxiway areas controlled by WMDC, instructing pilots to follow noise abatement procedures.

Approved. The content and location of airfield signs are subject to specific approval by appropriate FAA officials outside of the Part 150 process and are not approved in advance by this action. Such signs must not be construed as mandatory air traffic procedures.

2.3.2 Public Awareness Program. To promote good public relations WMDC would issue from time to time public releases, which it would send to local papers, town libraries, and other public facilities, describing the latest developments in its noise compatibility program.

Approved.

2.3.3 Monitoring Nighttime Operations and Runway Use. WMDC would log nighttime activity between 10 pm (2200) and 7 am (0700). Logs would include time, type aircraft, registration/flight number, landing or take-off, runway used, and wind and weather conditions. The information would be used to determine compliance with WMDC's nighttime noise rule and to help provide guidance to Air Force contract tower personnel to determine compliance with the preferential runway use program.

Approved in part; disapproved in part, pending submission of additional information to make an informed analysis. This measure is approved for purposes of Part 150, except with respect to the information being used to determine compliance with the nighttime noise rule. The WMDC has not submitted for review under Part 150 either the current nighttime restriction or the proposed amendments to its nighttime noise rule (pages 13-15 and 39-42 of the NCP). There is insufficient information for the FAA to determine whether compliance with the noise rule would meet the approval standards contained in 14 CFR Part 150.

Airport noise and access restrictions proposed after October 1, 1990, must be adopted in compliance with the Airport Noise and Capacity Act of 1990 (recodified at P.L. 103-272), 49 USC 47521 (hereinafter referred to as "ANCA"), as implemented by 14 CFR Part 161.

2.3.4 Using a basic spreadsheet program, WMDC would compute estimates of changes in noise exposure related to changes in scheduled civil jet operations, changes in civil nighttime operations, or changes in total nighttime civil operations. WMDC would submit an Environmental Notification Form (ENF) to the Massachusetts Secretary of Environmental Affairs for any change in noise exposure greater than 1.5 dBA above the forecasted exposure included in the noise compatibility planning program and would initiate a review of its Noise Compatibility Program. Finally, if noise exposure reaches that forecasted in the noise exposure map, WMDC would initiate an update to the noise compatibility planning study in 1999 and 5-year intervals thereafter.

Each update would address fully the noise exposure and incompatible land use existing at the time.

Approved. A basic spreadsheet program may be used as a screening tool. A screening tool, such as the FAA's Area Equivalent Method, may be a useful indicator as to whether there has been a significant change in the noise environment warranting a revision to the NEM per section 150.21 of Part 150.

DRAFT



Federal Aviation Administration

Memorandum

Date: January 6, 2015

From: Richard Doucette, Manager, Environmental Programs, ANE-610 RTD

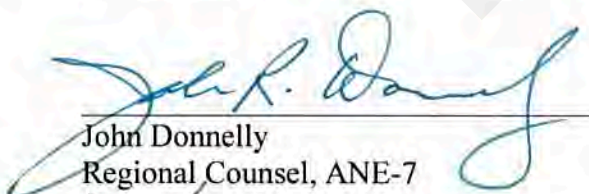

To: Mary Walsh, Manager, Airports Division, ANE-600
John Donnelly, Regional Counsel, ANE-7

Subject: Westover Metropolitan Airport, Part 150 Record of Approval

Attached is the Record of Approval for the Noise Compatibility Program developed by the Westover Metropolitan Development Corporation for the Westover Metropolitan Airport. One change to the existing Noise Compatibility Program measures is proposed. The Airport Sponsor proposes to expand the noise-land acquisition boundary from the 70DNL noise contour, out to the 65DNL noise contour. After discussion with APP-400, two other measures were disapproved, as they provide no measurable benefit inside the 65DNL noise contour

No written comments were received during the FAA comment period.

Upon your concurrence/approval below, the *Federal Register* Notice of FAA's approval of the Noise Compatibility Program can be submitted.

 _____ John Donnelly Regional Counsel, ANE-7	<u>2/6/2015</u> Date	<input checked="" type="checkbox"/> Concur	<input type="checkbox"/> Nonconcur
 _____ Mary Walsh Manager, Airports Division, ANE-600	<u>2/6/2015</u> Date	<input checked="" type="checkbox"/> Approved	<input type="checkbox"/> Disapproved

RECORD OF APPROVAL

Westover Metropolitan Airport
Chicopee and Ludlow, Massachusetts

FAR PART 150 NOISE COMPATIBILITY PROGRAM

1.0 Introduction

The Westover Metropolitan Airport sponsored an Airport Noise Compatibility Planning Study under a Federal Aviation Administration (FAA) grant, in compliance with Federal Aviation Regulation, Part 150. Westover Municipal Development Corporation produced a report entitled "*Westover Metropolitan Airport/Westover Air Reserve Base Noise Exposure Map and Noise Compatibility Program Update.*" The Noise Compatibility Program (NCP) and its associated Noise Exposure Maps (NEM) were developed concurrently and submitted to FAA for review and approval on September 25, 2014. The NEM was determined to be in compliance on September 25, 2014. This determination was announced in the Federal Register on October 10, 2014.

The study provides an overview of all the noise mitigation measure previously approved in the January 1, 1996 Record of Approval. This overview can be found in Chapter 5 of the NEM/NCP document. The one change proposed in the NCP Update is expanding the noise land acquisition boundary from the 70DNL noise contour out to the 65DNL noise contour. This measure is approved. All other previously approved (1996) measures were reviewed for their current status, and for consistency with Part 150. As part of this review, the FAA now disapproves two previously approved measures: the Runway 23 and Runway 05 noise abatement departure procedures for civilian aircraft. These measures do not currently provide benefits within the 65 DNL contour. Meaningful noise abatement procedures may be designed and recommended under a future NCP update.

2.0 Noise Abatement Measures

The 1996 NCP evaluated and recommended several noise abatement measures. These measures were modeled and compared to the noise exposure contours developed under that study, and those which provided a benefit (a reduction in the number of residences and estimated population within the 65 DNL noise contour) were included in the Airport's recommended plan submitted to the FAA. Each of the four approved measures included consultation with the Westover Tower and Bradley Approach Control, the air traffic facility whose jurisdiction surrounds that of the Westover Tower.

Measures were proposed for both civilian and military operations. The following sections describe each of the measures, the FAA's conclusions at the time (approval or disapproval), and evaluates the procedure in the current environment.

2.1 Nighttime Preferential Runway Use for Civilian Aircraft

Description: This measure calls for civilian aircraft to use Runway 05 for departures and Runway 23 for arrivals to the maximum extent practicable. This preferential runway use was first adopted by the WMDC Board of Directors in 1987. Thus, the recommended pattern of civilian operations would be departures to the north and arrivals from the north, taking advantage of the lower density of residential land uses in Granby and Ludlow. If nighttime operations increased to levels predicted at the time, the WMDC would reevaluate the measure to achieve a more balanced level of runway use.

This non-mandatory measure was recommended in part to assist noise abatement efforts once the Westover Tower remained open for 24 hours per day. At the time, civilian operations could not operate at the Airport when the Westover Tower was closed (11:00 p.m. to 7:00 a.m.) without prior arrangement. The 1996 NCP included the assumption that the Westover Tower would begin 24-hour operations, although this has not yet occurred. Implementing this measure was forecast to reduce the estimated population within the 65 DNL noise contour south of the Airport.

FAA Finding 1996: Approved this voluntary measure.

Current Status: Preferential runway use for civilian operations remains consistent, mostly due to the location of the general aviation facilities (FBO/terminal area). Approximately 80% of civilian operations occur to or from the north. The Westover Tower remains closed to civilian operations from 11:00 p.m. to 7:00 a.m., although the WMDC can request a waiver for the Westover Tower to open prior to 7:00 a.m. or remain open past 11:00 p.m. if needed.

2.2 Noise Abatement Departure Procedures for Military Aircraft on Runway 23

The 1996 NCP proposed that select military C-5 departures from Runway 23 follow a noise abatement procedure. Military operations primarily depart from Runway 23 (south). At the time of the study, C-5 Runway 23 departures were required to climb on runway heading (approximately 230 degrees) until radar contact is confirmed with Bradley Approach Control, located 20 miles south of Westover. Due to the distance between the radar and aircraft, this sometimes resulted in the overflight of heavily populated areas until radar contact was established and aircraft were instructed to turn towards their destination. The proposed flight paths included earlier left or right turns, coordinated with the Bradley Approach Control.

FAA Finding 1996: Approved as voluntary, as implementation was shown to reduce the estimated population within the 65 DNL noise contour.

Current Status: The military continues to use Runway 23 as the primary departure runway. Due to the change in the mission of C-5 aircraft, the types of operations flown have changed to meet wartime flying requirements. C-5 operations do use an early turn to the west to avoid overflight of more heavily populated areas.

2.3 Noise Abatement Departure Procedures for Civilian Aircraft on Runway 23

Description: This measure proposed that civilian aircraft, particularly larger and louder aircraft that depart from Runway 23, use a noise abatement heading of 205 or 255 degrees, rather than flying a runway heading (approximately 230 degrees).

FAA Finding 1996: Approved this voluntary measure. Implementation of this measure would have, at the time, assisted in reducing the number of residences within the 65 DNL noise contour.

Current Status: Many of the larger aircraft that operated at the Airport prior to 2000, such as 727's or 737-200's, were phased out of the fleet through the passage of the Airport Noise and Capacity Act of 1990 (Stage 2 aircraft weighing less than 75,000 pounds will be prohibited from operating in 2015). As a result, the overall fleet of passenger aircraft is quieter. Noise modeling input data, developed in consultation with the Westover Tower, indicates that a majority (approximately 72%) of civilian departures from Runway 23 depart on a course that follows the runway heading (approximately 230 degrees), while approximately 28% depart from the runway and turn towards a heading of approximately 270 degrees.

In consideration of the current and forecast levels of civilian air traffic, the current types of aircraft in use at the airport, and the predominant noise characteristics of the military fleet, it is not expected that use of the noise abatement procedure would reduce the noise-sensitive land uses within the 65 DNL.

FAA Finding 2015: Disapproved. This measure provides no measurable benefit within the 65 DNL contour at this time. Meaningful noise abatement procedures may be designed and recommended under a future NCP update, as the local conditions warrant.

2.4 Noise Abatement Departure Procedures for Civilian Aircraft on Runway 05

Description: The measure called for aircraft, upon departure from Runway 05 and once safely airborne, to turn to an ATC-assigned heading of 080 degrees, then follow instructions issued by Bradley Approach Control towards their respective navigation fix. This early turn of approximately 30 degrees would route departing aircraft further away from the Acrebrook subdivision, taking advantage of more compatible land uses. The measure was proposed to be applicable between the hours of 10:00 p.m. and 6:00 a.m. and was estimated to reduce potential noise impacts in the Acrebrook subdivision, which was also proposed for eligibility under the voluntary acquisition program. The measure was proposed contingent upon FAA approval of the voluntary acquisition program (discussed in Section 5.2.2) to reduce noise north of the Airport, specifically in the Acrebrook neighborhood.

FAA Finding 1996: Approved this voluntary measure. This measure would reduce the number of residences and estimated population within the 65 DNL noise contour.

Current Status: Generally, aircraft departures from Runway 05 fly a runway heading of approximately 50 degrees. In consideration of the current and forecast levels of civilian air traffic, the current types of aircraft in use at the airport, and the predominant noise characteristics of the military fleet, it is not expected that use of the noise abatement procedure would reduce the noise-sensitive land uses within the 65 DNL.

FAA Finding 2015: Disapproved. This measure provides no measurable benefit within the 65 DNL contour at this time. Meaningful noise abatement procedures may be designed and recommended under a future NCP update, as the local conditions warrant.

3.0 Land Use Measures

Land use measures seek to correct existing non-compatible land uses and to further inhibit the development of land uses that could be impacted by noise from aircraft operations. The WMDC does not control the land uses surrounding the Airport, but can make recommendations in consultation with local jurisdictions. The recommended land use measures include mitigation programs (voluntary acquisition and relocation, sound insulation) and preventive measures, which seek to limit the possibility of future non-compatible development.

