



Noise Exposure Map Update

Igor I Sikorsky Memorial Airport

PUBLIC REVIEW DRAFT

January 2021

Prepared by:



Prepared for:



Noise Exposure Map Update

Igor I Sikorsky Memorial Airport

In Compliance with Title 14 of the Code of Federal Regulations (CFR) Part 150

HMMH 310150.001

January 2021

Prepared for:

City of Bridgeport, Connecticut

Public Review Draft

Prepared by:

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Sponsor's Certification

The City of Bridgeport, Connecticut has completed a comprehensive update in accordance with Title 14 of the Code of Federal Regulations (CFR) Part 150 Noise Exposure Map for Igor I Sikorsky Memorial Airport. ***This page serves to certify the following:***

1) The 2021 and 2026 Noise Exposure Maps and associated documentation for Igor I Sikorsky Memorial Airport submitted by the City of Bridgeport to the Federal Aviation Administration under Code of Federal Regulations Part 150, Subpart B, Section 150.21, are true and complete under penalty of 18 U.S.C.1001.

2) Pursuant to Part 150, Subpart B, Section 150.21(b), all interested parties have been afforded adequate opportunity to submit their views, data, and comments concerning the correctness and adequacy of the draft noise exposure map and of the descriptions of forecast aircraft operations.

3) The “Existing Conditions (2021) Noise Exposure Map” (Figure 9 on page 38) accurately represents conditions for calendar year 2021, modeled prior to the COVID-19 pandemic and resulting travel restrictions, and re-examined in light of actual 2020 operations levels.

4) The “Forecast Conditions (2026) Noise Exposure Map” (Figure 10 on page 40) accurately represents forecast conditions for calendar year 2026, prepared prior to the COVID-19 pandemic and resulting travel restrictions, and re-examined in light of actual 2020 operations levels.

By: _____

Title: _____

Date: _____

**This section will be filled
in upon final submission
to the FAA.**

Airport Name: Igor I Sikorsky Memorial Airport

Airport Owner/Operator: City of Bridgeport, Connecticut

Address: 1000 Great Meadow Road
Stratford, CT 06615

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Executive Summary

This document presents the update to the Igor I Sikorsky Memorial Airport (BDR or Sikorsky Memorial Airport) Noise Exposure Map (NEM), which is one of two principal elements associated with a land use compatibility planning study under Part 150. The second element is the Noise Compatibility Program (NCP), which includes the measures to reduce or eliminate noncompatible land uses subject to aircraft noise. The Sikorsky Memorial Airport is only updating the NEM at this time.

The primary products associated with an NEM are the aircraft noise exposure contours presented in five-decibel (dB) increments from 65 to 75 dB in terms of Day-Night Average Sound Level (DNL). The contours are overlaid on a land use base map to identify the areas near the airport experiencing aircraft noise levels that are noncompatible with residential and other noise sensitive land uses, such as schools and places of worship. Descriptions of the noise metrics relevant to this document are provided in Appendix A.

An NEM is an extensive document, complying with FAA Part 150 regulations, that includes the airport layout, aircraft operations at the airport (e.g., arrivals and departures), and an aviation forecast projecting aircraft operations five years into the future. The aircraft noise exposure contours representing existing and forecast conditions are included in the document.

An NEM Update provides an opportunity to reach out to:

1. The interested public to present the results of the project
2. Airport users to determine how they use the airport and to convey to them the importance of aircraft noise and “flying friendly”
3. Local jurisdictions responsible for land use planning to obtain the most current land use data in the vicinity of the airport and stress the importance of appropriate land use planning within the airport environs

Figure ES-1 presents the aircraft noise exposure contours overlaid on the land use base map carefully and accurately prepared during this study for the existing conditions – year 2021. Figure ES-2 presents noise exposure contours representing forecast conditions, specifically forecast aircraft operations for the year 2026.

The NEMs for which Sikorsky Memorial Airport is seeking FAA acceptance as their “official” maps are provided in Section 3 as Figure 9 (existing - 2021) and Figure 10 (forecast - 2026). According to FAA land use compatibility guidelines from Appendix A of 14 CFR Part 150, all land uses are generally compatible with aircraft noise levels below 65 dB DNL. As shown in Figures ES-1 and ES-2, no noise sensitive land uses or facilities lie within the 65 dB DNL contours in either year. The estimated residential population and number of housing units with the 65 dB DNL contours is zero as well.

The NEM figures display supplemental noise contours at 60 dB DNL. These supplemental contours are not required under 14 CFR Part 150. They are for informational purposes only and have not been approved by the Federal Aviation Administration.

The NEM Update noise contours reflect approximately 50,900 annual aircraft operations in 2021 and approximately 53,300 in 2026. The forecasted five percent total growth in operations from 2021 to 2026 is expected to occur in the air taxi and general aviation categories. The small number of military operations is presumed to remain constant and the 2026 forecast does not assume any introduction of air carrier operations.

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Author: M.J.Hamilton; Document Path: \\FS1\vol1\Projects\310XXX\310150_BDR_NEM_Update\GIS\310150_BDR_FigureES-1_Existing_2021_NEM_Contour.mxd



- 2021 DNL Contour (60 dB For Informational Purposes Only)
- 2021 DNL Contour (65-75 dB)
- Airport Boundary
- Runways / Taxiways
- Municipal Boundary
- Highway
- Primary Roads
- Secondary Roads
- Local Roads



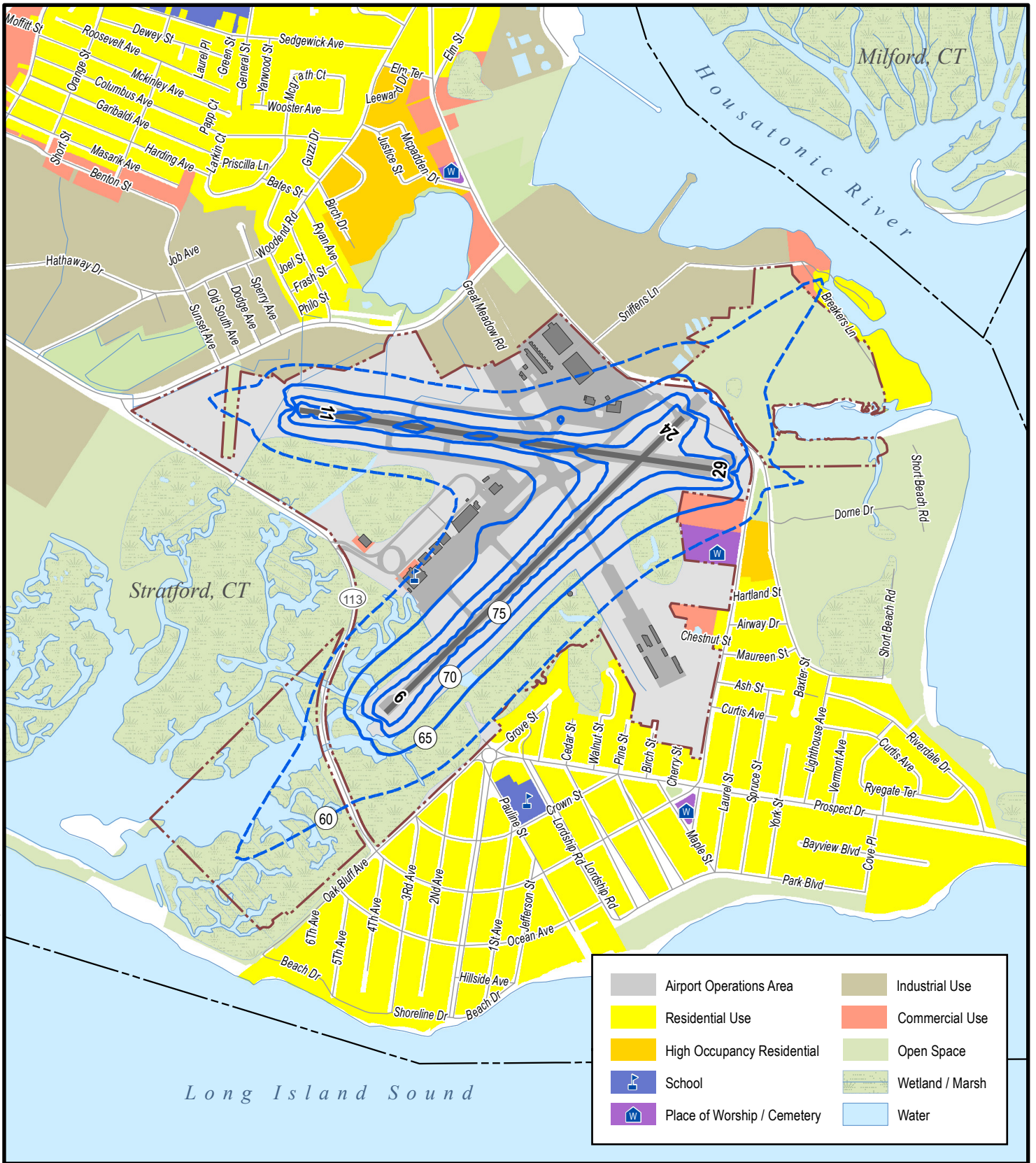
Igor I Sikorsky Memorial Airport

Figure ES-1
Existing Conditions (2021) Noise Exposure Map



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Author: M.J.Hamilton; Document Path: \\FS1\vol1\Projects\310XXX\310150_BDR_NEM_Update\GIS\310150_BDR_FigureES-2_Forecast_2026_NEM_Contour.mxd



	Airport Operations Area		Industrial Use
	Residential Use		Commercial Use
	High Occupancy Residential		Open Space
	School		Wetland / Marsh
	Place of Worship / Cemetery		Water

- 2026 DNL Contour (60 dB For Informational Purposes Only)
- 2026 DNL Contour (65-75 dB)
- Airport Boundary
- Runways / Taxiways
- Municipal Boundary
- Highway
- Primary Roads
- Secondary Roads
- Local Roads

Igor I Sikorsky Memorial Airport

Figure ES-2
Forecast Conditions (2026) Noise Exposure Map



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1 INTRODUCTION

This document provides an update of the Sikorsky Memorial Airport (BDR) Noise Exposure Map (NEM) to reflect aircraft noise exposure from current conditions and forecast aircraft operational activity. It updates the NEM submittal accepted by the Federal Aviation Administration (FAA) on July 25, 1990. The NEM identifies noise exposure from BDR aircraft operations and assesses the compatibility of nearby land uses. The primary product of an NEM Update is a set of maps that display the aircraft noise exposure in terms of Day-Night Average Sound Level (DNL) contours intended to assess the noise and land use compatibility for existing and forecast aircraft activity. Noise exposure is presented on the maps in contours of equal noise exposure, much like terrain maps use contours to show equal ground elevation. These maps are used to define the areas in which federal funds can be used to implement Noise Compatibility Program (NCP) measures such as noise abatement procedures, land acquisition and sound insulation of noise-sensitive structures.

1.1 Federal Regulation Guiding Airport Noise Compatibility Planning

The emphasis on aircraft noise compatibility planning in the United States started with the passing of the Aviation Safety and Noise Abatement (ASNA) Act of 1979. This act gave the FAA authority to provide assistance to airport operators to prepare and carry out noise compatibility programs. The FAA assistance includes both regulatory guidance and financial support. The FAA implemented the ASNA noise-related regulatory requirements in Title 14 of the Code of Federal Regulations Part 150 (14 CFR Part 150), “Airport Noise Compatibility Planning”.

The regulation, commonly referred to as “Part 150,” sets forth standards for airport operators to use in documenting noise exposure in their airport environs and for establishing programs to minimize noise-related land use incompatibilities. While participation in this program by an airport is voluntary, over 250 airport sponsors, including BDR, have participated in the program, which assists in standardizing noise analysis at a national level. The FAA provides funding support under the Federal Airport Improvement Program (AIP). The agency has provided over \$100 million in AIP grants for Part 150 studies and over \$5 billion in grants for implementation of noise compatibility measures nationwide.

Part 150 sets forth a process for airport sponsors to follow in developing and obtaining FAA approval of programs to reduce or eliminate incompatibilities between aircraft noise and surrounding land uses. In establishing the requirements for the development of noise compatibility programs at airports, Part 150 prescribes specific standards and systems for:

- Measuring noise
- Estimating cumulative noise exposure
- Describing other means to assess the impacts of noise (including single aircraft event levels and cumulative levels)
- Coordinating NCP development with local land use officials and other interested parties
- Documenting the analytical process used in developing the NCP
- Submitting documentation to the FAA

- Providing for FAA and public review processes

A Part 150 study includes two principal elements: (1) the NEM and (2) the NCP. However, the NEM may be updated independently of the NCP. The NEM identifies existing and potential future noise / land use compatibility within the 65-decibel (dB) DNL noise contour. Federal guidelines and standards identify the 65 dB DNL contour as the outer limit of the area within which any category of land use may be considered noncompatible with aircraft noise (e.g., residences, schools, and places of worship).

This document represents only an updated NEM for Sikorsky Memorial Airport.

1.1.1 Part 150 Noise Exposure Map

Per regulation, the NEM describes the airport layout and operation, aircraft-related noise exposure, land uses in the airport environs, and the resulting noise/land use compatibility situation. The aircraft noise exposure is expressed in decibels (dB) in terms of the Day-Night Average Sound Level (DNL). Contours of equal DNL values, similar to topographic contours of equal elevation, form the basis for evaluating the noise exposure from aircraft operations to the nearby communities. The NEM must address two time frames: (1) data representing the year of submission (the “existing conditions”) and (2) the fifth calendar year or later following the year of submission (the “forecast conditions”).

The primary objective is to describe the current and forecast conditions at the airport and the noise effects of the aircraft activity on the surrounding communities. While this description is normally processed into individual noise exposure maps, Part 150 requires more than simply a “map” to provide all the necessary information. The process required to provide the information for analysis includes such tasks as:

- Collecting historical aviation activity data such as aircraft fleet mix, number and type of operations, and runway utilization
- Developing a forecast of aircraft activity for a period at least five years in the future from the year representing the existing conditions
- Determining aircraft flight tracks
- Formatting the necessary inputs to the FAA’s noise model to represent the average annual day
- Collecting data from local jurisdictions to establish a detailed land use map of the airport environs
- Estimating population data within the area of concern

In addition to the graphical elements, the NEM submission must document, through tabulated information and text discussions, the current and future noise environment due to aircraft activity at the airport.

During the process of the Part 150 study, the airport initiates and maintains contact with airport users and other interested stakeholders to obtain the various perspectives on noise modeling inputs. After considering all stakeholder and public comments, the airport sponsor submits the NEM documents to the FAA, and, subsequent to a thorough review, the FAA determines compliance with Part 150 regulation and accepts the NEM as being compliant with 14 CFR Part 150.

The year of submission for this NEM Update is 2021. Therefore, the official Noise Exposure Maps within this document reflect the 2021 existing conditions and the 2026 forecast conditions.

1.2 Project Location and Setting

Sikorsky Memorial Airport is owned by the City of Bridgeport, CT and is located in Fairfield County within the town of Stratford, CT. It is located on a peninsula that extends into Long Island Sound. Airport property is bordered by a mix of land uses including open space, industrial, residential, commercial, and religious uses.

The physical parameters of the Airport, as required for noise modeling purposes, are discussed in Section 2.2.1. A map of the Airport and its surrounding area is presented in Section 2, Figure 1.

1.3 Project Roles and Responsibilities

Several groups were involved in the development of this 2021 NEM update. Primary groups included: the City of Bridgeport, the FAA, and the consultant team.

1.3.1 City of Bridgeport

As the airport operator, the City of Bridgeport has overall responsibility for the Sikorsky Memorial Airport NEM Update study and must certify that the submission to FAA accurately represents current and forecast conditions. The City retained a team of consultants to conduct the technical work required to fulfill Part 150 analysis and documentation requirements.

1.3.2 Federal Aviation Administration

The FAA has the responsibility for reviewing the NEM submission to determine if the technical work, consultation, and documentation comply with 14 CFR Part 150. If the airport sponsor requests approval of non-standard modeling¹ processes to adequately model aircraft operations, the FAA is responsible for reviewing and evaluating such requests.

1.3.3 Consultant Team

The City of Bridgeport contracted with the consulting firm of Clough Harbour & Associates LLP (CHA) to have overall responsibility for completion of this NEM Update. In addition to overall project management, CHA coordinated the necessary stakeholder consultation. Harris Miller Miller & Hanson, Inc. (HMMH), acting as a subconsultant to CHA, completed the noise modeling, land use data collection, and documentation required for the NEM Update.

1.4 Noise Exposure Map Checklist

The FAA produced Advisory Circular 150/5020, "Airport Noise and Land Use Compatibility Planning", which includes a checklist for FAA's use in reviewing NEM submissions. To support the efficient review of this NEM Update document, a copy of the FAA NEM checklist with appropriate page numbers and other references/notes is provided in Table 1.

¹ Non-standard modeling request procedures are outlined in the documentation for the FAA's aircraft noise modeling software known as the Aviation Environmental Design Tool (AEDT).

Table 1. Part 150 Noise Exposure Map ChecklistSource: FAA/APP, Washington, DC, March 1989; revised June 2005; reviewed for currency 12/2007²

PART 150 NOISE EXPOSURE MAP CHECKLIST-PART I			
Airport Name: Igor I Sikorsky Memorial Airport	REVIEWER:		
	Yes	No	Supporting Pages/Review Comments
I. Submitting and Identifying the NEM:			
A. Submission properly identified:			
1. 14 C.F.R. Part 150 NEM?	X		Sponsor's Certification (p. iii) and Section 1 (p. 1)
2. NEM and NCP together?		X	Only NEM update
3. Revision to NEM FAA previously determined to be in compliance with Part 150?	X		Section 1 (p. 1)
B. Airport and Airport Operator's name are identified?			
C. NCP is transmitted by operator's dated cover letter, describing it as a Part 150 submittal and requesting appropriate FAA determination?			
		X	Only NEM update
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?			
	X		Section 4 (p. 43)
B. Identification of consulted parties:			
1. Are the consulted parties identified?			
	X		Section 4 (p. 43)
2. Do they include all those required by 150.21(b) and A150.105 (a)?			
	X		Section 4 (p. 43)
3. Agencies in 2. above, correspond to those indicated on the NEM?			
	X		Section 4 (p. 43)
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)?			
	X		Sponsor's Certification (p. iii) and Section 4 (p. 43)
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?			
	X		Section 4 (p. 43), Appendix D
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)?			
	X		Existing Conditions 2021 NEM is Figure 9 (p. 38); Forecast Conditions 2026 NEM is Figure 10 (p. 40)
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?			
	X		Figure 9 (p. 38) is 2021 Existing Conditions NEM

² http://www.faa.gov/airports/environmental/airport_noise/part_150/checklists/

PART 150 NOISE EXPOSURE MAP CHECKLIST-PART I			
Airport Name: Igor I Sikorsky Memorial Airport	REVIEWER:		
	Yes	No	Supporting Pages/Review Comments
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?	X		Section 2.2 (p. 14); Figure 10 (p. 40) is 2026 five-year Forecast NEM
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?	N/A		
2. If the forecast year map is based on program implementation:			
a. Are the specific program measures that are reflected on the map identified?	N/A		
b. Does the documentation specifically describe how these measures affect land use compatibilities depicted on the map?	N/A		
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? (Note (1) if the submittal uses separate graphics to depict flight tracks and/or noise monitoring sites, these must be of the same scale, because they are part of the documentation required for NEM.) (Note (2) supplemental graphics that are not required by the regulation do not need to be at the 1" to 2,000' scale)	X		2021 Existing Conditions NEM; Figure 10 (p. 40) Forecast Conditions 2026 NEM have 1" to 1,500' scale
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)	X		Figure 3 (p. 16) AEDT Arrival Model Tracks; Figure 4 (p. 20), AEDT Departure Model Tracks; Figure 5 (p. 22) AEDT Touch and Go Model Tracks; Figure 9 (p. 38) 2021 Existing Conditions NEM; Figure 10 (p. 40) Forecast Conditions 2026 NEM
C. Depiction of the airport and its environs.			

PART 150 NOISE EXPOSURE MAP CHECKLIST-PART I			
Airport Name: Igor I Sikorsky Memorial Airport	REVIEWER:		
	Yes	No	Supporting Pages/Review Comments
1. Is the following graphically depicted to scale on both the existing condition and forecast year maps:			Figure 3 (p. 16) AEDT Arrival Model Tracks; Figure 4 (p. 20), AEDT Departure Model Tracks; Figure 5 (p. 22) AEDT Touch and Go Model Tracks; Figure 9 (p. 38) 2021 Existing Conditions NEM; Figure 10 (p. 40) Forecast Conditions 2026 NEM
a. Airport boundaries	X		
b. Runway configurations with runway end numbers	X		
2. Does the depiction of the off-airport data include?			Figure 9 (p. 38) 2021 Existing Conditions NEM; Figure 10 (p. 40) Forecast Conditions 2026 NEM
a. A land use base map depicting streets and other identifiable geographic features	X		
b. The area within the DNL 65 dB (or beyond, at local discretion)	X		
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)	X		
D. 1. Continuous contours for at least DNL 65, 70, and 75 dB?	X		Figure 9 (p. 38) 2021 Existing Conditions NEM; Figure 10 (p. 40) Forecast Conditions 2026 NEM
2. Has the local land use jurisdiction(s) adopted a lower local standard and, if so, has the sponsor depicted this on the NEM?		X	
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?	X		Sponsor's Certification (p. iii); Section 2.2.6 (p.24) presents existing and forecast operational data, Appendix C
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?	X		Figure B-1 (p.64) AEDT Arrival Model Tracks; Figure B-2 (p. 65) AEDT Departure Model Tracks; Figure B-3 (p. 66) AEDT Touch and Go Model Tracks
F. Locations of any noise monitoring sites (these may be on supplemental graphics which must use the same land use base map and scale as the official NEM)		X	
G. Noncompatible land use identification:			
1. Are noncompatible land uses within at least the DNL 65 dB noise contour depicted on the map graphics?	X		Figure 9 (p. 38) 2021 Existing Conditions NEM; Figure 10 (p. 40) Forecast Conditions 2026 NEM
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.)	X		Section 3.2.1
3. Are the noncompatible uses and noise sensitive public buildings readily identifiable and explained on the map legend?	N/A		

PART 150 NOISE EXPOSURE MAP CHECKLIST-PART I			
Airport Name: Igor I Sikorsky Memorial Airport	REVIEWER:		
	Yes	No	Supporting Pages/Review Comments
4. Are compatible land uses, which would normally be considered noncompatible, explained in the accompanying narrative?	N/A		
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 NEM are based adequately described in the narrative?	X		Section 2.2 (p. 14) presents aircraft operations data and other modeling inputs
2. Are the underlying technical data and planning assumptions reasonable?	X		
B. Calculation of Noise Contours:			
1. Is the methodology indicated?	X		Section 2 (p. 9); AEDT 2d SP2
a. Is it FAA approved?	X		
b. Was the same model used for both maps? (Note: The same model also must be used for NCP submittals associates 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.)	X		
c. Has AEE approval been obtained for use of a model other than those that have previous blanket FAA approval?		X	
2. Correct use of noise models:			Section 2.2.5 (p.17) indicates no adjustments, calibration, or substitutions
a. Does the documentation indicate, or is there evidence, the airport operator (or its consultant) has adjusted or calibrated 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?		X	
b. If so, does this have written approval from AEE, and is that written approval included in the submitted document?	N/A		
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? (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.)	N/A		Figure 9 (p. 38) 2021 Existing Conditions NEM; Figure 10 (p. 40) Forecast Conditions 2026 NEM show the 60 dB DNL contours for informational purposes only.
C. Noncompatible Land Use Information:			

PART 150 NOISE EXPOSURE MAP CHECKLIST-PART I			
Airport Name: Igor I Sikorsky Memorial Airport	REVIEWER:		
	Yes	No	Supporting Pages/Review Comments
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?	X		Table 14 (p. 42), Section 3.2.1 (p.37)
2. Does the documentation indicate whether the airport operator used Table 1 of Part 150?	X		Section 2.1.1 (p. 9)
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?		X	
4. Where normally noncompatible land uses are not depicted as such on the NEM, does the narrative satisfactorily explain why, with reference to the specific geographic areas?	N/A		
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?	X		Section 0 (p. 37)
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?	X		Sponsor's Certification (p. iii)
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. Section 1001?	X		

2 DEVELOPMENT OF NOISE EXPOSURE MAP

The NEM includes two major elements: (1) aircraft noise exposure contours and (2) a land use base map on which to display the contours. Developing the contours for the NEM requires the use of an FAA-approved methodology or computer program, which for this project is the Aviation Environmental Design Tool (AEDT) Version 2d, SP2³. The AEDT combines acoustic and flight performance modeling capabilities to determine aircraft noise exposure in the vicinity of airports. Section 2.1 describes the inventory of land use data. Section 2.2 provides the various AEDT data input requirements for generating the aircraft noise exposure contours in the Sikorsky Memorial Airport environs.

