

BURLINGTON INTERNATIONAL AIRPORT
PART 150 NOISE COMPATIBILITY PROGRAM UPDATE
TECHNICAL PAPER – VARIOUS NOISE MITIGATION PROGRAMS
February 27, 2018

1.0 Introduction

The purpose of this paper is to review the various types of noise mitigation that can be offered in addition to sound insulation which was presented in the previous technical paper.

Additional Noise Mitigation Programs

The Federal Aviation Administration (FAA) Part 150 process allows for several types of noise mitigation programs to be offered to non-compatible land uses. In general there are 2 types of programs;

- No change in land use and
- Change in land use

An Airport sponsor may implement programs designed to acquire an easement for noise compatibility purposes if it is contained within an approved 14 CFR Part 150 Noise Compatibility Program.

The properties must be within the 65 dB DNL or higher noise contour for which the land use is not considered to be compatible (49 USC § 47502, as implemented by Table 1 of Appendix A in 14 CFR Part 150). The requirements for implementing these types of programs is defined by the FAA in accordance with Appendix R “Noise Compatibility Planning/Projects” of FAA Order 5100.38D “Airport Improvement Program (AIP) Handbook¹”.

Below is a table which summarizes each potential noise mitigation measure, the estimated potential cost per parcel, whether an aviation easement is required, and the potential advantages and disadvantages. The sponsor believes that a combination of these programs may offer the best options to the community for the foreseeable future. The City of Burlington and the City of South Burlington have expressed a preference in maintaining the residential neighborhood adjacent to the airport which is currently impacted. Other adjacent jurisdictions should consider the following options and express an opinion regarding the implementation of these programs in their jurisdictions should the updated noise exposure map expand the current noise exposure area.

¹ FAA Order 5100.38D “Airport Improvement Program Handbook”, Appendix R “Noise Compatibility Planning/Projects”, effective date September 30, 2014.

Matrix of Mitigation Measures:

The matrix below identifies the various mitigation programs discussed in this paper and summarizes the type of program, need for an avigation easement, estimated average cost per home, recommended noise contour for implementation advantages and disadvantages. A more detailed discussion of each program follows:

Mitigation Measure	Easement Required	Estimated Average Potential Costs per Property	Recommended Noise Contour to be Implemented	Advantages	Disadvantages
Sound Barriers and Buffers	Not Applicable	N/A	70 DNL (Day-Night Average Sound Level)	<ul style="list-style-type: none"> Provides noise relief to those adjacent to wall Provides a visible barrier between the residential area and the airport property 	<ul style="list-style-type: none"> Properties which benefit from barrier are not eligible for other types of mitigation Expensive measure which benefits a few and will delay implementation of other programs
Sales Assistance	Yes	Up to 10% of Fair Market Value (FMV) ²	65-75 DNL	<ul style="list-style-type: none"> Allows the property owner to relocate outside the project area Maintains the residential neighborhood Stabilizes market by limiting sales to market absorption Airport sponsor obtains an easement which makes property Part 150 land use compatible Property owner is guaranteed fair market value for property Avoids vacant properties Maintains the jurisdiction(s)' tax base 	<ul style="list-style-type: none"> Does not guarantee sale of home Depending on market conditions process can be slow Typically very low participation in this type of program Developing policies regarding differential payment to ensure market stability can be difficult

² Estimated cost is 10% of average fair market value based on homes purchased by BTV 2017 home acquisition program.

<p>Purchase Assurance</p>	<p>Yes</p>	<p>FMV³</p>	<p>65-75 DNL</p>	<ul style="list-style-type: none"> • Allows property owners to sell to the sponsor immediately, pending available funding • Allows for sound insulation of property along with current homeowner's ability to move from neighborhood 	<ul style="list-style-type: none"> • Depending on how long it takes to sell the property, maintenance and protection costs could be excessive • Jurisdiction(s) would lose ad valorem tax revenue during sponsor ownership of property • The Airport sponsor obtains ownership of the property, which would result in costly maintenance to prevent deterioration including: lawn maintenance, securing from vandalism and theft, ensuring buildings remain mold-free, securing and maintaining swimming pools, providing routine inspections, which increases administrative costs to the project • The market absorption and foreclosure market may result in long term vacancies and destabilize the neighborhood and property values for remaining residents • The Program has excessive costs and timeline which will detract funding from strategies such as Sound Insulation and Sales Assistance • The Airport sponsor absorbs all the risk
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³ Estimated cost is based on the FMV of homes purchased by BTV 2017 home acquisition program.

