APPENDIX F
NOISE AND NOISE-COMPATIBLE LAND USE

This appendix discusses information regarding noise and land use that supplements the material in **Section 5.5**. This appendix includes summaries of the operational data and methods used to calculate noise exposure levels. It also provides background information regarding metrics used to describe aircraft noise, how people respond to noise, and Federal Aviation Administration (FAA) guidance on the compatibility of various land uses with different levels of noise exposure (and when those levels are considered non-compatible).

This appendix consists of the following sections:

- **F.1** Noise Analysis Methodology
- **F.2** Land Use
- **F.3** Data Development and Noise Exposure for the Existing Condition
- **F.4** Data Development and Noise Exposure for the Interim No Action
- **F.5** Data Development and Noise Exposure for the Interim Proposed Action
- **F.6** Data Development and Noise Exposure for the Build Out No Action
- **F.7** Data Development and Noise Exposure for the Build Out Proposed Action
- **F.8** Construction Noise
- **F.9** Summary Results for All Alternatives
- **F.10** Mitigation and Minimization

This appendix has seven attachments:

- **Attachment F-1** Basics of Noise and Terminology
- **Attachment F-2** AEDT Modeling Memorandums
- **Attachment F-3** Modeled Flight Track Use Percentages and Flight Track Exhibits
- **Attachment F-4** Altitude Control Code Development Memorandums
- **Attachment F-5** Land Use and Noise-Sensitive Site Development and Results
- **Attachment F-6** Grid Point Analysis Exhibits
- **Attachment F-7** Noise Research Program Update

F.1 NOISE ANALYSIS METHODOLOGY

Section F.1.1 addresses the regulatory context of noise. **Section F.1.2** describes the study areas evaluated in the noise analysis. **Section F.1.3** introduces aircraft noise modeling relevant to the Chicago O'Hare International Airport Terminal Area Plan and Air Traffic Procedures Environmental Assessment (EA).

F.1.1 Regulatory Context

The analysis of aviation noise impacts from federal actions is the FAA's responsibility. Federal statutes, FAA regulations, and FAA guidance related to the consideration of noise impacts include:

- 49 United States Code (U.S.C.) 44715, The Control and Abatement of Aircraft Noise and Sonic Boom Act of 1968, as amended
- 49 U.S.C. 4901-4918, The Noise Control Act of 1972
- 49 U.S.C. 47501 et seq., The Aviation Safety and Noise Abatement Act of 1979, as amended
- 49 U.S.C. 47101 et seq., The Airport and Airway Improvement Act of 1982, as amended
- 49 U.S.C. 47521-47534, The Airport Noise and Capacity Act of 1990
- 14 CFR Part 150, Airport Noise Compatibility Planning
- 14 CFR Part 161, Notice and Approval of Airport Noise and Access Restrictions
- 49 U.S.C. 47534, Prohibition on Operating Certain Aircraft weighing 75,000 Pounds or Less Not Complying with Stage 3 Noise Levels [section 506 of the FAA Modernization and Reform Act of 2012]
- FAA Order 1050.1F, Environmental Impacts: Policies and Procedures
- FAA Order 5050.4B, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions

These laws and guidance documents specify the use of the Day-Night Average Sound Level (DNL) as the noise metric used in all FAA aviation noise studies in airport communities. DNL, a cumulative sound level, provides a measure of total sound energy. DNL is a logarithmic average of the sound levels of multiple events at one location over a 24-hour period. A 10-decibel (dB) penalty is added to all sounds occurring during nighttime hours (between 10:00:00 p.m. and 6:59:59 a.m.). The 10 dB increase for nighttime events accounts for the added intrusiveness of noise during typical sleeping hours as ambient sound levels during nighttime hours are typically about 10 dB lower than during daytime hours.

For a NEPA noise analysis, the FAA requires that the 24-hour analysis period represent the average annual day (AAD). The AAD reflects the daily aircraft operations averaged over a 365-day period. Further details on noise metrics, including DNL, can be found in **Attachment F-1**.

Estimates of noise effects resulting from aircraft operations can be interpreted in terms of the probable effects on human activities that typically occur within specific land uses. The FAA has adopted guidelines for evaluating land-use compatibility with noise exposure. In general, most land uses are considered compatible with DNL less than 65 dB, but only certain uses are compatible with DNL greater than or equal to 65 dB. **Attachment F-1** contains further details on land use compatibility.

The noise analysis compares the No Action and Proposed Action Alternatives in each condition (Interim and Build Out) using the FAA's thresholds of significance. **Table F-1** defines the significance threshold for changes in noise in accordance with FAA Order 1050.1F. When an action (compared to the No Action Alternative for the same timeframe) would cause noise-sensitive areas to have a DNL greater than or equal to 65 dB and experience a noise increase of at least 1.5 dB, the impact is considered significant. **Table F-1** also lists FAA-defined reportable changes of noise levels.

TABLE F-1
AIRCRAFT DNL THRESHOLDS AND IMPACT CATEGORIES

	65 DNL or Greater	Greater than or equal to 60 DNL but less than 65 DNL	Greater than or equal to 45 DNL but less than 60 DNL
Minimum Change in DNL with Proposed Action Alternative DNL	1.5 dB	3.0 dB	5.0 dB
Level of Change	Significant	Reportable	Reportable
Sources: FAA Order 1050.1F and the 1050.1F 2020 Desk Reference			

F.1.1.1 Study Areas

The noise analysis of this EA has two study areas: a Primary Study Area (PSA) for the area in the immediate vicinity of O'Hare International Airport (O'Hare or the airport) and a Secondary Study Area (SSA) for areas underlying proposed changes to air traffic procedures.

Two FAA Orders and an FAA Policy Statement Notice establish guidance for the methodology used to derive noise study areas for analysis under NEPA:

- FAA Order 1050.1F, Environmental Impacts: Policies and Procedures (2015), specifically as detailed in its companion Desk Reference document (2020);
- JO 7400.2N, Procedures for Handling Airspace Matters (2021); and
- Notice of Change in Air Traffic Noise Screen (ATNS) Policy (2000) (65 Federal Register 76339).

Referenced sections of these guidance documents include:

- Appendix B of 1050.1F, Federal Aviation Administration Requirements for Assessing Impacts Related to Noise and Noise-Compatible Land Use and Section 4(f) of the Department of Transportation Act (49 U.S.C. Section 303);
- FAA 1050.1F Desk Reference Chapter 11, Noise and Noise-Compatible Land Use, specifically Section 11.2, Affected Environment;
- Chapter 32 of JO 7400.2N, entitled Environmental Matters, specifically Section 2, Environmental Processing; and,
- Notice of Change in ATNS , specifically the text found at Page 76340, which states: "The [Air Traffic Noise Screen] ATNS will be used to evaluate proposed changes in arrival procedures between 3,000 feet and 7,000 feet and departure procedures between 3,000 and 10,000 feet AGL, for large civil jet aircraft weighing over 75,000 pounds." (The context and other portions of the Policy Statement make clear that altitudes referenced are with respect to feet above ground level [AGL] as opposed to feet above mean sea level [MSL]).

The policy presented in Notice of Change in ATNS and the resulting ATNS methodology tool relied on research completed in July 1999. This research examined the predictive capabilities of using various flight altitude ceilings to derive lateral extents of a study area that would include areas exposed to DNLs greater than 45 dB due to aircraft operations. The purpose of forming a study area is to enable characterization of the affected environment, bounding it in such a manner as to coincide with the extent of potential impacts that may arise from changes in air traffic procedures. In the intervening years, improvements to the ATNS tool have been incorporated into successor noise modeling tools including the Noise Integrated Routing System and the Aviation Environmental Design Tool (AEDT).

The PSA is used to define an affected environment based on land use compatibility guidelines found in 14 Code of Federal Regulations (CFR) Part 150, Appendix A (Part 150). This regulation indicates that any land use would ordinarily be considered compatible with DNLs less than 65 dB. The FAA guidance documents cited above and in Part 150 recognize, however, that there may be circumstances pertaining to National Parks, U.S. Fish and Wildlife Service (USFWS) Refuges, and tribal lands in which the Part 150 land use guidelines might not adequately address potential impacts from aircraft noise.

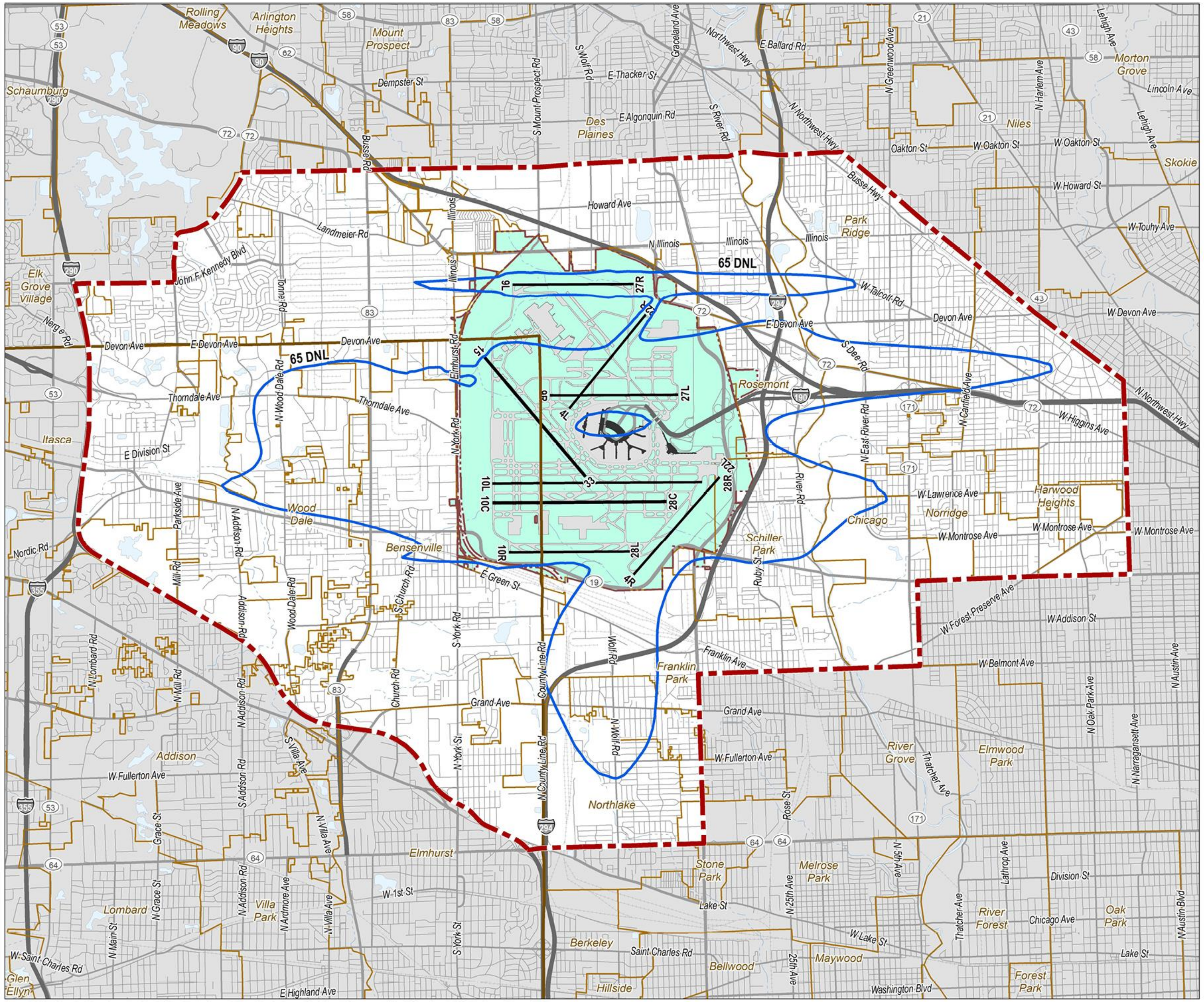
The PSA for this project was developed to encompass an area that would contain at least the lateral extent of the estimated 65 DNL contour resulting from aircraft flight and ground operations contemplated under the Proposed Action, with an adequate buffer to accommodate potential changes in the contour between the No Action and Proposed Action Alternatives. As described in **Section F.1.3.5**, all noise-sensitive facilities (e.g., schools, libraries, places of worship, hospitals), as well as sites subject to protection under Section 4(f) and Section 106, have been identified, inventoried and modeled within the PSA.