3.1 Voluntary Land Acquisition and Relocation Program

Description: The intent of the voluntary purchase and relocation program is to eliminate or significantly reduce the number of people remaining in areas of high noise exposure. The 1996 NCP identified approximately 150 residences exposed to 70 DNL, which was updated under the 2004 NEM Update to include approximately 416 potentially eligible structures (single and multi-family structures) within the 70 DNL of the 2003 NEM. The WMDC received funding from the FAA to initiate the voluntary acquisition program in 2005.

FAA Finding 1996: Approved this voluntary measure.

Current Status: **Figure 5-1** presents a map depicting those properties which have been acquired as of December 2013. These 48 properties, accounting for approximately 203 acres, have been acquired, any homes have been demolished, and the land remains vacant (therefore compatible with aircraft operations).

Of the 48 total acquired properties, 39 properties are located in residential areas north of the airport; 23 properties in Granby and 16 properties in Ludlow, while the 9 remaining properties are located to the south of the Airport in Chicopee. For each acquired property, an aviation easement will be attached to the deed after parcel assembly is completed. Once acquired, the properties are maintained by the WMDC until a complete reuse and disposal plan is developed.

FAA Finding 2015: This NCP is proposing that residences exposed to noise levels 65 DNL and above be included in the voluntary acquisition program. The continuation of the program is discussed in Section 5.3. This is a change from the previously-approved noise land acquisition program in the 70 DNL contour, and is the one measure proposed for revision at this time.

Voluntary Acquisition of land is approved, except for those identified parcels now removed from the eligible noise contour. Due to changes in the aircraft fleet mix and level of operations, a number of parcels once eligible for noise mitigation are not eligible at this time. If the level of operations and fleet mix change over time, causing the noise contour to grow, the NEM should once again be updated. This could make more properties eligible for noise mitigation in the future. Noise land acquisition will be accomplished within the parameters of Part 150, the AIP Handbook, and the Uniform Relocation Act.

3.2 Voluntary Sound Insulation Program

Description: A sound insulation program is a voluntary program with the goal of providing acoustic treatment to eligible homes to reach a 5 dB improvement compared to existing indoor levels. The sound insulation program was initially identified to include those residences within the 65 DNL noise contour, in addition to residences located in the 70 DNL noise contour that declined participation in the voluntary acquisition program. In exchange for the installation of sound insulating materials, which typically include acoustically-rated windows and doors, and could include upgrades to mechanical systems, the property owner would be required to grant a noise easement.

FAA Finding 1996: Approved this voluntary measure.

Current Status: A sound insulation program has not been implemented. The WMDC began the voluntary acquisition program once funding became available for homes that experienced higher noise levels. This NCP is proposing that residences exposed to noise levels above 65 DNL within the Future (2019) NEM be included in the voluntary acquisition program. The WMDC prefers to complete the voluntary acquisition program prior to initiating a sound insulation program. Any initiation of a sound insulation program will be approved in advance by the FAA, to ensure conformance with Part 150.

3.3 Compatible Use Zoning

Description: Zoning for compatible land uses includes rezoning land that may be developed with noise-sensitive land uses, such as residences, places of worship, or schools. Rezoning would change the development potential of the land to a use that is more compatible with aircraft operations, such as industrial or open space. The 1996 NCP included specific recommendations for each city or town in order to minimize chances that new noncompatible land uses will be developed within the 65 DNL contour. The 1996 NCP suggested that

Chicopee, Granby and Ludlow maintain their existing zoning but consider adopting overlay zoning, and that Springfield and South Hadley maintain their existing industrial zoning classifications.

FAA Finding 1996: The FAA, although it has no jurisdiction in local land use affairs, approved this measure.

Current Status: Based on zoning information provided by MassGIS, portions of the Future (2019) NEM 65 DNL contour include residential zoning in Granby, residential-agricultural zoning in Ludlow, and general industrial and residential zoning in Chicopee. The 65 DNL noise contour does not include land within South Hadley or Springfield, although aircraft do overfly these areas. The WMDC will continue to work with each jurisdiction to determine the feasibility of implementing this measure.

3.4 Airport Overlay District

Description: An overlay district is a zoning technique which identifies additional restrictions on development in addition to the underlying zoning, by modifying (but not eliminating) the underlying zoning. Overlay districts offer an option to provide a more flexible development control than that of changing the allowed uses in entire zoning districts and focusing on only the portion of the community with potential non-compatible land uses.

Since 1992, the Town of Ludlow has had an Aircraft Flight Overlay District intended to protect the public health, safety, and general welfare; and to protect human life and property from hazards of aircraft noise and accident potential created by the Town's proximity to Westover. By 1996, Ludlow had implemented the aircraft flight overlay district, encompassing the noise and accident potential zones from the AICUZ. At that time, hospitals, nursing homes, auditoriums and concert halls were prohibited within the overlay districts. Educational and religious institutions are permitted by right in all districts according to the Massachusetts Zoning Enabling Act, and the Town had sought and received home rule authority from the state legislature to allow restriction of development of schools, day care centers, and houses of worship within accident potential zones. The existing overlay district does not prohibit residential land uses or impose sound insulating requirements on residential lands.

The initial NCP recommended that Chicopee and Granby adopt an airport overlay district which encompasses land within the 65 DNL contour, and that the town of Ludlow change the boundaries of its airport overlay district to include all of the land within the forecasted 1998 contour.

FAA Finding 1996: The FAA, although it has no jurisdiction in local land use affairs, approved this measure for the purposes of Part 150.

Current Status: No further changes to the Town of Ludlow's overlay district have been implemented, and no other jurisdictions have developed an overlay district to date. The 65 DNL noise contour of the Future (2019) NEM extends into Ludlow, Granby and Chicopee. The WMDC will continue to work with each jurisdiction to determine the feasibility of implementing this measure.

3.5 Subdivision Regulations

Description: Subdivision regulations describe the procedures and standards for the division of parcels of land, most notably for sale or development as smaller parcels. The use of subdivision regulations by a municipality prescribes certain conditions that must be met by a developer prior to receipt and recordation of a plat. Generally, amending subdivision regulations is most practical when large amounts of undeveloped land are present.

The 1996 NCP recommended that the Town of Granby, as the jurisdiction with the most notable assemblage of undeveloped land within the 65 DNL noise contour, amend their subdivision regulations to require noise easements to be obtained on newly created lots within the 65 DNL noise contour.

FAA Finding 1996: The FAA, although it has no jurisdiction in local land use affairs, approved this measure for the purposes of Part 150.

Current Status: The Town of Granby has not included the recommendations requiring noise easements into their subdivision regulations. The 65 DNL noise exposure contour of the Future (2019) NEM extends into Granby, in areas in which the WMDC is currently offering voluntary acquisition. The WMDC will continue to work with Granby to determine the feasibility of implementing this measure.

4.0 Implementation, Monitoring, and Review Measures

Implementation, monitoring, and review measures are those that can be undertaken by the WMDC to track the progress of the recommended noise compatibility program. They include measures that are designed to increase awareness of noise abatement and mitigation, and provisions for the continued monitoring of noise surrounding an Airport. The 1996 NCP identified four measures for inclusion in the program, as described in the following sections.

4.1 Pilot Awareness Program

Description: This measure identified that the WMDC would publish a pamphlet of noise abatement practices to be distributed to civilian pilots through the aviation services provider and WMDC's airport management. The pamphlet would include a map of noise sensitive areas around the airport and describe the operational measures which WMDC has adopted for noise abatement, including use of noise abatement departure procedures recommended by the National Business Aircraft Association or by individual aircraft manufacturers. The measure suggested that the WMDC would install signs in all terminal areas frequented by civilian pilots and along ramp and taxiway areas controlled by WMDC, instructing pilots to follow noise abatement procedures.

FAA Finding 1996: This measure was approved, with the caveat that the location and content of signs may be subject to FAA approval.

Current Status: The WMDC has installed signs in the terminal area pilot lounge and in areas leading to airside facilities directing pilots to be aware of noise-sensitive locations around the Airport. The WMDC is further evaluating the feasibility of installing more permanent signs encouraging the use of the noise abatement procedures for civilian aircraft from Runways 5 and 23.

4.2 Public Awareness Program

Description: This measure served to increase public awareness in the surrounding communities regarding the latest developments in the noise compatibility program.

FAA Finding 1996: Approved this voluntary measure.

Current Status: WMDC currently offers a voluntary acquisition and relocation program to property owners within the updated 2003 NEM. As part of that practice, the WMDC maintains contact with property owners within the 65 DNL noise contours.

4.3 Monitoring Nighttime Operations and Runway Use

Description: This measure was intended to assist in the identification and quantification of nighttime aircraft activity, specifically during the hours in which the Westover Tower was closed. Information to be collected included the time, type aircraft, registration/flight number, landing or take-off, runway used, and wind and weather conditions. The information would be used to determine compliance with WMDC's nighttime noise rule and to help provide guidance to Air Force contract tower personnel to determine compliance with the preferential runway use program.

FAA Finding 1996: The FAA approved in part and disapproved in part this measure. The FAA required the submittal of additional information regarding the noise rule, and stated that using the data to ensure compliance with any rules that would essentially limit aircraft operations would require an additional noise study.

Current Status: The Westover Tower tracks operations during hours the tower is open. Minimum operations occur during nighttime hours (10:00 p.m. to 7:00 a.m.). The additional information noted in the 1996 FAA Finding has not been submitted, and therefore the partial disapproval remains in effect.

4.4 Periodic Updates of Noise Exposure

Description: This measure recommended the ongoing monitoring of changes in noise exposure at the Airport, primarily by focusing on the changes that would likely have the greatest impact to cause an increase in cumulative noise exposure. The original measure identified, as primary potential drivers of noise exposure, any planned changes in scheduled jet operations by civilian aircraft, any planned changes in nighttime operations by civil aircraft, or annual changes in total civil operations.

FAA Finding 1996: Approved.

Current Status: As indicated in the introduction to the NCP in this chapter, the WMDC has completed or supported multiple evaluations of noise exposure as a result of changes in operations, including this update. WMDC will provide periodic NEM updates as required by law and regulation.

APPENDIX C

AEE Coordination

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DRAFT

MEMORANDUM



To
Richard Doucette
Environmental Program Manager
New England Region
Federal Aviation Administration
12 New England Executive Park
Burlington, MA 01803

From
Yue Xu, HNTB

Cc
Gordon Hutchinson, WMDC
Ervin Deck, Stantec
Randall Christensen, Stantec
Kim Hughes, HNTB

Subject
Request for Non-standard Substitution
Aircraft and Weather Parameters for
Westover Air Reserve/Metropolitan Airport
Noise Exposure Map Update and EA

Date
April 19, 2018

The Westover Metropolitan Development Corporation (WMDC) has initiated a Part 150 Update and an Environmental Assessment (EA) for Westover Air Reserve Base (WARB)/Metropolitan Airport (CEF), with the assistance of Stantec Consulting Services and HNTB Corporation. The WMDC oversees civilian operations at CEF which is currently open 16 hours per day. The Airport is also home to the Massachusetts Air Force Reserve 439th Airlift Wing, which previously operated Lockheed C-5A Galaxy aircraft and has upgraded to the C-5M Super Galaxy. The Part 150 Update is being prepared to assess the impacts of the C-5M Super Galaxy fleet upgrade. The WMDC has proposed to extend CEF operating hours to 24 hours per day and the EA is being prepared to assess the potential environmental impacts of this proposed change in operating hours.

HNTB is preparing noise exposure contours representative of existing conditions in 2018 and forecast conditions in 2023 using the Aviation Environmental Design Tool (AEDT) 2d and NOISEMAP Version 7.363 for both the Part 150 Update and EA. Four aircraft identified in the existing and forecast fleet mixes do not have direct AEDT type or pre-approved AEDT substitutions, as shown in **Table 1**. This request is in accordance with the required protocol to obtain approval of non-standard aircraft substitution related to AEDT¹.

¹ *Guidance on Using the Aviation Environmental Design Tool (AEDT) to Conduct Environmental Modeling for FAA Actions Subject to NEPA*, FAA, October 27, 2017.