Easement Acquisition	Yes	\$2,500	65-75 DNL	<ul style="list-style-type: none"> • Allows the property owner to remain in their home • Maintains the residential neighborhood • Airport sponsor obtains an easement which makes property Part 150 land use compatible • Property owner is guaranteed a cash payment in exchange for the easement • Maintains jurisdiction(s)' tax base • Is an alternative for individuals who do not qualify for sound insulation 	<ul style="list-style-type: none"> • Typically very low participation in this type of program
Land Acquisition & Relocation	Prior to Land Use Change	FMV (\$296,000) & Relocation costs (\$43,000) ⁴	75+ DNL	<ul style="list-style-type: none"> • Allows homeowners to sell to the Airport sponsor immediately, pending available funding • There are no other viable mitigation options for homes located in the highest noise levels 	<ul style="list-style-type: none"> • Jurisdiction(s) would lose ad valorem tax revenue • The Airport sponsor obtains ownership of the property, which would result in costly maintenance to prevent deterioration including: lawn maintenance, securing from vandalism and theft, which increases administrative costs to the project
Sound Insulation	Encouraged / Not Required	\$45,000 ⁵	65- up to the 75 DNL	<ul style="list-style-type: none"> • Allows the property owner to remain in their home • Maintains the residential neighborhood • Maintains jurisdiction(s)' tax base 	<ul style="list-style-type: none"> • Is not effective in residential properties in high DNLs

⁴ Estimated cost is based upon the average of the 2017 property purchases by Burlington International Airport

⁵ Estimated cost is based upon 2017 costs from other New England Region sound insulation programs

2.0 Sound Barriers and Buffers (HMMH)

Introduction to Sound Barriers

Physical barriers can be effective means of reducing noise exposure in certain situations. Barriers are commonly used along roadways and near stationary noise sources to minimize the propagation of noise to adjacent communities. Barriers can be effective at airports in containing the noise at runup locations, and airport buildings can offer some shielding from gate and taxiing operations. Barriers near runways to block takeoff and landing noise are generally not practical due to airspace restrictions.

Sound Barrier Effectiveness

Sound barriers begin to be effective only when the line-of-sight between the source and receiver is broken. However, simply breaking the line of sight between the source and receiver provides a very minimal amount of shielding from noise produced by the source. Sound, as a wave phenomenon, experiences diffraction around objects in its path. This means that for an optimally effective noise barrier, line-of-sight blockage alone is insufficient. Two quantities must be considered when predicting the value of a noise barrier:

1. Path length difference. This is the distance the sound travels from source to receiver, over the top of the barrier, minus the direct distance from source to receiver through the barrier.
2. Wavelength of sound.

The barrier's effectiveness depends on the ratio of these two quantities. The greater the path-length difference relative to the wavelength of the sound, the more the sound will be blocked. For a broadband noise source, such as a jet aircraft, the effectiveness of the barrier is frequency-dependent, with more blockage of high-frequency components than low-frequency components. In practical terms, what this means is that for a barrier to be optimally effective, it should be:

1. High relative to source and receiver heights,
2. High relative to the wavelength of the lowest-frequency sound to be blocked, and
3. Close to either source or receiver.

The requirement that the barrier be high relative to the source height means that for aircraft noise, barriers can only be effective for blocking ground noise, and are ineffective for airborne aircraft.

Constraints to Barrier Design

A significant constraint limiting the effectiveness of barriers at airports is the requirement to limit the height of obstacles in the airport environs. The heights of objects near an airport's runways are limited by CFR Part 77⁶, which defines imaginary surfaces above the airfield that cannot be penetrated by structures or other objects on the ground. These surfaces include a horizontal rectangle including and adjacent the runway, and sloping surfaces rising from this horizontal surface at a slope of 1:7 (rise:run) to the sides of the runway, and 1:50 from the ends of the runway. This severely limits the ability to build

⁶ Height restrictions are regulated by 14 CFR Part 77 "Objects Affecting Navigable Airspace" and other associated FAA documents.

a barrier both high enough and close enough to the runway to be effective in blocking takeoff roll and landing roll noise.