The FAA used the 2020 Interim Condition 65 DNL contour from the 2015 Written Re-Evaluation of the 2005 O'Hare Modernization Program Environmental Impact Statement (EIS) (hereinafter called the "criterion contour"), as shown in **Exhibit F-1** to define the extents of the PSA. This criterion contour was chosen because it represents predicted noise for the O'Hare Modernization Build Out. The extent of the area defined by the criterion contour intersects several cities and towns. The areas in the criterion contour from each city or town were appended to form the PSA. In addition, the boundaries of the PSA were extended to the intersections with major roadways and natural features (e.g., rivers, lakes, etc.) outside the criterion contour. Municipal boundaries were obtained from the Illinois Geospatial Data Clearinghouse (2018). Natural feature mapping data was obtained from the Chicago Metropolitan Agency for Planning (CMAP) Data Hub (Land Use 2013), and the roadways were taken from the Environmental Systems Research Institute (ESRI) Roads database (2017). As defined, the PSA is sufficiently extensive to capture areas that may experience changes causing a DNL of 65 or greater due to the Proposed Action.

Exhibit F-1 displays the PSA along with the criterion contour and intersecting municipal boundaries. The PSA is shown with the red dashed line; it extends from the center of O'Hare approximately five miles to the west and east, three miles to the north, and four miles to the south.

The SSA defines an expanded area outside the PSA for documenting potential reportable impacts (as defined by NEPA) to noise-sensitive land uses, National Parks, USFWS Refuges, and tribal lands. The identification of an SSA facilitates further analysis that may be required under Section 4(f) of the U.S. Department of Transportation Act of 1966 (a 4(f) Analysis), under Section 106 of the National Historic Preservation Act of 1966 (a Section 106 Analysis), or for any other special purpose, in addition to anything listed under NEPA.

Based on the previously cited FAA guidance, the SSA was developed to cover a geographic area underlying the proposed flight path changes to Standard Instrument Arrival Procedures (IAPs) or where IAPs are lower than 7,000 feet AGL.



Source: HMMH, Ricondo & Associates, NearMap US Inc., Illinois Geospatial Data Clearinghouse, Cook County Government GIS, DuPage County GIS, US Census Bureau, ESRI

Chicago O'Hare International Airport

Terminal Area Plan and Air Traffic Procedures Environmental Assessment

- Primary Study Area
- 2020 Interim Condition 65 DNL Contour
- Airport Boundary
- Existing Runways
- County Boundary
- Community Boundary
- Highway
- Primary Roads
- Secondary Roads
- Local Roads
- Railroad Lines

0 1 2
Miles

Primary Study Area for Noise Analysis

Exhibit F-1

To define the SSA, the EA team analyzed FAA-provided radar flight track data for calendar year 2018 to determine where arriving jet aircraft[1] are at or below 7,000 feet AGL. Since altitudes of aircraft in radar flight track data are given in terms of feet MSL, the AGL-based criteria was converted to MSL by adding 7,000 feet to the ground elevation. The ground elevation at O'Hare's reference point is 680 feet MSL,[2] so the first iteration of the process determined the extent of each arrival flight track where the aircraft was at or below 7,680 feet MSL. In the area thus defined by the collection of flight tracks, the highest ground elevation was then added to 7,000 feet to form a new cutoff altitude, and the process was repeated. This procedure was applied iteratively until 95 percent of the jet arrival flight track extents at or below 7,000 feet AGL were contained in the defined region. The area defined by this process was then expanded slightly to have its lateral extents generally coincide with major roadways, terrain features, and jurisdictional boundaries. Finally, the SSA was defined as the smallest square that fully encompassed the irregular shape.

Exhibit F-2 presents locations at which jet aircraft cross 7,000 feet AGL and the recommended SSA that results from applying the previously described methodology. The SSA is indicated by the red dashed square, which extends from the center of O'Hare approximately 36 miles west, 17 miles east, 31 miles north, and 25 miles south.

In compliance with JO 7400.2N, the FAA considered whether to analyze noise above 10,000 feet AGL as an exception to the policy. The purpose of such analysis would be to identify overflights occurring between 10,000 feet AGL and 18,000 feet AGL that also would overfly a National Park or USFWS Wildlife Refuge where non-aircraft noise is relatively low and a quiet setting is a generally recognized purpose and attribute of the park or refuge's management plan. The FAA has determined, however, that the proposed air traffic changes would not alter flight paths above 7,000 feet AGL. Therefore, the study area does not examine flights between 10,000 feet AGL and 18,000 feet AGL.

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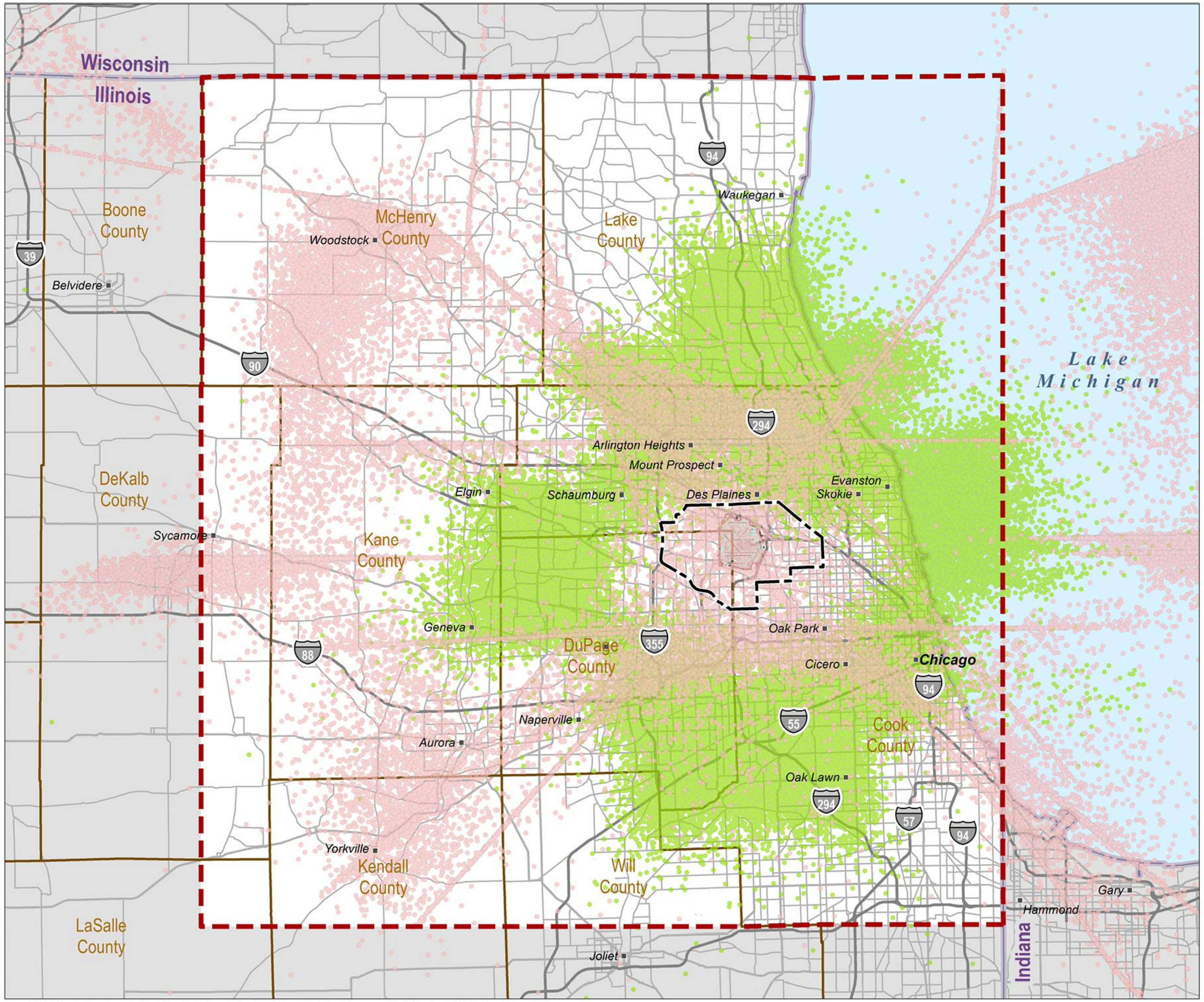
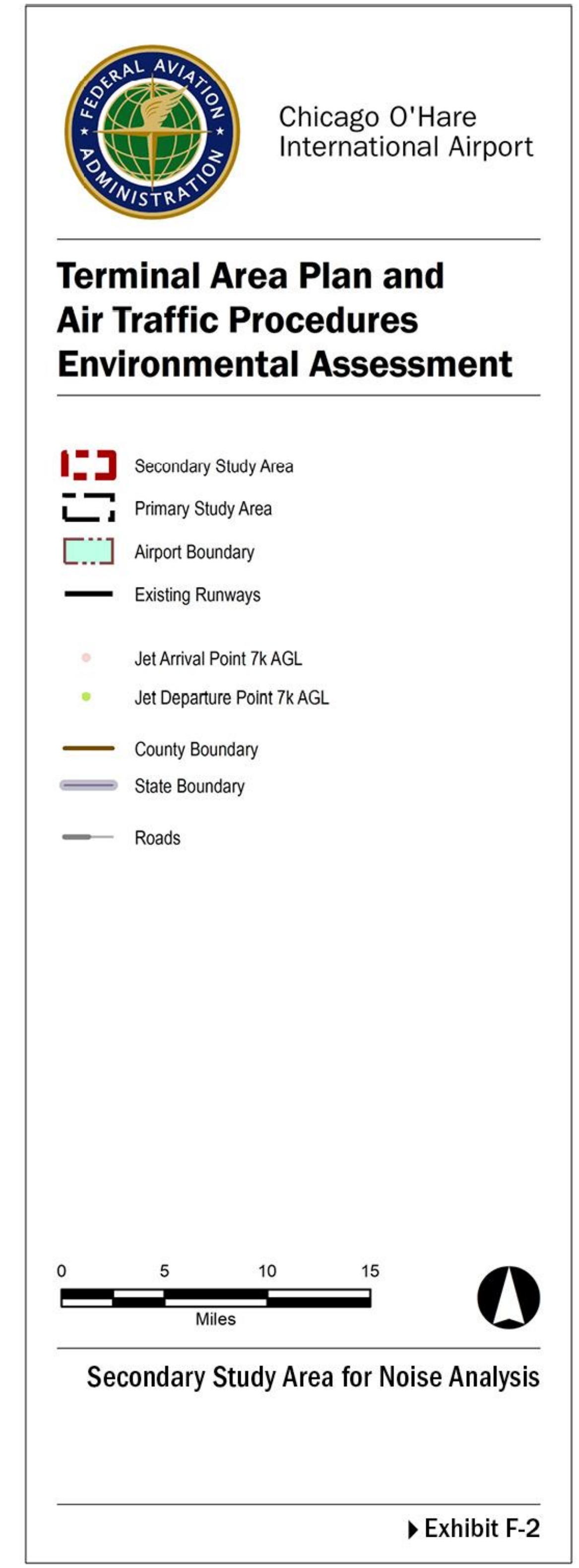
1 Operations between local airports such as Milwaukee and O'Hare, which may not reach an altitude of 7,000 feet AGL, were excluded from the analysis.

2 FAA Form 5010-1 for O'Hare International Airport (04508.*A), dated 5/23/2019





Source: HMMH, Ricondo & Associates, NearMap US Inc., Illinois Geospatial Data Clearinghouse, Cook County Government GIS, DuPage County GIS, US Census Bureau, ESRI

F.1.2 Aircraft Noise Modeling

This section contains seven subsections introducing various aspects of noise modeling relevant to this EA.

F.1.2.1 Noise Model

The aircraft noise analysis of this EA uses AEDT 2d Service Pack 2.[3] AEDT is a combined noise and emission model that uses a database of aircraft noise and performance characteristics. The AEDT predicts ground based DNL values from user input for aircraft types, AAD aircraft operations, airport operating conditions, aircraft performance, and flight patterns. AEDT also calculates air pollutant emissions from aircraft engines for air quality analyses, enables noise and air quality calculations on a regional basis (as opposed to only in the immediate airport environment), and includes updated databases for newer aircraft models.