Table 1
Non-standard AEDT Aircraft Substitution for Westover Part 150/EA

Aircraft Code	Aircraft Description	AEDT Model / Substitution Model	Recommended EQUIP_ID	ANP_ID	BADA_ID
BE35	Beech Bonanza 35	Raytheon Beech Bonanza 36	1276	CNA208	TBM8
DA40	Diamond Star DA40	EADS Socata TB-10 Tobago	1904	GASEPV	TB21
F22	Boeing Raptor F22	Boeing F-15E Strike Eagle	4235	F15E29	FGTN
S22T	Cirrus SR-22 Turbo	Cirrus SR22	1325	COMSEP	SR22

Sources: Westover Air Traffic Control Tower and HNTB analysis, 2018.

BE35 – Beech Bonanza 35

The Beech Bonanza 35 is a single-engine general aviation aircraft powered by a Continental E-185-1 engine (185 hp) with an MTOW of 3,400 lbs. HNTB recommends using the Raytheon Beech Bonanza 36 (AEDT Equipment ID = 1276, ANP Code = CNA208, and BADA ID = TBM8) as a substitute. The Raytheon Beech Bonanza 36 is a single-engine aircraft powered by a Continental IO-550-B engine (300 hp) with an MTOW of 3,650 lbs.

DA40 - Diamond Star DA40

The Diamond Star DA40 is a low-wing, single-engine piston aircraft with an MTOW of 2,535 lbs. It is powered by a Lycoming IO-360-M1A engine producing 180 hp. The Diamond DA40 has a two or three-blade, constant speed variable pitch propeller. HNTB recommends using the EADS Socata TB-10 Tobago (AEDT Equipment ID = 1904, ANP Code = GASEPV, and BADA ID = TB21) as a substitute. The ADS Socata TB-10 Tobago has a MTOW of 2,530 lbs. and is powered by a Lycoming O-360-A1AD engine producing 180 hp. The ADS Socata TB-10 Tobago and Diamond Star DA40 have similar engines and MTOWs.

F22 – Boeing Raptor F22

The Boeing Raptor F22 is a twin-engine fighter aircraft powered by two Pratt & Whitney F119-PW-100 turbofans and has an MTOW of 83,500 lbs. HNTB recommends using the Boeing F-15E Strike Eagle (AEDT Equipment ID = 4235, ANP Code = F15E29, and BADA ID = FGTN) as a substitute. The Boeing F-15E Strike Eagle is a twin-engine fighter aircraft powered by two Pratt & Whitney F100-PW-229 turbofans and has an MTOW of 81,000 lbs. The Boeing Raptor F22 and Boeing F-15 Eagle have similar engines and MTOWs.

S22T - Cirrus SR22 Turbo

The Cirrus SR22 Turbo is a turbocharged version of the Cirrus SR-22. It has an MTOW of 3,600 lbs and is powered by a Tornado Alley turbonormalizing upgrade kit (310 hp) or a ground-boosted Continental TSIO-550K engine producing (315 hp). HNTB recommends using the Cirrus SR22 (AEDT Equipment ID = 1325, ANP Code = COMSEP, and BADA ID = SR22) as a substitute. Considering the relatively low altitude of Westover Airport (245ft), it is doubtful that the turbocharged version of the Cirrus SR22 produces considerably different noise signature than the standard version.

HNTB also proposes to apply the 30-year average temperature and pressure at CEF² as the AEDT default temperature and pressure are missing for CEF, as shown in **Table 2**. HNTB collected temperature and pressure data of the weather station 744910 – Westover AFB/Metropolitan Airport (between April 1989 and March 2018). The calculated average temperature and pressure, together with other AEDT default weather parameters, are recommended to be applied in the study.

Table 2
Temperature and Pressure

Parameter	AEDT Default	Recommended Value
Temperature	0	50.0 (°F)
Pressure	0	1,006.6 (millibars)

Sources: FAA AEDT 2d and NOAA, 2018.

We are requesting the approval or recommendation of five non-standard AEDT aircraft substitutions and 30-year average temperature and pressure for use in the Westover Part 150 and EA noise analysis. Should you have any additional questions, please do not hesitate to contact me. Thank you in advance for your consideration of this request.

Best regards,



Yue Xu, Ph.D., P.E.
Aviation/Environmental Planner
HNTB Corporation

² Global Summary of the Day, Climate Data Online, National Centers for Environmental Information, National Oceanic and Atmospheric Administration, <https://www.ncdc.noaa.gov/cdo-web/datasets>, accessed April 2018.



U.S. Department
of Transportation
**Federal Aviation
Administration**

Office of Environment and Energy

800 Independence Ave., S.W.
Washington, D.C. 20591

5/8/2018

Richard Doucette
Airports Division
Federal Aviation Administration,
New England Region
1200 District Avenue
Burlington, MA 01803

Dear Richard,

The Office of Environment and Energy (AEE) has received the memo dated April 19th 2018, referencing the 14 CFR Part 150 for Westover Air Reserve Base/Metropolitan Airport (WARB/CEF) for the user defined AEDT aircraft substitutions and user entered atmospheric conditions listed below:

Aircraft Code	Aircraft Description	AEDT Model / Substitution Model	Recommended EQUIP_ID	ANP_ID	BADA_ID	AEE Requirement
BE35	Beech Bonanza 35	Raytheon Beech Bonanza 36	1276	CNA208	TBM8	Concur
DA40	Diamond Star DA40	EADS Socata TB-10 Tobago	1904	GASEPV	TB21	Concur
F22	Boeing Raptor F22	Boeing F-15E Strike Eagle	4235	F15E29	FGTN	Model with DOD NoiseMap
S22T	Cirrus SR-22 Turbo	Cirrus SR22	1325	COMSEP	SR22	Concur

AEE grants approval for all of the recommended substitutions **except** for the Boeing Raptor F22. Due to the unique noise and performance characteristics of fifth generation, military fighter aircraft AEE is unable to approve AEDT substitution requests for these aircraft. Noise modeling for F22 operations should therefore be conducted using the DOD NoiseMap model. The NoiseMap noise results should then be combined with the civil aircraft AEDT noise results, using tools available in AEDT.

Parameter	AEDT Default	Recommended Value	AEE Recommendation
Temperature (°F)	NA	50.0	Concur
Pressure (millibars)	NA	1,006.6	Concur
Sea Level Pressure (millibars)	1016.52		Update with NOAA data
Relative humidity (%)	65.33		Update with NOAA data
Dew Point (°F)	38.74		Update with NOAA data
[Average] Wind Speed (knots)	6.62		Update with NOAA data

AEE concurs with the use of the NOAA Global Summary of the Day, Climate Data Online, National Centers for Environmental Information Data for use in providing updated atmospheric data. Due to the lack of available temperature and pressure information in the AEDT standard database, AEE recommends that to ensure data consistency that all of the required parameters be updated to use the same NOAA data source.

Please understand that this approval is limited to this particular 14 CFR Part 150 evaluation at Westover Air Reserve Base/Metropolitan Airport and that other non-standard AEDT inputs for additional projects at this or any other site will require separate approval.

Sincerely,



Rebecca Cointin
 Manager
 AEE-100/Noise Division

cc: Airports Contact (Jim Byers APP-400)

APPENDIX D

Noise and Its Effect on People

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APPENDIX D

Noise and Its Effect on People

Aircraft noise exposure in this document is primarily addressed using the Day-Night Average Sound Level (DNL) metric. This study also involves the use of supplemental noise metrics in addition to DNL to provide comprehensive analysis for quantifying a specific situation. To assist reviewers in interpreting complex noise metrics, this appendix presents an introduction to the relevant fundamentals of acoustics and noise terminology, and the effects of noise on human activity.

D.1 Noise and its Metrics

Noise, often defined as unwanted sound, is one of the most common environmental issues associated with aircraft operations. Of course, aircraft are not the only sources of noise in an urban or suburban surrounding, where interstate and local roadway traffic, rail, industrial and neighborhood sources may also intrude on the everyday quality of life. Nevertheless, aircraft are readily identifiable to those affected by their noise and are typically singled out for criticism. Consequently, aircraft noise problems often dominate analyses of environmental impacts.

A “metric” is defined as something “of, involving, or used in measurement.” As used in environmental noise analyses, a metric refers to the unit or quantity that quantitatively measures the effect of noise on the environment. Noise studies have typically involved a confusing proliferation of noise metrics used by individual researchers who have attempted to understand and represent the effects of

noise. As a result, literature describing environmental noise or environmental noise abatement has included many different metrics.

Various federal agencies involved in environmental noise mitigation have agreed on common metrics for environmental impact analysis documents. Furthermore, the Federal Aviation Administration (FAA) has specified which metrics, such as DNL, should be used for federal aviation noise assessments.

This section discusses the following acoustic terms and metrics:

- Decibel (dB)
- A-Weighted Decibel (dBA)
- Maximum Sound Level (L_{max})
- Sound Exposure Level (SEL)
- Equivalent Sound Level (L_{eq})
- Day-Night Average Sound Level (DNL)
- Time-Above a Specified Level (TA)

D.1.1 The Decibel (dB)

All sounds come from a sound source—a musical instrument, a speaking voice, or an airplane passing overhead. It takes energy to produce sound. The sound energy produced by any sound source is transmitted through the air in sound waves—tiny, quick oscillations of pressure just above and just below atmospheric

pressure. These oscillations, or sound pressures, impinge on the ear creating the sound we hear.

Our ears are sensitive to a wide range of sound pressures. The loudest sound that we hear without pain has about one trillion times more energy than the quietest sounds we hear. On a linear scale, this range is unwieldy. Therefore we compress the total range of sound pressures to a more meaningful range by introducing the concept of sound pressure level (SPL) and its logarithmic unit of decibel (dB).

SPL is a measure of the sound pressure of a given noise source relative to a standard reference value (typically the quietest sound that a young person with good hearing can detect). Decibels are logarithmic quantities—logarithms of the ratio of the two pressures, the numerator being the pressure of the sound source of interest, and the denominator being the reference pressure (the quietest sound we can hear).

The logarithmic conversion of sound pressure to SPL means that the quietest sound we can hear (the reference pressure) has a SPL of about zero decibels, while the loudest sounds we hear without pain have SPLs less than or equal to about 120 dB. Most sounds in our day-to-day environment have SPLs from 30 to 100 dB.

Because decibels are logarithmic quantities, they require logarithmic math and not simple (linear) addition and subtraction. For example, if two sound sources each produce 100 dB and are operated together, they produce only 103 dB—not 200 dB as might be expected. Four equal sources operating simultaneously result in a total SPL of 106 dB. In fact, for every doubling of the number of equal sources, the SPL (of all of the sources combined) increases another three decibels. A ten-fold increase in the

number of sources makes the SPL increase by 10 dB. A hundredfold increase makes the level increase by 20 dB, and it takes a thousand equal sources to increase the level by 30 dB.

If one source is much louder than another, the two sources together will produce the same SPL (and sound to our ears) as if the louder source were operating alone. For example, a 100 dB source plus an 80 dB source produce 100 dB when operating together. The louder source “masks” the quieter one. But if the quieter source gets louder, it will have an increasing effect on the total SPL. When the two sources are equal, as described above, they produce a level 3 decibels above the sound level of either one by itself.

From these basic concepts, note that one hundred 80 dB sources will produce a combined level of 100 dB; if a single 100 dB source is added, the group will produce a total SPL of 103 dB. Clearly, the loudest source has the greatest effect on the total.

There are two useful rules of thumb to remember when comparing SPLs: (1) most of us perceive a 6 to 10 dB increase in the SPL to be an approximate doubling of loudness, and (2) changes in SPL of less than about 3 dB are not readily detectable outside of a laboratory environment.