2.1 Inventory of Existing Land Use

To assess the land use compatibility within the noise exposure contours, a land use base map is required that includes the airport and its surrounding area, with each parcel identified by its land use category, e.g., residential, commercial, or public use. This section provides the background information on the development of the land use base map for Sikorsky Memorial Airport NEM (Figure 1), which will be used to display the noise exposure contours generated by the noise modeling.

2.1.1 Compatible Land Use Guidelines

Under the provisions of Part 150, land uses exposed to noise levels of less than DNL 65 dB are considered compatible. The land use compatibility guidelines contained in Part 150, which are based on empirical studies of the correlation between reported levels of annoyance and levels of cumulative noise exposure, identify the types of land uses that are most sensitive to airport related noise. For example, residential uses (including mobile home parks and transient lodgings), schools, and amphitheaters are, with few exceptions, considered noncompatible with noise levels of DNL 65 dB or greater. Some other uses, including hospitals, nursing homes, churches and auditoriums, are also considered noncompatible within levels of DNL 65 dB or greater.

FAA land use guidelines are reproduced below in Table 2.

2.1.2 Land Use Map

The land use map presented in this NEM is based on the State of Connecticut Department of Energy and Environmental Protection's Connecticut Parcels for Protected Open Space Mapping project. The NEM consultant team updated the land use boundaries and noise sensitive location data based on recent aerial photography.

Figure 1 shows the land uses, as defined in Table 2, in close proximity to the Airport.

³ AEDT version 2d Service Pack 2 was released on September 5, 2019

Table 2 Part 150 Noise/Land Use Compatibility Guidelines*Source: 14 CFR Part 150, Appendix A, Table 1*

Land Use	Yearly Day-Night Average Sound Level, DNL, [or Community Noise Equivalent Level, CNEL], in Decibels					
	<65	65-70	70-75	75-80	80-85	>85
Residential Use						
Residential other than mobile homes and transient lodgings						
Lodgings	Y	N(1)	N(1)	N	N	N
Mobile home park	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail--building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade--general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheatres	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables, and water recreation	Y	Y	25	30	N	N

Key to Table 10 – Notes are presented on the following page

SLUCM: Standard Land Use Coding Manual.

Y(Yes): Land use and related structures compatible without restrictions.

N(No): Land use and related structures are not compatible and should be prohibited.

NLR: Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.

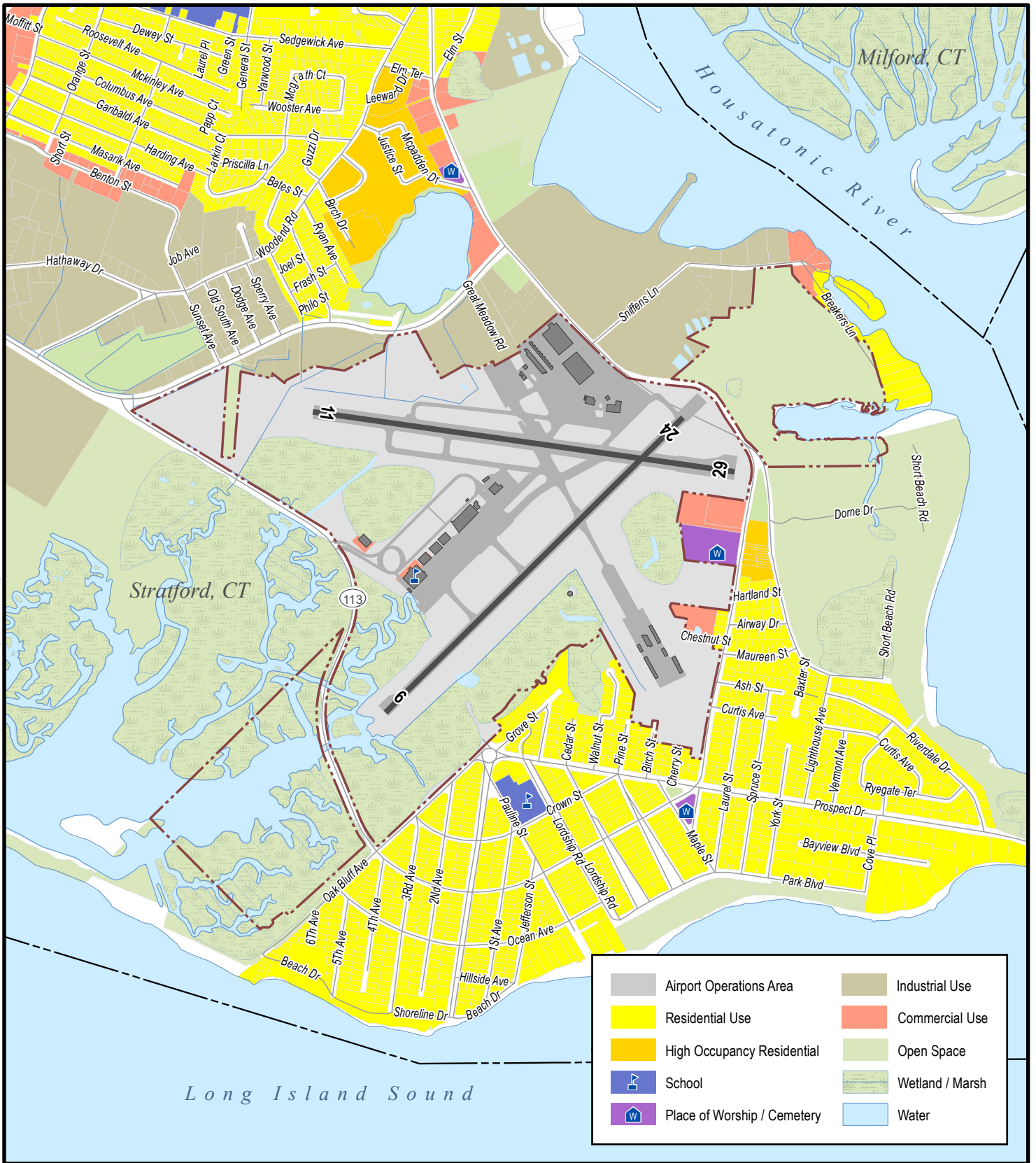
25, 30, or 35: Land use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 dB must be incorporated into design and construction of structure.

Notes for Table 10

The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under 14 CFR Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

1. Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often started as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.
2. Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.
3. Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.
4. Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.
5. Land use compatible provided special sound reinforcement systems are installed.
6. Residential buildings require an NLR of 25.
7. Residential buildings require an NLR of 30.
8. Residential buildings not permitted.

Author: M.J.Hamilton; Document Path: G:\Projects\310XXX\310150_BDR_NEM_Update\GIS\310150_BDR_Figure1_Existing_Land_Use.mxd



- Airport Boundary
- Runways / Taxiways
- Airport Buildings
- Municipal Boundary
- Highway
- Primary Roads
- Secondary Roads
- Local Roads

Igor I Sikorsky Memorial Airport

Figure 1
Existing Land Use



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2.2 Noise Modeling Inputs

To produce accurate aircraft noise exposure contours, the AEDT requires the following noise model input categories:

- Physical characteristics
 - Airfield layout
 - Flight track geometry
 - Terrain
 - Climatological data
 - Aircraft noise and performance data
- Operational characteristics
 - Aircraft operations (daily by time of day)
 - Runway use
 - Flight track use

The following sections present the detailed noise modeling input developed for the generation of the aircraft noise exposure contours presented Section 3.

2.2.1 Airfield Layout

BDR has two runways (Runway 6/24 and Runway 11/29). Figure 2 shows the Airport Diagram and Table 3 provides the existing runway specifications required for modeling in the AEDT.

Runway ends are the most important airport layout data for noise modeling, as they determine the aircraft departure and arrival locations. Each end of the runway is designated by a number that, with the addition of a trailing “0”, reflects the magnetic heading of the runway to the nearest 10 degrees, as seen by the pilot. Runway length, runway width, instrumentation and declared distances affect the types of aircraft that might use a particular runway and under what conditions, and therefore how often a runway is used relative to the other runways at the airport.

Helicopter operations arrive and depart from several locations on the airport. The intersection of Taxiways A and C and the intersection of Taxiways E and D were used as the representative helipad locations in the AEDT model based on radar track geometry. Figure 2 shows the representative helipad locations with blue circles.

Table 3. Existing Runway Details

Source: FAA Form 5010

Runway	Latitude (degrees)	Longitude (degrees)	Elevation (ft. MSL)	Displaced Threshold (feet)	Glide Slope (degrees)	Threshold Crossing Height (feet)
6	41.15704	-73.131954	6.9	-	3	51
11	41.16624	-73.134962	8.5	-	3.5	40
24	41.16612	-73.119945	6.8	320	3	52
29	41.16446	-73.117838	6.5	364	3	54
H1	41.16241	-73.127761	7	-	3	-
H2	41.16602	-73.124891	7	-	3	-

Note:

https://www.faa.gov/airports/airport_safety/airportdata_5010/ accessed 1/3/2019

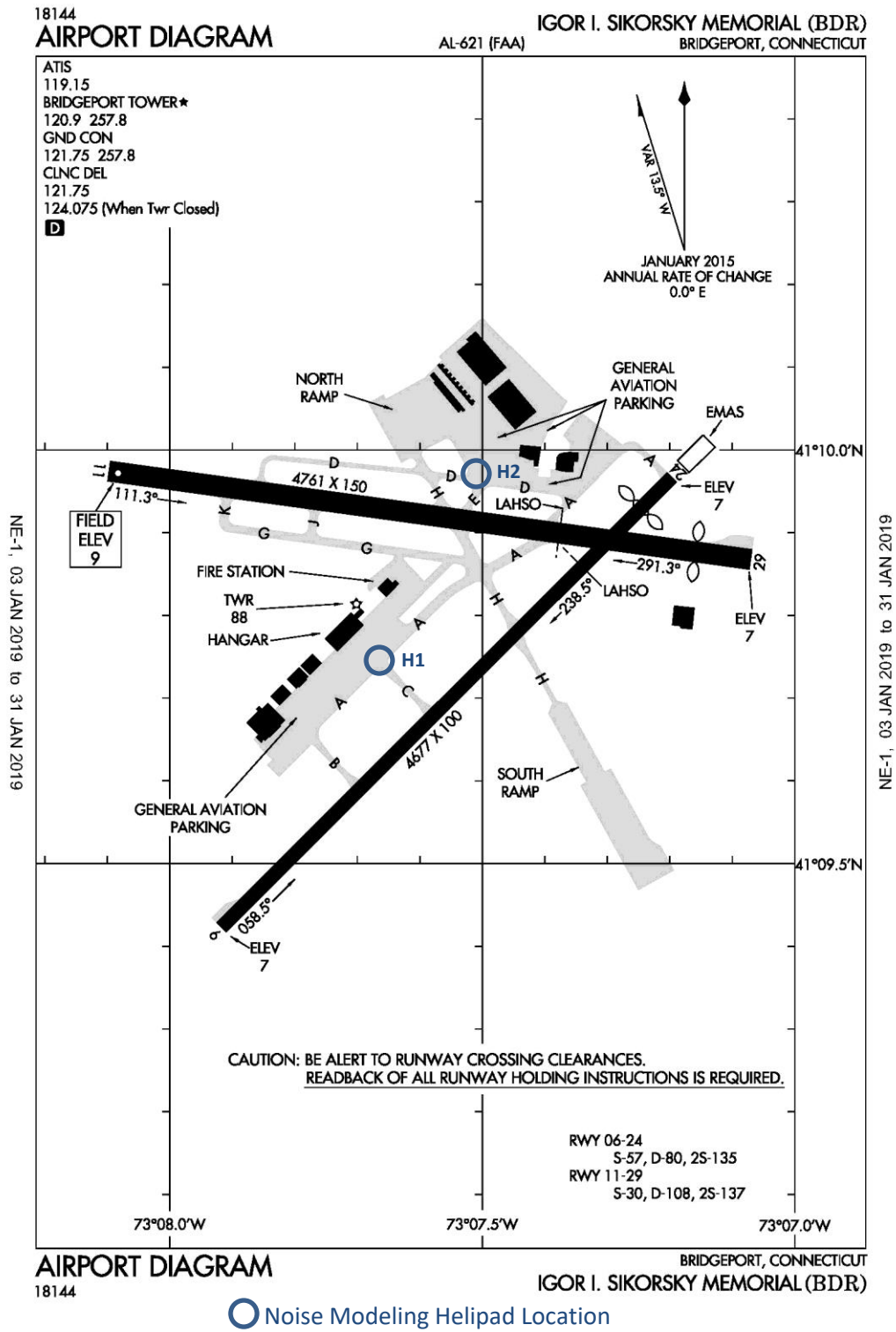


Figure 2. Existing Sikorsky Memorial Airport (BDR) Layout

Sources: FAA, digital Terminal Procedures, effective January 3, 2019 to January 30, 2019; helipads HMMH

A runway shift of 150 feet westward to each end of Runway 11/29 is planned to be completed by 2025. Table 4 provides the resulting modified runway specifications used in modeling the forecast case.

Table 4. Forecast Runway Details

Source: Master Plan Recommended Plan, CHA

Runway	Latitude (degrees)	Longitude (degrees)	Elevation (ft. MSL)	Displaced Threshold (feet)	Glide Slope (degrees)	Threshold Crossing Height (feet)
6	41.15704	-73.131954	6.9	-	3	51
11F	41.16629	-73.135497	5.8	211	3.5	40
24	41.16612	-73.119945	6.8	320	3	52
29F	41.16451	-73.118375	6.1	211	3	54
H1	41.16241	-73.127761	7	-	3	-
H2	41.16602	-73.124891	7	-	3	-

Notes:

The Runway 11/29 pavement will be extended 150 feet on the west (11) end, and it will be correspondingly shortened on the east (29) end to retain a runway length of 4,761 feet. Each end will have a displaced landing threshold of 211 feet.

2.2.2 Flight Track Geometry and Utilization

Flight tracks represent the ground projection of paths flown by aircraft to and from an airport. HMMH prepared the 2021 and 2026 contours using an AEDT pre-processor named RC for AEDT. RC for AEDT converts aircraft flight track data directly into AEDT input data and thus the AEDT results are based on the modeling of each individual flight track. It should be emphasized that the AEDT, not the pre-processor program, was used for all noise calculations. RC for AEDT provides an efficient method for creating AEDT input for the large volume of individual flight tracks modeled in the study.

Flight tracks were provided from a full calendar year of 2018 data from the FAA’s National Offload Program (NOP). Over 4,500 individual flight tracks were directly used for the preparation of the contours. These tracks provided excellent representation of the distribution of flight paths off all runway ends and helipads. All radar flight tracks that could be matched to a valid operation type, runway, and AEDT aircraft type were utilized in the noise modeling. There were no air carrier operations at BDR in 2018 and no air carrier operations were included in the modeled fleet for either NEM year.

Touch and goes are typically conducted by smaller aircraft at low altitudes and therefore those radar tracks are often partial or contain “ground clutter” that prevent their use in AEDT. For this reason, representative average model tracks were constructed in order to model touch and goes rather than using individual radar flight paths directly in AEDT.

Figure 3, Figure 4, and Figure 5 display the modeled arrival, departure, and touch and go flight tracks, respectively⁴. For arrivals and departures, the relative dispersion of the modeled operations is visible in the distribution of flight tracks in the figures below. For touch and goes, the distribution between the two model tracks (left traffic and right traffic) was computed based on the number of radar tracks consistent with each pattern in the 2018 radar sample. Table 5 displays the modeled touch and go track utilization for general aviation and military aircraft.

⁴ These figures display a larger extent than is possible at the scale used for the official NEM contour figures. Additionally, the map is simplified to focus attention on the flight track geometry. Appendix B presents additional flight track figures using the same land use basemap and scale as the official NEM contour figures.

Table 5. Touch and Go Track Utilization*Source: FAA National Offload Program radar data, HMMH*

Runway	Flight Track	Track Utilization (%)	
		General Aviation	Military
6	06TL1	72.6	72.6
	06TR1	27.4	27.4
	Total	100.0	100.0
11	11TL1	97.2	97.2
	11TR1	2.8	2.8
	Total	100.0	100.0
24	24TL1	20.5	20.5
	24TR1	79.5	79.5
	Total	100.0	100.0
29	29TL1	4.4	4.4
	29TR1	95.6	95.6
	Total	100.0	100.0

2.2.3 Terrain

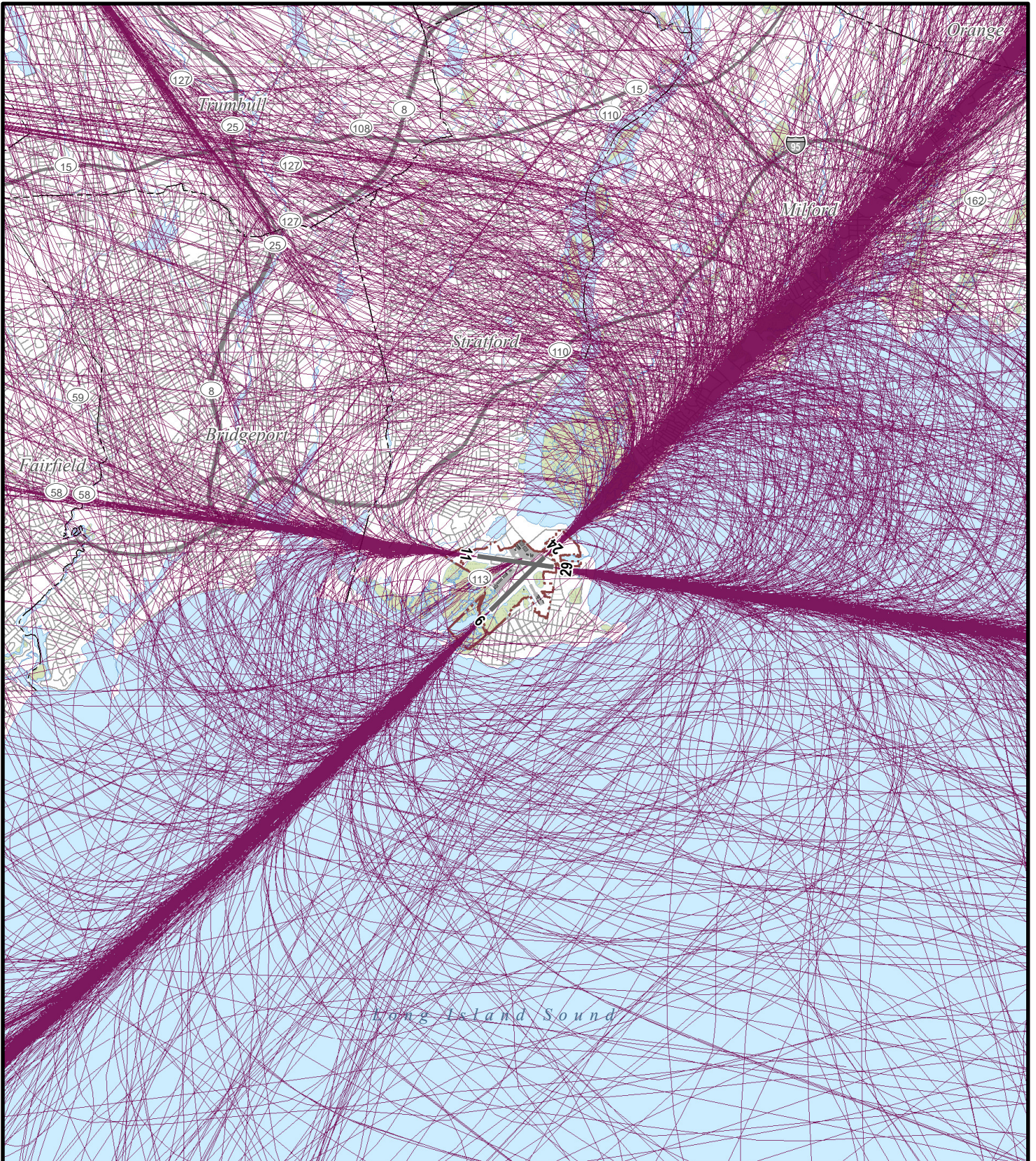
Terrain data provide the elevation of the ground surrounding an airport and airport property. The AEDT uses terrain data to adjust the ground level under the flight paths. The terrain data do not affect the aircraft's performance or emitted noise levels; they only affect the vertical distance between the aircraft and a "receiver" on the ground. This in turn affects the computed noise levels at particular points on the ground. The terrain data were obtained from the United States Geological Survey (USGS) National Map Viewer and were used with the terrain feature of the AEDT in generating the noise contours for this NEM.

2.2.4 Meteorological Conditions

The AEDT utilizes meteorological data in calculations related to aircraft performance profiles (thrust, speed, etc.) and sound propagation. Meteorological inputs include average annual temperature, barometric pressure, relative humidity, and average headwind speed at an airport. AEDT contains a database of average annual weather data for many airports. Use of other weather data requires FAA approval. The NEM modeling utilized the AEDT standard average annual conditions for Sikorsky Memorial Airport: a temperature of 52.0 F, sea level pressure of 1016.59 mm-Hg, relative humidity of 68.11 percent, and average headwind speed of 8.12.

2.2.5 Aircraft Noise and Performance Characteristics

The AEDT requires specific noise and performance data for each aircraft type operating at an airport. Noise data are specified in the form of sound exposure level (SEL – see Appendix A) at a range of distances (from 200 feet to 25,000 feet) from a particular aircraft with engines at a specific thrust level. Performance data include thrust, speed and altitude profiles for takeoff and landing operations. The AEDT database contains standard noise and performance data for over 300 different fixed-wing aircraft types and helicopters, most of which are civilian aircraft. The AEDT automatically accesses the noise and performance data for takeoff and landing operations by those aircraft. All the noise and performance data used in this NEM Update were from the AEDT standard database. The model was used without any unauthorized calibration or adjustment.