F.1.2.2 Noise Model Input Data

The primary data input categories for the AEDT are:

- Airfield layout, which includes the coordinates of each runway centerline endpoint, runway widths, approach threshold crossing heights, and runway end elevations.
- Meteorological data, which refers to weather conditions affecting sound propagation and aircraft performance. AEDT's database of airports was accessed to obtain annual average daily O'Hare weather conditions. AEDT's airport database contains 30-year average meteorological data (from 1981 to 2010), which AEDT uses to adjust aircraft performance and sound propagation parameters from standard day conditions.
- Terrain data, which refers to ground elevations. AEDT uses terrain data to adjust the aircraft-to-ground path length, which is the distance between the modeled location on the ground and the aircraft in flight, making the ground closer to or farther from the aircraft relative to flat-earth conditions. The AEDT does not use terrain data to account for shielding or reflective effects of terrain.
- Specific aircraft types in O'Hare's fleet mix, defined by airframe and engine type combinations. All but one aircraft type evaluated for the O'Hare modeling are either in the AEDT database or have approved substitutions. The EA included updated Boeing 737800 data provided by the FAA Office of Environment and Energy (AEE). This data is considered non-standard for AEDT and required FAA AEE approval, which was provided September 6, 2019. The FAA AEE approval is provided in **Attachment F-2**.
- Aircraft flight operations, which are numbers of AAD aircraft operations by DNL time periods and by aircraft type. Daytime is defined as 7:00:00 AM to 9:59:59 PM and nighttime is defined as 10:00:00 PM to 6:59:59 AM Departures and arrivals were the two types of flight operations modeled for this EA. Touch-and-go or circuit operations are not conducted at O'Hare.
- Aircraft noise and performance characteristics. The AEDT database contains noise and performance data for more than 300 different aircraft types. AEDT accesses the noise and performance data for takeoff, landing, and pattern operations by those aircraft. The database provides single-event noise levels for slant distances from 200 feet to 25,000 feet for several thrust

[3] Version 2d, Service Pack 2 was released on September 5, 2019 (https://aedt.faa.gov/2d_information.aspx). After modeling began (Summer of 2019), the FAA released Version 3b, 3c and 3d; however, consistent with FAA guidance, the EA will use the version of the model available at the start of the modeling.

or power settings for each aircraft type. Performance data includes thrust, speed, and altitude profiles for takeoffs and landings. For those aircraft types operating at O'Hare that are not directly represented in the AEDT database, the AEDT contains FAA-approved substitutions for noise modeling.

- Stage length, which is a surrogate for an aircraft's weight that varies according to its fuel load. Stage length is assigned according to each departure's trip distance to its destination, using city-pair information provided in the operations forecast. The assigned stage length then determines the appropriate flight performance profile from the AEDT database.
- Flight profiles, which are based on standard flight procedures for each aircraft type contained in the AEDT database. Information in flight profiles describe the sequence of altitudes, thrust/power settings, and airspeeds for departure and arrival operations. Based on a review of calendar year 2018 radar data from the Chicago Department of Aviation's (CDA) Airport Noise Management System (ANMS),[4] the FAA determined that some aircraft arriving to and departing from O'Hare commonly fly procedures that are not represented by the standard profiles provided in AEDT. For these flight procedures, the modeling utilizes Altitude Control Codes (ACC)[5] available in AEDT, which adjusts standard profiles to emulate actual flight profiles as closely as possible. Using this method to adjust the flight profiles does not require FAA approval.
- Runway use, which is the allocation of flight operations to each runway, on an AAD basis, by DNL time periods, operation type, and aircraft type.
- Flight tracks and their usage. A flight track is the two-dimensional projection of the aircraft's three-dimensional flight path onto the ground. A *modeled* flight track represents one or more actual flight tracks. Modeled flight tracks for a given flight corridor typically consist of a backbone track and sub-tracks that represent the average location and dispersion of the actual flights in the corridor. Each backbone flight track typically represents a general heading for departures or originating point for arrivals. As each runway usually has multiple headings and originating points, the distribution of operations, or track use, on an AAD basis, must be specified. Operations are further spread on backbone tracks and sub-tracks via distribution percentages on an AAD basis.
- Aircraft Run-up Operations, which are stationary engine-focused operations at various locations on the airfield. The term "run-up" is derived from the engine's throttle being cycled or temporarily advanced for purposes of engine testing or maintenance. To model run-ups, AEDT requires the number of run-up operations on an AAD basis, by DNL time periods, aircraft or engine type, by location on the airfield and heading, power setting, and duration.

F.1.2.3 Noise Exposure Contours

Noise contours (i.e., lines of equal noise exposure, usually expressed in terms of DNL) are typically used to illustrate average daily noise exposure around an airport. Noise contours are conceptually similar to topographic contour maps. A set of concentric contours, representing successively lower DNL, usually extends away from the airport's runways. DNL contours are typically presented in 5 dB increments on a base map, with each successive contour representing a 5 dB decrease in noise exposure on an AAD basis. Contours developed for this EA represent 65, 70, and 75 DNL.

[4] CDA provided CY2018 ANMS data on May 15, 2019.

[5] An altitude control code defines rules for what an aircraft's altitude should and should not be as it passes over a particular track point. Specifically, it establishes a target altitude that an aircraft should try to reach as it passes over the track point, as well as restricted altitude ranges that the aircraft is not allowed to occupy as it passes over the track point. Note that track points are not required to have altitude controls associated with them, and only one altitude control can be assigned to a given track point.

F.1.2.4 Grid Point Noise Calculations

Besides noise contours, the AEDT provides another way to show noise levels in the airport environs. DNL (or other metrics supported by the AEDT) can be calculated for specific locations, defined as grid points, and can be presented in a number of formats. Grid point analyses can show the change in noise levels over specific locations and are helpful in determining where significant or reportable noise changes may occur.

For this EA, noise levels are developed for two area-wide grid sets. An inner set of points is defined to generally capture areas that would be exposed to 60 DNL or greater for one or more of the analyzed Conditions/Alternatives; an outer set of points is defined to generally capture areas that would be exposed to levels in the range of 45 DNL to 60 DNL for one or more of the analyzed scenarios. The inner grid consists of a square made up of 2,304 points spaced 0.25 nautical miles[6] (NM) (1,519 feet) apart, extending approximately six NM in each direction from the Airport Reference Point (which is near the geographic center of O'Hare's runways). The inner grid covers the PSA. The outer grid consists of a square made up of 13,924 points spaced 0.5 NM (3,038 feet) apart. The outer grid extends approximately 38 NM west, 21 NM east, 26 NM miles south, and 33 NM north of O'Hare in order to cover the extent of the SSA.

F.1.2.5 Site-Specific Noise Calculations (Noise-Sensitive Facilities)

AEDT allows single points to be defined in the same manner as uniformly spaced grids, providing a means for calculating DNL (or other metrics supported by the AEDT) for any geographic location.

As described in FAA Order 1050.1F, a noise-sensitive area is "an area where noise interferes with normal activities associated with its use. Normally, noise sensitive areas include residential, educational, health, and religious structures and sites, and parks, recreational areas, areas with wilderness characteristics, wildlife refuges, and cultural and historical sites. For example, in the context of noise from airplanes and helicopters, noise sensitive areas include such areas within the DNL 65 dB noise contour…The FAA recognizes that there are settings where the DNL 65 dB standard may not apply. In these areas, the responsible FAA official will determine the appropriate noise assessment criteria based on specific uses in that area." For this EA, noise levels are provided for the following types of noise-sensitive facilities in the PSA: learning institutions, health care facilities, places of worship, parks, and Section 4(f) lands[7], as described in **Attachment F-5.** In addition, the uniformly spaced grid point calculation setup described in **Section 0** facilitates obtaining noise impact results for any previously unidentified noise-sensitive facilities within the PSA or SSA.

F.1.2.6 Noise Exposure Mapping

The primary way noise exposure levels are shown in this EA is by dispalying the DNL contours on land use maps. The maps identify all land uses and noise sensitive sites within each DNL contour level. The DNL contours can be used to:

- Identify aircraft noise levels,
- Assist in preparing noise compatibility programs, and

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[6] AEDT uses units of international nautical miles (abbreviated nmi or NM). One NM is exactly 1,852 meters (about 6,076 feet).

[7] The '4(f)' part of "Section 4(f)/6(f) lands" refer to lands falling under the US DOT Act of 1966 (now codified at 49 U.S.C. § 303), which protects significant publicly owned parks, recreational areas, wildlife and waterfowl refuges, and public and private historic sites. The '6(f)' part of "section 4(f)/6(f) lands" refers to Section 6(f) of 16 U.S.C. § 4601-8(f) associated with the Land and Water Conservation Fund, which applies if the property was acquired or developed with financial assistance under the Land and Water Conservation Fund State Assistance Program. Section 6(f) does not apply to this EA as no lands affected by the Proposed Action were acquired or developed using Section 6(f) LWCF funds.

- Provide guidance in developing land use controls such as zoning ordinances, subdivision regulations, and building codes.

For purposes of the EA, the noise contours (see Section 0 for the Existing Condition contours) show areas exposed to DNLs for each condition and alternative. It is important to recognize that a line drawn on a map does not imply that a particular noise condition exists on one side of the line and not the other. For further information on noise and its effects on people, please refer to **Attachment F-1**.

The noise contours are developed from a dense grid generally defined to capture areas that would be exposed to 60 DNL or greater for one or more alternatives. The dense grid consists of squares with sides 0.025 NM (152 feet) in length, extending approximately six NM east and west and 3.5 NM north and south from the Airport Reference Point.

F.1.2.7 Noise Modeling versus Noise Monitoring Data

Since 1996, the CDA has utilized its ANMS to monitor the noise that O'Hare aircraft generate over the surrounding communities. The ANMS collects, analyzes, and processes data from several sources of information, including a network of 40 permanent noise monitors[8] near O'Hare and cross-references that data with FAA radar data. That information is used to share data in monthly and quarterly reports that disclose past noise levels to the public.[9]

Computer modeling, rather than measured data from the ANMS noise monitors surrounding O'Hare, is used to create the noise contours for this EA because noise monitors only record *existing* noise levels and cannot predict *future* noise levels. Comparing potential future noise levels that would be experienced with each alternative is a requirement for assessing impacts for the EA under NEPA and FAA implementing orders.[10]

AEDT is used to calculate levels of aircraft noise for this EA. AEDT's database of aircraft noise characteristics, described in **Section F.1.3.2,** includes measured reference acoustic data to predict DNLs based on user input on the types and number of aircraft operations, AAD operating conditions, average aircraft performance, and aircraft flight patterns.

The ANMS is used to provide information on historical noise levels, while AEDT is used to predict future noise levels.

F.2 LAND USE

NEPA requires the review of land uses located in the airport environs to understand the relationship between those land uses and the noise exposure associated with arriving and departing aircraft. This includes delineation of land uses within the 65 DNL and higher aircraft noise exposure contours on the noise contour exhibits and identification of noise sensitive uses that may be non-compatible with that level of noise exposure. Identification of a noise sensitive use within the 65 DNL contour does not necessarily mean that the use is either considered non-compatible or that it is eligible for mitigation. Rather, identification merely indicates that the use is generally considered non-compatible but requires further investigation. Factors that influence compatibility and/or eligibility may include but are not limited to previous sound reduction treatments, current interior noise levels, structure condition, ambient and self-

[8] The ANMS has 40 noise monitors as of December 2021: https://www.flychicago.com/SiteCollectionDocuments/Community/Noise/OHare/ANMS/ORD_Fact_Sheet_Monitor_Introduction.pdf
[9] https://www.flychicago.com/community/ORDnoise/ANMS/Pages/ANMSreports.aspx
[10] FAA Order 1050.1F and FAA Order 5050.4B

generated noise levels, whether a given use is considered temporary or permanent, and the timeframe within which a given structure was constructed.

This appendix provides a description of recommended land uses that are deemed generally compatible under Appendix A of Part 150, and an overview of existing and future land uses classifications in the vicinity of the airport.