D.1.2 A-Weighted Decibel (dBA)

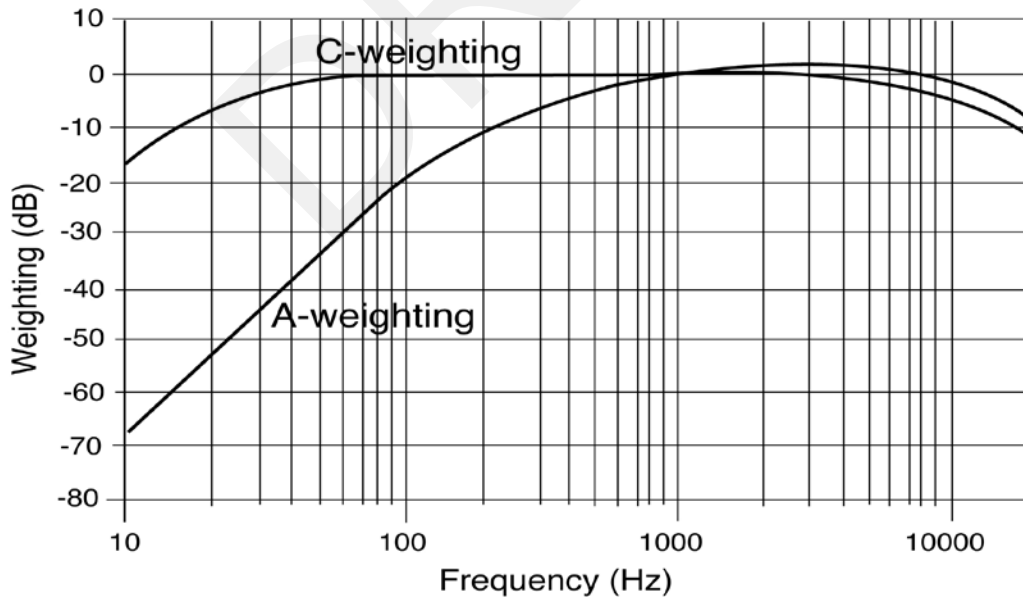
Another important characteristic of sound is its frequency, or “pitch.” This is the rate of repetition of the sound pressure oscillations as they reach our ear. Frequency can be expressed in units of cycles per second (cps) or Hertz (Hz). Although cps and Hz are equivalent, Hz is the preferred scientific unit and terminology.

A very good ear can hear sounds with frequencies from 16 Hz to 20,000 Hz. However, most people hear from approximately 20 Hz to approximately 10,000-15,000 Hz. People respond to sound most readily when the predominant frequency is in the range of normal conversation, around 1,000 to 4,000 Hz. Acousticians have developed and applied “filters” or “weightings” to SPLs to match our ears’ sensitivity to the pitch of sounds and to help us judge the relative loudness of sounds made up of different frequencies. Two such filters, “A” and “C,” are most applicable to environmental noises.

A-weighting significantly de-emphasizes noise at low and high frequencies (below approximately 500 Hz and above approximately 10,000 Hz) where we do not hear as well. The filter has little or no effect at intervening frequencies where our hearing is most efficient. **Figure D-1** shows a graph of the A-weighting as a function of frequency and its aforementioned characteristics. Because this filter generally matches our ears’ sensitivity, sounds having higher A-weighted sound levels are usually judged to be louder than those with lower A-weighted sound levels, a relationship which does not always hold true for unweighted levels. Therefore, A-weighted sound levels are normally used to evaluate environmental noise. SPLs measured through this filter are referred to as A-weighted decibels (dBA).

Figure D-1

Frequency Response Characteristics of Various Weighting Networks



Source: ANSI S1.4-1983 “Specification of Sound Level Meters.”

As shown in Figure D-1, C-weighting is nearly flat throughout the audible frequency range, hardly de-emphasizing the low frequency noise. C-weighted levels are not used as frequently as A-weighted levels, but they may be preferable in evaluating sounds whose low-frequency components are responsible for secondary effects such as the shaking of a building, window rattle, perceptible vibrations or other factors that can cause annoyance and complaints. Uses include the evaluation of blasting noise, artillery fire, sonic boom, and in some cases, aircraft noise inside buildings. SPLs measured through this filter are referred to as C-weighted decibels (dBC).

Other weighting networks have been developed to correspond to the sensitivity and perception of other types of sounds, such as the “B” and “D” filters. However, A-weighting has been adopted as the basic measure of community environmental noise by the U.S. Environmental Protection Agency (EPA) and nearly every other agency concerned with aircraft noise throughout the United States.

Figure D-2 presents typical A-weighted sound levels of several common environmental sources. Sound levels measured (or computed) using A-weighting are most properly called “A-weighted sound levels” while sound levels measured without any frequency weighting are most properly called “sound levels.” However, since this document deals only with A-weighted sound levels, the adjective “A-weighted” will be hereafter omitted, with A-weighted sound levels referred to simply as sound levels. As long as the use of A-weighting is understood, there is no difference implied by the terms “sound level” and “A-weighted sound level” or by the dB or dBA units.

An additional dimension to environmental noise is that sound levels vary with time and typically have a limited duration, as shown in **Figure D-3**. For example, the sound level increases as an aircraft approaches, then falls and blends into the background as the aircraft recedes into the distance (although even the background varies as birds chirp, the wind blows or a vehicle passes by). Sounds can be classified by their duration as continuous like a waterfall, impulsive like a firecracker or sonic boom or intermittent like an aircraft overflight or vehicle passby.

D.1.3 Maximum Sound Level (L_{max})

The variation in sound level over time often makes it convenient to describe a particular noise “event” by its maximum sound level, abbreviated as L_{max} . For the aircraft overflight event in Figure D-3, the L_{max} is approximately 67 dBA.

Figure D-4 shows L_{max} values for a variety of common aircraft from the FAA’s Integrated Noise Model (INM) database. These L_{max} values for each aircraft type are for aircraft performing a maximum stage (trip) length departure on a day with standard atmospheric conditions at a reference distance of 3.5 nautical miles (NM) from their brake release point. Of the dozen aircraft types listed on the figure, the Concorde has the highest L_{max} and the Saab 340 (SF340) has the lowest L_{max} .

The maximum level describes only one dimension of an event; it provides no information on the cumulative noise exposure generated by a sound source. In fact, two events with identical maxima may produce very different total exposures. One may be of short duration, while the other may continue for an extended period. The metric, discussed later in this appendix, corrects for this deficiency.

Figure D-2

Sound Levels of Typical Noise Sources (dBA)

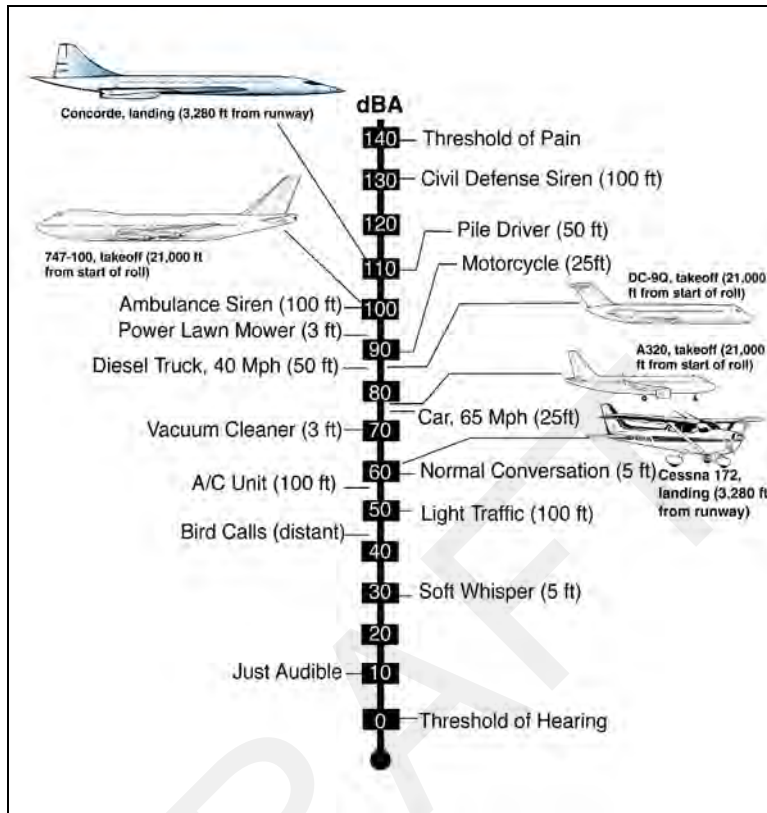
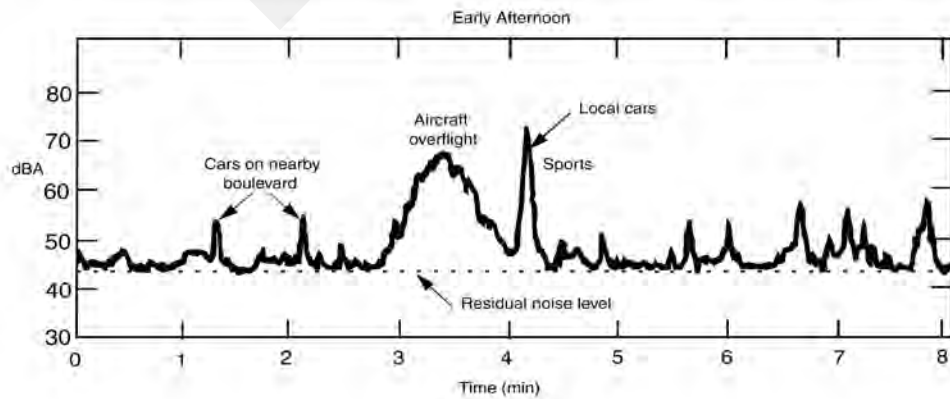


Figure D-3

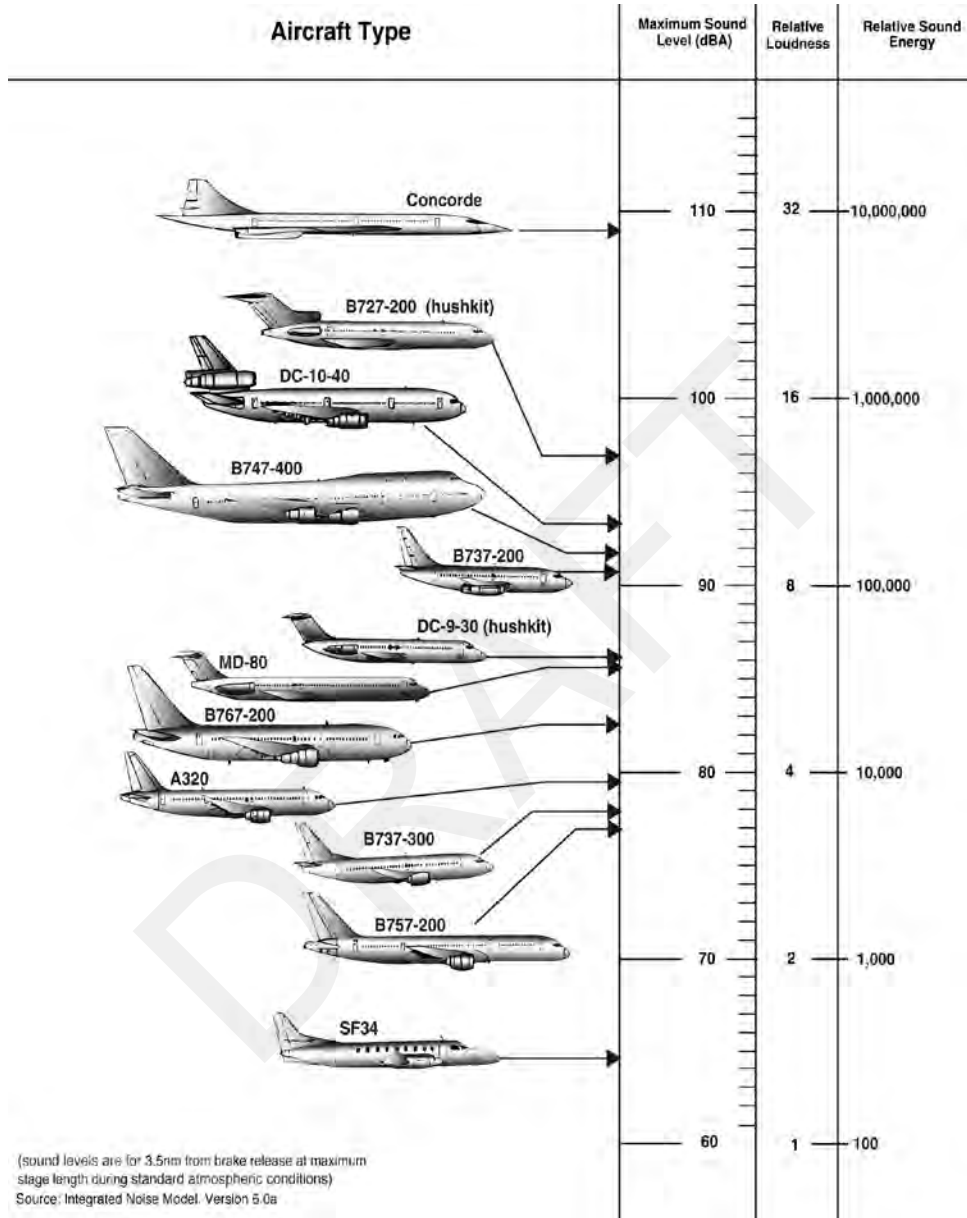
Variation of Community Noise in a Suburban Neighborhood



Source: "Community Noise," NTID 300.3 EPA, December 1971.