For taxiways and runup areas sufficiently distant from runways, the Part 77 constraints may allow structures or barriers of sufficient height to provide effective shielding.

If a barrier cannot be placed close to the noise source, its effectiveness will be greatest if it can be placed close to the receiver location. This means that a high wall built adjacent to residences providing acoustic blockage, may result in visual or aesthetic intrusion to these residents. In such cases, the community would need to balance the visual intrusion against the expected noise benefits of such a structure.

Airport Improvement Program Funding and Requirements

In accordance with Appendix R “Noise Compatibility Planning/Projects” of the Federal Aviation Administration (FAA) Order 5100.38D Airport Improvement Program Handbook⁷ (AIP Handbook), a noise barrier must be able to reduce aircraft noise levels by at least 5 dB⁸. If construction of a noise barrier is funded through the Part 150 program, any residences receiving a 5 dB reduction in DNL would be considered mitigated and would likely not maintain eligibility for other mitigation measures such as sound insulation or acquisition.

Advantages

- Provides noise relief to those adjacent to wall
- Provides a visible barrier between the residential area and the airport property

Disadvantages

- Properties which benefit from barrier are not eligible for other types of mitigation
- Expensive measure which benefits a few and will delay implementation of other programs

⁷ FAA Order 5100.38D “Airport Improvement Program Handbook”, Appendix R “Noise Compatibility Planning/Projects”, effective date September 30, 2014.

⁸ FAA Order 5100.38D Appendix R, Table R-6 “Noise Compatibility Planning/Project Requirements”, m. “Noise Mitigation Measures – On-airport Noise Barriers” Paragraph (4): “The project must reduce noise to a land use noncompatible with aircraft noise by at least 5 dB.”

3.0 Noise Compatibility Program With No Change in Land Use

Sales Assistance Program⁹

Objective

The objective of a Sales Assistance Program is to provide eligible property owners who wish to relocate outside the noise impact area with technical and financial assistance in the sale of their home on the open market. The Airport sponsor will not acquire the property and is responsible for closing costs. The property owner is not eligible for relocation benefits. There will not be any change to the underlying land use.

Implementation

The property owner(s) will enter into an agreement with the Airport sponsor agreeing to participate in the voluntary Sales Assistance Program. The property owner(s) will be responsible for the marketing and selling their home through a licensed real estate agent, including listing the property on the open market. The listing price will be based on the Fair Market Value (FMV) as established by appraisal following federal appraisal guidelines¹⁰. If the property does not sell at the FMV within a reasonable timeframe, the Airport sponsor may provide a differential payment that shall not exceed a percentage of the FMV. Prior to the sale of the home, the owner will record an avigation easement in exchange for sales assistance. It is typical for these programs to pay the realtor commission on the sale of the property. This will encourage the local realtors to participate in the program and help to ensure the market remains stable. Policies regarding length of time on market, appraisals and market absorptions will be developed as part of the program's policy and procedures process.

Once a property sells through the Sales Assistance Program, the property is then considered noise compatible under FAA criteria and a subsequent property owner will not be eligible for any of the other programs under the Noise Compatibility Program.

Typical Appraisal Process

The appraisal process shall follow federal guidelines. FMV of a property shall be determined by an appraisal of the property by a certified appraiser. This appraisal will be reviewed by a certified appraiser ("review appraiser") and the FMV will be determined¹¹. The FMV will be used as the sale price for the home on the open market.

⁹ FAA Order 5100.38D Appendix R, Table R-6 "Noise Compatibility Planning/Project Requirements", f. "Acquire Easement for Noise Compatibility"

¹⁰ 49 CFR part 24, the current version of FAA Order 5100.37, Land Acquisition and Relocation Assistance for Airport Projects, and the current version of Advisory Circular 150/5100-17, Land Acquisition and Relocation Assistance for Airport Improvement Program Assisted Projects.

¹¹ Appraisals and review's determinations must be prepared and performed in accordance with: 42 USC Chapter 61, "Uniform Relocation Assistance and Real Property Acquisition Policies for Federal and Federally Assisted Programs"; 49 CFR Part 24, "Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally-Assisted Programs"; the Uniform Standards of Professional Appraisal Practice ("USPAP"); and all state, local and FAA standards.