F.2.1 Land Use Compatibility Guidelines

The objective of airport noise compatibility planning is to promote compatible land use in communities surrounding airports. NEPA requires the review of land uses surrounding an airport to determine land use compatibility associated with aircraft activity at the airport.

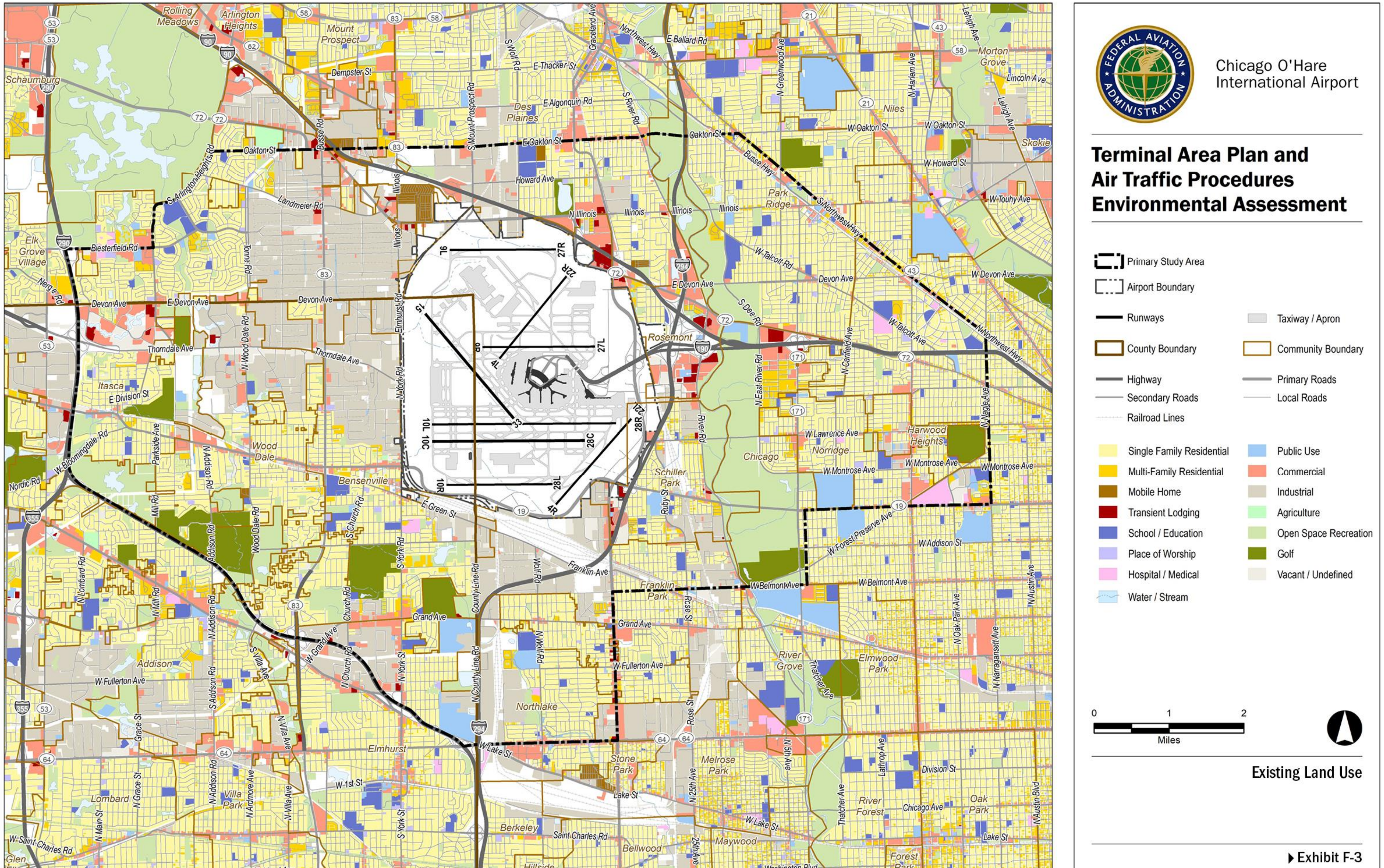
The FAA has published land use compatibility designations, as set forth in Part 150, Appendix A, Table 1 (provided in **Attachment F-5**). The FAA generally considers all land uses to be compatible with aircraft-related DNL below 65 dB, including residential, hotels, retirement homes, intermediate care facilities, hospitals, nursing homes, schools, preschools, and libraries. These categories will be referenced throughout the EA. Institutional or public land use land use consists of schools, hospitals, nursing homes, churches, auditoriums, concert halls, governmental services, transportation and parking. While all of these uses are compatible with aircraft-related DNL below 65 dB, schools are not compatible above 65 DNL without mitigation and are listed seperately in this EA.

F.2.2 Existing Land Use

O'Hare is located on over 7,200 acres in the City of Chicago, Illinois, and is partially located in both Cook and DuPage Counties. The airport is west of Interstate 294, south of Interstate 90, and northwest of the city center.

Existing land use in the PSA consists of the airport property, residential uses, and commercial and industrial land uses as shown on **Exhibit F-3**. The airport is largely surrounded to the north, east, and south by residential areas consisting of single-family and multi-family residences. The area west of the airport is primarily industrial and commercial, with small areas of residential land use located in Bensenville.

The area directly south of the airport is industrial up to Interstate 294, with residential areas located beyond the highway.

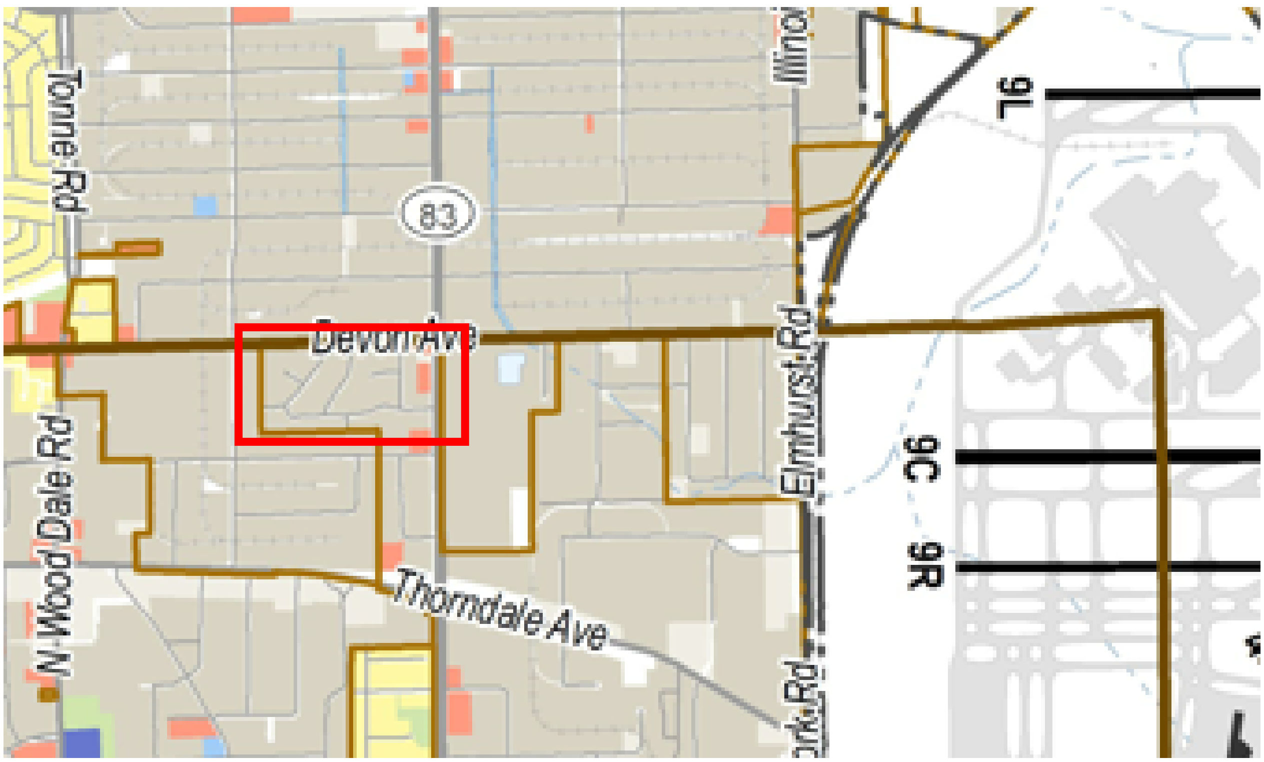


Source: HMMH 2018, USCB 2016, USCB 2010, Illinois Geospatial Data Clearinghouse, CMAP Data Hub, ESRI

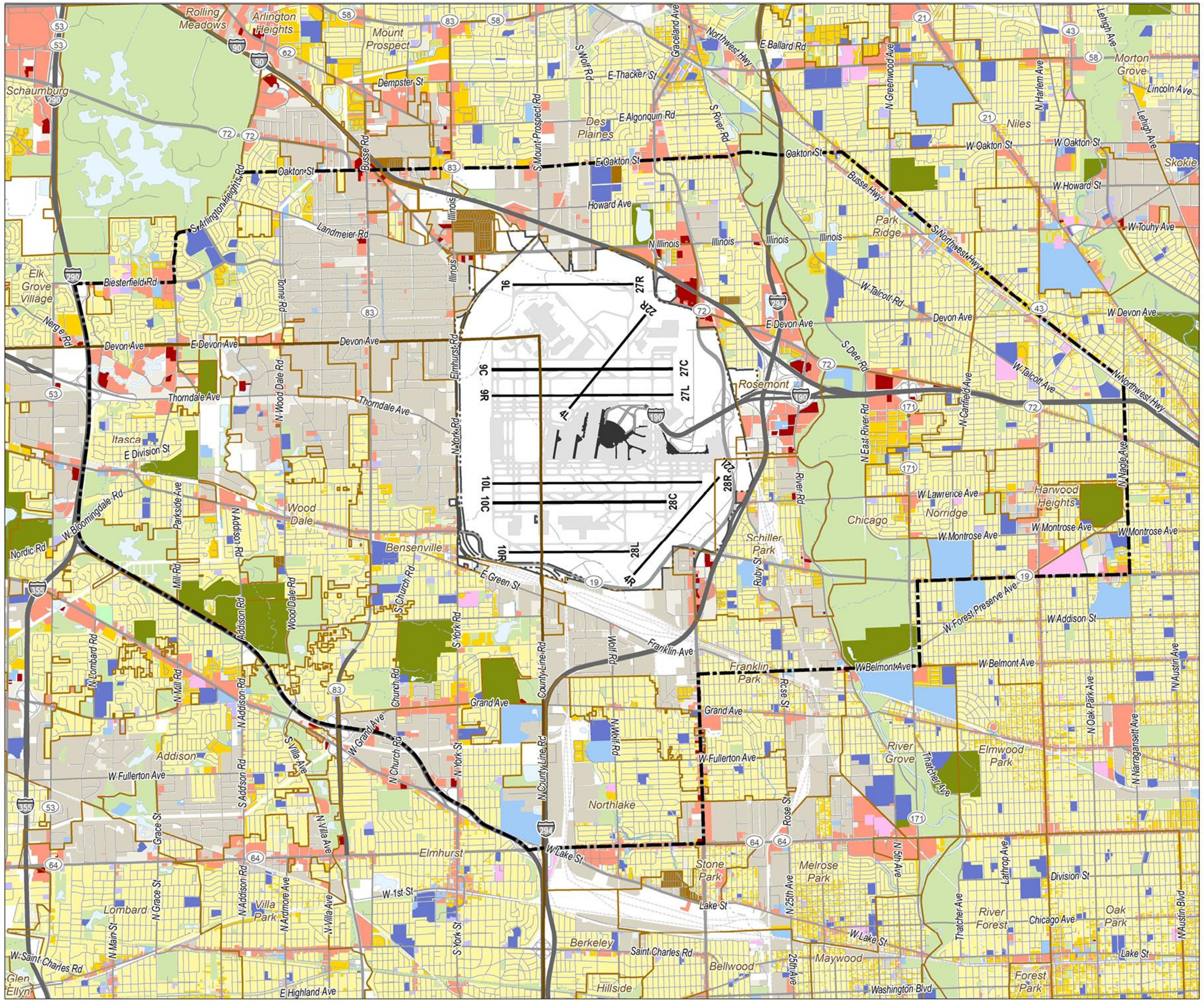
F.2.3 Future Land Use

Development in Cook and DuPage Counties is ongoing. The City of Bensenville has been working to convert residential land use west of the airport into land use compatible with airport noise levels. The Mohawk Terrace neighborhood located at the southwest corner of East Devon Avenue and Route 83 was recently rezoned from residential to industrial as shown in **Figure F-1** within the red box. The neighborhood, which consists of 112 parcels, is located just north of the approach to Runway 9C. The future land use map reflects this change along with other parcels in the PSA that have been converted from residential to non-residential compatible land use. These changes are reflected in the future land use map, **Exhibit F-4**, which will be used for all land use evaluations in the EA.