Figure D-4

Common Aircraft Departure Noise Levels



D.1.4 Sound Exposure Level (SEL)

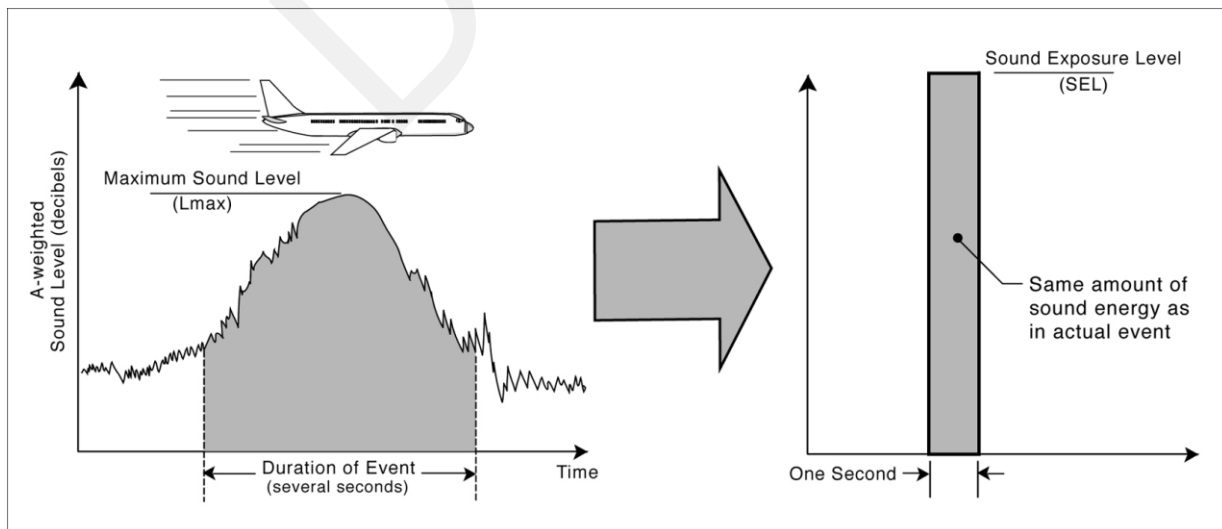
A frequently used metric of noise exposure for a single aircraft flyover is the Sound Exposure Level, or SEL. SEL may be considered an accumulation of the sound energy over the duration of an event. The shaded area in **Figure D-5** illustrates that portion of the sound energy (or “dose”) included in an SEL computation. The dose is then normalized (standardized) to a duration of one second. This “revised” dose is the SEL, shown as the shaded rectangular area in Figure D-5. Mathematically, the SEL represents the sound level of the constant sound that would, in one second, generate the same acoustic energy as the actual time-varying noise event. For events that last more than one second, SEL does not directly represent the sound level heard at any given time, but rather provides a measure of the net impact of the entire acoustic event.

Note that, because the SEL is normalized to one second, it will always be larger in magnitude than the maximum A-weighted level for an event that lasts longer than one second. In fact, for most aircraft overflights, the SEL is on the order of 7 to 12 dBA higher than the L_{max} . The fact that it is a cumulative measure means that not only do louder flyovers have higher SELs than quieter ones (of the same duration), but longer flyovers also have greater SELs than shorter ones (of the same L_{max}).

It is the SEL’s inclusion of both the intensity and duration of a sound source that makes SEL the metric of choice for comparing the single-event levels of varying duration and maximum sound level. This metric provides a comprehensive basis for modeling a noise event in determining overall noise exposure.

Figure D-5

Relationship Between Single Event Noise Metrics



D.1.5 Equivalent Sound Level (L_{eq})

Maximum A-weighted level and SEL are used to measure the noise associated with individual events. The following metrics apply to longer-term cumulative noise exposure that often includes many events.

The first cumulative noise metric, the Equivalent Sound Level (abbreviated L_{eq}), is a measure of the exposure resulting from the accumulation of A-weighted sound levels over a particular period of interest (e.g., an hour, an 8-hour school day, nighttime or a full 24-hour day). However, because the length of the period can be different depending on the time frame of interest, the applicable period should always be identified or clearly understood when discussing the metric. Such durations are often identified through a subscript, for example $L_{eq(8)}$ or $L_{eq(24)}$.

As for its application to aircraft noise issues, L_{eq} is often presented for consecutive 1-hour periods to illustrate how the hourly noise dose rises and falls throughout a 24-hour period, as well as how certain hours are significantly affected by a few loud aircraft. Since the period of interest for this study is in a full 24-hour day, $L_{eq(24)}$ is the proper nomenclature.

Conceptually, L_{eq} may be thought of as a constant sound level over the period of interest that contains as much sound energy as the actual time-varying sound level with its normal “peaks” and “valleys,” as illustrated in Figure D-3. In the context of noise from typical aircraft flight events and as noted earlier for SEL, L_{eq} does not represent the sound level heard at any particular time, but rather represents the total sound exposure for the period of interest. Also, it should be noted that the “average” sound level suggested by L_{eq} is

not an arithmetic value, but a logarithmic, or “energy-averaged,” sound level. Thus, loud events tend to dominate the noise environment described by the L_{eq} metric.

D.1.6 Day-Night Average Sound Level (DNL)

DNL is the same as L_{eq} (an energy-average noise level over a 24-hour period) except that 10 dB is added to those noise events occurring at night (between 10 p.m. and 7 a.m.). This weighting reflects the added intrusiveness of nighttime noise events attributable to the fact that community background noise levels typically decrease by about 10 dB during those nighttime hours. DNL does not represent the sound level heard at any particular time, but rather represents the total (and partially weighted) sound exposure.

Typical DNL values for a variety of noise environments are shown in **Figure D-6** to indicate the range of noise exposure levels usually encountered.

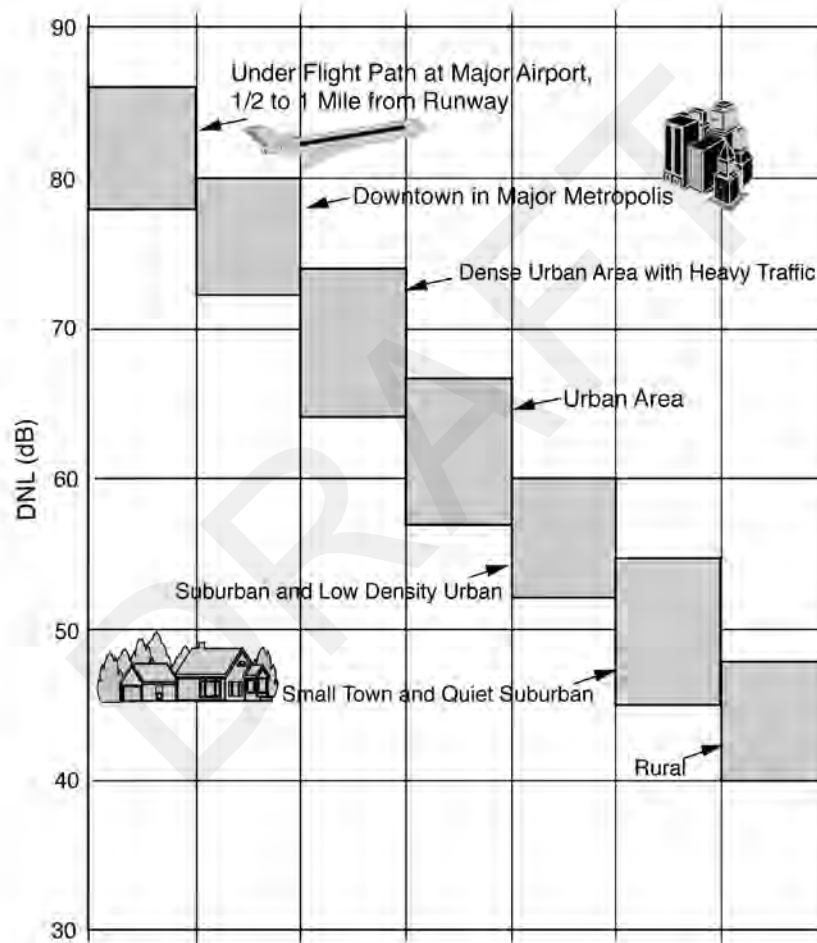
Due to the DNL metric’s excellent correlation with the degree of community annoyance from aircraft noise, DNL has been formally adopted by most federal agencies for measuring and evaluating aircraft noise for land use planning and noise impact assessment. Federal interagency committees such as the Federal Interagency Committee on Urban Noise (FICUN) and the Federal Interagency Committee on Noise (FICON) which include the EPA, FAA, Department of Defense, Department of Housing and Urban Development (HUD), and Veterans Administration, found DNL to be the best metric for land use planning. They also found no new cumulative sound descriptors or metrics of sufficient scientific standing to substitute for DNL. Other cumulative

metrics could be used only to supplement, not replace DNL. Furthermore, FAA Order 1050.1E for environmental documents requires that DNL be used in describing cumulative noise exposure and in identifying aircraft noise/land use compatibility issues.^{1 2 3 4 5}

Measurements of DNL are practical only for obtaining values for a relatively limited number of points. Instead, many noise studies, including this document, are based on estimates of DNL using an FAA-approved computer-based noise model.

Figure D-6

Typical Range of Outdoor Community Day-Night Average Sound Levels



Source: U.S. Department of Defense, Departments of the Air Force, the Army, and the Navy, 1978. *Planning in the Noise Environment*. AFM 19-10, TM 5-803-2, and NAVFAC P-970. Washington, D.C.: U.S. DoD.

D.1.7 Time-Above a Specified Level (TA)

The Time-Above a Specified Level (TA) metric describes the total number of minutes that instantaneous sound levels (usually from aircraft) are above a given threshold. For example, if 65 dB is the specified threshold, the metric would be referred to as “TA65.” Like DNL, the TA metric is typically associated with a 24-hour annual average day or only for the DNL nighttime period of 10 p.m. to 7 a.m.

When the TA calculation is expressed as a percentage of the day it is referred to as “%TA.” Although the threshold chosen for the TA calculation is arbitrary, it is usually the ambient level for the location of interest or 65 dB for comparison to a level of 65 dB DNL.

D.2 The Effects of Aircraft Noise on People

To many people, aircraft noise can be an annoyance and a nuisance. It can interfere with conversation and listening to television, disrupt classroom activities in schools and disrupt sleep. Relating these effects to specific noise metrics aids in the understanding of how and why people react to their environment. This section addresses three ways we are potentially affected by aircraft noise: annoyance, interference of speech and disturbance of sleep.

D.2.1 Community Annoyance

The primary potential effect of aircraft noise on exposed communities is one of annoyance. The U.S. EPA defines noise annoyance as any negative subjective reaction on the part of an individual or group.¹

Scientific studies^{1 2 3 6 7} and a large number of social/attitudinal surveys^{8 9} have been conducted to appraise the U.S. and international community of annoyance due to all types of environmental noise, especially aircraft events. These studies and surveys have found the DNL to be the best measure of that annoyance.