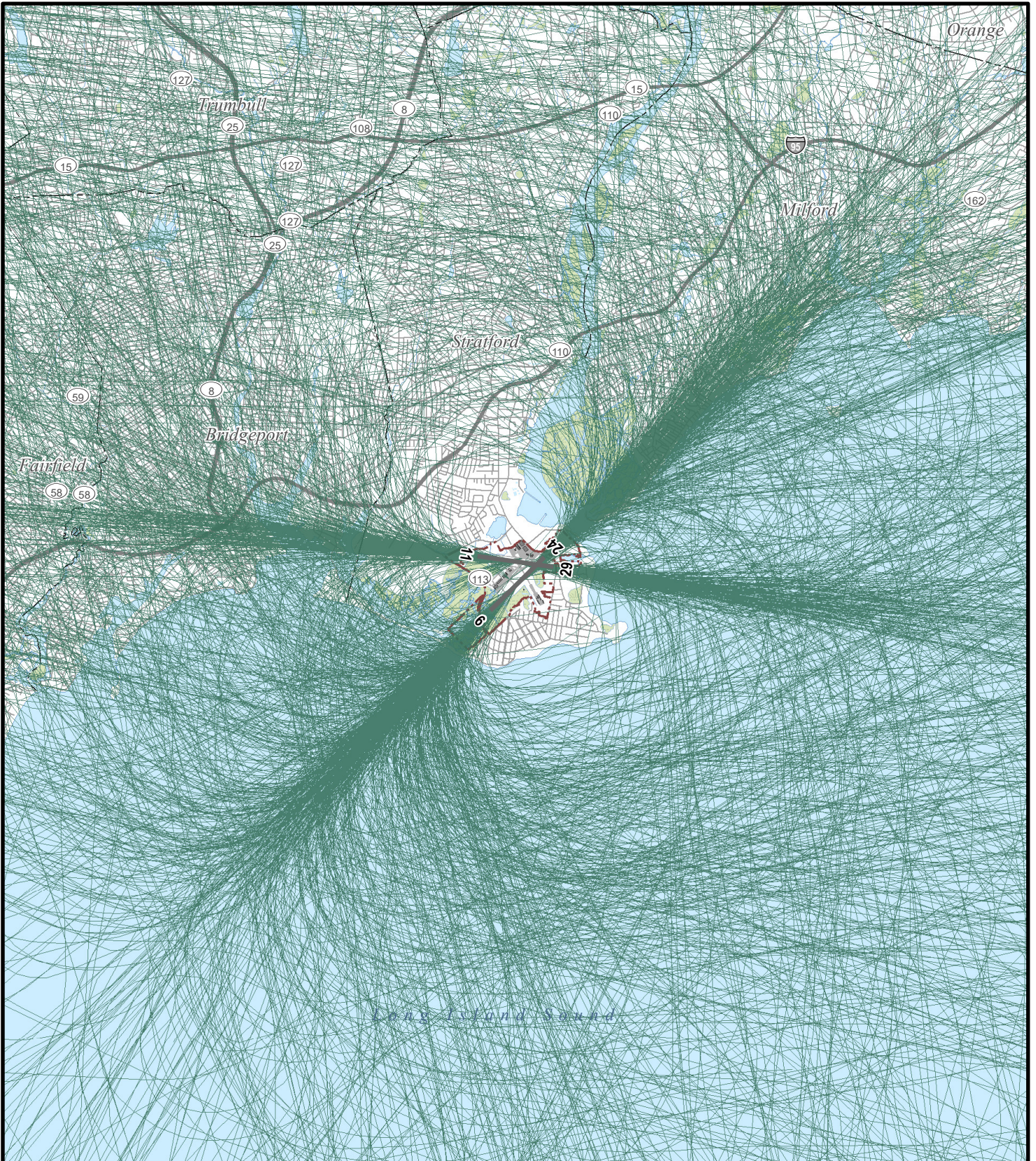
- AEDT Arrival Model Tracks
- Airport Boundary
- Runways / Taxiways
- Airport Buildings
- Municipal Boundary
- Highway
- Primary Roads
- Secondary Roads
- Local Roads

Igor I Sikorsky Memorial Airport

Figure 3
AEDT Arrival Model Tracks



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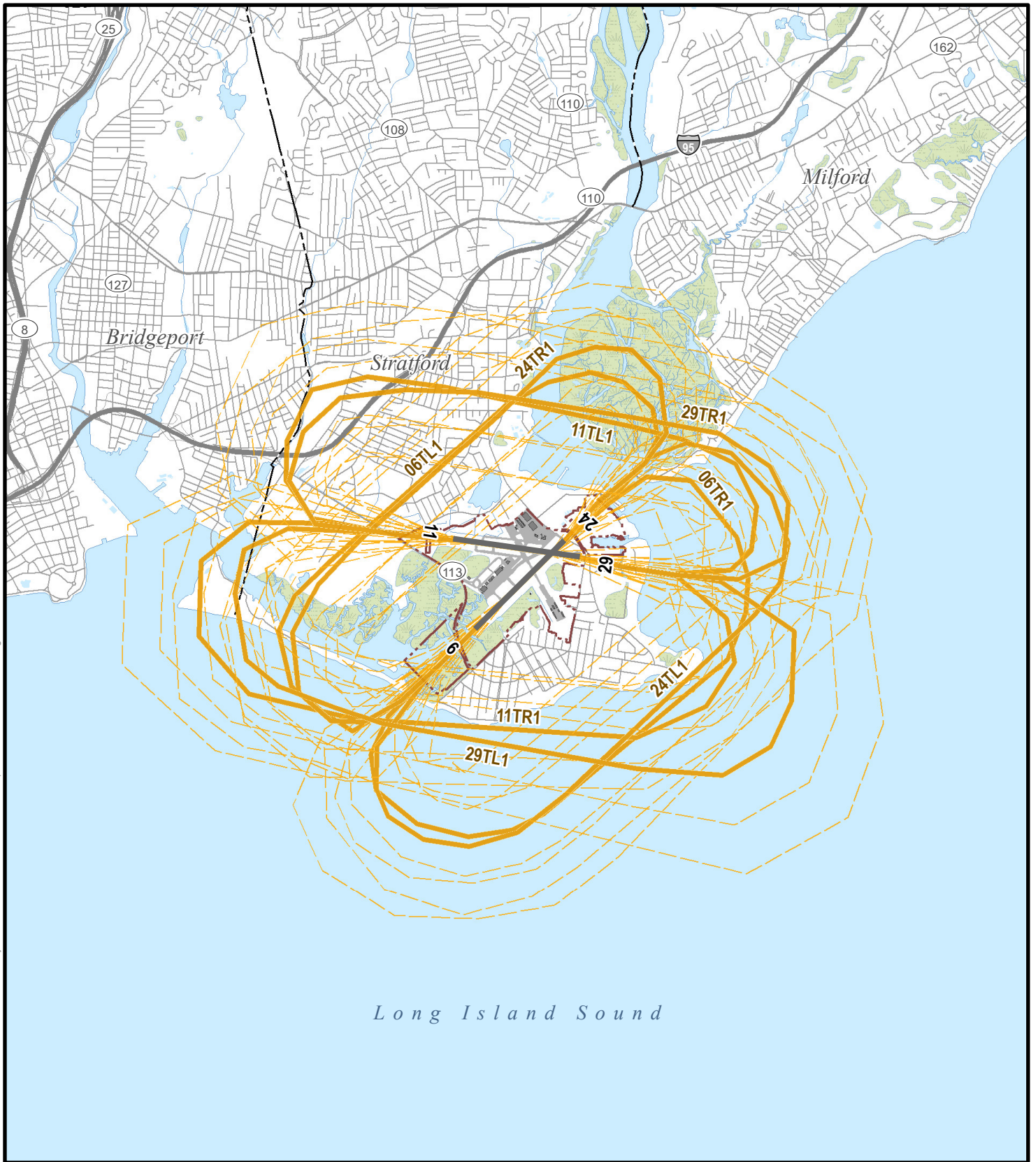
- AEDT Departure Model Tracks
- Airport Boundary
- Runways / Taxiways
- Airport Buildings
- Municipal Boundary
- Highway
- Primary Roads
- Secondary Roads
- Local Roads

Igor I Sikorsky Memorial Airport

Figure 4
AEDT Departure Model Tracks



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- AEDT Circuit Model Tracks (Backbone)
- AEDT Circuit Model Tracks (Dispersed)
- Airport Boundary
- Runways / Taxiways
- Airport Buildings
- Municipal Boundary
- Highway
- Primary Roads
- Secondary Roads
- Local Roads

Igor I Sikorsky Memorial Airport

Figure 5
AEDT Touch and Go Model Tracks



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Within the AEDT database, aircraft takeoff or departure profiles are usually defined by a range of trip distances identified as “stage lengths.” A longer trip distance or higher stage length is associated with a heavier aircraft due to the increase in fuel requirements for the flight. For this study, city-pair distances were determined for each departure flight track in the NOP radar data, which were then used to define the specific stage length according to the AEDT standard definitions.

2.2.6 Aircraft Operations

Part 150 and its table of noise/land use compatibility guidelines require the calculation of “yearly Day-Night Average Sound Level (DNL)” values. The AEDT produces these values of exposure utilizing an “average annual day” of aircraft operations. The annual-average day aircraft operations are determined by dividing the annual operations by the number of days in the year.

The operations and fleet mix information were developed from several sources. The NOP radar data was prepared for noise modeling input by assigning flights to operation types (i.e. arrivals, departures, touch and goes) and runways using their geometry. The aircraft type, registration, and airline for flights with associated flight plans were used to match these flights to the appropriate representative noise and performance aircraft type in AEDT. The flights were tagged with the appropriate user class (air carrier, air taxi, general aviation, military) based on the aircraft type and flight identifier. These operations were then scaled by category to the forecast operations for the appropriate year in the Master Plan forecast⁵ to represent all operations at BDR in 2021 and 2026.

Table 6 shows the aircraft operations for 2021 and the expected growth to operations in 2026. All annual totals are divided by the number of days in the year to produce operations counts for an annual-average day. The applicable pages from the operations forecast chapter of the Master Plan are reproduced in Appendix C. Also included in Appendix C are the FAA’s letter of acceptance of the forecast and a comparison of modeled operations totals to actual 2020 operations levels.

Table 6. Forecast of Aircraft Operations - 2021 and 2026

Source: CHA, HMMH

Operation Type	User Class	2021 Operations		2026 Operations	
		Annual	Average Annual Day	Annual	Average Annual Day
Itinerant	Air Taxi*	3,179	8.7	3,330	9.1
	General Aviation*	20,600	56.3	21,578	59.1
Local	Military	108	0.3	108	0.3
	General Aviation	26,962	73.7	28,242	77.4
	Military	74	0.2	74	0.2
Total		50,923	139.1	53,332	146.1

* The Master Plan forecast does not distinguish between air taxi and general aviation itinerant operations. The percentage split within the most recent full year of FAA OPSNET radar data at the time of the analysis (calendar year 2018) was applied to the combined total in the Master Plan to split the operations into the categories above.

Table 7 and Table 8 show the modeled number of average-annual day arrivals and departures by aircraft type for 2021 and 2026, respectively. The table separately lists daytime and nighttime operations. The

⁵ Existing and forecast case conditions were modeled prior to the onset of the COVID-19 pandemic and resulting travel restrictions. The modeled operation levels were re-examined in light of actual 2020 operations counts, and were determined to be reasonable expectations of 2021 and 2026 activity levels.

day/night breakdown is critical to the calculation of DNL because the metric weights night (10:00 pm to 6:59 am) operations by a factor of 10 (mathematically equivalent to adding 10 decibels to night noise levels produced by aircraft). In addition to the aircraft name, the tables list the identifier (AEDT Type) for the noise and performance dataset that AEDT uses to model that aircraft.

Table 7. Modeled Average Daily Aircraft Operations for 2021

Sources: FAA National Offload Program Data, CHA Forecast, HMMH

Operation Type and User Class	Aircraft	AEDT Type	Arrival		Departure		Total
			Day	Night	Day	Night	
Itinerant Air Taxi	Bombardier Challenger 300	CL600	0.14	0.00	0.13	0.01	0.28
	Bombardier Challenger 350	CL600	0.08	0.00	0.08	0.00	0.17
	Bombardier Challenger 605	CL600	0.02	0.00	0.02	0.00	0.03
	Bombardier Global Express	BD-700-1A10	0.30	0.00	0.28	0.02	0.59
	Cessna 208 Caravan	CNA208	0.63	0.00	0.63	0.00	1.27
	Cessna 525 CitationJet	CNA500	0.07	0.00	0.07	0.01	0.14
	Cessna 525 CitationJet	CNA525C	0.02	0.00	0.02	0.00	0.05
	Cessna 560 Citation Excel	CNA560U	0.26	0.00	0.25	0.01	0.53
	Cessna 560 Citation V	CNA560E	0.01	0.00	0.01	0.00	0.02
	Cessna 560 Citation V	CNA560U	0.02	0.00	0.02	0.00	0.05
	Cessna 560 Citation XLS	CNA560XL	0.04	0.00	0.05	0.00	0.09
	Cessna 680 Citation Sovereign	CNA680	0.12	0.00	0.12	0.01	0.24
	Cessna 680-A Citation Latitude	CNA680	0.07	0.00	0.07	0.00	0.14
	Cessna 750 Citation X	CNA750	0.05	0.00	0.05	0.00	0.09
	Cirrus SR22	COMSEP	0.02	0.00	0.02	0.00	0.05
	Dassault Falcon 2000	CNA750	0.02	0.00	0.02	0.00	0.04
	Dassault Falcon 900-EX	CNA750	0.10	0.00	0.11	0.00	0.22
	Embraer 505	CNA55B	0.16	0.00	0.16	0.00	0.32
	Embraer ERJ135-LR	EMB145	0.13	0.01	0.12	0.02	0.27
	Embraer Legacy 450 (EMB-545)	CNA510	0.01	0.00	0.01	0.00	0.02
	Embraer Legacy 650	CNA55B	0.02	0.00	0.01	0.00	0.03
	Gulfstream G280	IA1125	0.11	0.01	0.11	0.00	0.22
	Gulfstream G400	GIV	0.21	0.01	0.22	0.00	0.44
	Gulfstream G500	GV	0.01	0.00	0.01	0.00	0.02
	Gulfstream IV-SP	GIV	0.02	0.00	0.02	0.00	0.04
	Honda HA-420 Hondajet	MU3001	0.09	0.00	0.08	0.01	0.18
	Pilatus PC-12	CNA208	0.91	0.02	0.91	0.02	1.87
	Pilatus PC-24	CNA55B	0.02	0.00	0.02	0.00	0.04
	Piper PA-28 Cherokee Series	PA28	0.03	0.00	0.03	0.00	0.07
	Piper PA-32 Cherokee Six	GASEPV	0.01	0.00	0.01	0.00	0.02
	Raytheon Beech 99	DHC6	0.01	0.00	0.01	0.00	0.02
	Raytheon Beechjet 400	MU3001	0.08	0.00	0.08	0.00	0.16
	Raytheon Hawker 800	LEAR35	0.02	0.00	0.01	0.00	0.03
	Raytheon Premier I	MU3001	0.01	0.00	0.01	0.00	0.02
Raytheon Super King Air 200	DHC6	0.01	0.00	0.01	0.00	0.02	
Raytheon Super King Air 300	DHC6	0.43	0.00	0.42	0.01	0.86	
Itinerant Air Taxi Subtotal			4.28	0.06	4.22	0.13	8.69

Operation Type and User Class	Aircraft	AEDT Type	Arrival		Departure		Total
			Day	Night	Day	Night	
Itinerant General Aviation	Aerostar PA-60	BEC58P	0.04	0.00	0.04	0.00	0.07
	Bombardier Challenger 300	CL600	1.37	0.04	1.39	0.02	2.81
	Bombardier Challenger 600	CL601	0.07	0.00	0.07	0.00	0.15
	Bombardier Challenger 601	CL601	0.04	0.00	0.04	0.00	0.07
	Bombardier Global 5000 Business	BD-700-1A11	0.36	0.00	0.34	0.02	0.71
	Bombardier Global Express	BD-700-1A10	1.20	0.02	0.98	0.24	2.44
	Bombardier Learjet 31	LEAR35	0.09	0.00	0.09	0.00	0.19
	Bombardier Learjet 40	LEAR35	0.41	0.00	0.41	0.00	0.82
	Bombardier Learjet 45	LEAR35	0.04	0.00	0.04	0.00	0.07
	Bombardier Learjet 60	LEAR35	0.30	0.00	0.28	0.02	0.60
	Cessna 172 Skyhawk	CNA172	1.22	0.00	1.22	0.00	2.44
	Cessna 182	CNA182	0.52	0.00	0.50	0.02	1.05
	Cessna 206	CNA206	0.28	0.00	0.28	0.00	0.56
	Cessna 208 Caravan	CNA208	0.69	0.02	0.58	0.13	1.42
	Cessna 210 Centurion	GASEPV	0.34	0.00	0.32	0.02	0.67
	Cessna 310	BEC58P	0.02	0.00	0.02	0.00	0.04
	Cessna 340	BEC58P	0.11	0.00	0.11	0.00	0.22
	Cessna 402	BEC58P	0.09	0.00	0.09	0.00	0.19
	Cessna 421 Golden Eagle	BEC58P	0.09	0.00	0.09	0.00	0.19
	Cessna 441 Conquest II	CNA441	0.30	0.00	0.30	0.00	0.60
	Cessna 525 CitationJet	CNA525C	0.36	0.00	0.31	0.04	0.71
	Cessna 525C CitationJet	CNA525C	0.36	0.00	0.36	0.00	0.71
	Cessna 550 Citation II	CNA55B	0.13	0.00	0.13	0.00	0.26
	Cessna 560 Citation Excel	CNA560U	0.82	0.04	0.78	0.09	1.72
	Cessna 560 Citation XLS	CNA560XL	0.21	0.02	0.22	0.00	0.45
	Cessna 650 Citation III	CIT3	0.07	0.00	0.07	0.00	0.15
	Cessna 680 Citation Sovereign	CNA680	0.62	0.00	0.47	0.15	1.24
	CESSNA CITATION 510	CNA510	0.45	0.00	0.43	0.02	0.90
	Cirrus SR20	COMSEP	0.52	0.00	0.52	0.00	1.05
	Cirrus SR22	COMSEP	2.21	0.02	2.23	0.00	4.46
	DAHER TBM 900/930	CNA208	0.04	0.00	0.04	0.00	0.07
	Dassault Falcon 2000	CNA750	0.45	0.05	0.49	0.02	1.01
	Dassault Falcon 50	CNA750	0.22	0.00	0.22	0.00	0.45
	Dassault Falcon 900-EX	CNA750	0.81	0.07	0.84	0.04	1.76
	Dassault Falcon 900-EX	COMJET	0.02	0.00	0.02	0.00	0.04
	EADS Socata TBM-700	CNA208	0.07	0.00	0.07	0.00	0.15
	Eclipse 500 / PW610F	ECLIPSE500	0.07	0.00	0.07	0.00	0.15
	Embraer 505	CNA55B	0.09	0.00	0.09	0.00	0.19
	Embraer ERJ135 Legacy Business	EMB145	0.02	0.00	0.02	0.00	0.04
	Falcon 7X	CNA750	0.15	0.00	0.13	0.02	0.30
	GULFSTREAM AEROSPACE Gulfstream G650	GV	0.69	0.00	0.69	0.00	1.39
	Gulfstream G400	GIV	0.28	0.02	0.24	0.06	0.60
	Gulfstream G500	GV	0.97	0.00	0.97	0.00	1.95
	Gulfstream G550	GV	0.22	0.02	0.24	0.00	0.49
	Gulfstream IV-SP	GIV	0.19	0.00	0.19	0.00	0.37
Kaman SH-2 Seasprite	SA330J	0.13	0.00	0.07	0.06	0.26	
Mitsubishi MU-2	DHC6	0.04	0.00	0.04	0.00	0.07	
Mooney M20-K	GASEPV	0.21	0.00	0.21	0.00	0.41	
Pilatus PC-12	CNA208	0.30	0.00	0.30	0.00	0.60	
Pilatus Turbo Trainer PC-9	GASEPF	0.47	0.00	0.47	0.00	0.94	
Piper PA-24 Comanche	GASEPV	0.02	0.00	0.02	0.00	0.04	
Piper PA-27 Aztec	BEC58P	0.04	0.00	0.04	0.00	0.07	
Piper PA-28 Cherokee Series	GASEPF	0.37	0.00	0.37	0.00	0.75	

Operation Type and User Class	Aircraft	AEDT Type	Arrival		Departure		Total
			Day	Night	Day	Night	
	Piper PA-28 Cherokee Series	PA28	1.16	0.02	1.15	0.03	2.36
	Piper PA-30 Twin Comanche	PA30	0.02	0.00	0.02	0.00	0.04
	Piper PA-31 Navajo	BEC58P	0.54	0.02	0.56	0.00	1.12
	Piper PA-31T Cheyenne	CNA441	0.13	0.00	0.13	0.00	0.26
	Piper PA-32 Cherokee Six	GASEPV	2.40	0.02	2.42	0.00	4.83
	Piper PA-34 Seneca	BEC58P	0.39	0.00	0.39	0.00	0.79
	Piper PA46-TP Meridian	GASEPF	0.09	0.00	0.09	0.00	0.19
	Raytheon Beech 99	DHC6	0.24	0.00	0.24	0.00	0.49
	Raytheon Beech Baron 58	BEC58P	0.28	0.00	0.28	0.00	0.56
	Raytheon Beech Bonanza 36	CNA208	1.03	0.04	1.03	0.03	2.14
	Raytheon Beechjet 400	MU3001	0.07	0.00	0.07	0.00	0.15
	Raytheon Hawker 800	LEAR35	0.96	0.00	0.91	0.04	1.91
	Raytheon Premier I	MU3001	0.22	0.06	0.24	0.04	0.56
	Raytheon Super King Air 200	DHC6	0.30	0.00	0.30	0.00	0.60
	Raytheon Super King Air 300	DHC6	0.19	0.00	0.19	0.00	0.37
	Sikorsky S-76 Spirit	S76	0.17	0.00	0.17	0.00	0.34
	SOCATA TBM 850	CNA441	0.24	0.00	0.24	0.00	0.49
Itinerant General Aviation Subtotal			27.67	0.47	27.05	1.10	56.28
Itinerant Military	Cessna 182	CNA182	0.01	0.00	0.01	0.00	0.02
	Sikorsky SH-60 Sea Hawk	S70	0.13	0.01	0.14	0.00	0.27
Itinerant Military Subtotal			0.14	0.01	0.15	0.00	0.30
Local General Aviation	Aerostar PA-60	BEC58P	0.13	0.00	0.13	0.00	0.25
	Cessna 172 Skyhawk	CNA172	4.14	0.00	4.14	0.00	8.28
	Cessna 182	CNA182	1.78	0.00	1.78	0.00	3.57
	Cessna 206	CNA206	0.96	0.00	0.96	0.00	1.91
	Cessna 210 Centurion	GASEPV	1.15	0.00	1.15	0.00	2.29
	Cessna 310	BEC58P	0.06	0.00	0.06	0.00	0.13
	Cessna 340	BEC58P	0.38	0.00	0.38	0.00	0.76
	Cessna 402	BEC58P	0.32	0.00	0.32	0.00	0.64
	Cessna 421 Golden Eagle	BEC58P	0.32	0.00	0.32	0.00	0.64
	Cirrus SR20	COMSEP	1.78	0.00	1.78	0.00	3.57
	Cirrus SR22	COMSEP	7.58	0.00	7.58	0.00	15.17
	Mooney M20-K	GASEPV	0.70	0.00	0.70	0.00	1.40
	Piper PA-24 Comanche	GASEPV	0.06	0.00	0.06	0.00	0.13
	Piper PA-27 Aztec	BEC58P	0.13	0.00	0.13	0.00	0.25
	Piper PA-28 Cherokee Series	GASEPF	1.27	0.00	1.27	0.00	2.55
	Piper PA-31 Navajo	BEC58P	1.91	0.00	1.91	0.00	3.82
	Piper PA-32 Cherokee Six	GASEPV	8.22	0.00	8.22	0.00	16.44
	Piper PA-34 Seneca	BEC58P	1.34	0.00	1.34	0.00	2.68
Raytheon Beech Baron 58	BEC58P	0.96	0.00	0.96	0.00	1.91	
Raytheon Beech Bonanza 36	CNA208	3.63	0.00	3.63	0.00	7.26	
Local General Aviation Subtotal			36.83	0.00	36.83	0.00	73.67
Local Military	Cessna 182	CNA182	0.10	0.00	0.10	0.00	0.20
Local Military Subtotal			0.10	0.00	0.10	0.00	0.20
Total			69.03	0.54	68.34	1.22	139.13