FIGURE F-1
REZONED MOHAWK TERRACE NEIGHBORHOOD



Source: City of Bensenville, HMMH



Source: HMMH 2018, USCB 2016, USCB 2010, Illinois Geospatial Data Clearinghouse, CMAP Data Hub, ESRI

Chicago O'Hare International Airport

Terminal Area Plan and Air Traffic Procedures Environmental Assessment

- Primary Study Area
- Airport Boundary
- Runways
- Taxiway / Apron
- County Boundary
- Community Boundary
- Highway
- Primary Roads
- Secondary Roads
- Local Roads
- Railroad Lines
- Single Family Residential
- Multi-Family Residential
- Mobile Home
- Transient Lodging
- School / Education
- Place of Worship
- Hospital / Medical
- Water / Stream
- Public Use
- Commercial
- Industrial
- Agriculture
- Open Space Recreation
- Golf
- Vacant / Undefined

0 1 2 Miles

Future Land Use

Exhibit F-4

F.3 DATA DEVELOPMENT AND NOISE EXPOSURE FOR THE EXISTING CONDITION

As mentioned in **Section F.1**, AEDT requires geographic data and detailed aircraft operational data as input. **Sections F.3.1** through **F.3.8** address the data input to AEDT for the aircraft noise modeling of the Existing Condition. **Section F.3.9** presents the resulting Existing Condition noise exposure.

F.3.1 Airfield Layout

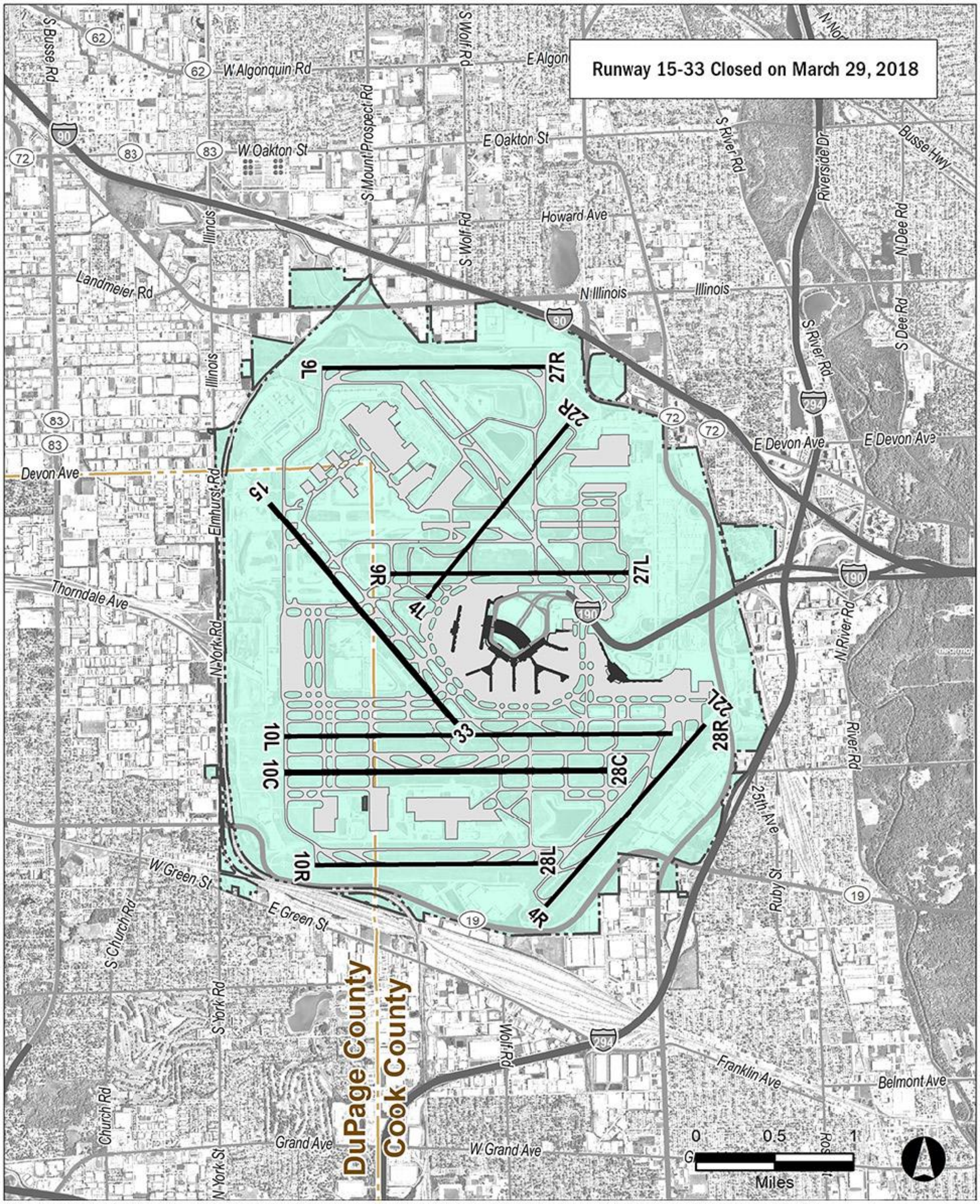
Table F-2 presents the runway layout information required by AEDT for the Existing Condition. The CDA provided the runway coordinates and elevations. The coordinates were verified using Google Earth and its 2018 satellite imagery. Elevations match FAA Form 5010 data. Runways 10LX and 28RX are not "official" runways but are shortened versions of Runways 10L and 28R, respectively, which are modeled in AEDT for taxiway intersection departures. The Existing Condition includes Runway 15/33, which was active through March 2018. **Exhibit F-5** depicts the modeled runway layout.

TABLE F-2
RUNWAY DATA FOR THE EXISTING CONDITION

Runway ID	Latitude (degrees North)	Longitude (degrees West)	Elevation (feet MSL)	Displaced Landing Threshold (feet)	Glide Slope (degrees)	Threshold Crossing Height (feet)
9L	42.002833	87.926675	668.0	None	3	55
9R	41.983897	87.918353	659.8	None	3	57
10L	41.968994	87.931531	672.1	None	3	56
10LX[1]	41.969014	87.920842	665.7	None	3	n/a
10C	41.965703	87.931522	669.4	None	3	55
10R	41.957200	87.927861	680.0	None	3	55
4L	41.981656	87.913917	655.7	None	3	55
4R	41.953328	87.899419	661.4	None	3	52
15[2]	41.990463	87.933140	665.6	None	3	55
27R	42.002831	87.899083	663.6	None	3	55
27L	41.983900	87.889050	650.1	None	3	55
28R	41.969069	87.883728	651.4	None	3	54
28RX[1]	41.969053	87.895553	650.4	None	3	n/a
28C	41.965767	87.891811	650.1	None	3	55
28L	41.957247	87.900289	658.0	None	3	55
22L	41.969922	87.879744	654.4	None	3	55
22R	41.997536	87.896372	647.7	None	3	49
33[2]	41.970083	87.910230	654.8	None	3	55

Notes:
1) Runways 10LX and 28RX are not "official" runways; their coordinates represent the location for intersection departures for Runways 10L and 28R.
2) Runway 15/33 was closed in March 2018.

Source: CDA, 2019



Source: HMMH, Ricondo & Associates, Illinois Geospatial Data Clearinghouse, Cook County Government GIS, DuPage County GIS, Environmental Systems Research Institute

Chicago O'Hare International Airport

Terminal Area Plan and Air Traffic Procedures Environmental Assessment

Runway Layout for Existing Condition

Exhibit F-5

F.3.2 Meteorological and Terrain Data

The modeled meterological conditions for O'Hare are:

- Temperature: 49 degrees Fahrenheit
- Station Pressure: 992 mbar
- Sea Level Pressure: 1,016.83 mbar
- Dew point: 40.39 degrees Fahrenheit
- Relative humidity: 69.7 percent
- Wind speed: 8.36 knots (headwind each runway)

Terrain data was acquired from the United States Geological Survey National Elevation Dataset with one-third arc second (approximately 33 feet) resolution covering the PSA and SSA on October 15, 2019.

F.3.3 Aircraft Noise and Performance Characteristics

After the release of AEDT 2d Service Pack 2, the FAA released updated noise and performance data for the Boeing 737-800 aircraft but deemed that data "non-standard," requiring users to request permission for its use. A request to use the 737-800 data for the EA was submitted on August 30, 2019, and approved by the FAA AEE on September 6, 2019. FAA approval is provided in **Attachment F-2**.

Section F.3.7 contains further discussion of performance data and modeled flight profiles.

F.3.4 Aircraft Flight Operations

Development of Existing Condition flight operations began with the FAA's OPSNET Air Traffic Control Tower (ATCT) counts for 2018, shown in **Table F-3**. No "local" or traffic pattern operations were logged by the FAA ATCT at O'Hare; thus, none were modeled. Total flight operations for the Existing Condition is 903,747.

TABLE F-3
O'HARE TOWER COUNTS FOR THE EXISTING CONDITION

Itinerant Operations					Local Operations			
Air Carrier	Air Taxi	General Aviation	Military	Total	Civil	Military	Total	Total Operations
652,622	245,587	5,465	73	903,747	-	-	-	903,747

Source: FAA OPSNET database for calendar year 2018, accessed July 3, 2019.

The CDA provided 2018 O'Hare-specific data from its ANMS containing the following data fields:

- Time of day (local)
- Type of operation (arrival or departure)
- Runway ID
- Aircraft ID (four-character alphanumeric)
- Airline
- Flight Number
- Tail ID
- Airport of Origin (for arrivals)
- Airport Destination (for departures)

The CDA also provided 2018 Aerobahn® data for O'Hare from which the following data fields were used:

- Actual Landing Time
- Actual Departure Time
- Aircraft Type
- Airport Code
- Carrier Group
- Flight Number
- Registration
- Runway Assigned
- Tail Number
- Terminal Assigned
- Carrier
- Call Sign
- Gate Assigned
- Origination Airport
- Destination Airport
- Taxiway Used to Enter/Exit Runway
- Total Taxi Time
- Weight Class

The Aerobahn data aided the determination of intersection departures on Runway 10L/28R. The Aerobahn and ANMS data sources were merged to create a single Existing Condition flight operations database for O'Hare.

Flights in the ANMS/Aerobahn database were assigned to AEDT aircraft IDs and categorized to one of the three aircraft body categories:

- Widebody Jet
- Other Jet
- Non-jet

The AEDT equipment ID assignments were selected using a combination of sources. If the AEDT database had only one equipment ID for a given airframe or aircraft designator, then that AEDT equipment ID was selected. If the AEDT database had multiple entries for a given aircraft designator, then additional information (such as airline and aircraft registration number) was used with other data sources to craft a reasonable AEDT equipment ID. The other data sources, including publicly available data from the FAA's aircraft registry, provided information regarding the manufacturer and types of engines to narrow the selection of potential AEDT equipment IDs. If the data sources still indicated multiple options in the AEDT database, an entry that appeared to be complete for both noise and air quality analysis purposes was selected.

The Non-jet body category only includes fixed-wing aircraft. Rotary-wing aircraft, such as helicopters, were excluded from this EA. The justification for not modeling helicopters was that helicopters are not part of the EA's Proposed Action.

Table F-4 shows the tower count categories and body categories assigned to the AEDT aircraft IDs. Some AEDT aircraft IDs served more than one tower count category; for example, the AEDT aircraft ID LEAR35 served air taxi , general aviation, and military tower count categories. Each AEDT type was also assigned a weight category for air quality modeling.