Neighborhood Stability

To maintain neighborhood stability, the airport sponsor will conduct a market absorption study during program implementation to determine the expected rate at which homes can be sold without affecting the pricing of the housing market in the area.

Avigation Easement

An avigation easement is required in exchange for assisting in the sale of the property. This easement will run with the property. Once easement is recorded, the property is then considered noise compatible under FAA criteria.

Timeline

The sale of a property will depend upon market conditions and the sponsor's current noise grant funding. Based on current market conditions, sales could occur within 3 months based upon grant availability.

Advantages

- Allows the property owner to relocate outside the project area
- Maintains the residential neighborhood
- Stabilizes market by limiting sales to market absorption
- Airport sponsor obtains an easement which makes property Part 150 land use compatible
- Owner is guaranteed fair market value for property
- Avoids vacant properties
- Maintains the jurisdiction(s)' tax base
- Is an alternative for individuals who do not qualify for sound insulation

Disadvantages

- Does not guarantee sale of home
- Depending on market conditions process can be slow
- Typically very low participation in this type of program
- Developing policies regarding differential payment to ensure market stability can be difficult

Purchase Assurance Program¹²

Objective

The objective of a purchase assurance program is to provide property owners who wish to relocate outside the noise impact area with the ability to sell their property directly to the Airport sponsor in exchange for an avigation easement. Homeowners will not be eligible for relocation benefits. Funds received from the sale of the property must be reinvested in the noise mitigation program. There is no change to the underlying land use.

Implementation

The Airport sponsor will purchase an eligible property from the owner in exchange for an avigation easement. The home is purchased based upon the FMV as established through the FAA's appraisal process¹³. Upon sale and recording of the easement, the Airport sponsor will sound insulate the home and then sell it on the open market. The Airport sponsor will be responsible for closing costs associated with the acquisition of the property.

Avigation Easement

An avigation easement is required in exchange for purchasing the property. This easement will run with the property. Once the easement is recorded, the property is then considered noise compatible under FAA criteria.

Timeline

It is estimated that after the Airport sponsor takes possession of these properties, it would be required to maintain these properties for a minimum of 18 months while the property undergoes the sound insulation process and is placed on the open market for sale.

Advantages

- Allows property owners to sell to the sponsor immediately, pending available funding
- Allows for sound insulation of property along with current property owner's ability to move from neighborhood

¹² FAA Order 5100.38D Appendix R, Table R-6 "Noise Compatibility Planning/Project Requirements", f. "Acquire Easement for Noise Compatibility"

¹³ Appraisals and review's determinations must be prepared and performed in accordance with: 42 USC Chapter 61, "Uniform Relocation Assistance and Real Property Acquisition Policies for Federal and Federally Assisted Programs; 49 CFR Part 24, "Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally-Assisted Programs"; the Uniform Standards of Professional Appraisal Practice ("USPAP"); and all state, local and FAA standards.

Disadvantages

- Depending on how long it takes to sell the property, maintenance and protection costs could be excessive
- The jurisdiction(s) would lose ad valorem tax revenue during Airport sponsor ownership of property
- The Airport sponsor obtains ownership of the property, which would result in costly maintenance to prevent deterioration including: lawn maintenance, securing from vandalism and theft, ensuring buildings remain mold-free, securing and maintaining swimming pools, providing routine inspections, which increases administrative costs to the project
- The market absorption and foreclosure market may result in long term vacancies and destabilize the neighborhood and property values for remaining residents
- The Program has excessive costs and timeline which will detract funding from strategies such as Sound Insulation and Sales Assistance
- The Airport sponsor absorbs all the risk

Purchase of Avigation Easement¹⁴

Objective

The objective of an easement acquisition is to provide eligible property owners who wish to remain in their home, and do not qualify for sound insulation the ability to obtain a cash payment in exchange for the easement. There will not be any change to the underlying land use.

Implementation

Property owners who do not qualify for sound insulation and would like to remain in their home, may be able to obtain a one-time cash payment in exchange for an avigation easement. Easement values are typically in the \$2,000 - \$2,500 range.

Avigation Easement

This easement will run with the property. Once easement is recorded, the property is then considered a compatible land use under FAA criteria.