Table 8. Modeled Average Daily Aircraft Operations for 2026

Sources: FAA National Offload Program Data, CHA Forecast, HMMH

Operation Type and User Class	Aircraft	AEDT Type	Arrival		Departure		Total
			Day	Night	Day	Night	
Itinerant Air Taxi	Bombardier Challenger 300	CL600	0.14	0.00	0.14	0.01	0.30
	Bombardier Challenger 350	CL600	0.09	0.00	0.09	0.00	0.17
	Bombardier Challenger 605	CL600	0.02	0.00	0.02	0.00	0.03
	Bombardier Global Express	BD-700-1A10	0.31	0.00	0.29	0.02	0.62
	Cessna 208 Caravan	CNA208	0.66	0.00	0.66	0.00	1.33
	Cessna 525 CitationJet	CNA500	0.07	0.00	0.07	0.01	0.15
	Cessna 525 CitationJet	CNA525C	0.03	0.00	0.03	0.00	0.05
	Cessna 560 Citation Excel	CNA560U	0.28	0.00	0.27	0.01	0.56
	Cessna 560 Citation V	CNA560E	0.01	0.00	0.01	0.00	0.03
	Cessna 560 Citation V	CNA560U	0.03	0.00	0.02	0.00	0.05
	Cessna 560 Citation XLS	CNA560XL	0.04	0.00	0.05	0.00	0.10
	Cessna 680 Citation Sovereign	CNA680	0.13	0.00	0.12	0.01	0.25
	Cessna 680-A Citation Latitude	CNA680	0.07	0.00	0.07	0.00	0.15
	Cessna 750 Citation X	CNA750	0.05	0.00	0.05	0.00	0.10
	Cirrus SR22	COMSEP	0.03	0.00	0.03	0.00	0.05
	Dassault Falcon 2000	CNA750	0.02	0.00	0.02	0.00	0.04
	Dassault Falcon 900-EX	CNA750	0.11	0.00	0.11	0.00	0.23
	Embraer 505	CNA55B	0.17	0.00	0.17	0.00	0.34
	Embraer ERJ135-LR	EMB145	0.14	0.01	0.13	0.02	0.29
	Embraer Legacy 450 (EMB-545)	CNA510	0.01	0.00	0.01	0.00	0.02
	Embraer Legacy 650	CNA55B	0.02	0.00	0.01	0.00	0.03
	Gulfstream G280	IA1125	0.11	0.01	0.12	0.00	0.24
	Gulfstream G400	GIV	0.23	0.01	0.23	0.00	0.46
	Gulfstream G500	GV	0.01	0.00	0.01	0.00	0.03
	Gulfstream IV-SP	GIV	0.02	0.00	0.02	0.00	0.04
	Honda HA-420 Hondajet	MU3001	0.09	0.01	0.08	0.01	0.19
	Pilatus PC-12	CNA208	0.96	0.02	0.96	0.02	1.96
	Pilatus PC-24	CNA55B	0.02	0.00	0.02	0.00	0.04
	Piper PA-28 Cherokee Series	PA28	0.03	0.00	0.03	0.00	0.07
	Piper PA-32 Cherokee Six	GASEPV	0.01	0.00	0.01	0.00	0.02
	Raytheon Beech 99	DHC6	0.01	0.00	0.01	0.00	0.03
	Raytheon Beechjet 400	MU3001	0.08	0.00	0.08	0.00	0.17
	Raytheon Hawker 800	LEAR35	0.02	0.00	0.01	0.00	0.03
Raytheon Premier I	MU3001	0.01	0.00	0.01	0.00	0.02	
Raytheon Super King Air 200	DHC6	0.01	0.00	0.01	0.00	0.03	
Raytheon Super King Air 300	DHC6	0.45	0.00	0.44	0.01	0.90	
Itinerant Air Taxi Subtotal			4.50	0.06	4.43	0.13	9.12

Operation Type and User Class	Aircraft	AEDT Type	Arrival		Departure		Total
			Day	Night	Day	Night	
Itinerant General Aviation	Aerostar PA-60	BEC58P	0.04	0.00	0.04	0.00	0.08
	Bombardier Challenger 300	CL600	1.44	0.04	1.46	0.02	2.95
	Bombardier Challenger 600	CL601	0.08	0.00	0.08	0.00	0.16
	Bombardier Challenger 601	CL601	0.04	0.00	0.04	0.00	0.08
	Bombardier Global 5000 Business	BD-700-1A11	0.37	0.00	0.35	0.02	0.75
	Bombardier Global Express	BD-700-1A10	1.26	0.02	1.03	0.25	2.56
	Bombardier Learjet 31	LEAR35	0.10	0.00	0.10	0.00	0.20
	Bombardier Learjet 40	LEAR35	0.43	0.00	0.43	0.00	0.87
	Bombardier Learjet 45	LEAR35	0.04	0.00	0.04	0.00	0.08
	Bombardier Learjet 60	LEAR35	0.31	0.00	0.29	0.02	0.63
	Cessna 172 Skyhawk	CNA172	1.28	0.00	1.28	0.00	2.56
	Cessna 182	CNA182	0.55	0.00	0.53	0.02	1.10
	Cessna 206	CNA206	0.30	0.00	0.30	0.00	0.59
	Cessna 208 Caravan	CNA208	0.73	0.02	0.61	0.14	1.50
	Cessna 210 Centurion	GASEPV	0.35	0.00	0.33	0.02	0.71
	Cessna 310	BEC58P	0.02	0.00	0.02	0.00	0.04
	Cessna 340	BEC58P	0.12	0.00	0.12	0.00	0.24
	Cessna 402	BEC58P	0.10	0.00	0.10	0.00	0.20
	Cessna 421 Golden Eagle	BEC58P	0.10	0.00	0.10	0.00	0.20
	Cessna 441 Conquest II	CNA441	0.31	0.00	0.31	0.00	0.63
	Cessna 525 CitationJet	CNA525C	0.37	0.00	0.33	0.04	0.75
	Cessna 525C CitationJet	CNA525C	0.37	0.00	0.37	0.00	0.75
	Cessna 550 Citation II	CNA55B	0.14	0.00	0.14	0.00	0.28
	Cessna 560 Citation Excel	CNA560U	0.87	0.04	0.81	0.09	1.81
	Cessna 560 Citation XLS	CNA560XL	0.22	0.02	0.24	0.00	0.47
	Cessna 650 Citation III	CIT3	0.08	0.00	0.08	0.00	0.16
	Cessna 680 Citation Sovereign	CNA680	0.65	0.00	0.49	0.16	1.30
	CESSNA CITATION 510	CNA510	0.47	0.00	0.45	0.02	0.94
	Cirrus SR20	COMSEP	0.55	0.00	0.55	0.00	1.10
	Cirrus SR22	COMSEP	2.32	0.02	2.34	0.00	4.68
	DAHER TBM 900/930	CNA208	0.04	0.00	0.04	0.00	0.08
	Dassault Falcon 2000	CNA750	0.48	0.06	0.51	0.02	1.06
	Dassault Falcon 50	CNA750	0.24	0.00	0.24	0.00	0.47
	Dassault Falcon 900-EX	CNA750	0.85	0.07	0.89	0.04	1.85
	Dassault Falcon 900-EX	COMJET	0.02	0.00	0.02	0.00	0.04
	EADS Socata TBM-700	CNA208	0.08	0.00	0.08	0.00	0.16
	Eclipse 500 / PW610F	ECLIPSE500	0.08	0.00	0.08	0.00	0.16
	Embraer 505	CNA55B	0.10	0.00	0.10	0.00	0.20
	Embraer ERJ135 Legacy Business	EMB145	0.02	0.00	0.02	0.00	0.04
	Falcon 7X	CNA750	0.16	0.00	0.14	0.02	0.31
	GULFSTREAM AEROSPACE Gulfstream G650	GV	0.73	0.00	0.73	0.00	1.46
	Gulfstream G400	GIV	0.29	0.02	0.26	0.06	0.63
	Gulfstream G500	GV	1.02	0.00	1.02	0.00	2.05
	Gulfstream G550	GV	0.24	0.02	0.26	0.00	0.51
	Gulfstream IV-SP	GIV	0.20	0.00	0.20	0.00	0.39
Kaman SH-2 Seasprite	SA330J	0.14	0.00	0.08	0.06	0.28	
Mitsubishi MU-2	DHC6	0.04	0.00	0.04	0.00	0.08	
Mooney M20-K	GASEPV	0.22	0.00	0.22	0.00	0.43	
Pilatus PC-12	CNA208	0.31	0.00	0.31	0.00	0.63	
Pilatus Turbo Trainer PC-9	GASEPF	0.49	0.00	0.49	0.00	0.98	
Piper PA-24 Comanche	GASEPV	0.02	0.00	0.02	0.00	0.04	
Piper PA-27 Aztec	BEC58P	0.04	0.00	0.04	0.00	0.08	
Piper PA-28 Cherokee Series	GASEPF	0.39	0.00	0.39	0.00	0.79	

Operation Type and User Class	Aircraft	AEDT Type	Arrival		Departure		Total
			Day	Night	Day	Night	
	Piper PA-28 Cherokee Series	PA28	1.22	0.02	1.21	0.03	2.48
	Piper PA-30 Twin Comanche	PA30	0.02	0.00	0.02	0.00	0.04
	Piper PA-31 Navajo	BEC58P	0.57	0.02	0.59	0.00	1.18
	Piper PA-31T Cheyenne	CNA441	0.14	0.00	0.14	0.00	0.28
	Piper PA-32 Cherokee Six	GASEPV	2.52	0.02	2.54	0.00	5.08
	Piper PA-34 Seneca	BEC58P	0.41	0.00	0.41	0.00	0.83
	Piper PA46-TP Meridian	GASEPF	0.10	0.00	0.10	0.00	0.20
	Raytheon Beech 99	DHC6	0.26	0.00	0.26	0.00	0.51
	Raytheon Beech Baron 58	BEC58P	0.30	0.00	0.30	0.00	0.59
	Raytheon Beech Bonanza 36	CNA208	1.08	0.04	1.09	0.04	2.24
	Raytheon Beechjet 400	MU3001	0.08	0.00	0.08	0.00	0.16
	Raytheon Hawker 800	LEAR35	1.00	0.00	0.96	0.05	2.01
	Raytheon Premier I	MU3001	0.23	0.06	0.26	0.04	0.59
	Raytheon Super King Air 200	DHC6	0.31	0.00	0.31	0.00	0.63
	Raytheon Super King Air 300	DHC6	0.20	0.00	0.20	0.00	0.39
	Sikorsky S-76 Spirit	S76	0.18	0.00	0.18	0.00	0.35
	SOCATA TBM 850	CNA441	0.26	0.00	0.26	0.00	0.51
Itinerant General Aviation Subtotal			29.07	0.49	28.41	1.15	59.12
Itinerant Military	Cessna 182	CNA182	0.01	0.00	0.01	0.00	0.02
	Sikorsky SH-60 Sea Hawk	S70	0.13	0.01	0.14	0.00	0.27
Itinerant Military Subtotal			0.14	0.01	0.15	0.00	0.30
Local General Aviation	Aerostar PA-60	BEC58P	0.13	0.00	0.13	0.00	0.27
	Cessna 172 Skyhawk	CNA172	4.35	0.00	4.35	0.00	8.70
	Cessna 182	CNA182	1.87	0.00	1.87	0.00	3.75
	Cessna 206	CNA206	1.00	0.00	1.00	0.00	2.01
	Cessna 210 Centurion	GASEPV	1.20	0.00	1.20	0.00	2.41
	Cessna 310	BEC58P	0.07	0.00	0.07	0.00	0.13
	Cessna 340	BEC58P	0.40	0.00	0.40	0.00	0.80
	Cessna 402	BEC58P	0.33	0.00	0.33	0.00	0.67
	Cessna 421 Golden Eagle	BEC58P	0.33	0.00	0.33	0.00	0.67
	Cirrus SR20	COMSEP	1.87	0.00	1.87	0.00	3.75
	Cirrus SR22	COMSEP	7.97	0.00	7.97	0.00	15.93
	Mooney M20-K	GASEPV	0.74	0.00	0.74	0.00	1.47
	Piper PA-24 Comanche	GASEPV	0.07	0.00	0.07	0.00	0.13
	Piper PA-27 Aztec	BEC58P	0.13	0.00	0.13	0.00	0.27
	Piper PA-28 Cherokee Series	GASEPF	1.34	0.00	1.34	0.00	2.68
	Piper PA-31 Navajo	BEC58P	2.01	0.00	2.01	0.00	4.02
	Piper PA-32 Cherokee Six	GASEPV	8.63	0.00	8.63	0.00	17.27
	Piper PA-34 Seneca	BEC58P	1.41	0.00	1.41	0.00	2.81
Raytheon Beech Baron 58	BEC58P	1.00	0.00	1.00	0.00	2.01	
Raytheon Beech Bonanza 36	CNA208	3.82	0.00	3.82	0.00	7.63	
Local General Aviation Subtotal			38.69	0.00	38.69	0.00	77.38
Local Military	Cessna 182	CNA182	0.10	0.00	0.10	0.00	0.20
Local Military Subtotal			0.10	0.00	0.10	0.00	0.20
Total			72.50	0.56	71.77	1.28	146.12

2.2.7 Runway Utilization

Weather, particularly wind speed and direction, is the primary factor affecting runway use at airports. Additional factors that may affect runway use include: the position of a facility relative to the runways; temporary runway closures (generally for airfield maintenance and construction); and ability of a particular runway to effectively accommodate particular aircraft types.

The FAA NOP data for 2018 provided the information used to determine the actual runway end for each arrival and departure, as well as the time of day. Table 9 summarizes the arrival and departure runway use percentages by user class, listed separately by engine type and time period (daytime and nighttime) for the 2021 existing case. Table 10 does the same for the 2026 forecast case. Table 11 presents and touch and go pattern runway usage, assumed to be the same for the existing and the forecast cases.

The only difference in modeled runway use between the existing and forecast cases stems from the assumption that about 15 percent of the jet operations which use Runway 24 in the existing case would instead use Runway 29 in the forecast case. This results in an overall runway usage change between three to five percent from Runway 24 in the existing case to Runway 29 in the forecast case. The runway use change is not dramatic; it is expected to occur as a result of pavement improvements described in the Airport Master Plan documentation.

Table 9. Modeled Average Daily Arrival Runway Use by User Class/Engine Type for 2021

Source: FAA National Offload Program Data, HMMH

User Class	Engine Type	Daytime Arrivals					Nighttime Arrivals				
		6	11	24	29	Total	6	11	24	29	Total
Air Taxi	Jet	23.4%	11.8%	43.7%	21.1%	100.0%	63.6%	12.2%	13.2%	11.0%	100.0%
	Piston	6.3%	25.0%	50.0%	18.8%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Turboprop	30.5%	9.5%	42.2%	17.7%	100.0%	60.0%	0.0%	20.0%	20.0%	100.0%
General Aviation	Jet	26.4%	9.5%	40.1%	23.9%	100.0%	36.4%	0.0%	31.9%	31.6%	100.0%
	Piston	27.9%	10.6%	47.3%	14.2%	100.0%	50.0%	0.0%	50.0%	0.0%	100.0%
	Turboprop	26.8%	9.1%	49.2%	14.9%	100.0%	100.0%	0.0%	0.0%	0.0%	100.0%
Military	Piston	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
User Class	Engine Type	Daytime Departures					Nighttime Departures				
		6	11	24	29	Total	6	11	24	29	Total
Air Taxi	Jet	29.4%	9.4%	43.3%	17.9%	100.0%	50.0%	4.3%	32.9%	12.8%	100.0%
	Piston	6.3%	7.5%	71.3%	15.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Turboprop	29.1%	12.3%	41.3%	17.3%	100.0%	43.1%	14.1%	14.4%	28.4%	100.0%
General Aviation	Jet	28.3%	11.6%	38.6%	21.5%	100.0%	30.6%	2.3%	48.7%	18.3%	100.0%
	Piston	33.1%	11.9%	44.6%	10.4%	100.0%	33.0%	0.0%	46.9%	20.1%	100.0%
	Turboprop	32.5%	14.0%	44.6%	8.9%	100.0%	57.1%	14.3%	28.6%	0.0%	100.0%
Military	Piston	0.0%	0.0%	50.0%	50.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Table 10. Modeled Average Daily Arrival Runway Use by User Class/Engine Type for 2026

Source: CHA estimated changes to existing runway use

User Class	Engine Type	Daytime Arrivals					Nighttime Arrivals				
		6	11	24	29	Total	6	11	24	29	Total
Air Taxi	Jet	23.4%	11.8%	37.2%	27.6%	100.0%	63.6%	12.2%	11.2%	13.0%	100.0%
	Piston	6.3%	25.0%	50.0%	18.8%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Turboprop	30.5%	9.5%	42.2%	17.7%	100.0%	60.0%	0.0%	20.0%	20.0%	100.0%
General Aviation	Jet	26.4%	9.5%	34.1%	29.9%	100.0%	36.4%	0.0%	27.2%	36.4%	100.0%
	Piston	27.9%	10.6%	47.3%	14.2%	100.0%	50.0%	0.0%	50.0%	0.0%	100.0%
	Turboprop	26.8%	9.1%	49.2%	14.9%	100.0%	100.0%	0.0%	0.0%	0.0%	100.0%
Military	Piston	0.0%	100.0%	0.0%	0.0%	100.0%	63.6%	12.2%	11.2%	13.0%	0.0%
User Class	Engine Type	Daytime Departures					Nighttime Departures				
		6	11	24	29	Total	6	11	24	29	Total
Air Taxi	Jet	29.4%	9.4%	36.8%	24.4%	100.0%	50.0%	4.3%	28.0%	17.7%	100.0%
	Piston	6.3%	7.5%	71.3%	15.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Turboprop	29.1%	12.3%	41.3%	17.3%	100.0%	43.1%	14.1%	14.4%	28.4%	100.0%
General Aviation	Jet	28.3%	11.6%	32.8%	27.3%	100.0%	30.6%	2.3%	41.4%	25.6%	100.0%
	Piston	33.1%	11.9%	44.6%	10.4%	100.0%	33.0%	0.0%	46.9%	20.1%	100.0%
	Turboprop	32.5%	14.0%	44.6%	8.9%	100.0%	57.1%	14.3%	28.6%	0.0%	100.0%
Military	Piston	0.0%	0.0%	50.0%	50.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Table 11. Modeled Average Daily Touch and Go Runway Use, 2021 and 2026

Source: FAA National Offload Program Data, HMMH

User Class	Daytime Touch and Go				
	6	11	24	29	Total
General Aviation (Piston only)	14.6%	10.3%	51.8%	23.4%	100.0%
Military (Piston only)	14.6%	10.3%	51.8%	23.45	100.0%

To better visualize the runway use at a high level, the table and figures below summarize the average overall runway use for the two NEM scenarios. Table 12 shows the average of 2021 and 2026 overall runway utilization rates for all user classes for arrivals and departures. This same data is shown graphically in Figure 6 and Figure 7 for arrivals and departures, respectively. Figure 8 graphically shows the touch and go runway use (given in Table 11).

Table 12. Average Overall Runway Use Percentages (2021 and 2026)

Source: FAA National Offload Program Data, HMMH

Runway	2021 Existing Case				2026 Forecast Case			
	Arrivals		Departures		Arrivals		Departures	
	Day	Night	Day	Night	Day	Night	Day	Night
6	27%	45%	31%	36%	27%	45%	31%	36%
11	10%	1%	12%	4%	10%	1%	12%	4%
24	44%	33%	42%	44%	41%	30%	39%	39%
29	19%	22%	16%	16%	22%	25%	18%	22%
Total	100%	100%	100%	100%	100%	100%	100%	100%

Note: Totals may appear not to add up due to rounding

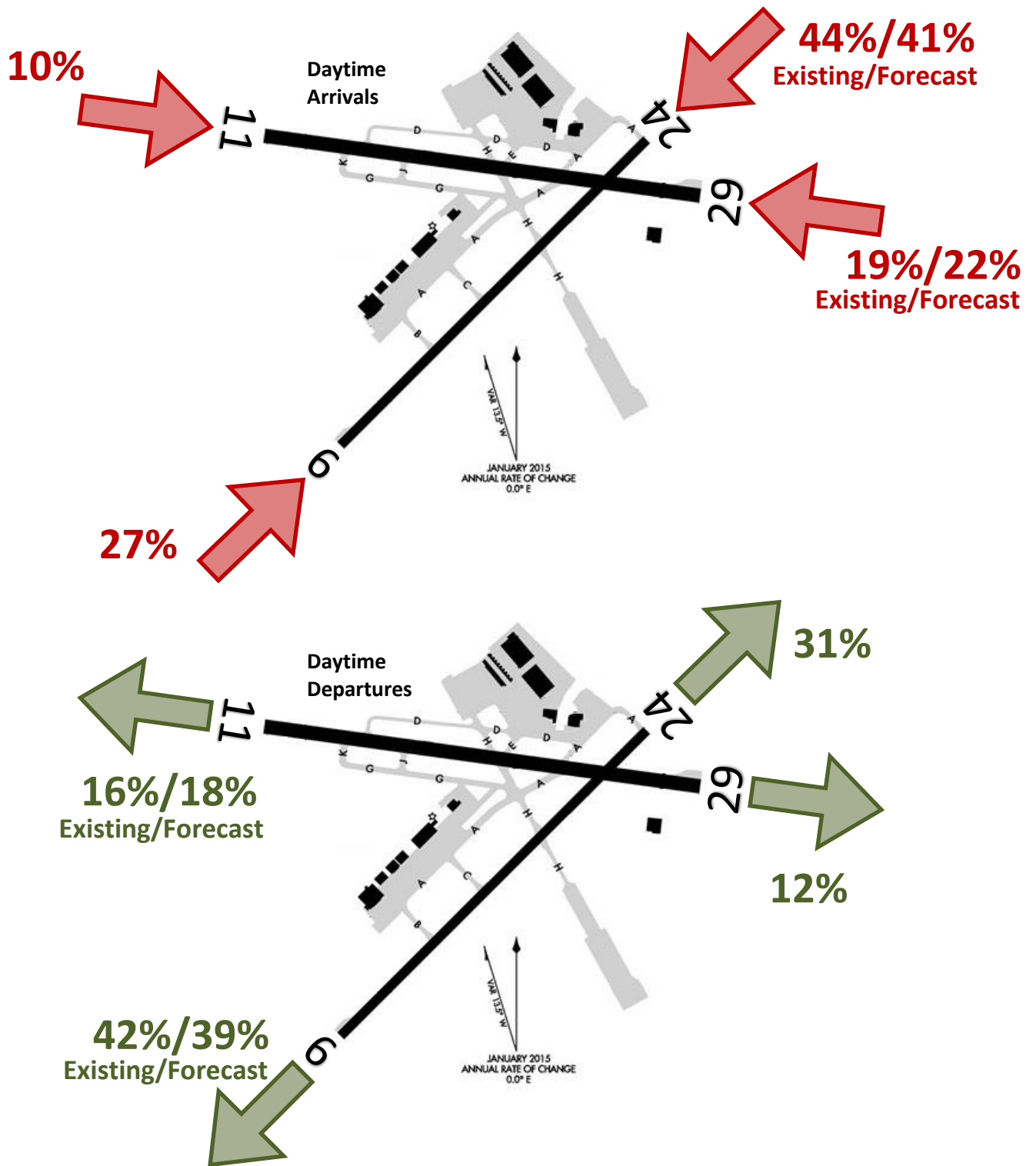


Figure 6. Average Overall Runway Use Percentages (2021 and 2026) – Daytime Arrivals and Departures

Source: FAA Airport Diagram, FAA National Offload Program Radar Data, HMMH

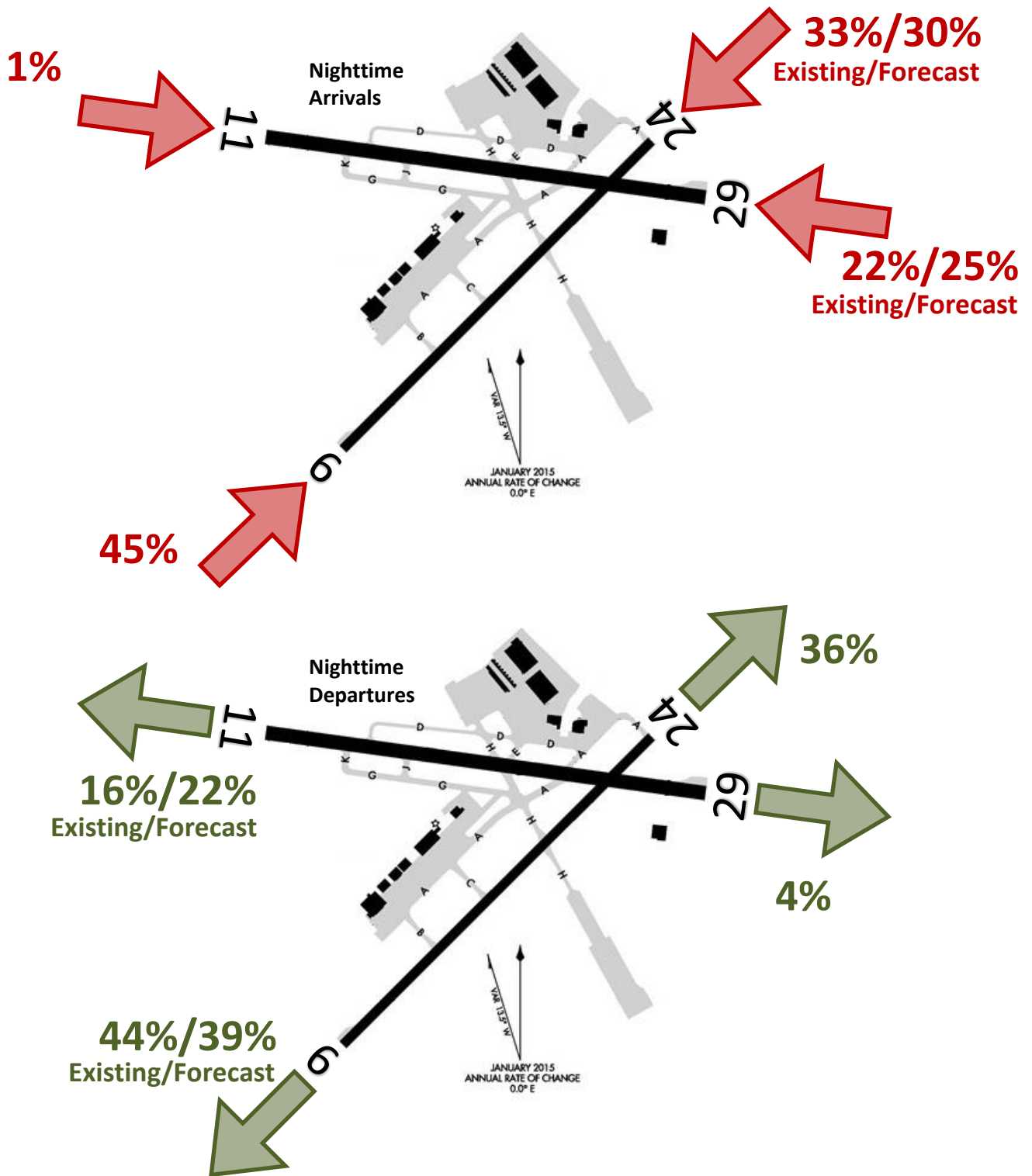


Figure 7. Average Overall Runway Use Percentages (2021 and 2026) – Nighttime Arrivals and Departures