TABLE F-4
ASSIGNMENT OF TOWER COUNT, BODY, AND WEIGHT CATEGORIES TO AEDT AIRCRAFT ID

AEDT Aircraft ID	Description	Tower Category Assigned	Body Category	Weight Category
74720B	Boeing 747-200 / JT9D-7Q	AC	WBJ	Heavy
747400	Boeing 747-400 / PW4056	AC	WBJ	Heavy
7478	Boeing 747-8F / GEnx-2B67	AC	WBJ	Heavy
767300	Boeing 767-300 / PW4060	AC	WBJ	Heavy
767400	Boeing 767-400ER / CF6-80C2B(F)	AC	WBJ	Heavy
767CF6	Boeing 767-200 / CF6-80A	AC	WBJ	Heavy
767JT9	Boeing 767-200 / JT9D-7R4D	AC	WBJ	Heavy
777200	Boeing 777-200ER / GE90-90B	AC	WBJ	Heavy
777300	Boeing 777-300 / TRENT892	AC	WBJ	Heavy
7773ER	Boeing 777-300ER / GE90-115B-EIS	AC	WBJ	Heavy
7878R	Boeing 787-8 / T1000-C/01 Family Plan Cert	AC	WBJ	Heavy
A300-622R	Airbus A300-622R / PW4168	AC	WBJ	Heavy
A300B4-203	Airbus A300B4-200 / CF6-50C2	AC	WBJ	Heavy
A330-301	Airbus A330-301 / GE CF6-80 E1A2	AC	WBJ	Heavy
A330-343	Airbus A330-343 / RR TRENT 772B	AC	WBJ	Heavy
A340-211	Airbus A340-211 / CFM56-5C2	AC	WBJ	Heavy
A340-642	Airbus A340-642 / Trent 556	AC	WBJ	Heavy
A380-841	Airbus A380-841 / RR Trent 970	AC	WBJ	Heavy
A380-861	Airbus A380-861 / EA GP7270	AC	WBJ	Heavy
DC1010	McDonnell Douglas DC10-10 / CF6-6D	AC	WBJ	Heavy
DC1030	McDonnell Douglas DC10-30 / CF6-50C2	AC	WBJ	Heavy
MD11GE	McDonnell Douglas MD-11 / CF6-80C2D1F	AC	WBJ	Heavy
MD11PW	McDonnell Douglas MD-11 / PW 4460	AC	WBJ	Heavy
717200	Boeing 717-200 / BR 715	AC	OJ	Large
737300	Boeing 737-300 / CFM56-3B-1	AC	OJ	Large
7373B2	Boeing 737-300 / CFM56-3B-2	AC	OJ	Large
737400	Boeing 737-400 / CFM56-3C-1	AC	OJ	Large
737500	Boeing 737-500 / CFM56-3C-1	AC	OJ	Large
737700	Boeing 737-700 / CFM56-7B24	AC	OJ	Large
U_737800	Boeing 737-800 / CFM56-7B26	AC	OJ	Large
7378MAX	Boeing 737-800 MAX / CFMLeap1B27	AC	OJ	Large
737N17	B737-200 / JT8D-17 Nordam B737 LGW Hushkit	AC	OJ	Large
757300	Boeing 757-300 / RB211-535E4B	AC	OJ	Large

AEDT Aircraft ID	Description	Tower Category Assigned	Body Category	Weight Category
757PW	Boeing 757-200 / PW2037	AC	OJ	Large
757RR	Boeing 757-200 / RB211-535E4	AC	OJ	Large
A319-131	Airbus A319-131 / IAE V2522-A5	AC	OJ	Large
A320-211	Airbus A320-211 / CFM56-5A1	AC	OJ	Large
A320-232	Airbus A320-232 / V2527-A5	AC	OJ	Large
A321-232	Airbus A321-232 / V2530-A5	AC	OJ	Large
CRJ9-ER	Challenger CL-600-2D15/CL-600-2D24 / CF34-8C5	AC	OJ	Large
CRJ9-LR	Challenger CL-600-2D15/CL-600-2D24 / CF34-8C5	AC	OJ	Large
EMB170	Embraer ERJ170-100	AC	OJ	Large
EMB175	Embraer ERJ170-200	AC	OJ	Large
EMB190	Embraer ERJ190-100	AC	OJ	Large
MD81	McDonnell Douglas MD-81 / JT8D-217	AC	OJ	Large
MD82	McDonnell Douglas MD-82 / JT8D-217A	AC	OJ	Large
MD83	McDonnell Douglas MD-83 / JT8D-219	AC	OJ	Large
MD9025	McDonnell Douglas MD-90 / V2525-D5	AC	OJ	Large
MD9028	McDonnell Douglas MD-90 / V2528-D5	AC	OJ	Large
BD-700-1A10	Bombardier BD-700-1A10/BR700-710A2-20	AT	OJ	Large
BD-700-1A11	Bombardier BD-700-1A11/BR700-710A2-20	AT	OJ	Large
CIT3	Cessna CIT 3 / TFE731-3-100S	AT, GA	OJ	Small
CL600	Challenger CL600 / ALF502L	AT, GA	OJ	Large
CL601	Challenger CL601 / CF34-3A	AT, GA	OJ	Large
CNA500	Cessna CIT 2 / JT15D-4	AT, GA	OJ	Small
CNA510	Cessna Mustang Model 510 / PW615F	AT, GA	OJ	Small
CNA525C	Cessna Citation CJ4 525C / FJ44-4A	AT, GA	OJ	Small
CNA55B	Cessna 550 Citation Bravo / PW530A	AT, GA	OJ	Large
CNA560E	Cessna Citation Encore 560 / PW535A	AT, GA	OJ	Small
CNA560U	Cessna Citation Ultra 560 / JT15D-5D	AT, GA	OJ	Small
CNA560XL	Cessna Citation Excel 560 / PW545A	AT, GA	OJ	Small
CNA680	Cessna Citation Sovereign 680 / PW306C	AT, GA	OJ	Small
CNA750	Cessna Citation X / Rolls Royce Allison AE3007C	AT, GA	OJ	Large
COMJET	1985 Business Jet	AT, GA	OJ	Large
ECLIPSE500	Eclipse 500 / PW610F	AT	OJ	Small
EMB145	Embraer 145 ER / Allison AE3007	AT	OJ	Large
EMB14L	Embraer 145 LR / Allison AE3007A1	AT	OJ	Large
FAL20	Falcon 20 / CF700-2D-2	AT, GA	OJ	Small
GIIB	Gulfstream GIIB / GIII - SPEY 511-8	AT	OJ	Large
GIV	Gulfstream GIV-SP / TAY 611-8	AT, GA	OJ	Large

AEDT Aircraft ID	Description	Tower Category Assigned	Body Category	Weight Category
GV	Gulfstream GV / BR 710	AT, GA	OJ	Large
IA1125	Astra 1125 / TFE731-3A	AT, GA	OJ	Small
LEAR35	Lear 36/TFE731-2	AT, GA, ML	OJ	Small
MU3001	Mitsubishi MU300-10 / JT15D-5	AT, GA	OJ	Small
DHC830	Dash 8-300 / PW123	AC	NJ	Large
1900D	Beech 1900D / PT6A67	AT	NJ	Small
BEC58P	Baron 58P / TS10-520-L	AT, GA	NJ	Small
CNA182	Cessna 182H / Continental O-470-R	AT, GA	NJ	Small
CNA206	Cessna 206H / Lycoming IO-540-AC	AT, GA	NJ	Small
CNA208	Cessna 208 / PT6A-114	AT, GA	NJ	Small
CNA441	Conquest II / TPE331-8	AT, GA	NJ	Small
COMSEP	1985 Composite Single Engine Propeller	AT, GA	NJ	Small
DHC6	Dash 6 / PT6A-27	AT, GA	NJ	Small
DHC8	Dash 8-100 / PW121	AT	NJ	Large
DO328	Dornier 328-100 / PW119C	AT	NJ	Small
EMB120	Embraer 120 ER / Pratt & Whitney PW118	AT	NJ	Small
GASEPF	1985 Single Engine Fixed-pitch Propeller	AT, GA	NJ	Small
GASEPV	1985 Single Engine Variable-pitch Propeller	AT, GA	NJ	Small
PA28	Piper Warrior PA-28-161 / O-320-D3G	AT, GA	NJ	Small
CNA172	Cessna 172R / Lycoming IO-360-L2A	GA	NJ	Small
C130	Lockheed Martin C-130H / T56-A-15	ML	NJ	Large
Notes:	AC = Air Carrier AT = Air Taxi	WBJ = Widebody Jet GA = General Aviation	OJ = Other Jet ML = Military	NJ = Non-jet
Source: HMMH analysis, 2021.				

Flights from the ANMS/Aerobahn database are summed by FAA tower county category, excluding helicopter operations and any records having contradictory combinations of aircraft ID and airline.[11] Because the counts of operations derived from the ANMS/Aerobahn databases did not exactly agree with the FAA's tower counts, the ANMS/Aerobahn counts were scaled up by tower category to match the FAA tower counts. The resulting totals are shown in **Table F-5**. While air carrier and air taxi operations required a scale factor very close to 1, GA operations required a multiplier of more than 1.8 (nearly doubling those operations) and military operations required a scale factor of approximately 1.24 to match the tower counts.

[11] A total of 1,728 operations from the ANMS/Aerobahn database were excluded.

TABLE F-5
SCALING FACTORS APPLIED TO THE EXISTING CONDITION OPERATIONS DATA

Tower Category	ANMS/Aerobahn Operations Counts	Scale Factor	FAA Tower Count
Air Carrier	643,939	1.013484	652,622
Air Taxi	243,901	1.006913	245,587
GA	2,968	1.841307	5,465
Military	59	1.237288	73
Total	**890,867**	**n/a**	**903,747**

Source: HMMH analysis, 2021

Summing the scaled operations database by body category and daytime/nighttime periods yields the operations for the Existing Condition as shown in **Table F-6**. Approximately 92 percent of the total operations were conducted by Other Jet operations, while Widebody Jet operations accounted for approximately eight percent of total operations. Non-jet operations were less than one percent of total operations. Within one operation (a rounding error), overall arrival and departure operations equal the FAA tower count total. Overall, nighttime operations at O'Hare comprised 11 percent of the total operations in the Existing Condition.

TABLE F-6
ANNUAL FLIGHT OPERATIONS FOR THE EXISTING CONDITION

	Arrivals			Departures			Total			
Body Category	**Day**	**Night**	**Total**	**Day**	**Night**	**Total**	**Day**	**Night**	**Total**	**Total Percent**
Widebody Jet	27,678	6,232	33,910	25,594	8,316	33,910	53,272	14,548	67,820	7.5%
Other Jet	361,169	52,906	414,075	379,774	34,301	414,075	740,943	87,207	828,150	91.6%
Non-jet	3,588	301	3,889	3,777	112	3,889	7,365	413	7,778	0.9%
Total	**392,435**	**59,439**	**451,874**	**409,145**	**42,729**	**451,874**	**801,580**	**102,168**	**903,748**	**100%**
Percentage	43%	7%	50%	45%	5%	50%	89%	11%	100%	

Source: HMMH analysis, 2021.

The 903,748 annual operations translate to 2,476 operations on the average annual day. **Table F-7** details the Existing Condition 2,476 AAD flight operations by AEDT type.