Timeline

The purchase of the avigation easement is dependent upon the sponsor's current noise grant funding.

¹⁴ FAA Order 5100.38D Appendix R, Table R-6 "Noise Compatibility Planning/Project Requirements", f. "Acquire Easement for Noise Compatibility"

Advantages

- Allows the property owner to remain in their home
- Maintains the residential neighborhood
- Sponsor obtains an easement which makes property Part 150 land use compatible
- Property owner is guaranteed a cash payment in exchange for the easement
- Maintains the jurisdiction(s)' tax base
- Is an alternative for individuals who do not qualify for sound insulation

Disadvantages

- Typically very low participation in this type of program

4.0 Noise Compatibility Program with a Change in Land Use

For those homes located within the highest DNL noise contours, where other noise mitigation programs are not feasible, a land acquisition and relocation may be offered to obtain land use compatibility.

Land Acquisition and Relocation

Objective

The objective of a land acquisition and relocation program¹⁵ is to provide owners of properties located in areas of high noise exposure (75 dB DNL), where other mitigation programs are not feasible, the ability to sell their property and relocate outside the noise impact area. The Airport sponsor will purchase the property at FMV from the owner. The occupants will be provided relocation benefits to allow them to move to an area outside the noise impact area. The sponsor will raze the structure upon acquisition and work with the local jurisdiction to rezone the land to a compatible land use.

Implementation

The land acquisition and relocation program is comprised of two transactions, the purchase of the property from the owner and the relocation of the occupants. The Airport sponsor will purchase an eligible property from the owner following federal requirements¹⁶. The home is purchased based upon the FMV as established through the FAA's appraisal process¹⁷. The occupants of the home will be

¹⁵ FAA Order 5100.38D Appendix R, Table R-6 "Noise Compatibility Planning/Project Requirements", e. "Acquire Land for Noise Compatibility and 49 CFR part 24, the current version of FAA Order 5100.37, Land Acquisition and Relocation Assistance for Airport Projects, and the current version of Advisory Circular 150/5100-17, Land Acquisition and Relocation Assistance for Airport Improvement Program Assisted Projects.

¹⁶ FAA Order 5100.37B "Land Acquisition and Relocation Assistance for Airport Projects" and FAA Advisory Circular 150/5100-17 "Land Acquisition and Relocation Assistance for Airport Improvement Program Assisted Project (Consolidated through Change 7)"

¹⁷ Appraisals and review's determinations must be prepared and performed in accordance with: 42 USC Chapter 61, "Uniform Relocation Assistance and Real Property Acquisition Policies for Federal and Federally Assisted Programs; 49 CFR Part 24,

eligible for a package of relocation benefits that are designed to provide new housing in a manner that is similar in size and function.

After the Airport sponsor has taken possession of the property, they will arrange for the structure to be razed. The Airport sponsor will include the acquired land on the Noise Land Inventory Map and Noise Land Reuse Plan. The Airport sponsor will continue to care for and manage the property until such time as it can be rezoned or designated for a compatible use.¹⁸

Avigation Easement

An avigation easement will be placed on the property after the purchase of the property. The easement will run with the property and the new owners will be subject to the easement. Any proceeds derived from the future sale of the land must be utilized for noise mitigation purposes.

Timeline

The acquisition and relocation process takes 12-18 months depending upon the relocation needs of the occupants.

Advantages

- Allows property owners to sell to the sponsor immediately, pending available funding
- There are no other viable mitigation options for homes located in the highest noise levels

Disadvantages

- Jurisdiction(s) would lose ad valorem tax revenue
- The Airport sponsor obtains ownership of the property, which would result in costly maintenance to prevent deterioration including: lawn maintenance, securing from vandalism and theft, which increases administrative costs to the project

[END OF MEMORANDUM]

"Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally-Assisted Programs"; the Uniform Standards of Professional Appraisal Practice ("USPAP"); and all state, local and FAA standards.

¹⁸ FAA Order 5100.38D Appendix R, Table R-6 "Noise Compatibility Planning/Project Requirements", e. "Acquire Land for Noise Compatibility", (2) The land must be included on (2) Noise Land Inventory Map and the Noise Land Reuse Plan. APP-400 maintains current guidance on noise land inventory and reuse plans.