Source: FAA Airport Diagram, FAA National Offload Program Radar Data, HMMH

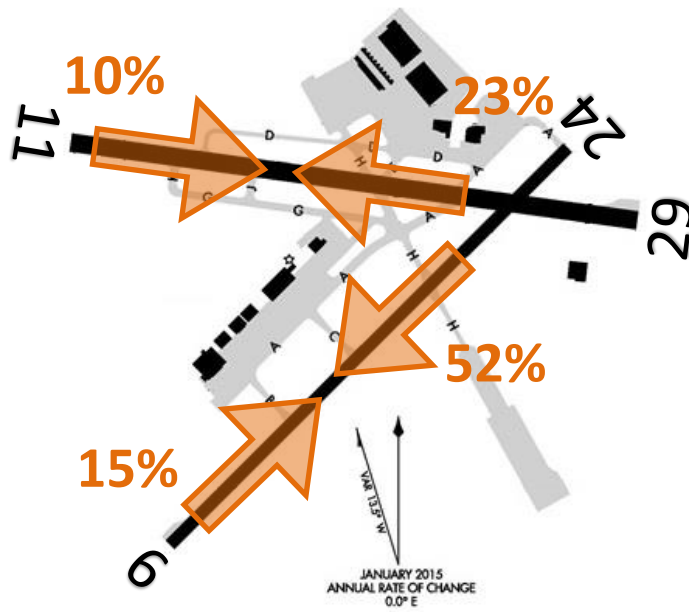


Figure 8. Average Overall Runway Use Percentages (2021 and 2026) – Touch and Go's

Source: FAA Airport Diagram, FAA National Offload Program Radar Data, HMMH

3 NOISE EXPOSURE MAP AND LAND USE COMPATIBILITY

As discussed in Section 1.1.1, the most fundamental elements of the NEM submission are cumulative noise exposure contours based on annual aircraft operations at an airport for: (1) data representing the year of submission and (2) data representing a forecast year at least five years beyond the year of submission⁶.

The year of submission for this NEM Update is 2021. Therefore, the existing conditions noise contours represent 2021 aircraft operations and the five-year forecast contours represent 2026.

Section 2.1 presented the base map with current land uses categorized by Part 150 recommended land use types. Section 2.2 summarized the noise modeling assumptions, identified data sources, and reviewed the modeling process. This section describes the updated NEMs and associated land use compatibility as follows:

- Section 3.1 presents the NEMs
- Section 0 discusses the compatible and noncompatible land uses within the NEM noise contours.

3.1 Noise Exposure Map Figures

Figure 9 and Figure 10 present the NEM figures for existing (2021) and forecast (2026) conditions, respectively. ***These are the official Noise Exposure Maps that the City of Bridgeport is submitting under Part 150 for appropriate FAA review and determination of compliance, pursuant to Part 150, §150.21.***

The copies of the figures bound into this volume on the following pages are at a scale of 1" = 1,500', which complies with the minimum scale permitted under §A150.103(b)(1); i.e., 1" = 2,000'.

The two figures identify the following items, as required in Part 150 (in the sections cited):

- Runway layout as required in §A150.103(b)(1). Section 2.2.1 provides more detailed information on Part 150 requirements related to runway layout and other airfield geometry data, including a more detailed airport layout diagram (Figure 2).
- Calendar year 2021 and 2026 noise contours (for 65, 70, and 75 dB DNL) resulting from aircraft operations, as required in §A150.101(e)(3).
- Outline of the airport boundaries, as required in §A150.101(e)(4) and §A150.103(b)(1).
- Noncompatible land uses within the contours, as required in §A150.101(e)(5), including Part 150 land use categories.
- Locations of noise sensitive public buildings, as required in §A150.101(e)(6).
- Properties within the contours that are on or eligible for inclusion in the National Register of Historic Places, as required in §A150.101(e)(6).

⁶ Recent FAA guidance and expectations suggest the forecast year be exactly five years beyond the existing year while the regulations states "at least" five years beyond the year of submission.

- All jurisdictional boundaries of for each public agency and planning agency who jurisdiction or responsibility is either wholly or partially within the 65 dB DNL contours as required in §A150.105.

The NEM figures display supplemental noise contours at 60 dB DNL. These supplemental contours are not required under 14 CFR Part 150. They are for informational purposes only and have not been approved by the FAA.

Table 13 presents a land area comparison of the 2021 and 2026 contours. The comparison of the two NEM years shows a slight decrease in contour size for 2026 compared to 2021. Despite modest increases in forecast operations from 2021 to 2026, the runway shift and runway use changes reduce the size of the 65 DNL contour slightly at the east end of Runway 11/29 and narrow but lengthen the western lobe a small amount. As shown in Table 13, the estimated decrease in overall area within the DNL 65 dB contour is approximately 3% from 2021 to 2026.

Table 13. Comparison of Land Area Enclosed by the 2021 and 2026 DNL Contours

Source: HMMH

Noise Level, DNL	Contour Land Area (Square Miles)		
	Existing Contours 2021	Forecast Contours 2026	Percent Change
65-70	0.151	0.145	-4%
70-75	0.084	0.082	-3%
75+	0.059	0.057	-3%
Total 65+	0.294	0.284	-3%
Notes: Percent change denoted is relative to the existing conditions (2021) contours.			

3.2 Compatible Land Use Analysis

The objective of airport noise compatibility planning is to promote the compatible growth and development of airports with their surrounding communities. This NEM Update uses the FAA's land-use compatibility guidelines, as set forth in Part 150, Appendix A, Table 1, which is reproduced as Table 2 in Section 2.1.1 of this document. For the purposes of Part 150, the FAA considers all land uses to be compatible with aircraft-related DNL below 65 dB. Residences, hotels, retirement homes, intermediate care facilities, hospitals, nursing homes, schools, preschools, and libraries are subject to the same criteria.

3.2.1 Noncompatible Land Uses within the Noise Contours

Based on the land use guidelines reproduced in Section 2.1.1, there are no noncompatible land uses or facilities within the DNL 65 dB and higher noise exposure contours as verified in Figure 9 and Figure 10, which present the 2021 NEM and 2026 NEM, respectively. The 65 dB DNL and higher contours lie entirely within the Town of Stratford, CT. No properties listed on the National Register of Historic Places lie within the 65 dB DNL contours.

Author: M.J.Hamilton; Document Path: \\FS1\vol1\Projects\310XXX\310150_BDR_NEM_Update\GIS\310150_BDR_Figure9_Existing_2021_NEM_Contour.mxd



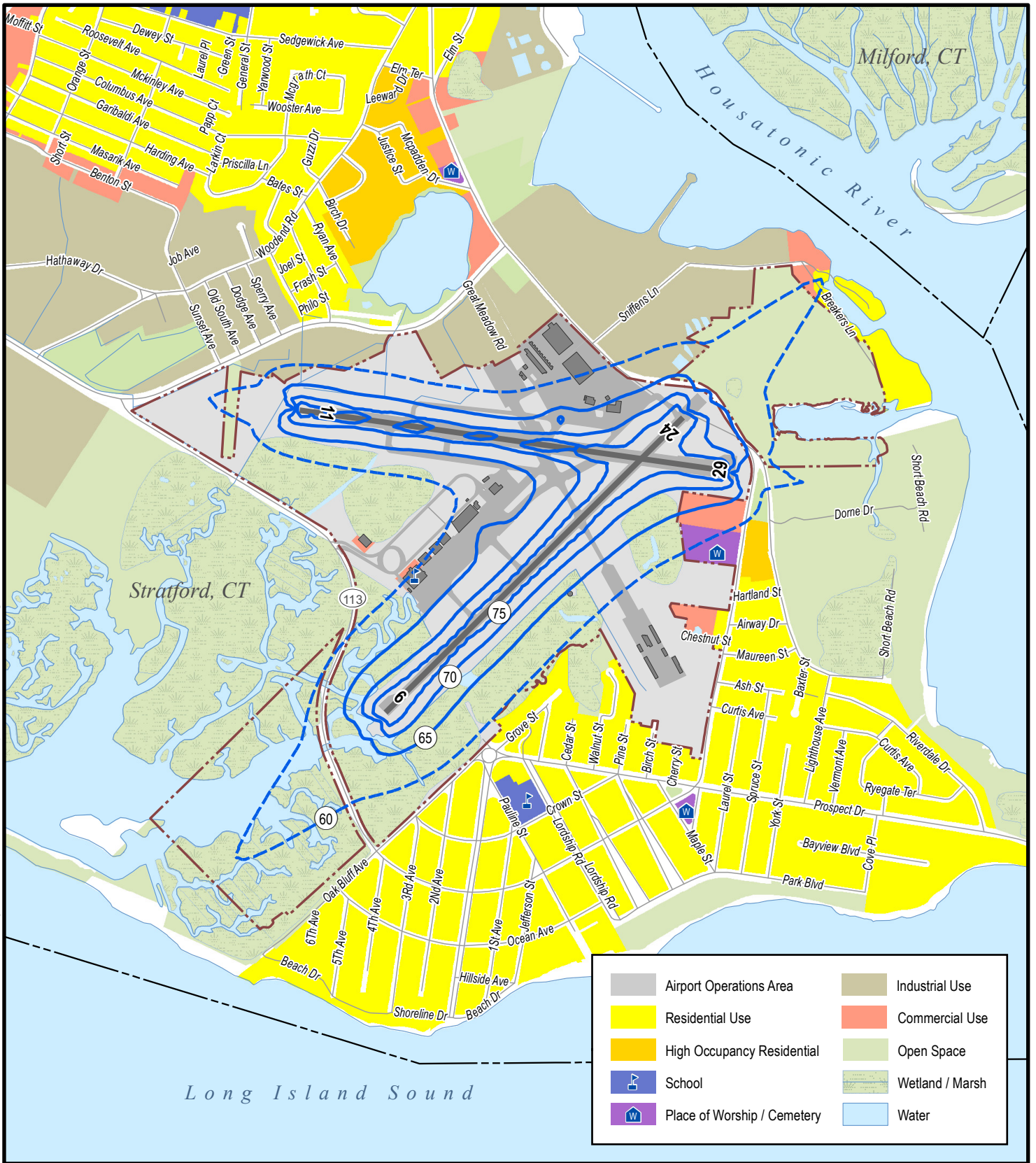
Igor I Sikorsky Memorial Airport

Figure 9
Existing Conditions (2021) Noise Exposure Map



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Author: M.J.Hamilton; Document Path: \\FS1\vol1\Projects\310XXX\310150_BDR_NEM_Updates\310XXX\310150_BDR_Figure10_Forecast_2026_NEM_Contour.mxd



	Airport Operations Area		Industrial Use
	Residential Use		Commercial Use
	High Occupancy Residential		Open Space
	School		Wetland / Marsh
	Place of Worship / Cemetery		Water

- 2026 DNL Contour (60 dB For Informational Purposes Only)
- 2026 DNL Contour (65-75 dB)
- Airport Boundary
- Runways / Taxiways
- Municipal Boundary
- Highway
- Primary Roads
- Secondary Roads
- Local Roads

Igor I Sikorsky Memorial Airport

Figure 10
Forecast Conditions (2026) Noise Exposure Map



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Estimates of population within the study area are an essential part of the Part 150 process. These estimates provide a basis for examining the effects of existing airport operations, as well as noise abatement alternatives. When quantified, an assessment of the relative impacts of various alternatives on population and households provide one means to measure the effectiveness of such alternatives.

Typically, in order to estimate the number of people residing within the noise contours, existing parcel boundary land use maps are overlaid on US Census maps that depict the smallest Census enumeration unit. “Populated Area” data polygons are then created by combining Census blocks with the residential land use concentrating population and housing unit values into the residential portion of the census block where people actually live. For example, in some areas the population is concentrated along the road rather than over several square miles of open or undeveloped land.

Finally, using GIS tools, the noise contours are intersected with these “Residential/Census” data for each DNL noise interval. The resulting wholly or partially encompassed Residential/Census areas are then identified; the proportion of total area within the contour level is then calculated to determine the estimated residential population and housing unit counts ascribed to that interval. As shown in the NEM figures and reiterated in Table 14, there is no residential land use within the 65 dB DNL contours for 2021 or 2026.

Table 14. Estimated Residential Population Within 2021 and 2026 DNL Contours

Source: HMMH, U.S. Census 2010

Noise Level, DNL	Existing Contours - 2021		Forecast Contours – 2026	
	Estimated Population	Estimated Number of Housing Units	Estimated Population	Estimated Number of Housing Units
65-70 dB	0	0	0	0
70-75 dB	0	0	0	0
75+ dB	0	0	0	0
Total	0	0	0	0

3.2.2 Compatible Land Uses within the Noise Contours

The area within the 65 dB DNL contours in the 2021 Existing Conditions NEM and the 2026 Forecast Conditions NEM consists primarily of airport property. The second largest area within the 65 dB DNL contours is undeveloped open space and marshland. Portions of the commercial land use area near the end of Runway 29 also lie within the 65 dB DNL contours. Finally, a small area of industrial land use just north of Runway 24 also lies within the contours. These land uses are compatible with aircraft noise below 70 dB DNL. These land uses are also compatible with higher levels if adequate noise level reduction is incorporated into any portions of buildings where the public is received, office areas, noise sensitive areas, or areas where the normal noise level is low. See Table 2 in Section 2.1.1 and its accompanying notes for further details.

4 STAKEHOLDER ENGAGEMENT

A critical element of the Part 150 Process is stakeholder engagement. This chapter describes outreach efforts conducted as part of the development of this NEM Update document.

The project team conducted a site visit in May of 2019 to collect and verify data for noise modeling. The team consulted with representatives from airport users (e.g. Fixed Based Operators, flight schools, and various flight departments, among others), the FAA, and the Airport to obtain current information related to aircraft operations and specific projects and plans at Sikorsky Memorial Airport.

This NEM Update has been conducted simultaneously with the Airport Master Plan Update project. A Technical Advisory Committee (TAC) made up of key stakeholders met throughout the project to review materials and provide input to the City of Bridgeport. Members of the TAC and the organizations they represent are listed in Table 15.

The Master Plan Update process included five TAC meetings and three public meetings, as listed in Table 16. Airport noise was a topic on the agenda at the TAC meetings held in November 2019 and in June 2020. Also noted in Table 16, a fourth public meeting has been scheduled to present the findings of this NEM Update during the 30-day public comment period. The study team welcomes public comment on this completed draft document and will submit all written comments in the final draft that will be submitted to the FAA. Copies of all meeting materials are posted on the Airport Master Plan website⁷.

⁷ <http://www.planbdairport.com/content/meetings/>

Table 15. Technical Advisory Committee Membership*Source: CHA*

Name	email	Organization
Mayor Joseph Ganim	Joseph.Ganim@bridgeportct.gov	City of Bridgeport
Aidee Nieves	Aidee.Nieves@bridgeportct.gov	City of Bridgeport
Craig Nadrizny	Craig.Nadrizny@bridgeportct.gov	City of Bridgeport
Michelle Muoio	Michelle.Muoio@bridgeportct.gov	City of Bridgeport
Thomas Norko	Thomas.Norko@bridgeportct.gov	City of Bridgeport
Mayor Laura Hoydick	Lhoydick@townofstratford.com	Town of Stratford
Michael Downes	Mdownes@townofstratford.com	Town of Stratford
Robert Shugrue	Robert.Shugrue@midwestatcs.com	Midwest ATC (control tower)
Thomas Connelly	tom@gamasignature.com	Gama Aviation Signature
Bud McGarry	BudMcGarry@gmail.com	Northeast Hangar LLC
Brian Ciambra	bciambra@voloaviation.com	Volo Aviation
Michael Phillips	Mphillips@atlanticaviation.com	Atlantic Aviation
David Faile	dfaile@aol.com	Friends of Sikorsky Airport
Ken Smith	ksmith@threewing.com	Three Wing Aviation
Molly Parsons	mparsons@ctairports.org	Connecticut Airport Authority
Lisa Lesperance	Lisa.Lesperance@faa.gov	FAA
John Merck	John.Merck@faa.gov	FAA
Frank Smith	fjs232@hotmail.com	Milford Board of Alderman
Richard Diedrichson	mrdpilgrim@aol.com	Stratford Airport Noise Task Force
Chris Tymniak	ctymniak@townofstratford.com	Town of Stratford
Mary Dean	mdean@townofstratford.com	Town of Stratford
Christopher Pia	cpia@townofstratford.com	Town of Stratford
David Kozak	david.kozak@ct.gov	State of Connecticut
Lydia Martinez	Lydia.Martinez@bridgeportct.gov	City of Bridgeport
Kenneth Flatto	Kenneth.Flatto@bridgeportct.gov	City of Bridgeport
Thomas Gill	Thomas.Gill@bridgeportct.gov	City of Bridgeport
Lynn Haig	Lynn.Haig@bridgeportct.gov	City of Bridgeport
Joe Scarduzio	Joe.Scarduzio@ct.gov	Stratford School for Aviation Maintenance
Daniel Roach	Daniel.Roach@bridgeportct.gov	City of Bridgeport
Annette Macaluso	Annette.Macaluso@bridgeportct.gov	City of Bridgeport
Rick Jacobson	Rick.Jacobson@ct.gov	State of Connecticut
Jay Habansky	JHabansky@townofstratford.com	Town of Stratford
Robin Blum	Robin.Blum@ct.gov	State of Connecticut
Betsey Wingfield	Betsey.Wingfield@ct.gov	State of Connecticut

Table 16. Project MeetingsSource: Master Plan website <http://www.planBDRairport.com/content/meetings/>

Meeting	Date	Topics Covered
TAC Meeting #1	March 7, 2019	Overview of Airport Master Plan Process, Role of TAC, Background Airport Information, Airport Inventory, Key Study Focus Areas
TAC Meeting #2	June 19, 2019	Working Paper # 1 including Inventory, Environmental Overview and Forecasts
Public Meeting #1	June 19, 2019	Overview of Airport Master Plan Process, Role of TAC, Background Airport Information, Airport Inventory, Key Study Focus Areas
TAC Meeting #3	Nov. 20, 2019	Working Paper # 2 including Facility Requirements, Airfield Alternatives, Landside Alternatives, Airport Noise Evaluation
Public Meeting #2	Nov.20, 2019	Working Paper # 2 including Facility Requirements, Airfield Alternatives, Landside Alternatives, Airport Noise Evaluation
TAC Meeting #4	Feb. 25, 2020	Review of Design Standards and Facility Requirements, Working Paper # 3 including Airport Development Concepts and Recommendations
TAC Meeting #5	June 9, 2020 (virtual)	Summary of Recommended Plan, Overview of Airport Noise Study, Overview of Airport Layout Plan Drawing Set
Public Meeting #3	June 9, 2020 (virtual)	Review of Draft Recommendations, Overview of Airport Noise Evaluation, Airport Layout Plan Drawing Set
Public Meeting #4	March 3, 2021	Noise Exposure Map Update, opportunity for public comment

4.1 Opportunity for Public Involvement

Preliminary draft noise exposure contours were presented to the public at the third public meeting. Figure 11 shows the newspaper advertisement for that meeting, which was held on a virtual platform due to the ongoing pandemic. The same advertisement was run in the Connecticut Post and in the Fairfield Citizen/Westport News.

In addition, members of the TAC were sent an email with the public meeting information. Members of the public who had sent a comment on the study via the study website⁸ were also provided with a courtesy email regarding the third public meeting. Figure 12 contains the virtual meeting access instructions that were attached to the email notifications.

⁸ Email notifications to the general public were limited to persons who had provided their email address.

A14 | Fairfield Citizen | Friday, May 29, 2020

FAIRFIELD CITIZEN | WESTPORT NEWS

CLASSIFIED

Deadlines: Monday Noon
all publications for current week's advertising
203-333-4151
classifieds@hearstmediact.com

B4 | Connecticut Post | Friday, May 29, 2020

CONNECTICUT POST

CLASSIFIED

SOUTHERN CT JOBS

GENERAL HELP WANTED | GENERAL HELP WANTED

203-333-4151 | classifieds@hearstmediact.com | Hours: 8:30 a.m.–4:30 p.m., M-F | Major Credit Cards Accepted

PUBLIC NOTICES

Public Information Meeting Scheduled for Igor I Sikorsky Memorial Airport Airport Master Plan Update

The City of Bridgeport is nearing completion of the Airport's Master Plan Update (MPU) to account for changes that have taken place at the Airport and in the aviation industry since the completion of the Airport's 2009 Airport Layout Plan (ALP) Update. The Master Plan will be used to guide airport improvement to meet existing and future needs of Airport users.

Please join us at for the 3rd informational meeting to learn more about the ongoing Airport MPU. Due to the unprecedented times we are experiencing, the meeting will be held virtually via Microsoft Teams. During the meeting, there will be a presentation of study findings and recommendations, and you will have an opportunity to provide feedback and questions regarding the future of the Airport.

www.planBDRairport.com

Tuesday, June 9, 2020 6 - 8 PM

Access and instructions to the meeting will be posted on the study website by June 5. For full meeting capabilities, you will only require a web browser with internet access. Additional software installation will not be necessary. A call-in number (audio-only) will be provided for those without web browser access.

Relevant Master Plan documents can be found on the website under the "Study Materials" tab. We want your input for this important study and future needs of Sikorsky Memorial Airport. Share your input, join the mailing list, and stay up to date with the Master Plan process on our website: www.planBDRairport.com. Please submit any comments by **July 1, 2020**.