This relation between community annoyance and time-average sound level has been confirmed, even for infrequent aircraft noise events.¹⁰ For helicopter overflights occurring at a rate of 1 to 52 per day, the stated reactions of community individuals correlated with the daily time-average sound levels of the helicopter overflights.

The relationship between annoyance and DNL that has been determined by the scientific community and endorsed by many federal agencies, including the FAA, is shown in **Figure D-7**. Two lines in Figure D-7 represent two large sets of social/attitudinal surveys: one for a curve fit of 161 data points compiled by an individual researcher, Ted Schultz, in 1978⁸ and one for a curve fit of 400 data points (which include Schultz’s 161 points) compiled in 1992 by the U.S. Air Force.¹¹ The agreement of these two curves simply means that when one combines the more recent studies with the early landmark surveys in 1978, the results of the early surveys (i.e., the quantified effect of noise on annoyance) are confirmed.

Figure D-7 shows the percentage of people “highly annoyed” by a given DNL. For example, the two curves in the figure yield a value of about 13% for the percentage of people that would be highly annoyed by a DNL exposure of 65 dB. The figure also shows that at very low values of DNL, such as 45 dB or less, 1% or less of the exposed

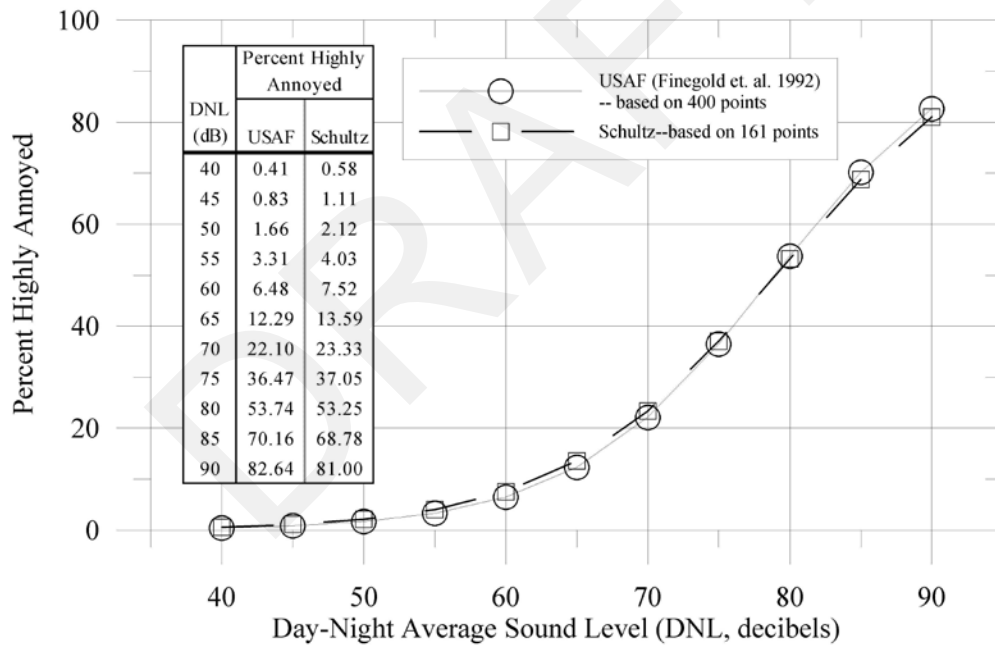
population would be highly annoyed. Furthermore, at very high values of DNL, such as 90 dB, more than 80% of the exposed population would be highly annoyed.

Recently, the use of DNL has been criticized as not accurately representing community annoyance and land-use compatibility with aircraft noise. One frequent criticism is based on the inherent feeling that people react more to single

noise events and not as much to “meaningless” time-average sound levels. In fact, a time-average noise metric, such as DNL, takes into account both the noise levels of all individual events which occur during a 24-hour period and the number of times those events occur. As described briefly above, the logarithmic nature of the decibel unit causes the noise levels of the loudest events to control the 24-hour average.

Figure D-7

Relationship Between Annoyance and Day-Night Average Sound Level



Source: Federal Interagency Committee on Noise (FICON), "Federal Agency Review of Selected Airport Noise Analysis Issues", August 1992, p. 3-6, Figure 3.1

As a simple example of this characteristic, consider a case in which only one aircraft overflight occurs in daytime hours during a 24-hour period, creating a sound level of 100 dB for 30 seconds. During the remaining 23 hours 59 minutes and 30 seconds of the day, the ambient sound level is 50 dB. The DNL for this 24-hour period is 65.5 dB. As a second example, assume that 10 such 30-second overflights occur in daytime hours during the next 24-hour period, with the same ambient sound level of 50 dB during the remaining 23 hours and 55 minutes of the day. The DNL for this 24-hour period is 75.4 dB. Clearly, the averaging of noise over a 24-hour period does not ignore the louder single events and tends to emphasize both the sound levels and number of those events. This is the basic concept of a time-average sound metric, and, specifically, the DNL.

It is often suggested that a lower DNL, such as 60 or 55 dB, be adopted as the threshold of community noise annoyance for FAA environmental analysis documents. While there is no technical reason why a lower level cannot be measured or calculated for comparison purposes, a DNL of 65 dB:

- Provides a valid basis for comparing and assessing community noise effects.
- Represents a noise exposure level that is normally dominated by aircraft noise and not other community or nearby highway noise sources.
- Reflects the FAA's threshold for grant-in-aid funding of airport noise mitigation projects.
- HUD also established a DNL standard of 65 dB for eligibility for federally guaranteed home loans.

D.2.2 Speech Interference

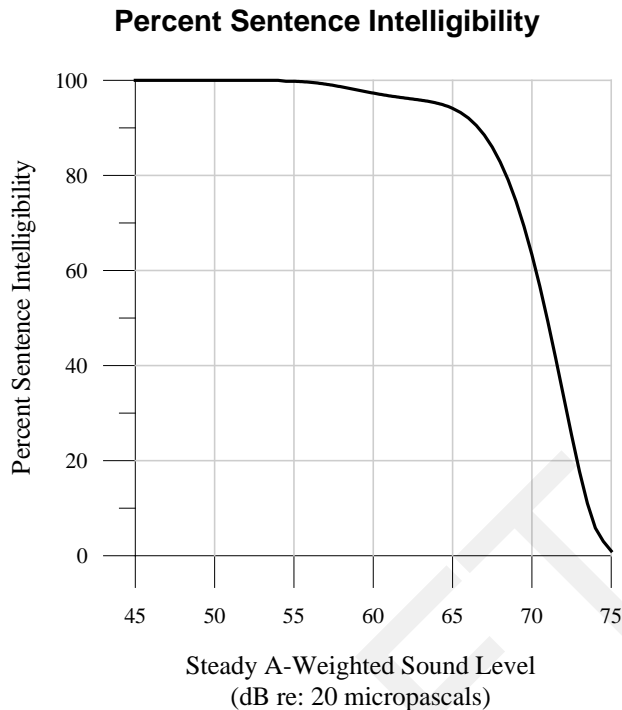
A primary effect of aircraft noise is its tendency to drown out or "mask" speech, making it difficult to carry on a normal conversation.

Speech interference associated with aircraft noise is a primary cause of annoyance to individuals on the ground. The disruption of routine activities, such as radio or television listening, telephone use or family conversation, causes frustration and aggravation. Research has shown that "whenever intrusive noise exceeds approximately 60 dB indoors, there will be interference with speech communication."¹

Indoor speech interference can be expressed as a percentage of sentence intelligibility among two people speaking in relaxed conversation approximately one meter apart in a typical living room or bedroom.¹ The percentage of sentence intelligibility is a non-linear function of the (steady) indoor background sound level, as shown in **Figure D-8**. This curve was digitized and curve-fitted for the purposes of this document. Such a curve-fit yields 100 percent sentence intelligibility for background levels below 57 dB and yields less than 10 percent intelligibility for background levels above 73 dB. Note that the function is especially sensitive to changes in sound level between 65 dB and 75 dB. As an example of the sensitivity, a 1 dB increase in background sound level from 70 dB to 71 dB yields a 14 percent decrease in sentence intelligibility.

In the same document from which Figure D-8 was taken, the EPA established an indoor criterion of 45 dB DNL as requisite to protect against speech interference indoors.

Figure D-8



Source: EPA 1974

D.2.3 Sleep Disturbance

Sleep disturbance is another source of annoyance associated with aircraft noise. This is especially true because of the intermittent nature and content of aircraft noise, which is more disturbing than continuous noise of equal energy and neutral meaning.

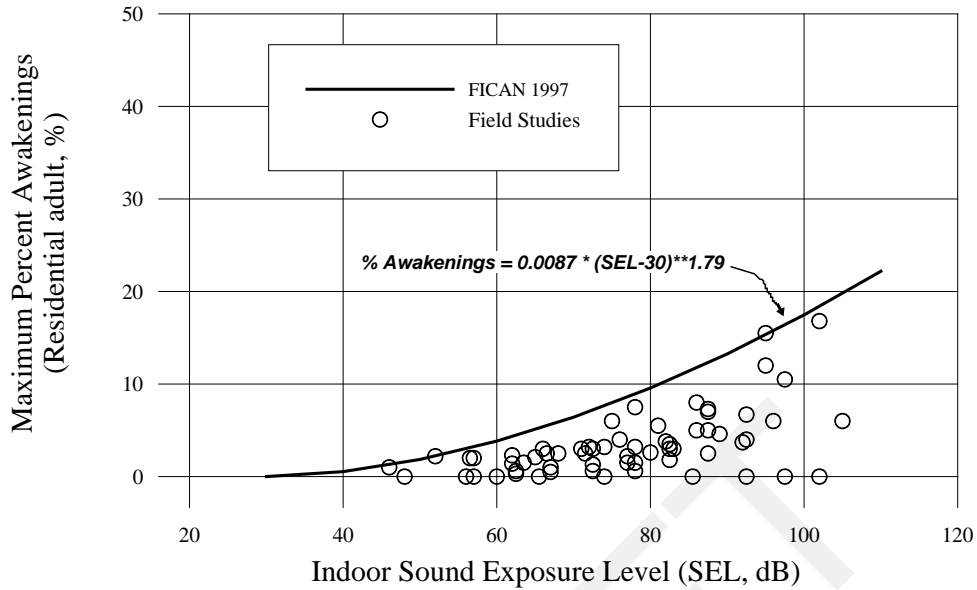
Sleep disturbance can be measured in one of two ways: "Arousal" represents awakening from sleep, while a change in "sleep stage" represents a shift from one of four sleep stages to another stage of lighter sleep without awakening. In general, arousal requires a higher noise level than does a change in sleep stage.

In terms of average daily noise levels, some guidance is available to judge sleep disturbance. The EPA identified an indoor DNL of 45 dB as necessary to protect against sleep interference.¹

In June 1997, the Federal Interagency Committee on Aviation Noise (FICAN) reviewed the sleep disturbance issue and presented a sleep disturbance dose-response prediction curve.¹² FICAN based their curve on data from field studies^{13 14 15} and recommends the curve as the tool for analysis of potential sleep disturbance for residential areas. **Figure D-9** shows this curve which, for an indoor SEL of 60 dB, predicts that a maximum of approximately 5 percent of the residential population exposed are expected to be behaviorally awakened. FICAN cautions that this curve should only be applied to long-term adult residents.