TABLE F-7
AAD FLIGHT OPERATIONS BY AIRCRAFT TYPE FOR THE EXISTING CONDITION

Aircraft ID (AEDT)	Arrivals			Departures			Total
	Day	Night	Total	Day	Night	Total	
Widebody Jet							
74720B	0.01	-	0.01	-	0.01	0.01	0.02
747400	8.73	3.33	12.06	8.03	4.03	12.06	24.12
7478	5.19	1.76	6.95	3.70	3.25	6.95	13.90
767300	8.97	1.82	10.79	8.08	2.71	10.79	21.58
767400	0.05	0.03	0.08	0.05	0.03	0.08	0.16
767CF6	0.12	0.01	0.13	0.13	0.01	0.14	0.27
767JT9	-	0.02	0.02	0.01	0.01	0.02	0.04
777200	10.93	3.12	14.05	12.85	1.20	14.05	28.10
777300	4.00	2.08	6.08	3.91	2.17	6.08	12.16
7773ER	10.65	0.93	11.58	10.27	1.30	11.57	23.15
7878R	14.53	0.36	14.89	11.98	2.90	14.88	29.77
A300-622R	0.45	1.05	1.50	0.45	1.06	1.51	3.01
A300B4-203	0.13	-	0.13	0.12	0.01	0.13	0.26
A330-301	4.14	0.02	4.16	4.05	0.10	4.15	8.31
A330-343	2.86	0.01	2.87	2.31	0.56	2.87	5.74
A340-211	0.89	-	0.89	0.05	0.84	0.89	1.78
A340-642	0.71	-	0.71	0.57	0.14	0.71	1.42
A380-861	0.48	-	0.48	0.32	0.16	0.48	0.96
DC1010	0.98	1.38	2.36	1.47	0.89	2.36	4.72
DC1030	0.08	0.07	0.15	0.11	0.04	0.15	0.30
MD11GE	1.57	0.65	2.22	1.27	0.95	2.22	4.44
MD11PW	0.38	0.43	0.81	0.39	0.41	0.80	1.61
Widebody Jet Subtotals	**75.85**	**17.07**	**92.92**	**70.12**	**22.78**	**92.90**	**185.82**
Other Jet							
717200	9.78	0.35	10.13	9.86	0.28	10.14	20.27
737300	0.17	0.06	0.23	0.19	0.04	0.23	0.46
7373B2 (1)	-	-	-	-	-	-	-
737400	0.11	0.09	0.20	0.16	0.04	0.20	0.40
737500	0.01	-	0.01	0.01	-	0.01	0.02
737700	16.25	1.95	18.20	16.92	1.27	18.19	36.39
U_737800	208.57	36.21	244.78	222.02	22.75	244.77	489.55
7378MAX	0.19	0.01	0.20	0.19	0.01	0.20	0.40

Aircraft ID (AEDT)	Arrivals			Departures			Total
	Day	Night	Total	Day	Night	Total	Total
737N17	0.01	-	0.01	0.01	-	0.01	0.02
757300	9.50	3.98	13.48	11.67	1.81	13.48	26.96
757PW	0.27	0.67	0.94	0.30	0.63	0.93	1.87
757RR	4.49	1.02	5.51	4.37	1.14	5.51	11.02
A319-131	50.50	7.43	57.93	53.35	4.58	57.93	115.86
A320-211	5.93	3.57	9.50	6.83	2.68	9.51	19.01
A320-232	55.23	10.58	65.81	58.45	7.36	65.81	131.62
A321-232	35.58	14.22	49.80	41.14	8.66	49.80	99.60
CRJ9-ER	141.38	16.50	157.88	146.98	10.90	157.88	315.76
CRJ9-LR	0.23	0.02	0.25	0.25	0.01	0.26	0.51
EMB170	20.39	2.38	22.77	21.44	1.34	22.78	45.55
EMB175	107.71	10.03	117.74	109.01	8.73	117.74	235.48
EMB190	11.73	0.44	12.17	10.99	1.18	12.17	24.34
MD81 (1)	-	-	-	-	-	-	-
MD82	0.88	0.13	1.01	0.89	0.11	1.00	2.01
MD83	8.59	1.33	9.92	8.42	1.50	9.92	19.84
MD9025	1.71	0.03	1.74	1.69	0.05	1.74	3.48
MD9028	0.88	0.01	0.89	0.86	0.03	0.89	1.78
BD-700-1A10	0.15	0.01	0.16	0.14	0.01	0.15	0.31
BD-700-1A11	0.06	0.01	0.07	0.06	-	0.06	0.13
CIT3	0.06	0.01	0.07	0.07	-	0.07	0.14
CL600	169.72	23.51	193.23	182.69	10.55	193.24	386.47
CL601	1.47	0.13	1.60	1.50	0.10	1.60	3.20
CNA500	0.02	-	0.02	0.02	-	0.02	0.04
CNA510	0.17	0.01	0.18	0.17	0.01	0.18	0.36
CNA525C	0.92	0.07	0.99	0.94	0.05	0.99	1.98
CNA55B	0.81	0.09	0.90	0.83	0.08	0.91	1.81
CNA560E	0.03	-	0.03	0.03	-	0.03	0.06
CNA560U	0.69	0.03	0.72	0.69	0.03	0.72	1.44
CNA560XL	0.75	0.05	0.80	0.76	0.04	0.80	1.60
CNA680	0.86	0.05	0.91	0.85	0.06	0.91	1.82
CNA750	1.90	0.14	2.04	1.94	0.11	2.05	4.09
COMJET	0.05	-	0.05	0.05	-	0.05	0.10
ECLIPSE500 (1)	-	-	-	-	-	-	-
EMB145	24.86	2.35	27.21	25.46	1.75	27.21	54.42
EMB14L	93.15	7.19	100.34	94.48	5.86	100.34	200.68

Aircraft ID (AEDT)	Arrivals			Departures			Total
	Day	Night	Total	Day	Night	Total	Total
FAL20	0.01	-	0.01	0.01	-	0.01	0.02
GIIB	0.01	-	0.01	0.01	-	0.01	0.02
GIV	0.35	0.03	0.38	0.35	0.02	0.37	0.75
GV	0.27	0.02	0.29	0.27	0.01	0.28	0.57
IA1125	0.38	0.03	0.41	0.40	0.02	0.42	0.83
LEAR35	2.17	0.18	2.35	2.20	0.14	2.34	4.69
MU3001	0.56	0.04	0.60	0.57	0.03	0.60	1.20
Other Jet Subtotals	**989.51**	**144.96**	**1,134.47**	**1,040.49**	**93.97**	**1,134.46**	**2,268.93**
Non-jet							
DHC830	0.01	-	0.01	-	0.01	0.01	0.02
1900D	0.01	-	0.01	0.01	-	0.01	0.02
BEC58P	3.41	0.06	3.47	3.43	0.03	3.46	6.93
CNA182	0.01	-	0.01	0.01	0.01	0.02	0.03
CNA206	0.04	-	0.04	0.04	-	0.04	0.08
CNA208	5.31	0.62	5.93	5.82	0.11	5.93	11.86
CNA441	0.11	0.01	0.12	0.12	0.01	0.13	0.25
COMSEP	0.05	-	0.05	0.04	0.01	0.05	0.10
DHC6	0.67	0.08	0.75	0.67	0.08	0.75	1.50
DHC8	0.01	-	0.01	0.01	-	0.01	0.02
DO328	0.01	-	0.01	0.01	-	0.01	0.02
EMB120 (1)	-	-	-	-	-	-	-
GASEPF	0.02	-	0.02	0.01	-	0.01	0.03
GASEPV	0.14	0.03	0.17	0.13	0.03	0.16	0.33
PA28	0.01	-	0.01	0.01	-	0.01	0.02
CNA172	0.01	0.02	0.03	0.02	0.01	0.03	0.06
C130	0.01	-	0.01	0.01	-	0.01	0.02
Non-jet Subtotals	**9.83**	**0.82**	**10.65**	**10.34**	**0.30**	**10.64**	**21.29**
Grand Totals	**1,075.19**	**162.85**	**1,238.04**	**1,120.95**	**117.05**	**1,238.00**	**2,476.04**

Note:
1) Fewer than 0.005 AAD daytime or nighttime departures or arrivals.

Source: HMMH analysis, 2021

F.3.5 Runway Use

Tables F-8 through **F-10** show the runway use percentages for arrivals, departures, and total operations, respectively, developed from the scaled ANMS/Aerobahn data. The far right columns in the tables show the overall runway use percentages in terms of AAD operations and Equivalent Daily Operations (EDO).[12]

[12] EDO is daytime use plus 10 times nighttime use; it is used for comparing net effects of the change in runway use on DNL.

To address the use of intersection departure operations for Runway 10L/28R, the Aerobahn database was used. The Aerobahn database provided the rate of intersection departures on Runway 10L/28R for each aircraft category. For example, if 50 percent of the operations by A320 aircraft used the intersection departure in the Aerobahn data, then 500 of 1,000 A320 annual departures were assigned to the intersection departure.

Two "flow" states are considered for O'Hare: east flow—when winds are from the east—and west flow—when winds are from the west. Overall, in terms of AAD, as shown in **Table F-10**, 57 percent of O'Hare's operations for the Existing Condition were in west flow. At 18 percent of total operations, Runway 28R was the most used runway at O'Hare, followed by Runways 9R and 27L, each at approximately 12 percent of total AAD operations. During the nighttime hours, Runway 28R was the most used runway (nearly 20 percent), followed by Runway 27L with approximately 17 percent of nighttime AAD operations.

TABLE F-8
RUNWAY USE PERCENTAGES FOR ARRIVALS FOR THE EXISTING CONDITION

		Daytime (see notes 1 and 2)				Nighttime (see notes 1 and 2)				Overall (see notes 1, 2, and 3)	
Flow	Runway ID (d)	WBJ	OJ	NJ	Overall	WBJ	OJ	NJ	Overall	AAD	EDO
E	9L	0.2	17.4	20.1	16.2	0.1	6.9	26.3	6.2	14.9	10.2
E	9R	0.4	0.8	1.4	0.7	0.1	1.5	2.7	1.3	0.8	1.1
E	10L	0.8	0.1	0.1	0.1	12.6	7.0	1.9	7.5	1.1	4.6
E	10C	42.4	16.7	3.9	18.4	25.4	23.1	7.9	23.2	19.0	21.3
E	10R	0.3	8.2	16.8	7.7	0.1	1.8	-	1.6	6.9	4.0
E	4L	-	-	-	-	-	-	-	-	-	-
E	4R	0.1	<0.05	0.1	<0.05	0.6	0.2	-	0.2	0.1	0.2
E	15	-	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	<0.05
W	27R	0.1	18.4	26.6	17.2	-	7.2	40.3	6.7	15.8	10.8
W	27L	2.1	24.9	3.5	23.1	3.7	31.4	16.0	28.4	23.8	26.3
W	28R	1.2	0.1	0.3	0.2	22.0	3.9	1.5	5.8	0.9	3.5
W	28C	52.3	13.5	27.1	16.3	35.1	16.8	3.0	18.6	16.6	17.7
W	28L	-	-	-	-	-	-	-	-	-	-
W	22L	0.1	<0.05	-	<0.05	0.3	<0.05	-	0.1	<0.05	<0.05
W	22R	-	<0.05	<0.05	<0.05	0.2	0.3	0.3	0.3	0.1	0.2
W	33	-	-	-	-	-	-	-	-	-	-

Notes:
1) Each column sums vertically to 100±0.2%
2) Daytime is defined as 7:00:00 a.m. to 9:59:59 p.m.; nighttime is defined as 10:00:00 p.m. to 6:59:59 a.m. (local time).
3) AAD pertains to annual average daily flight operations; EDO pertains to equivalent daily flight operations, i.e., daytime plus 10 times nighttime.