Figure 11. Newspaper Advertisements for Public Meeting

**Igor I Sikorsky Memorial Airport
Airport Master Plan Update
Public Information Meeting #3 (Microsoft Teams)**

Instructions for the meetings:

- 1) Tuesday, June 9, 2020 at 6 PM, click on the link provided below or head to the study website at www.planbdrairport.com to join the virtual meeting. WE ENCOURAGE YOU TO SIGN IN EARLY.
- 2) **(REVISED) Mobile device and Tablet users (iOS & Android):** You **must** download the Microsoft Teams app from the Apple App Store or the Google Play Store **prior** to clicking the "Join Public Meeting Here" button. **You will not be required to create an account.**



Direct Link:

https://teams.microsoft.com/l/meetup-join/19%3ameeting_NWQ1OWRjZjgtODMwOC00MTI5LWFjYjU0ODAzNWlZyZgyZjUx%40thread.v2/0?context=%7b%22Tid%22%3a%2209123cc3-9537-478e-a425-f5c2f1a69791%22%2c%22Oid%22%3a%2274b08f79-a7ea-467a-b1c9-c8ae8b82d9fb%22%2c%22IsBroadcastMeeting%22%3atrue%7d

Join from website:

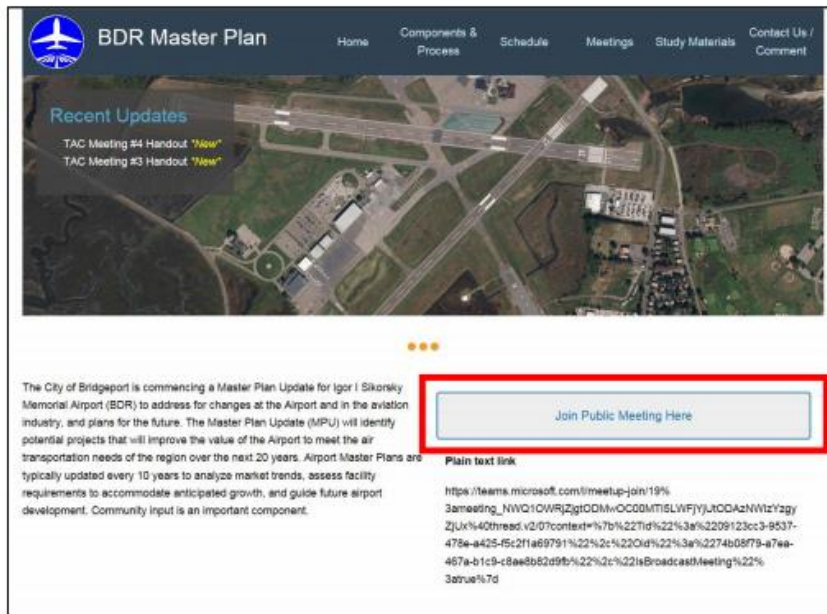
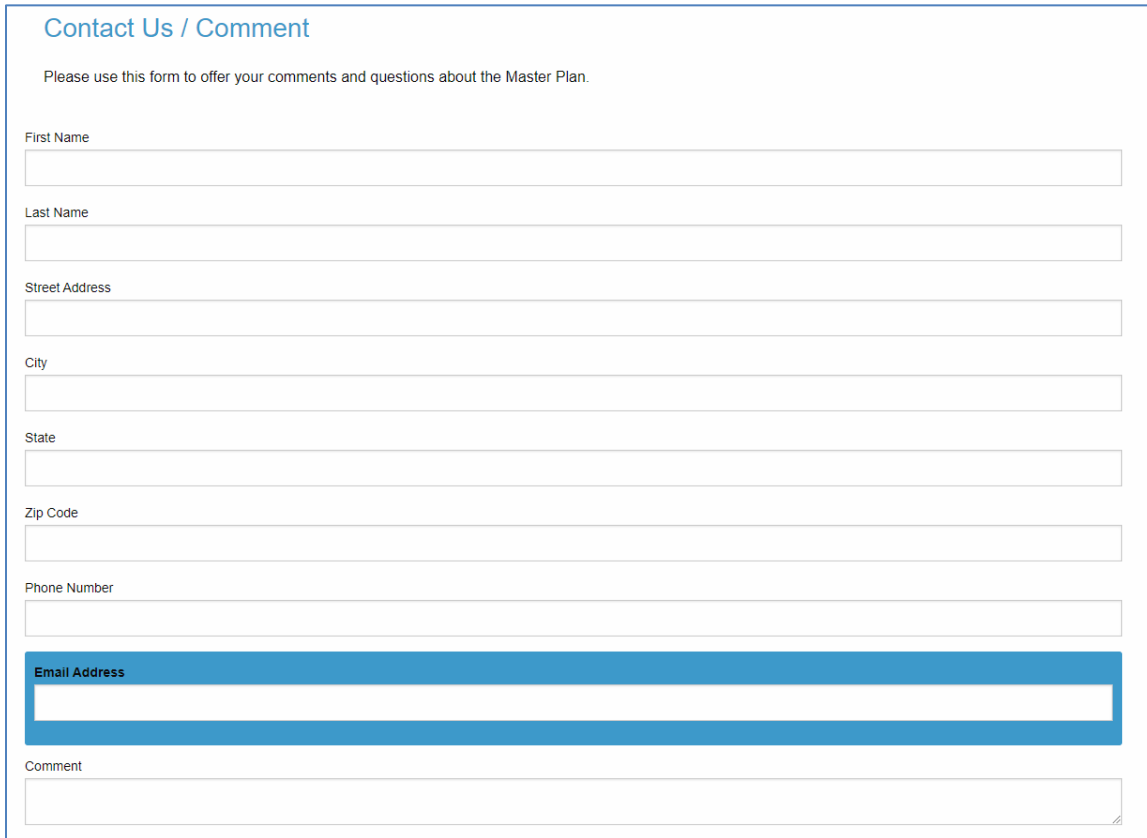


Figure 12. Notice of Public Information Meeting #3

The City of Bridgeport has welcomed public comment on the Airport Master Plan Update and Noise Exposure Map Update throughout the course of the projects. Figure 13 is a copy of the public comment form available on the project website.



The image shows a web form titled "Contact Us / Comment". The form is enclosed in a blue border and contains the following fields: "First Name", "Last Name", "Street Address", "City", "State", "Zip Code", "Phone Number", "Email Address", and "Comment". The "Email Address" field is highlighted with a blue background. The "Comment" field is a larger text area at the bottom. The form is set against a white background with a light blue header.

Figure 13. Public Comment Form

4.2 Public Meeting

The study team will hold a fourth public meeting on March 3, 2021, focusing on the NEM update. The virtual meeting will present the draft NEM DNL contours and supporting information. The public will be provided the opportunity to ask questions during the meeting and encouraged to provide public comment. A copy of the presentation materials will be included on the study website and in the final draft of this document.

4.3 Public Input Received during the Public Comment Period

The final draft of this document will include an Appendix D that will contain all public comments addressing aircraft noise issues that have been received by the close of the official public comment period (which will end on March 31, 2021).

Appendix A: Aircraft Noise Terminology

Noise is a complex physical quantity. The properties, measurement, and presentation of noise involve specialized terminology that can be difficult to understand. To provide a basic reference on these technical issues, this section introduces fundamentals of noise terminology, the effects of noise on human activity, and noise propagation.

Introduction to Noise Terminology

Analyses of potential impacts from changes in aircraft noise levels rely largely on a measure of cumulative noise exposure over an entire calendar year, expressed in terms of a metric called the Day-Night Average Sound Level (DNL). However, DNL does not provide an adequate description of noise for many purposes. A variety of measures, which are further described in subsequent sub-sections, are available to address essentially any issue of concern, including:

- Sound Pressure Level, SPL, and the Decibel, dB
- A-Weighted Decibel, dBA
- Maximum A-Weighted Sound Level, L_{max}
- Time Above, TA
- Sound Exposure Level, SEL
- Equivalent A-Weighted Sound Level, L_{eq}
- Day-Night Average Sound Level, DNL

Sound Pressure Level, SPL, and the Decibel, dB

All sounds come from a sound source – a musical instrument, a voice speaking, an airplane passing overhead. It takes energy to produce sound. The sound energy produced by any sound source travels through the air in sound waves – tiny, quick oscillations of pressure just above and just below atmospheric pressure. The ear senses these pressure variations and – with much processing in our brain – translates them into “sound.”

Our ears are sensitive to a wide range of sound pressures. The loudest sounds that we can hear without pain contain about one million times more energy than the quietest sounds we can detect. To allow us to perceive sound over this very wide range, our ear/brain “auditory system” compresses our response in a complex manner, represented by a term called sound pressure level (SPL), which we express in units called decibels (dB).

Mathematically, SPL is a logarithmic quantity based on the ratio of two sound pressures, the numerator being the pressure of the sound source of interest (P_{source}), and the denominator being a reference pressure ($P_{reference}$)⁹

$$\text{Sound Pressure Level (SPL)} = 20 * \text{Log} \left(\frac{P_{source}}{P_{reference}} \right) \text{dB}$$

⁹ The reference pressure is approximately the quietest sound that a healthy young adult can hear.

The logarithmic conversion of sound pressure to SPL means that the quietest sound that we can hear (the reference pressure) has a sound pressure level of about 0 dB, while the loudest sounds that we hear without pain have sound pressure levels of about 120 dB. Most sounds in our day-to-day environment have sound pressure levels from about 40 to 100 dB¹⁰.

Because decibels are logarithmic quantities, we cannot use common arithmetic to combine them. For example, if two sound sources each produce 100 dB operating individually, when they operate simultaneously, they produce 103 dB -- not the 200 dB we might expect. Increasing to four equal sources operating simultaneously will add another three decibels of noise, resulting in a total SPL of 106 dB. For every doubling of the number of equal sources, the SPL goes up another three decibels.

If one noise source is much louder than another is, the louder source "masks" the quieter one and the two sources together produce virtually the same SPL as the louder source alone. For example, a 100 dB and 80 dB sources produce approximately 100 dB of noise when operating together.

Two useful "rules of thumb" related to SPL are worth noting: (1) humans generally perceive a six to 10 dB increase in SPL to be about a doubling of loudness,¹¹ and (2) changes in SPL of less than about three decibels for a particular sound are not readily detectable outside of a laboratory environment.

A-Weighted Decibel

An important characteristic of sound is its frequency, or "pitch." This is the per-second oscillation rate of the sound pressure variation at our ear, expressed in units known as Hertz (Hz).

When analyzing the total noise of any source, acousticians often break the noise into frequency components (or bands) to consider the "low," "medium," and "high" frequency components. This breakdown is important for two reasons:

- Our ear is better equipped to hear mid and high frequencies and is least sensitive to lower frequencies. Thus, we find mid- and high-frequency noise more annoying.
- Engineering solutions to noise problems differ with frequency content. Low-frequency noise is generally harder to control.

The normal frequency range of hearing for most people extends from a low of about 20 Hz to a high of about 10,000 to 15,000 Hz. Most people respond to sound most readily when the predominant frequency is in the range of normal conversation – typically around 1,000 to 2,000 Hz. The acoustical community has defined several "filters," which approximate this sensitivity of our ear and thus, help us to judge the relative loudness of various sounds made up of many different frequencies.

The so-called "A" filter ("A weighting") generally does the best job of matching human response to most environmental noise sources, including natural sounds and sound from common transportation sources. "A-weighted decibels" are abbreviated "dBA." Because of the correlation with our hearing, the U. S. Environmental Protection Agency (EPA) and nearly every other federal and state agency have adopted A-weighted decibels as the metric for use in describing environmental and transportation noise. Figure A-1 depicts A-weighting adjustments to sound from approximately 20 Hz to 10,000 Hz.

¹⁰ The logarithmic ratio used in its calculation means that SPL changes relatively quickly at low sound pressures and more slowly at high pressures. This relationship matches human detection of changes in pressure. We are much more sensitive to changes in level when the SPL is low (for example, hearing a baby crying in a distant bedroom), than we are to changes in level when the SPL is high (for example, when listening to highly amplified music).

¹¹ A "10 dB per doubling" rule of thumb is the most often used approximation.

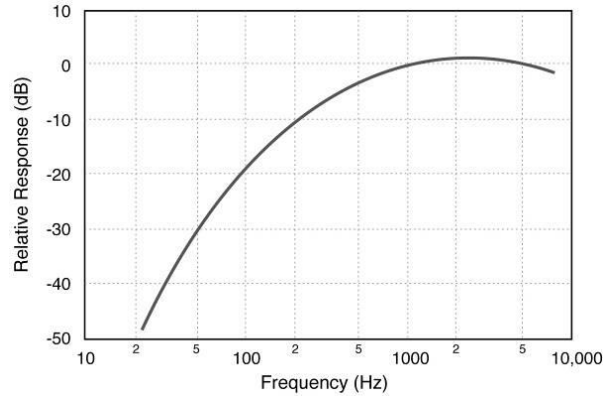


Figure A-1. A-Weighting Frequency Response

Source: Extract from Harris, Cyril M., Editor, "Handbook of Acoustical Measurements and Control," McGraw-Hill, Inc., 1991, pg. 5.13; HMMH

As the figure shows, A-weighting significantly de-emphasizes noise content at lower and higher frequencies where we do not hear as well, and has little effect, or is nearly "flat," in for mid-range frequencies between 1,000 and 5,000 Hz. All sound pressure levels presented in this document are A-weighted unless otherwise specified.

Figure A-2 depicts representative A-weighted sound levels for a variety of common sounds.

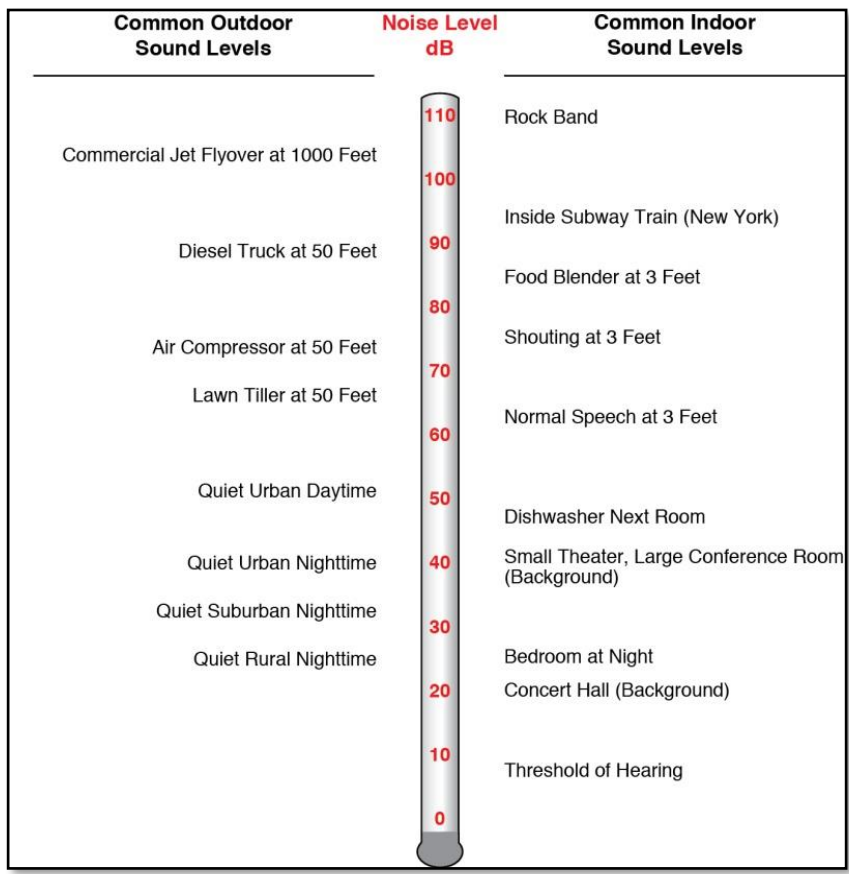


Figure A-2. A-Weighted Sound Levels for Common Sounds

Source: HMMH

Maximum A-Weighted Sound Level, L_{max}

An additional dimension to environmental noise is that A-weighted levels vary with time. For example, the sound level increases as a car or aircraft approaches, then falls and blends into the background as the aircraft recedes into the distance. The background or “ambient” level continues to vary in the absence of a distinctive source, for example due to birds chirping, insects buzzing, leaves rustling, etc. It is often convenient to describe a particular noise “event” (such as a vehicle passing by, a dog barking, etc.) by its maximum sound level, abbreviated as L_{max} .

Figure A-3 depicts this general concept, for a hypothetical noise event with an L_{max} of approximately 102 dB.

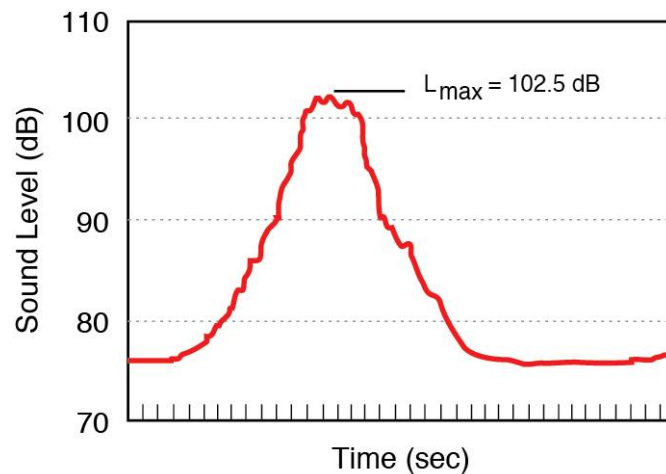


Figure A-3. Variation in A-Weighted Sound Level over Time and Maximum Noise Level

Source: HMMH

While the maximum level is easy to understand, it suffers from a serious drawback when used to describe the relative “noisiness” of an event such as an aircraft flyover; i.e., it describes only one dimension of the event and provides no information on the event’s overall, or cumulative, noise exposure. In fact, two events with identical maximum levels may produce very different total exposures. One may be of very short duration, while the other may continue for an extended period and be judged much more annoying. The next section introduces a measure that accounts for this concept of a noise “dose,” or the cumulative exposure associated with an individual “noise event” such as an aircraft flyover.

Sound Exposure Level, SEL

The most commonly used measure of cumulative noise exposure for an individual noise event, such as an aircraft flyover, is the Sound Exposure Level, or SEL. SEL is a summation of the A-weighted sound energy over the entire duration of a noise event. SEL expresses the accumulated energy in terms of the one-second-long steady-state sound level that would contain the same amount of energy as the actual time-varying level.

SEL provides a basis for comparing noise events that generally match our impression of their overall “noisiness,” including the effects of both duration and level. The higher the SEL, the more annoying a noise event is likely to be. In simple terms, SEL “compresses” the energy for the noise event into a single second. Figure A-4 depicts this compression, for the same hypothetical event shown in Figure A-3. Note that the SEL is higher than the L_{max} .

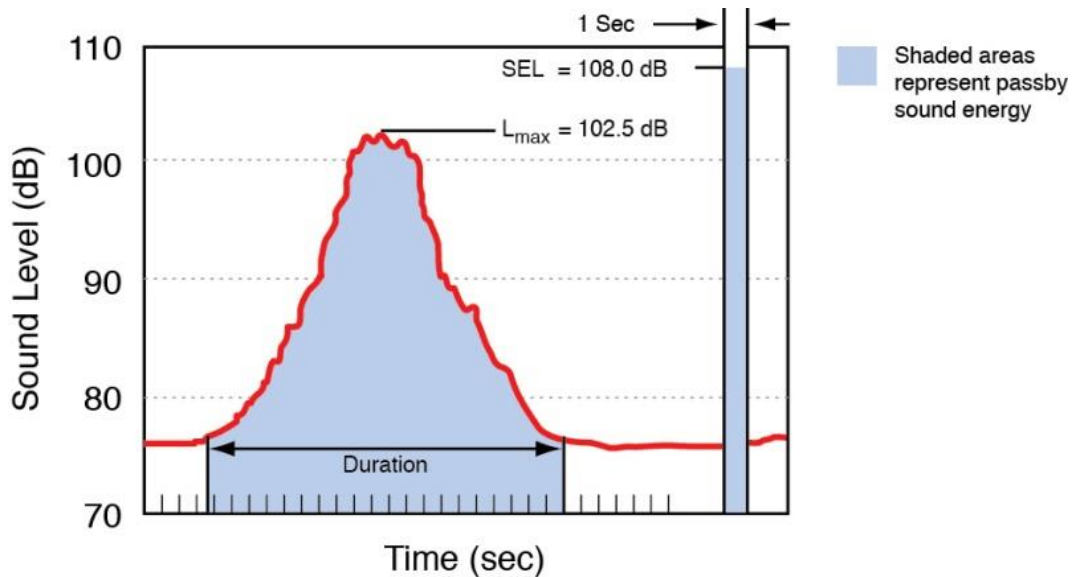


Figure A-4. Graphical Depiction of Sound Exposure Level

Source: HMMH

The “compression” of energy into one second means that a given noise event’s SEL will almost always be a higher value than its L_{max} . For most aircraft flyovers, SEL is roughly five to 12 dB higher than L_{max} . Adjustment for duration means that relatively slow and quiet propeller aircraft can have the same or higher SEL than faster, louder jets, which produce shorter duration events.

Equivalent A-Weighted Sound Level, L_{eq}

The Equivalent Sound Level, abbreviated L_{eq} , is a measure of the exposure resulting from the accumulation of sound levels over a particular period of interest; e.g., one hour, an eight-hour school day, nighttime, or a full 24-hour day. L_{eq} plots for consecutive hours can help illustrate how the noise dose rises and falls over a day or how a few loud aircraft significantly affect some hours.

L_{eq} may be thought of as the constant sound level over the period of interest that would contain as much sound energy as the actual varying level. It is a way of assigning a single number to a time-varying sound level. Figure A-5 illustrates this concept for the same hypothetical event shown in Figure A-3 and Figure A-4. Note that the L_{eq} is lower than either the L_{max} or SEL.

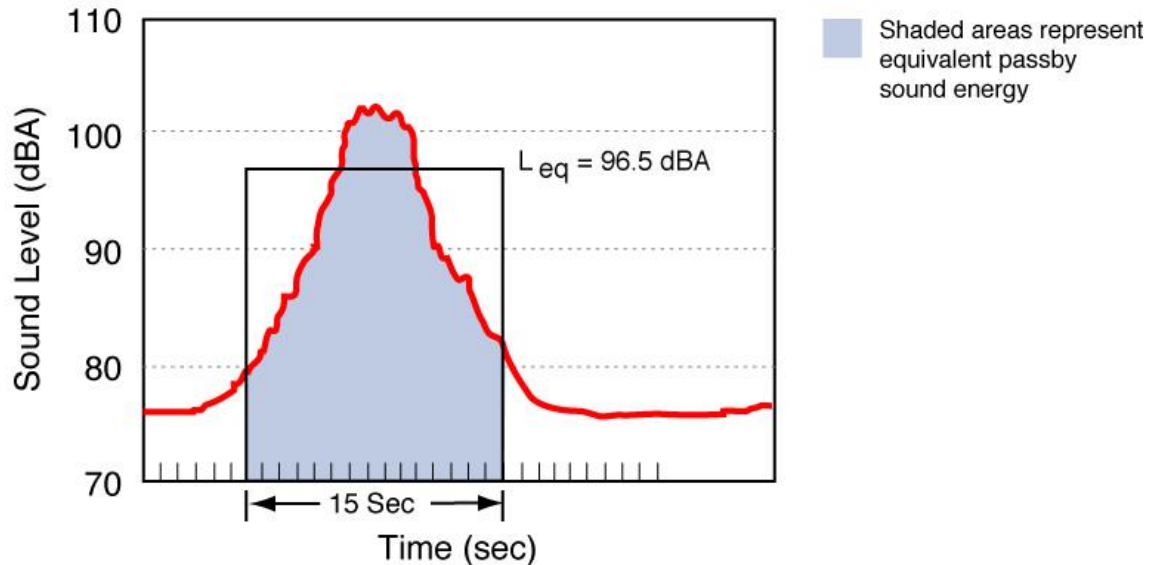


Figure A-5. Example of a 15-Second Equivalent Sound Level

Source: HMMH

Day-Night Average Sound Level, DNL or L_{dn}

The FAA requires that airports use a measure of noise exposure that is slightly more complicated than L_{eq} to describe cumulative noise exposure – the Day-Night Average Sound Level, DNL.

The U.S. Environmental Protection Agency identified DNL as the most appropriate means of evaluating airport noise based on the following considerations¹².

- The measure should be applicable to the evaluation of pervasive long-term noise in various defined areas and under various conditions over long periods.
- The measure should correlate well with known effects of the noise environment and on individuals and the public.
- The measure should be simple, practical, and accurate. In principal, it should be useful for planning as well as for enforcement or monitoring purposes.
- The required measurement equipment, with standard characteristics, should be commercially available.
- The measure should be closely related to existing methods currently in use.
- The single measure of noise at a given location should be predictable, within an acceptable tolerance, from knowledge of the physical events producing the noise.
- The measure should lend itself to small, simple monitors, which can be left unattended in public areas for long periods.

Most federal agencies dealing with noise have formally adopted DNL. The Federal Interagency Committee on Noise (FICON) reaffirmed the appropriateness of DNL in 1992. The FICON summary report stated: “There are no new descriptors or metrics of sufficient scientific standing to substitute for the present DNL cumulative noise exposure metric.”