Figure D-9

Sleep Disturbance Dose-Response Relationship



Source: FICAN, 1997

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Endnotes

- ¹ U.S. Environmental Protection Agency, "Information on Levels of Environmental Noise Requisite to Protect the Public Health and Welfare with an Adequate Margin of Safety," Report 550/9-74-004, March 1974.
- ² "Guidelines for Considering Noise in Land Use Planning and Control," Federal Interagency Committee on Urban Noise (FICUN), June 1980.
- ³ "Federal Agency Review of Selected Airport Noise Analysis Issues," Federal Interagency Committee on Noise (FICON), August 1992.
- ⁴ 14 CFR Part 150, Airport Noise Compatibility Planning, Amendment 150-3, Updated April 2012.
- ⁵ FAA Order 1050.1E, Chg 1, Environmental Impacts: Policies and Procedures, Department of Transportation, Federal Aviation Administration, March 20, 2006.
- ⁶ "Sound Level Descriptors for Determination of Compatible Land Use," American National Standards Institute Standard ANSI S3.23-1980.
- ⁷ "Quantities and Procedures for Description and Measurement of Environmental Sound, Part I," American National Standards Institute Standard ANSI S21.9-1988.
- ⁸ Schultz, T.J., "Synthesis of Social Surveys on Noise Annoyance," *J. Acoust. Soc. Am.*, 64, 377-405, August 1978.
- ⁹ Fidell, S., Barger, D.S., Schultz, T.J., "Updating a Dosage-Effect Relationship for the Prevalence of Annoyance Due to General Transportation Noise." *J. Acoust. Soc. Am.*, 89, 221-233, January 1991.
- ¹⁰ "Community Reactions to Helicopter Noise: Results from an Experimental Study," *J. Acoust. Soc. Am.*, 479-492, August 1987.
- ¹¹ Finegold, L.S., C.S. Harris, H.E. VonGierke., "Applied Acoustical Report: Criteria for Assessment of Noise Impacts on People." *J. Acoust. Soc. Am.*, June 1992.
- ¹² Federal Interagency Committee on Aviation Noise (FICAN), "Effects of Aviation Noise on Awakenings from Sleep," June 1997.
- ¹³ Pearson, K.S., Barber, D.S., Tabachnick, B.G., "Analyses of the Predictability of Noise-Induced Sleep Disturbance," USAF Report HSD-TR-89-029, October 1989.
- ¹⁴ Ollerhead, J.B., Jones, C.J., Cadous, R.E., Woodley, A., Atkinson, B.J., Horne, J.A., Pankhurst, F., Reyner, L, Hume, K.I., Van, F., Watson, A., Diamond, I.D., Egger, P., Holmes, D., McKean, J., "Report of a Field Study of Aircraft Noise and Sleep Disturbance." London Department of Safety, Environment, and Engineering, 1992.
- ¹⁵ Fidell, S., Pearsons, K., Howe, R., Tabachnick, B., Silvati, L., Barber, D.S. "Noise-Induced Sleep Disturbance in Residential Settings," AL/OH-TR-1994-0131, Wright Patterson AFB, OH, Armstrong Laboratory, Occupational and Environmental Health Division, 1994.
- ¹⁶ Fidell, S., Howe, R., Tabachnick, B., Pearsons, K., Sneddon, M., "Noise-Induced Sleep Disturbance in Residences Near Two Civil Airports," Langley Research Center, 1995.

APPENDIX E

Record of Consultation

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APPENDIX E

Record of Consultation

This appendix includes the following attachments:

1. Land Use Verification Letters to City of Chicopee, Town of Granby, and Town of Ludlow (May 3, 2018)
2. Land Use Verification Response from Town of Ludlow (May 7, 2018)
3. Public Notice of Draft Document Availability and Public Meeting Documents (*to be provided*)

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Attachment 1:
Land Use Verification Letters
to City of Chicopee, Town of Granby, and Town of Ludlow
May 3, 2018

Lee M. Pouliot, ASLA
Director, Planning Department
City of Chicopee
274 Front Street
4th Floor Annex
Chicopee, MA 01013



May 3, 2018

Dear Mr. Pouliot,

The Westover Metropolitan Development Corporation (WMDC) is conducting an update to the Title 14 Code of Federal Regulations (CFR) Part 150 Noise Compatibility Study (Part 150 Study) at Westover Air Reserve Base/ Metropolitan Airport (CEF). The Airport is operated under a joint-use agreement with the Department of Defense (DoD) and the WMDC. Title 14 CFR Part 150, *Airport Noise Compatibility Planning*, is the primary Federal regulation guiding and controlling planning for aviation noise compatibility on and around airports. The general purpose of a Part 150 Study is to recommend a program of airport operations and land use controls that will help to reduce aircraft noise and prevent future development which would be incompatible with airport noise.

The WMDC completed a Part 150 Study Update including updated noise exposure maps in 2014 with a Record of Approval (ROA) issued by the Federal Aviation Administration (FAA) in early 2015. Due to technology upgrades in aircraft and improved avionics at CEF an update to the Part 150 Study is proposed due to the potential to change the airport's noise contours.

Stantec and HNTB are assisting the WMDC in the development of the Part 150 Study Update. In order to evaluate demographic and land use impacts, the enclosed **Figure 1** has been developed to depict the generalized land use for the area surrounding the Airport. Land uses are generalized into the following categories: Commercial/ Industrial, Open/ Agricultural/ Recreational, Public/ Quasi-Public, Residential, Cemetery, Institutional, Water, and Transportation. Noise sensitive locations such as schools, places of worship and historic resources are also identified. This map was developed using generalized land use data from the Bureau of Geographic Information (MassGIS), and was refined based on MassGIS parcel boundary outlines and aerial photo interpretation. Areas that have been acquired under the WMDC's voluntary acquisition program are also identified. We are aware of the combined efforts of the Westover Joint Land Use (JLUS) Steering Committee and the Pioneer Valley Planning Commission (PVPC) to review and update current "Land Use" GIS data in the PVPC system. We intend to remain in communication with the JLUS/PVPC up until our project deadlines to ensure inclusion of any updated data they may generate in this interim period.

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Best regards,

Caroline E. Pinegar

Caroline E. Pinegar, AICP
HNTB

Enclosure: **Figure 1: Draft Generalized Existing Land Use**

cc: Michael Bolton, President/CEO, Westover Airport
Dan Kost, Contract Community Planner, Westover ARB
Larry Smith, Principal Land Use Planner, PVPC

DRAFT

On behalf of the City of Chicopee Planning Department, I verify that the land use information shown on Figure 1 provided by HNTB is accurate to the best of my knowledge.

Lee M. Pouliot, ASLA (or designee)
Planning Department
City of Chicopee

Date

DRAFT

Cathy Leonard
Town Administrator's Assistant / Planning Board Contact
Town Hall/ Senior Center Building
10-B West State Street
2nd Floor
Granby, MA 01033



May 3, 2018

Dear Ms. Leonard,

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Larry Smith, Principal Land Use Planner, PVPC

DRAFT

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Cathy Leonard (or designee)
Town of Granby

Date

DRAFT

Douglas J. Stefancik
Town Planner
Town of Ludlow
488 Chapin Street
Ludlow, MA 01056



May 3, 2018

Dear Mr. Stefancik,

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Caroline E. Pinegar

Caroline E. Pinegar, AICP
HNTB

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cc: Michael Bolton, President/CEO, Westover Airport
Dan Kost, Contract Community Planner, Westover ARB
Larry Smith, Principal Land Use Planner, PVPC

DRAFT

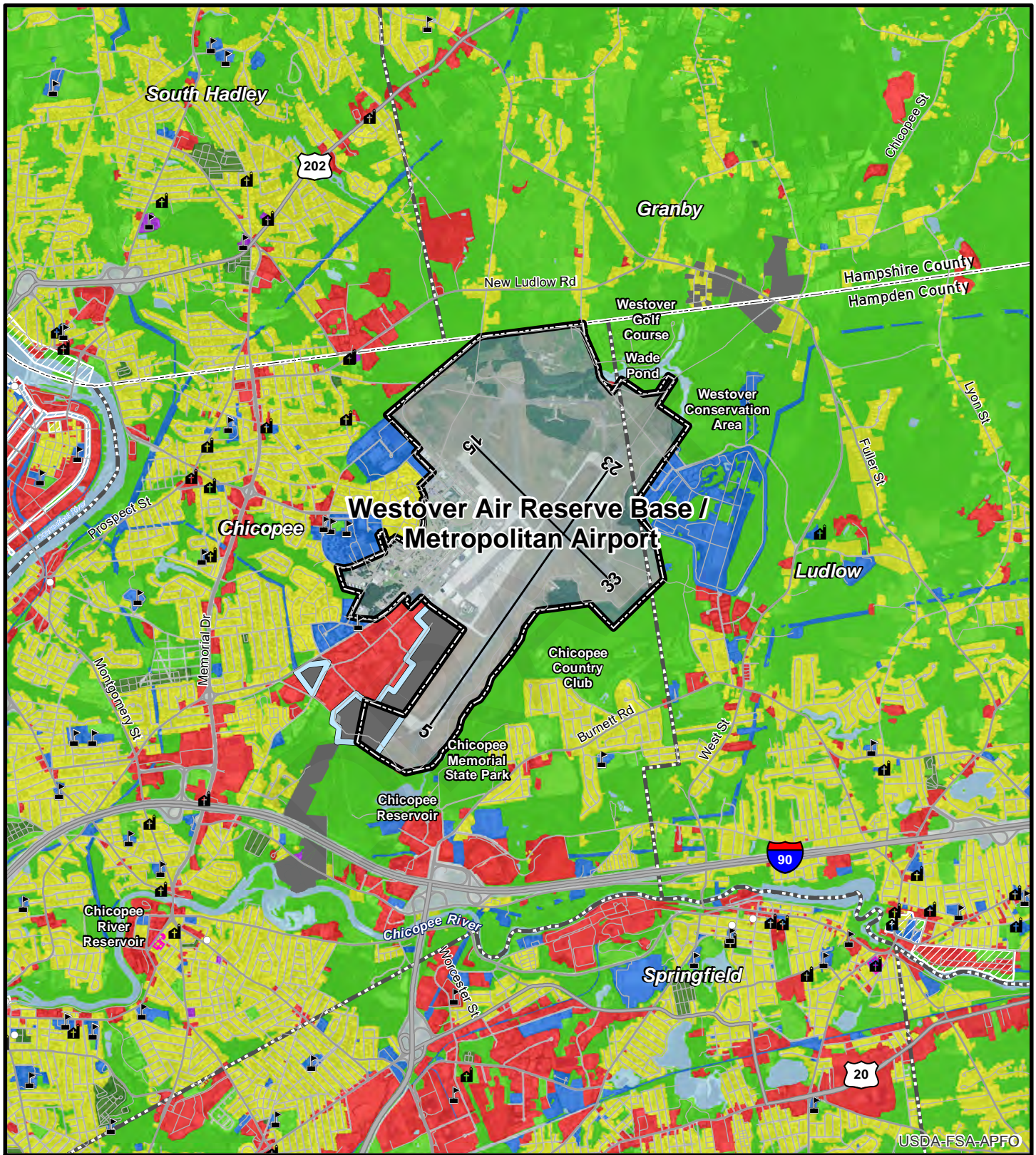
On behalf of the Town of Ludlow Planning Department, I verify that the land use information shown on Figure 1 provided by HNTB is accurate to the best of my knowledge.

Douglas J. Stefancik (or designee)
Planning Department
Town of Ludlow

Date

DRAFT

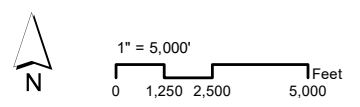
Westover Air Reserve Base / Metropolitan Airport
 DRAFT Generalized Existing Land Use



LEGEND

- | | | |
|---|--|---|
| ■ Commercial/Industrial | ■ Transportation | ■ Local Historic District |
| ■ Open/Agricultural/Recreational | ■ Water | ⛪ Place of Worship |
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Figure 1



Sources: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services, WMDC 2018, HNTB GIS (2018), Aerial - USDA 2016, ESRI Data and HNTB Analysis

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DRAFT

Attachment 2:
Land Use Verification
Response from Town of Ludlow
May 7, 2018

On behalf of the Town of Ludlow Planning Department, I verify that the land use information shown on Figure 1 provided by HNTB is accurate to the best of my knowledge.

Douglas J. Stefancik *
Douglas J. Stefancik (or designee)
Planning Department
Town of Ludlow

May 7, 2018
Date

* Note #1 Marianna Lane is all Residential.
Note #2 483-485 Wolvake St is Commercial/Industrial.