¹² "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety," U. S. EPA Report No. 550/9-74-004, March 1974.

In simple terms, DNL is the 24-hour L_{eq} with one adjustment; all noises occurring at night (defined as 10 p.m. through 7 a.m.) are increased by 10 dB, to reflect the added intrusiveness of nighttime noise events when background noise levels decrease. In calculating aircraft exposure, this 10 dB increase is mathematically identical to counting each nighttime aircraft noise event ten times.

DNL can be measured or estimated. Measurements are practical only for obtaining DNL values for limited numbers of points, and, in the absence of a permanently installed monitoring system, only for relatively short periods. Most airport noise studies use computer-generated DNL estimates depicted as equal-exposure noise contours (much as topographic maps have contours of equal elevation).

The annual DNL is mathematically identical to the DNL for the average annual day; i.e., a day on which the number of operations is equal to the annual total divided by 365 (366 in a leap year). Figure A-6 graphically depicts the manner in which the nighttime adjustment applies in calculating DNL. Figure A-7 presents representative outdoor DNL values measured at various U.S. locations.

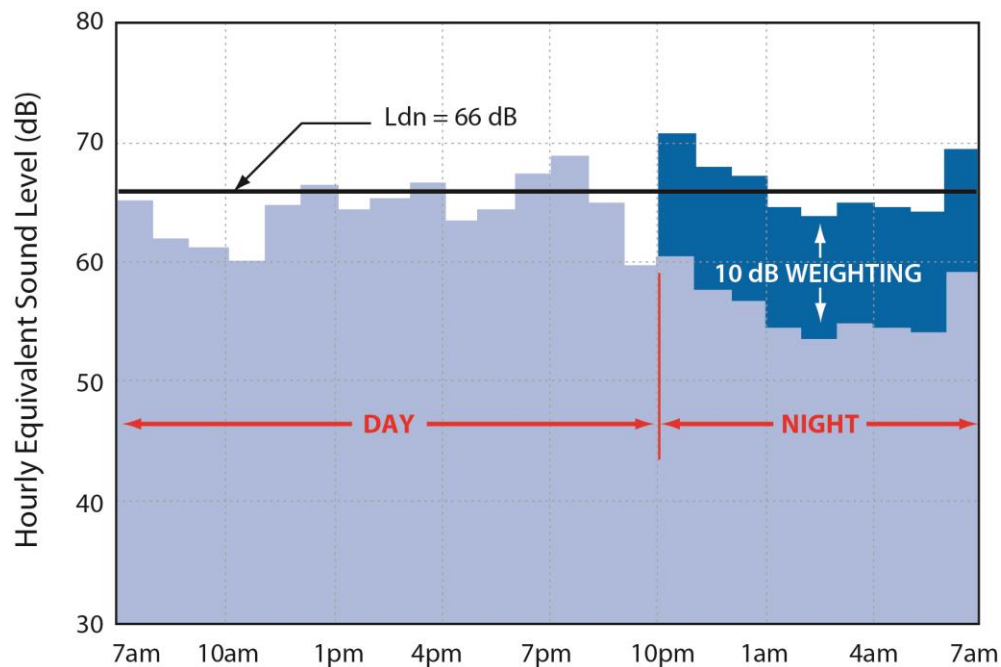


Figure A-6. Example of a Day-Night Average Sound Level Calculation

Source: HMMH

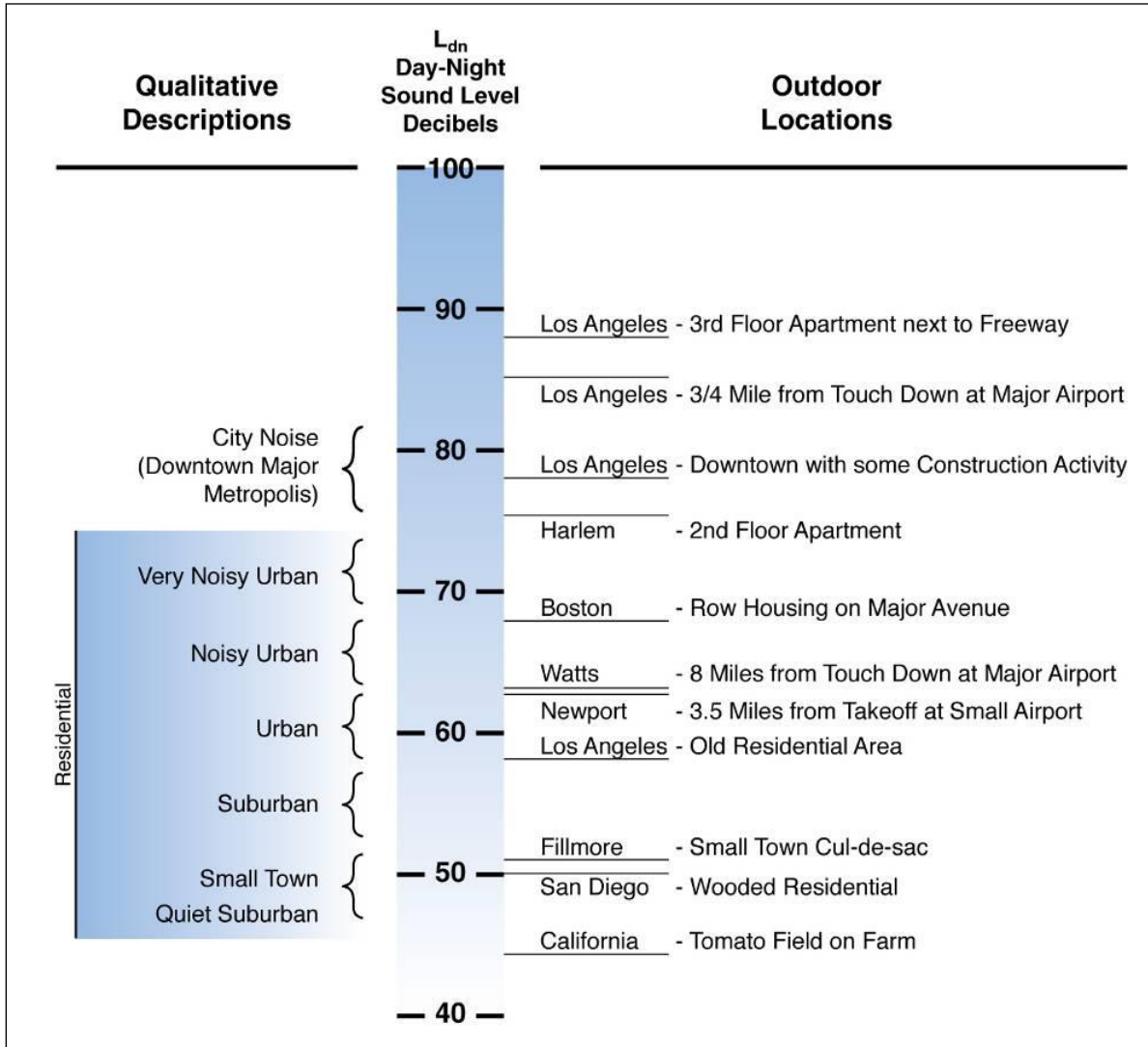


Figure A-7. Examples of Measured Day-Night Average Sound Levels, DNL

Source: U.S. Environmental Protection Agency, "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety," March 1974, p.14.

Aircraft Noise Effects on Human Activity

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 helps in the understanding of how and why people react to their environment.

Speech Interference

One potential effect of aircraft noise is its tendency to "mask" speech, making it difficult to carry on a normal conversation. The sound level of speech decreases as the distance between a talker and listener increases. As the background sound level increases, it becomes harder to hear speech.

Figure A-8 presents typical distances between talker and listener for satisfactory outdoor conversations, in the presence of different steady A-weighted background noise levels for raised, normal, and relaxed voice effort. As the background level increases, the talker must raise his/her voice, or the individuals must get closer together to continue talking.

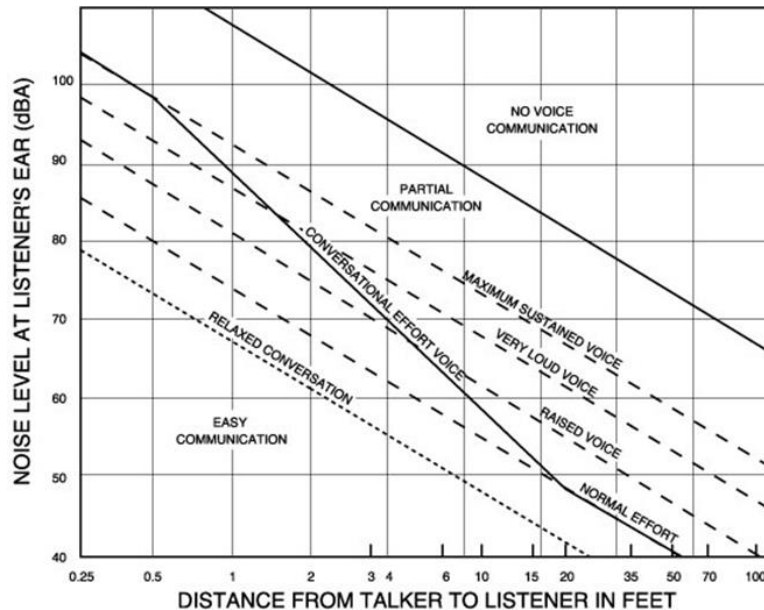


Figure A-8. Outdoor Speech Intelligibility

Source: U.S. Environmental Protection Agency, "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety," March 1974, p.D-5.

Satisfactory conversation does not always require hearing every word; 95% intelligibility is acceptable for many conversations. In relaxed conversation, however, we have higher expectations of hearing speech and generally require closer to 100% intelligibility. Any combination of talker-listener distances and background noise that falls below the bottom line in the figure (which roughly represents the upper boundary of 100% intelligibility) represents an ideal environment for outdoor speech communication. Indoor communication is generally acceptable in this region as well.

One implication of the relationships in Figure A-8 is that for typical communication distances of three or four feet, acceptable outdoor conversations can be carried on in a normal voice as long as the background noise outdoors is less than about 65 dB. If the noise exceeds this level, as might occur when an aircraft passes overhead, intelligibility would be lost unless vocal effort were increased or communication distance were decreased.

Indoors, typical distances, voice levels, and intelligibility expectations generally require a background level less than 45 dB. With windows partly open, housing generally provides about 10 to 15 dB of interior-to-exterior noise level reduction. Thus, if the outdoor sound level is 60 dB or less, there is a reasonable chance that the resulting indoor sound level will afford acceptable interior conversation. With windows closed, 24 dB of attenuation is typical.

Sleep Interference

Research on sleep disruption from noise has led to widely varying observations. In part, this is because (1) sleep can be disturbed without awakening, (2) the deeper the sleep the more noise it takes to cause arousal, (3) the tendency to awaken increases with age, and other factors. Figure A-9 shows a summary of findings on the topic.

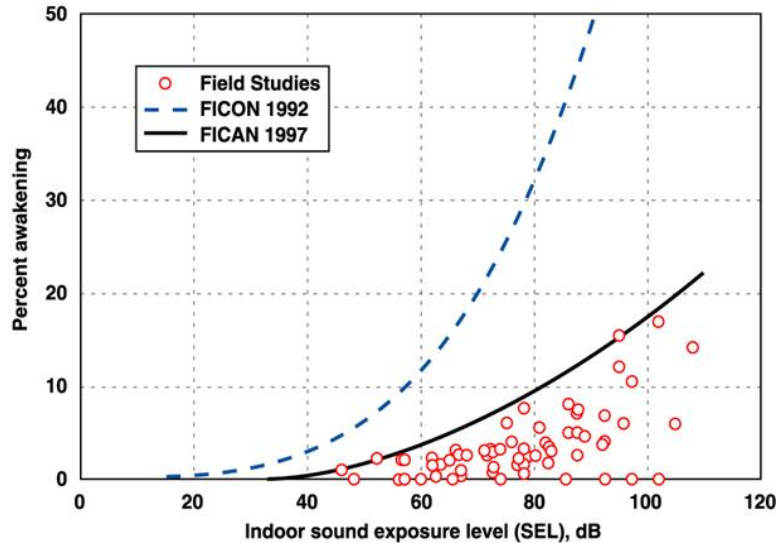


Figure A-9. Sleep Interference

Source: Federal Interagency Committee on Aircraft Noise (FICAN), "Effects of Aviation Noise on Awakenings from Sleep," June 1997, pg. 6

Figure A-9 uses indoor SEL as the measure of noise exposure; current research supports the use of this metric in assessing sleep disruption. An indoor SEL of 80 dBA results in a maximum of 10% awakening.¹³

Community Annoyance

Numerous psychoacoustic surveys provide substantial evidence that individual reactions to noise vary widely with noise exposure level. Since the early 1970s, researchers have determined (and subsequently confirmed) that aggregate community response is generally predictable and relates reasonably well to cumulative noise exposure such as DNL. Figure A-10 depicts the widely recognized relationship between environmental noise and the percentage of people "highly annoyed," with annoyance being the key indicator of community response usually cited in this body of research.

¹³ The awakening data presented in Figure A-9 apply only to individual noise events. The American National Standards Institute (ANSI) has published a standard that provides a method for estimating the number of people awakened at least once from a full night of noise events: ANSI/ASA S12.9-2008 / Part 6, "Quantities and Procedures for Description and Measurement of Environmental Sound – Part 6: Methods for Estimation of Awakenings Associated with Outdoor Noise Events Heard in Homes." This method can use the information on single events computed by a program such as the FAA's Aviation Environmental Design Tool, to compute awakenings.

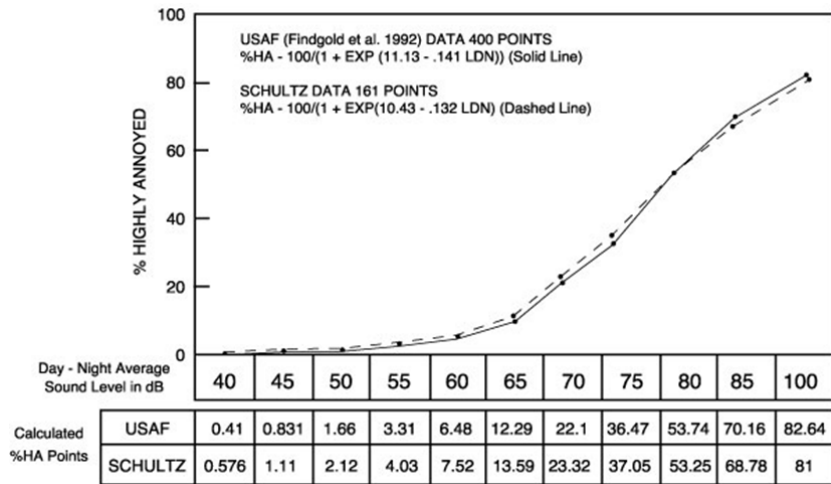


Figure A-10. Percentage of People Highly Annoyed

Source: FICON, "Federal Agency Review of Selected Airport Noise Analysis Issues," September 1992

Separate work by the EPA has shown that overall community reaction to a noise environment is also dependent on DNL. Figure A-11 depicts this relationship.

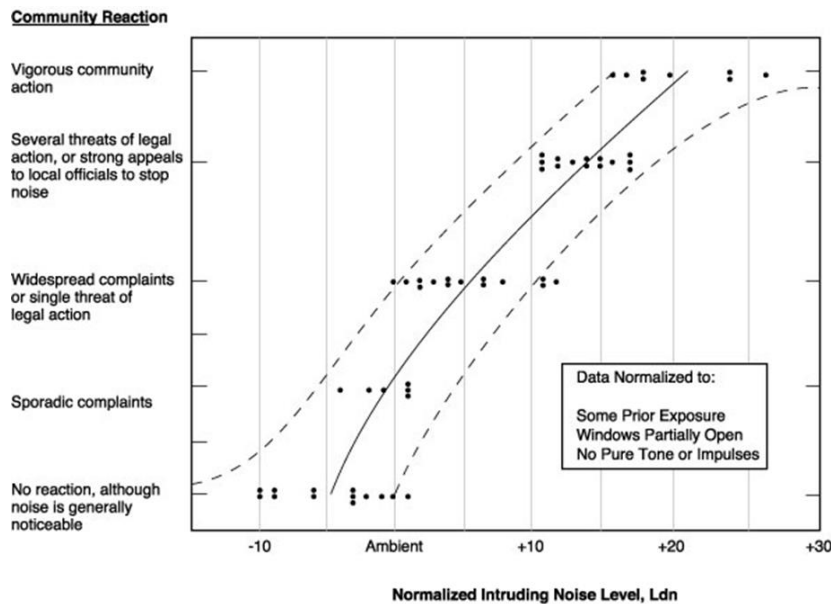


Figure A-11. Community Reaction as a Function of Outdoor DNL

Source: Wyle Laboratories, Community Noise, prepared for the U.S. Environmental Protection Agency, Office of Noise Abatement and Control, Washington, D.C., December 1971, pg. 63

Data summarized in the figure suggest that little reaction would be expected for intrusive noise levels five decibels below the ambient, while widespread complaints can be expected as intruding noise exceeds background levels by about five decibels. Vigorous action is likely when levels exceed the background by 20 dB.

Noise Propagation

This section presents information sound-propagation effect due to weather, source-to-listener distance, and vegetation.

Weather-Related Effects

Weather (or atmospheric) conditions that can influence the propagation of sound include humidity, precipitation, temperature, wind, and turbulence (or gustiness). The effect of wind – turbulence in particular – is generally more important than the effects of other factors. Under calm-wind conditions, the importance of temperature (in particular vertical “gradients”) can increase, sometimes to very significant levels. Humidity generally has little significance relative to the other effects.

Influence of Humidity and Precipitation

Humidity and precipitation rarely effect sound propagation in a significant manner. Humidity can reduce propagation of high-frequency noise under calm-wind conditions. This is called “Atmospheric absorption.” In very cold conditions, listeners often observe that aircraft sound “tinny,” because the dry air increases the propagation of high-frequency sound. Rain, snow, and fog also have little, if any noticeable effect on sound propagation. A substantial body of empirical data supports these conclusions.¹⁴

Influence of Temperature

The velocity of sound in the atmosphere is dependent on the air temperature.¹⁵ As a result, if the temperature varies at different heights above the ground, sound will travel in curved paths rather than straight lines. During the day, temperature normally decreases with increasing height. Under such “temperature lapse” conditions, the atmosphere refracts (“bends”) sound waves upwards and an acoustical shadow zone may exist at some distance from the noise source.

Under some weather conditions, an upper level of warmer air may trap a lower layer of cool air. Such a “temperature inversion” is most common in the evening, at night, and early in the morning when heat absorbed by the ground during the day radiates into the atmosphere.¹⁶ The effect of an inversion is just the opposite of lapse conditions. It causes sound propagating through the atmosphere to refract downward.

The downward refraction caused by temperature inversions often allows sound rays with originally upward-sloping paths to bypass obstructions and ground effects, increasing noise levels at greater distances. This type of effect is most prevalent at night, when temperature inversions are most common and when wind levels often are very low, limiting any confounding factors.¹⁷ Under extreme conditions, one study found that noise from ground-borne aircraft might be amplified 15 to 20 dB by a temperature

¹⁴Ingard, Uno. “A Review of the Influence of Meteorological Conditions on Sound Propagation,” *Journal of the Acoustical Society of America*, Vol. 25, No. 3, May 1953, p. 407.

¹⁵In dry air, the approximate velocity of sound can be obtained from the relationship: $c = 331 + 0.6T_c$ (c in meters per second, T_c in degrees Celsius). Pierce, Allan D., *Acoustics: An Introduction to its Physical Principles and Applications*. McGraw-Hill. 1981. p. 29.

¹⁶Embleton, T.F.W., G.J. Thiessen, and J.E. Piercy, “Propagation in an inversion and reflections at the ground,” *Journal of the Acoustical Society of America*, Vol. 59, No. 2, February 1976, p. 278.

¹⁷Ingard, p. 407.

inversion. In a similar study, noise caused by an aircraft on the ground registered a higher level at an observer location 1.8 miles away than at a second observer location only 0.2 miles from the aircraft.¹⁸

Influence of Wind

Wind has a strong directional component that can lead to significant variation in propagation. In general, receivers that are downwind of a source will experience higher sound levels, and those that are upwind will experience lower sound levels. Wind perpendicular to the source-to-receiver path has no significant effect.

The refraction caused by wind direction and temperature gradients is additive.¹⁹ One study suggests that for frequencies greater than 500 Hz, the combined effects of these two factors tends towards two extreme values: approximately 0 dB in conditions of downward refraction (temperature inversion or downwind propagation) and -20 dB in upward refraction conditions (temperature lapse or upwind propagation). At lower frequencies, the effects of refraction due to wind and temperature gradients are less pronounced.²⁰

Wind turbulence (or “gustiness”) can also affect sound propagation. Sound levels heard at remote receiver locations will fluctuate with gustiness. In addition, gustiness can cause considerable attenuation of sound due to effects of eddies traveling with the wind. Attenuation due to eddies is essentially the same in all directions, with or against the flow of the wind, and can mask the refractive effects discussed above.²¹

Distance-Related Effects

People often ask how distance from an aircraft to a listener affects sound levels. Changes in distance may be associated with varying terrain, offsets to the side of a flight path, or aircraft altitude. The answer is a bit complex, because distance affects the propagation of sound in several ways.

The principal effect results from the fact that any emitted sound expands in a spherical fashion – like a balloon – as the distance from the source increases, resulting in the sound energy being spread out over a larger volume. With each doubling of distance, spherical spreading reduces instantaneous or maximum level by approximately six decibels and SEL by approximately three decibels.

Vegetation-Related Effects

Sound can be scattered and absorbed as it travels through vegetation. This results in a decrease in sound levels. The literature on the effect of vegetation on sound propagation contains several approaches to calculating its effect. Though these approaches differ in some aspects, they agree on the following:

- The vegetation must be dense and deep enough to block the line of sight
- The noise reduction is greatest at high frequencies and least at low frequencies

¹⁸Dickinson, P.J., “Temperature Inversion Effects on Aircraft Noise Propagation,” (Letters to the Editor) *Journal of Sound and Vibration*. Vol. 47, No. 3, 1976, p. 442.

¹⁹Piercy and Embleton, p. 1412. Note, in addition, that as a result of the scalar nature of temperature and the vector nature of wind, the following is true: under lapse conditions, the refractive effects of wind and temperature add in the upwind direction and cancel each other in the downwind direction. Under inversion conditions, the opposite is true.

²⁰Piercy and Embleton, p. 1413.

²¹Ingard, pp. 409-410.

The International Standard ISO 9613-2²² provides a useful example of the types of calculations employed in these methods. Originally developed for industrial noise sources, ISO 9613-2 is well-suited for the evaluation of ground-based aircraft noise sources under favorable meteorological conditions for sound propagation. ISO 9613-2's methodology for calculating sound propagation includes geometric dispersion from acoustical point sources, atmospheric absorption, the effects of areas of hard and soft ground, screening due to barriers, and reflections. The attenuation provided by dense foliage varies by octave band and by distance as shown in Table A-1.

For propagation through less than 10 m of dense foliage, no attenuation is assumed. For propagation through 10 m to 20 m of dense foliage, the total attenuation is shown in the first row of Table A-1.

For distances between 20 m and 200 m, the total attenuation is computed by multiplying the distance of propagation through dense foliage by the dB/m values shown in the second row of Table A-1.

Table A-1. Dense Foliage Noise Attenuation

Source: ISO 9613-2, Table A.1

Propagation Distance	Nominal Midband Frequency (Hz)							
	63	125	250	500	1,000	2,000	4,000	8,000
10 m to 20 m (dB Attenuation)	0	0	1	1	1	1	2	3
20 m to 200 m (dB/m Attenuation)	0.02	0.03	0.04	0.05	0.06	0.08	0.09	0.12

ISO 9613-2 assumes a moderate downwind condition. The equations in the ISO Standard also hold, equivalently, for average propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs on clear, calm nights. In either case, the sound is refracted downward. The radius of this curved path is assumed to be 5 km. With this curved sound path, only portions of the sound path may travel through the dense foliage, as illustrated by Figure A-12. Thus, the relative locations of the source and receiver, the dimensions of the volume of dense foliage, and the contours of the intervening terrain are essential to the estimation of the noise attenuation.

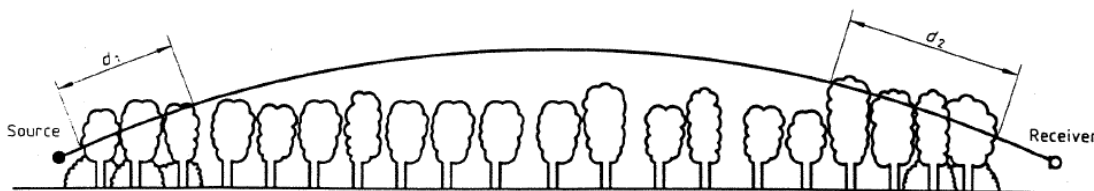


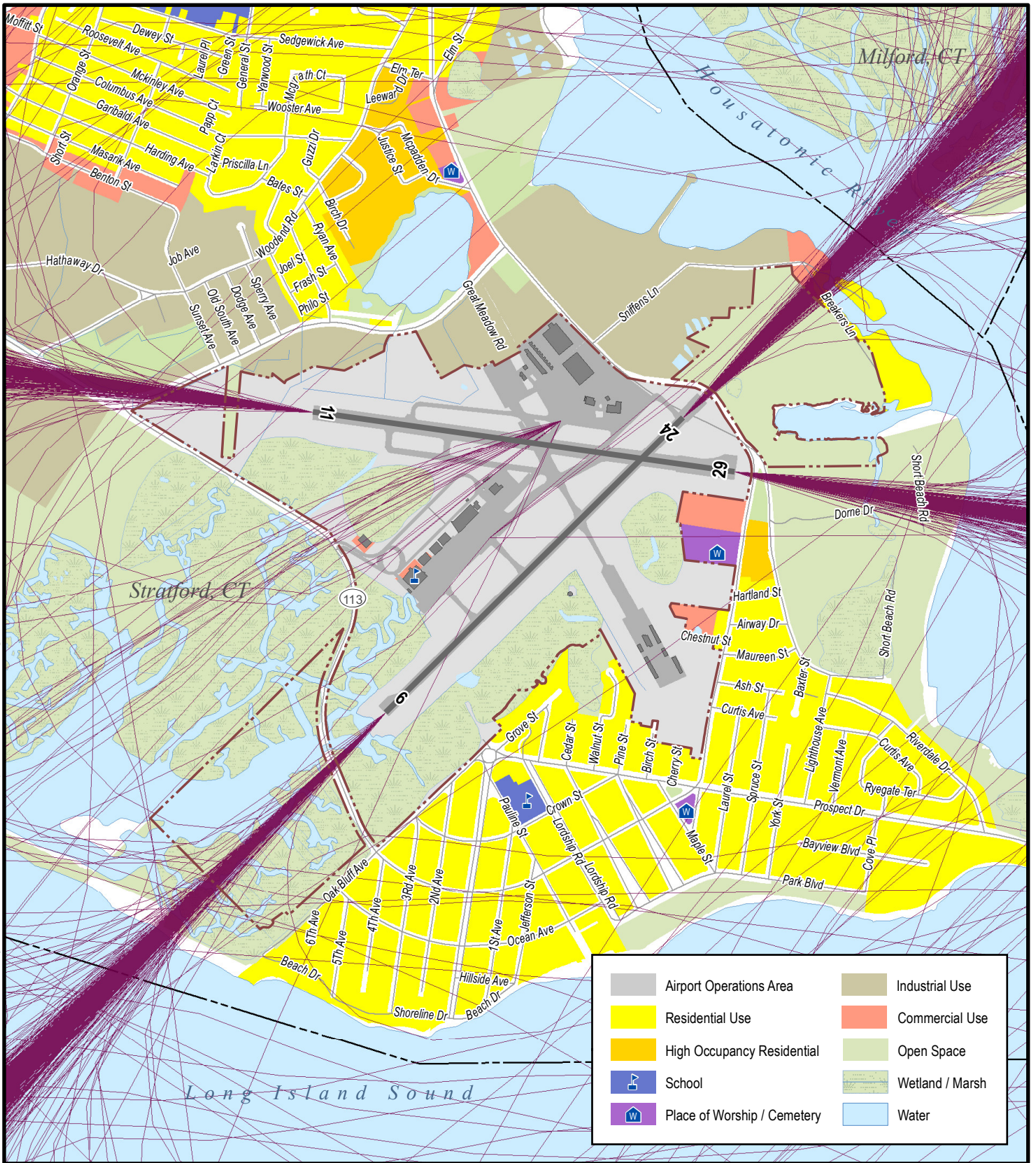
Figure A-12. Downward Refracting Sound Path (source: ISO 9613-2)

As illustrated in, Figure A-12, the foliage only provides attenuation if the sound path passes through the foliage. For aircraft in the air, the sound will pass through little, if any foliage. Additionally, either the noise source or receiver must be near the foliage for it to have an effect.

²² International Organization for Standardization, Acoustics – Attenuation of sound during propagation outdoors – Part 2: General Method of calculation, International Standard ISO9613-2, Geneva, Switzerland (15 December 1996).

Appendix B: Flight Track Figures

Author: M.J.Hamilton; Document Path: G:\Projects\310XXX\310150_BDR_NEM_Update\GIS\310150_BDR_FigureB1_AEDT_ARR_Model_Tracks.mxd



- AEDT Arrival Model Tracks
- Airport Boundary
- Airport Buildings
- Municipal Boundary
- Highway
- Primary Roads
- Secondary Roads
- Local Roads

Igor I Sikorsky Memorial Airport

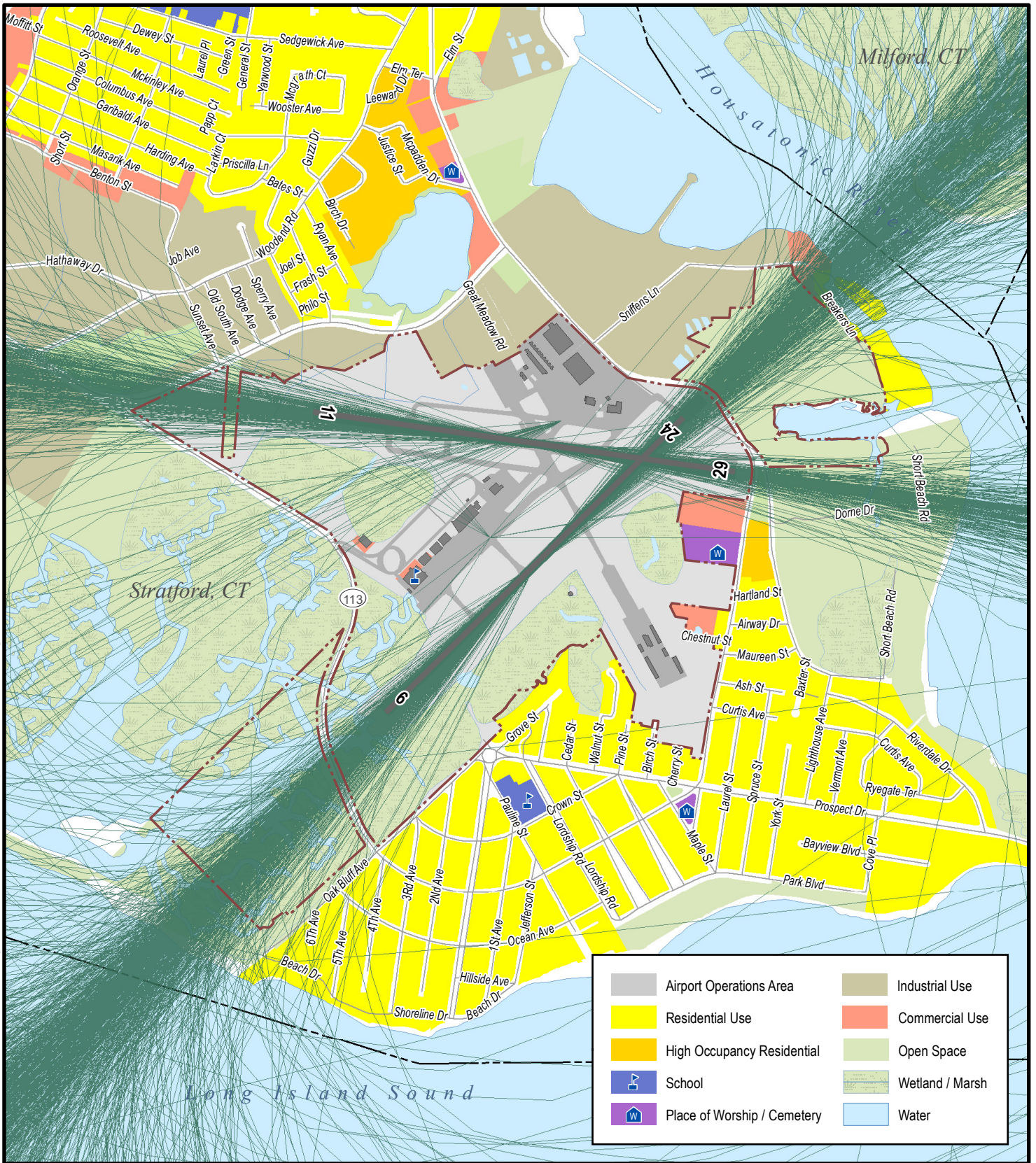
Figure B1
AEDT Arrival Model Tracks



0 1,500 3,000 Feet



Author: M.J.Hamilton; Document Path: G:\Projects\310XXX\310150_BDR_NEM_Update\GIS\310150_BDR_FigureB2_AEDT_DEP_Model_Tracks.mxd



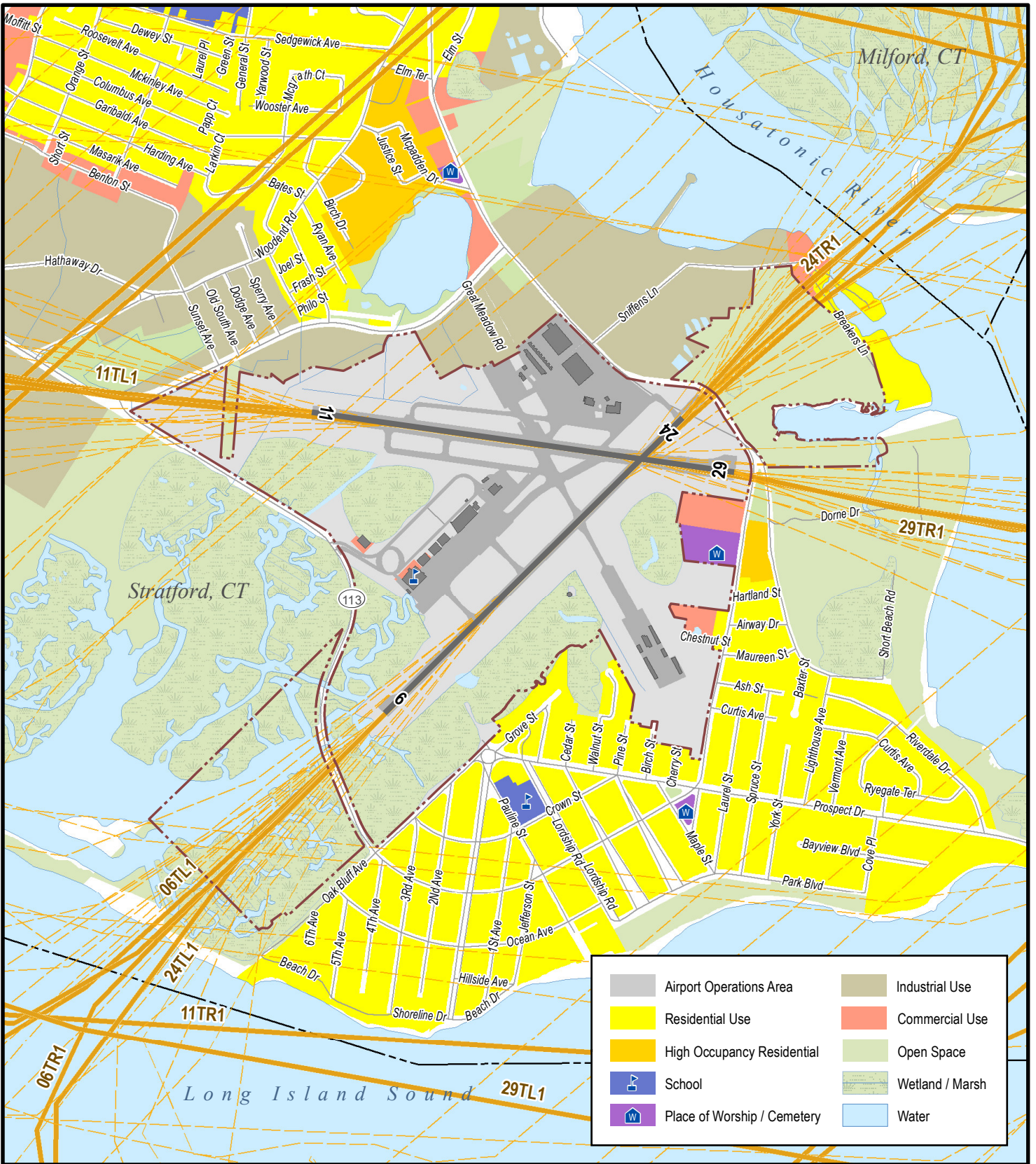
	Airport Operations Area		Industrial Use
	Residential Use		Commercial Use
	High Occupancy Residential		Open Space
	School		Wetland / Marsh
	Place of Worship / Cemetery		Water

- AEDT Departure Model Tracks
- Airport Boundary
- Airport Buildings
- Municipal Boundary
- Highway
- Primary Roads
- Secondary Roads
- Local Roads

Igor I Sikorsky Memorial Airport

Figure B2
AEDT Departure Model Tracks





- AEDT Circuit Model Tracks (Backbone)
- AEDT Circuit Model Tracks (Dispersed)
- Airport Boundary
- Runways / Taxiways
- Airport Buildings
- Municipal Boundary
- Highway
- Primary Roads
- Secondary Roads
- Local Roads

Igor I Sikorsky Memorial Airport

Figure B3
AEDT Touch and Go Model Tracks



Appendix C: Aircraft Operations Forecast

The aircraft operations data that formed the noise model inputs to this NEM Update are based on the FAA-approved Master Plan operations forecast for BDR. This appendix reproduces the three pertinent pages from Chapter 3 of the Airport Master Plan Update documentation, followed by the FAA acceptance letter of that forecast, which refers to those pages.

Table C-1 below compares the modeled operations levels to actual 2019 and 2020 operations counts, which were not available at the time of the initial analysis. In terms of noise impacts, especially in consideration of DNL calculations, jet aircraft have the most influence. At BDR, the loudest aircraft are the jets in the air taxi and general aviation categories, flying itinerant operations. The local operations, which comprise more than half of all annual activity, are all flown by non-jet aircraft.

The 2019 actual totals are very close to modeled: they are only 2 percent higher than the Existing Conditions model, overall, with more general aviation operations and fewer air taxi operations. 2020 counts vary more, with a marked decline in air taxi operations perhaps counterbalanced by a significant increase in general aviation local operations. The modeled operations for 2021 are shown to be representative as the 2019 and 2020 Itinerant totals are within four percent. Given the highly unusual conditions in 2020 due to the global pandemic, the observed shifts should not be taken as an indication of future changes.

Table C-1. Comparison of Modeled Operations Levels to 2019 and 2020 Actual Operations Counts

Source: CHA, FAA OPSNET, HMMH

Operation Type	User Class	Modeled Operations ¹ Levels		Actual FAA Operations ² Counts			
		Existing Conditions representing 2021	5-year Forecast representing 2026	2019	comparison to modeled ³	2020	comparison to modeled ³
Itinerant	Air Carrier	0	0	0	--	8	--
	Air Taxi	3,179	3,330	2969	-7%	2464	-22%
	General Aviation	20,600	21,578	21520	+4%	20236	-2%
	Military	108	108	115		239	
	TOTAL	23887	25016	24604	+3%	22947	-4%
Local	General Aviation	26,962	28,242	27308	+1%	33338	+24%
	Military	74	74	66		18	
	TOTAL	27036	28316	27374		33356	
Total		50,923	53,332	51978	+2%	56303	+11%

Notes:

1. Modeled Operations were based on the Master Plan forecasts for 2020 and 2025 with reference to the most recent full year of FAA OPSNET data at the time of the analysis (calendar year 2018).
2. Actual Counts for 2019 and 2020 from FAA OPSNET, available at time of document submission
3. Comparison calculations show percent change from modeled Existing Conditions category totals to OPSNET counts

3.4 Recommended Forecast Summary

The following tables present a summary of the preferred aviation activity forecasts for GA activity (based aircraft and operations), military activity, and air carrier (operations and enplanements), as detailed in the previous sections.

Upon review of the GA based aircraft forecast scenarios, the Regional Market Share scenario was chosen as the recommended based aircraft forecast, which takes into consideration national and regional trends, while staying relatively conservative. **Table 3-7** presents the recommended based aircraft forecast as well as the breakdown by aircraft type.

As BDR is primarily a GA airport with many local operations, the OPBA Scenario for operations is believed to be the most reasonable scenario for the BDR forecast, as GA activity is significantly driven by based aircraft. For forecasting purposes, it was assumed that military activity will remain static at baseline year levels throughout the forecast period, as military operations are a function of military decisions, national security priorities, and budget pressures that cannot be predicted over the course of the forecast period.

The air carrier forecasts were developed in conjunction with Airport Management (**Table 3-6**) and are speculative at this time. The FAA will consider and review these forecasts when a certified airline announces the proposed start of service. As BDR has no schedule passenger services (as of 2019) and has not had service within the past 10 years, the forecasts are based solely on airline operational plans.

Table 3-8 presents the complete summary of the preferred forecasts for based aircraft and activity at BDR. In addition to a summary of the preferred aviation activity forecasts, direct comparisons to the FAA's TAF for BDR are provided for evaluation purposes, as provided in **Table 3-9**. FAA parameters require master plan forecasts to be within 15% of the TAF operations forecast for the 10-year planning period. As indicated in **Table 3-9**, the difference between the TAF and recommended forecast is 5.9% in year 2029, well within the FAA parameter. It is important to note that due to the TAF not accounting for a potential scheduled air service provider, the comparison between the TAF and recommended forecast does not include commercial operations in the total counts.

Igor I Sikorsky Memorial Airport

Airport Master Plan Update

Table 3-7 – Recommended Based Aircraft Forecast

Year	Single	Multi	Turboprop	Jet	Rotorcraft	Total
2019	103	7	7	32	2	151
2024	103	7	8	38	2	159
2029	102	7	9	44	3	166
2034	101	8	11	51	3	173
2039	100	8	12	58	3	181
AAGR 2019-2039	-0.2%	0.4%	2.9%	3.0%	2.6%	0.9%
Growth 2019-2039	-3.2%	7.4%	76.0%	79.9%	67.7%	19.6%

Source: FAA Aerospace, FAA TAF, CHA, 2019

Table 3-8 – Recommended Forecast

Year	Based Aircraft	Enplanements	Itinerant Operations				Local Operations			Total Operations*
			Commercial	GA	Military	Total	Civil	Military	Total	
2018	150	0	0	23,355	108	23,463	26,481	74	26,555	50,018
2019	151	0	0	23,555	108	23,662	26,708	74	26,782	50,444
2020	153	0	0	23,779	108	23,887	26,962	74	27,036	50,923
2021	154	0	0	24,007	108	24,115	27,221	74	27,295	51,410
2022	155	0	0	24,199	108	24,307	27,438	74	27,512	51,819
2023	157	0	0	24,456	108	24,563	27,729	74	27,804	52,367
2024	159	147,825	2,190	24,688	108	26,986	27,993	74	28,067	52,863
2025	160	167,535	2,482	24,908	108	27,498	28,242	74	28,317	53,333
2026	161	187,245	2,774	25,129	108	28,010	28,492	74	28,566	53,803
2027	163	206,955	3,066	25,353	108	28,526	28,746	74	28,821	54,281
2028	164	226,665	3,358	25,573	108	29,039	28,996	74	29,070	54,751
2029	166	246,375	3,650	25,797	108	29,555	29,250	74	29,325	55,230
2030	167	266,085	3,942	26,022	108	30,071	29,504	74	29,579	55,708
2031	169	285,795	4,234	26,242	108	30,583	29,754	74	29,829	56,178
2032	170	305,505	4,526	26,470	108	31,104	30,013	74	30,087	56,665
2033	171	325,215	4,818	26,698	108	31,624	30,272	74	30,346	57,152
2034	173	344,925	5,110	26,935	108	32,153	30,540	74	30,614	57,657
2035	174	354,780	5,256	27,167	108	32,531	30,804	74	30,878	58,153
2036	176	364,635	5,402	27,404	108	32,913	31,072	74	31,146	58,658
2037	178	374,490	5,548	27,648	108	33,304	31,349	74	31,424	59,180
2038	179	384,345	5,694	27,905	108	33,707	31,640	74	31,715	59,728
2039	181	394,200	5,840	28,166	108	34,114	31,936	74	32,011	60,284
AAGR 2019-2039	0.9%	-	-	0.9%	0.0%	1.8%	0.9%	0.0%	0.9%	1.4%
Growth 2019-2039	19.6%	-	-	19.6%	0.0%	44.2%	19.6%	0.0%	19.5%	31.1%

Source: FAA 2019 TAF, FAA OPSNET/ATADS, CHA, 2019.

*Total Operations do not include Commercial Operation numbers

May 2019

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Table 3-9 – Recommended Forecast vs. FAA TAF

Year	FAA TAF	Recommended Operations Forecast			FAA TAF vs. Recommended Forecast
		GA	Military	Total	
2018	49,545	49,836	182	50,018	1.0%
2019	51,429	50,262	182	50,444	1.9%
2024	51,776	52,681	182	52,863	2.1%
2029	52,136	55,048	182	55,230	5.9%
2034	52,512	57,475	182	57,657	9.8%
2039	52,905	60,102	182	60,284	13.9%
AAGR 2019-2039	0.1%	0.9%	-	0.9%	-
Growth 2019-2039	2.9%	19.6%	-	19.6%	-

Source: FAA 2019 TAF, FAA OPSNET/ATADS, CHA, 2019.

3.5 Peak Activity Forecast

To properly plan, size, and design general aviation facilities at the Airport, an understanding of peak month and peak month-average day (PMAD) operational demand is necessary. The peak month and PMAD forecasts are key elements in defining the future facility requirements needed to accommodate above average levels of utilization (i.e., peak activity).

The peak month is the calendar month of the year when the highest level of general aviation operations typically occur. Peak month-average day is simply the total GA operations divided by the number of days in the peak month. Peak hour is the busiest hour of operations on the PMAD, which will later be used when determining airfield capacity.

3.5.1 General Aviation Peak Operations

Historical Peak GA Operations

A review of historical data was developed to identify the peak month for general aviation operations at BDR. When developing the forecast, July was determined to be the peak month in 2018.



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

Federal Aviation Administration
New England Region

1200 District Avenue
Burlington, MA 01803

August 22, 2019

Ms. Michelle Muoio, PMP
Airport Manager
I.I. Sikorsky Memorial Airport
1000 Great Meadow Road
Stratford, CT 06615

Dear Ms. Muoio:

The Federal Aviation Administration (FAA) has reviewed the forecast for I.I. Sikorsky Memorial Airport, Bridgeport, Connecticut, as depicted in *Chapter 3, Forecasts of Aviation Demand*, of draft working paper number 1 dated May 2019, prepared by CHA.

The forecast development is associated with the Airport Master Plan Update under Airport Improvement Program grant number 3-09-0002-033-2018.

This document has identified based aircraft and operational forecast as summarized in Tables 3-7 and 3-8 respectively.

Chapter three has also identified an overall airport approach category and airport design group as C-III. This classification will determine the applicable federal design standards to be achieved with respect to the airport layout/infrastructure.

FAA approves the based aircraft and operational forecasts as well as the airport design category of C-III.

Sincerely,

A handwritten signature in black ink that reads "Lisa J. Lesperance".

Lisa J. Lesperance
Lead Community Planner

Cc: Molly Parsons, Airport Planner, Connecticut Airport Authority