DRAFT

Attachment 3:
Public Notice of Draft Document Availability
and Public Meeting Documents
(to be provided)

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DRAFT

APPENDIX E

Record of Consultation

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APPENDIX E

Record of Consultation

This appendix includes the following attachments:

1. Land Use Verification Letters to City of Chicopee, Town of Granby, and Town of Ludlow (May 3, 2018)
2. Land Use Verification Responses
3. Public Notice of Draft Document Availability and Public Meeting Documents (*to be provided*)

DRAFT

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DRAFT

Attachment 1:
Land Use Verification Letters
to City of Chicopee, Town of Granby, and Town of Ludlow
May 3, 2018

Lee M. Pouliot, ASLA
Director, Planning Department
City of Chicopee
274 Front Street
4th Floor Annex
Chicopee, MA 01013



May 3, 2018

Dear Mr. Pouliot,

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City of Chicopee

Date

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Town of Granby

Date

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Douglas J. Stefancik
Town Planner
Town of Ludlow
488 Chapin Street
Ludlow, MA 01056



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DRAFT

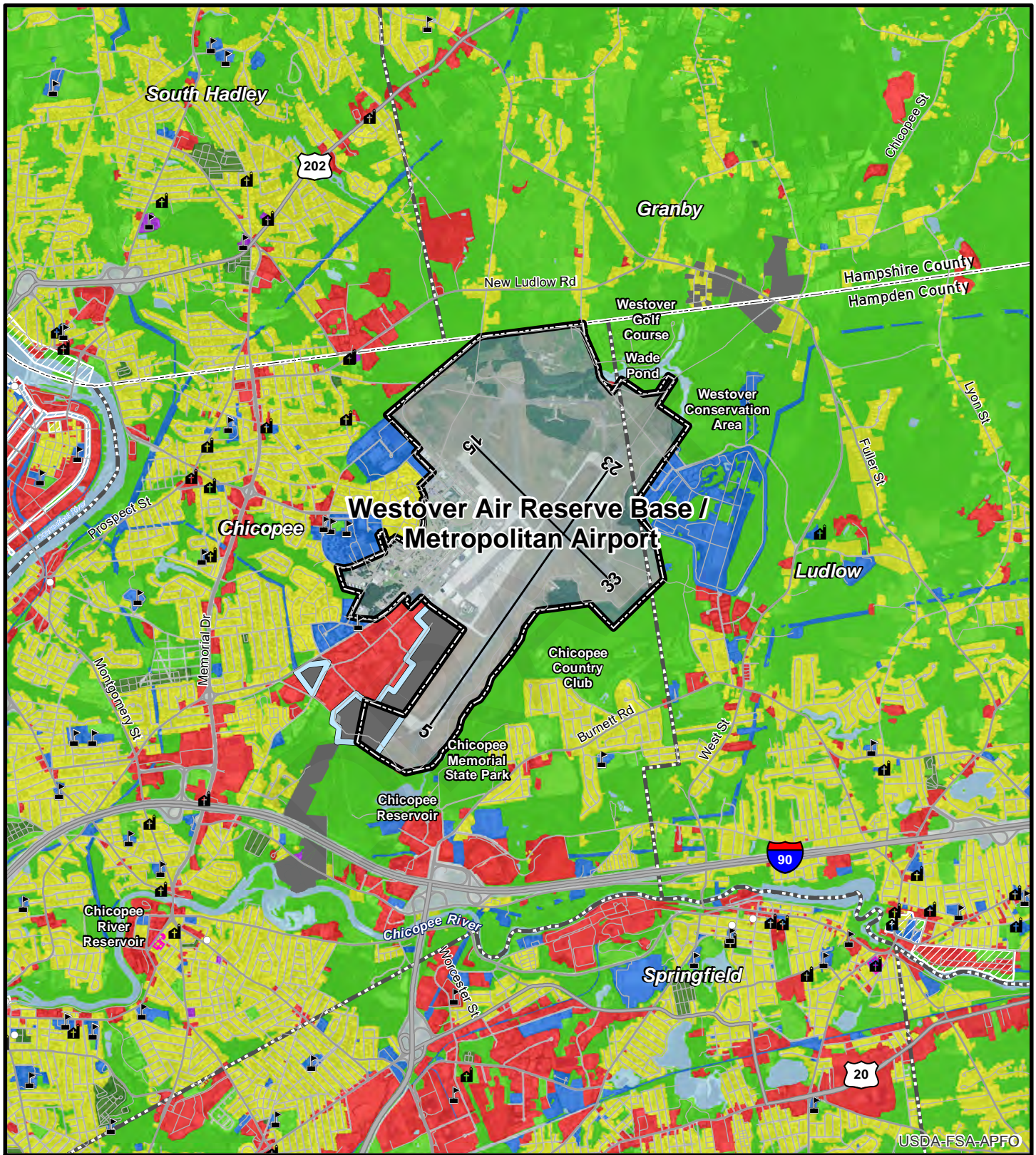
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Douglas J. Stefancik (or designee)
Planning Department
Town of Ludlow

Date

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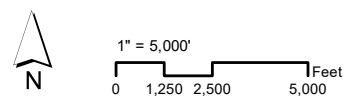
Westover Air Reserve Base / Metropolitan Airport
 DRAFT Generalized Existing Land Use



LEGEND

- | | | |
|---|--|--|
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Figure 1



Sources: Bureau of Geographic Information (MassGIS),
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DRAFT

Attachment 2:
Land Use Verification Responses

DRAFT

On behalf of the Town of Ludlow Planning Department, I verify that the land use information shown on Figure 1 provided by HNTB is accurate to the best of my knowledge.

Douglas J. Stefancik *
Douglas J. Stefancik (or designee)
Planning Department
Town of Ludlow

May 7, 2018
Date

* Note #1 Marianna Lane is all Residential.
Note #2 483-485 Wolvok St is Commercial/Industrial.

DRAFT

City of Chicopee
Department of Planning & Development

City Hall Annex • 274 Front Street • Chicopee, Massachusetts 01013
Tel (413) 594-1515 • Fax (413) 594-1514
www.chicopeema.gov



Jack S. Benjamin
Assistant Planner

Michelle Santerre
GIS Coordinator

Lee M. Pouliot
Director, AICP, ASLA

James Dawson
Development Manager

Kristen Pope
Senior Clerk

May 16, 2018

Caroline Pinegar, AICP
HNTB Corporation
2900 South Quincy Street, Suite 600
Arlington, VA 22206

Re: WMDC Title 14 CFR Part 150 Noise Compatibility Study at Westover Air Reserve Base/Metropolitan Airport (CEF)

Caroline,

Per request made by your letter dated May 3, 2018 staff in the City of Chicopee's Department of Planning & Development has reviewed the provided land use map for the areas surrounding Westover Air Reserve Base/Metropolitan Airport. Per your letter, we understand that the land use data reflected in the provided map was sourced from available MassGIS data.

The Department of Planning & Development encourages the use of standardized MassGIS data in the absence of municipally-produced data sets. Specifically, regarding land use data, the City has not created its own data set. The Department and City utilize the MassGIS data for existing land use data on a regular basis. We also understand from the provided land use map that the data is 'generalized' and not particularly site specific or based upon land use codes as are assigned by the City's Assessors Department. Planning Staff is comfortable with the generalized data portrayed on the map as we ourselves rely on this particular MassGIS dataset. Please see attached the requested verification document, as requested.

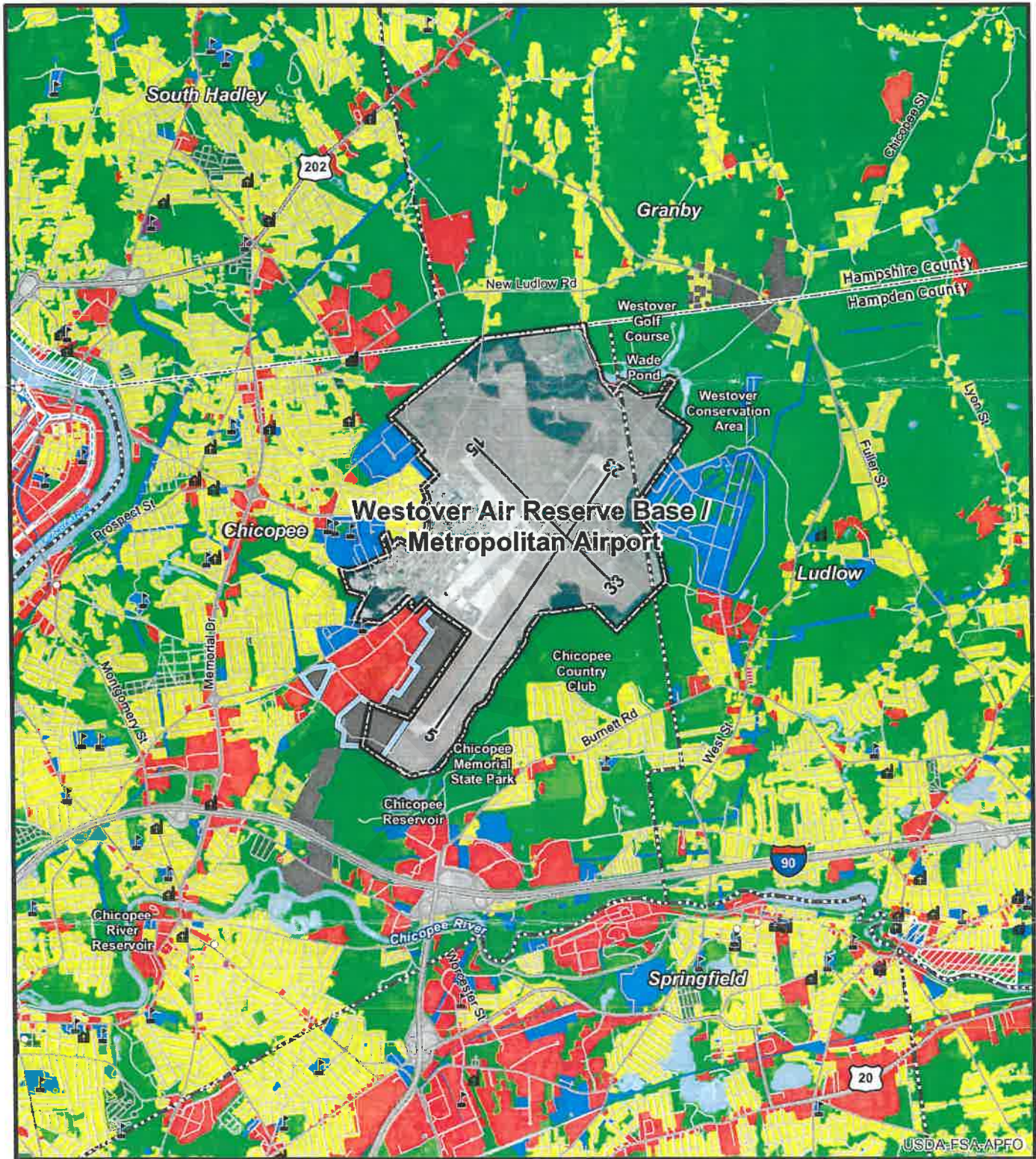
Should you have any questions regarding this response, please feel free to contact me at any time.

With Regards,


Lee M. Pouliot, AICP, ASLA
Director

Cc: Michelle Santerre, GIS Coordinator

Westover Air Reserve Base / Metropolitan Airport DRAFT Generalized Existing Land Use



LEGEND

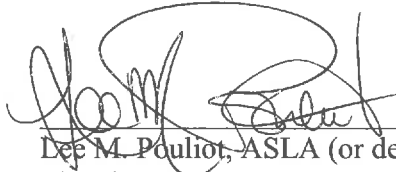
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Figure 1



Sources: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services, WMDC 2018, HNTB GIS (2018), Aerial - USDA 2016, ESRI Data and HNTB Analysis

On behalf of the City of Chicopee Planning Department, I verify that the land use information shown on Figure 1 provided by HNTB is accurate to the best of my knowledge.



Dee M. Pouliot, ASLA (or designee)
Planning Department
City of Chicopee

5/16/18

Date

DRAFT

Attachment 3:
Public Notice of Draft Document Availability
and Public Meeting Documents
(to be provided)