WBJ = Widebody Jet; OJ = Other Jet; NJ = Non-jet

Source: HMMH analysis, 2020

TABLE F-9
RUNWAY USE PERCENTAGES FOR DEPARTURES FOR THE EXISTING CONDITION

		Daytime (see notes 1 and 2)				Nighttime (see notes 1 and 2)				Overall (see notes 1, 2, and 3)	
Flow	**Runway ID (d)**	**WBJ**	**OJ**	**NJ**	**Overall**	**WBJ**	**OJ**	**NJ**	**Overall**	**AAD**	**EDO**
E	9L	-	<0.05	-	<0.05	-	-	-	-	<0.05	<0.05
E	9R	8.8	23.8	27.8	22.9	2.6	24.2	29.9	20.0	22.6	21.4
E	10L	9.0	0.8	0.5	1.3	23.1	2.1	-	6.1	1.7	3.8
E	10LX	27.1	18.1	14.7	18.6	12.7	11.1	9.7	11.4	17.9	14.9
E	10C	0.4	<0.05	-	<0.05	6.1	0.7	3.1	1.8	0.2	0.9
E	10R	<0.05	<0.05	-	<0.05	-	-	-	-	<0.05	<0.05
E	4L	<0.05	0.1	0.1	0.1	0.4	2.8	0.9	2.4	0.3	1.3
E	4R	<0.05	<0.05	-	<0.05	0.2	<0.05	-	0.1	<0.05	<0.05
E	15	-	-	-	-	<0.05	-	-	<0.05	<0.05	<0.05
W	27R	-	-	-	-	-	-	1.8	<0.05	<0.05	<0.05
W	27L	<0.05	0.2	0.4	0.2	0.4	0.2	14.8	0.3	0.2	0.2
W	28R	11.3	2.5	3.3	3.1	29.5	8.5	19.5	12.6	4.0	7.9
W	28RX	39.4	31.6	42.3	32.2	12.0	30.0	9.7	26.4	31.7	29.2
W	28C	0.4	0.1	0.3	0.1	8.3	2.7	2.7	3.8	0.5	2.0
W	28L	-	<0.05	-	<0.05	-	-	-	-	<0.05	<0.05
W	22L	3.5	22.8	10.7	21.5	4.2	17.3	8.0	14.7	20.8	18.0
W	22R	-	<0.05	-	<0.05	0.1	-	-	<0.05	<0.05	<0.05
W	33	<0.05	0.1	<0.05	0.1	0.4	0.4	-	0.4	0.1	0.3

Notes:
a) Each column sums vertically to 100±0.1%
b) Daytime is defined as 7:00:00 a.m. to 9:59:59 p.m.; nighttime is defined as 10:00:00 p.m. to 6:59:59 a.m. (local time).
c) AAD pertains to annual average daily flight operations; EDO pertains to equivalent daily flight operations, i.e., daytime plus 10 times nighttime.
d) The "X" notation means intersection departures from that runway.
WBJ = Widebody Jet; OJ = Other Jet; NJ = Non-jet

Source: HMMH analysis, 2020

TABLE F-10
OVERALL RUNWAY USE PERCENTAGES FOR THE EXISTING CONDITION

		Daytime (see notes 1 and 2)				Nighttime (see notes 1 and 2)				Overall (see notes 1, 2, and 3)	
Flow	**Runway ID**	**WBJ**	**OJ**	**NJ**	**Overall**	**WBJ**	**OJ**	**NJ**	**Overall**	**AAD**	**EDO**
E	9L	0.1	8.5	9.8	7.9	<0.05	4.2	19.2	3.6	7.5	5.5
E	9R	4.4	12.5	14.9	12.0	1.5	10.4	10.0	9.1	11.7	10.4
E	10L[4]	17.8	9.7	7.8	10.2	25.8	9.4	4.0	11.7	10.4	11.1
E	10C	22.2	8.1	1.9	9.0	14.3	14.3	6.6	14.3	9.6	12.0

		Daytime (see notes 1 and 2)				Nighttime (see notes 1 and 2)				Overall (see notes 1, 2, and 3)	
Flow	**Runway ID**	**WBJ**	**OJ**	**NJ**	**Overall**	**WBJ**	**OJ**	**NJ**	**Overall**	**AAD**	**EDO**
E	10R	0.2	4.0	8.2	3.8	<0.05	1.1	-	0.9	3.4	2.2
E	4L	<0.05	0.1	<0.05	0.1	0.3	1.1	0.2	1.0	0.2	0.6
E	4R	<0.05	<0.05	<0.05	<0.05	0.3	0.1	-	0.2	<0.05	0.1
E	15	-	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	<0.05
W	27R	<0.05	9.0	12.9	8.4	-	4.4	29.9	3.9	7.9	5.9
W	27L	1.1	12.2	1.9	11.4	1.8	19.1	15.7	16.7	12.0	14.3
W	28R[4]	25.0	17.5	23.5	18.1	33.1	17.5	9.0	19.7	18.3	19.0
W	28C	27.4	6.6	13.3	8.1	19.8	11.2	2.9	12.4	8.5	10.5
W	28L	-	<0.05	-	<0.05	-	-	-	-	<0.05	<0.05
W	22L	1.7	11.7	5.5	11.0	2.5	6.8	2.1	6.2	10.4	8.3
W	22R	-	<0.05	<0.05	<0.05	0.1	0.2	0.2	0.2	<0.05	0.1
W	33	<0.05	<0.05	<0.05	<0.05	0.2	0.2	-	0.2	<0.05	0.1

Notes:
1) Each column sums vertically to 100±0.2%
2) Daytime is defined as 7:00:00 a.m. to 9:59:59 p.m.; nighttime is defined as 10:00:00 p.m. to 6:59:59 a.m. (local time).
3) AAD pertains to annual average daily flight operations; EDO pertains to equivalent daily flight operations, i.e., daytime plus 10 times nighttime.
4) The departure operations indicated for runways "10LX" and "28RX" are included in this table in the overall usage of Runways 10L and 28R, respectively.
WBJ = Widebody Jet; OJ = Other Jet; NJ = Non-jet

Source: HMMH analysis, 2020

F.3.6 Modeled Flight Tracks and Operational Assignments

The CDA provided approximately one week's worth of O'Hare radar flight track data from the ANMS for each month of 2018. **Table F-11** lists the dates of the 87 days of data. In addition to the three-dimensional position of the aircraft (latitude, longitude, altitude), the radar flight tracking data provides the following information:

- Time of day (local)
- Type of operation (arrival or departure)
- Aircraft type ID (four-character alphanumeric identifier)
- Airline
- Flight Number

TABLE F-11
DAYS OF RADAR DATA PROVIDED FOR THE EXISTING CONDITION

Month of 2018	Date Range	Number of Data Days
January	1/14 (Sunday) – 1/20 (Saturday)	7
February	2/11 (Sunday) – 2/17 (Saturday)	7
March	3/11 (Sunday) – 3/17 (Saturday)	7
April	4/15 (Sunday) – 4/21 (Saturday)	7
May	5/13 (Sunday) – 5/19 (Saturday), and 5/30 (Wednesday)	8
June	6/17 (Sunday) – 6/23 (Saturday)	7
July	7/1 (Sunday) and 7/15 (Sunday) – 7/21 (Saturday)	8
August	8/12 (Sunday) – 8/18 (Saturday)	7
September	9/1 (Saturday) and 9/16 (Sunday) – 9/22 (Saturday)	8
October	10/14 (Sunday) – 10/20 (Saturday)	7
November	11/11 (Sunday) – 11/17 (Saturday)	7
December	12/16 (Sunday) – 12/22 (Saturday)	7
	Total:	**87**

Source: CDA, 2019

The four-letter alphanumeric aircraft types in the radar flight tracking data were each assigned an aircraft body category. The EA team reviewed the radar flight track data, tagging all usable and applicable flight data records. Radar track data was "bundled" by mode, procedure, and runway. Using these bundles, the EA team developed the Existing Condition modeled flight tracks and determined their utilization for each aircraft body category. Modeled flight tracks consist of a backbone flight track—describing the mean (or average) flight track—and sub-tracks depicting the dispersion or spread of flights from the backbone track.

Table F-12 summarizes the number of tracks for each aircraft body category. Due to the complex nature of the airspace at O'Hare, 1,545 unique backbone tracks were developed, each having up to six sub-tracks, to represent the 903,747 annual flight operations at O'Hare in 2018. Of these track bundles, 928 were repeated for the purpose of separately modeling with ACC. Altitude data of the radar tracks in each bundle were used to determine the average altitudes. **Section F.3.7** contains more information regarding ACC.

Distribution of operations by flight track was derived directly from the radar data bundling. **Attachment F-3** contains the flight track use percentages and modeled flight track depictions for arrivals and departures by runway end for each flow.

As shown in **Attachment F-3,** arrival tracks for Runways 10R and 28L have final approaches that are offset from the extended runway centerlines.[13] The downwind legs of arrival tracks south of O'Hare to runways in east flow are not parallel to their final approach but are parallel to and more coincident with Runway 10R's downwind legs.

[13] For the Existing Condition, approach offsets to Runway 10R and 28L—which were temporarily approved as part of the 2015 Re-Evaluation—were still in effect during the time period covered by the Existing Condition.

TABLE F-12
COUNTS OF FLIGHT TRACKS BY TYPE OF OPERATION FOR THE EXISTING CONDITION

Track Set	Aircraft Category	Traffic Flow	Arrival Track Bundles (see note 1)			Departure Track Bundles (see note 1)			Total Track Bundles (see note 1)		
			Day	Night	Total	Day	Night	Total	Day	Night	Total
Regular Tracks (see note 1)	WBJ	East	87	71	158	48	66	114	135	137	272
		West	63	57	120	64	70	134	127	127	254
	OJ	East	89	73	162	75	103	178	164	176	340
		West	69	72	141	100	103	203	169	175	344
	NJ	East	29	36	65	18	77	95	47	113	160
		West	28	34	62	60	53	113	88	87	175
	Subtotals by Traffic Flow										
	East		205	180	385	141	246	387	346	426	772
	West		160	163	323	224	226	450	384	389	773
	Subtotals by Aircraft Category										
	WBJ		150	128	278	112	136	248	262	264	526
	OJ		158	145	303	175	206	381	333	351	684
	NJ		57	70	127	78	130	208	135	200	335
	Total Regular Tracks		**365**	**343**	**708**	**365**	**472**	**837**	**730**	**815**	**1,545**
Flight Tracks duplicated for Altitude Control Code Modeling (see note 2)	WBJ		118	120	238	36	53	89	154	173	327
	OJ		122	127	249	65	85	150	187	212	399
	NJ		30	79	109	41	52	93	71	131	202
	Total Duplicate Tracks		**270**	**326**	**596**	**142**	**190**	**332**	**412**	**516**	**928**
Total Flight Track Bundles	WBJ		268	248	516	148	189	337	416	437	853
	OJ		280	272	552	240	291	531	520	563	1,083
	NJ		87	149	236	119	182	301	206	331	537
	Grand Total		**635**	**669**	**1,304**	**507**	**662**	**1,169**	**1,142**	**1,331**	**2,473**

Notes:
1) Numbers indicate 'backbone' tracks only; each backbone track may have up to six associated sub-tracks to model dispersion around the backbone; "regular" flight tracks section excludes duplicate tracks for altitude control code modeling.
2) Numbers indicate duplicated tracks with ACC added to account for flight profile level off or hold downs.
WBJ = Widebody Jet; OJ = Other Jet; NJ = Non-jet

Source: HMMH analysis, 2020

F.3.7 Flight Profiles

AEDT has standard climb and descent procedures or flight profiles[14] for fixed-wing aircraft departure, arrival, and circuit-type (or touch and go) operations. AEDT also has standard profiles for rotary-wing takeoffs and landings. AEDT standard profiles were used for all aircraft types where available.

A typical AEDT standard departure procedure consists of the following procedure statements: 1) takeoff; 2) climb to 1,000 feet above field elevation (AFE); 3) accelerate and retract flaps; 4) climb to 3,000 feet AFE; 5) accelerate to 250 knots; and 6) climb to 10,000 feet AFE. The standard procedures in AEDT can be refined, without FAA approval, by including ACCs to represent target altitudes at various points along the flight track that would not normally be present in the standard climb/descent procedure. [15]

A review of flight track data from the ANMS indicated that some aircraft arriving to and departing from O'Hare commonly fly procedures not represented by standard AEDT profiles. More accurate modeling of those flights required AEDT's ACC methodology to adjust the standard profiles where necessary along the trajectory to emulate the actual flight profiles seen in the flight track data. Additional details on how the ACCs were developed are provided in **Attachment F-4**. ACCs were applied to 928 model track bundles (596 arrival track bundles and 332 departure track bundles). The duplicated tracks are indicated by "ACC" appended to the track name in the detailed usage tables in **Attachment F-3.**

To select the proper flight profile, AEDT requires departure operation inputs to identify trip distance or "stage length." **Table F-13** shows AEDT's stage length definitions. The stage length represents the flight distance from takeoff to the destination airport and is a proxy for the aircraft weight based on the assumed amount of fuel that is needed for the flight distance.[16] AEDT groups trip distances into 10 stage length IDs, with upper bounds for the groups ranging from 500 NM to 11,000 NM.

TABLE F-13
AEDT STAGE LENGTH DEFINITIONS

Stage Length ID	Trip Length (NM) (see note 1)	Stage Length ID	Trip Length (NM) (see note 1)
1	0-500	6	3,500-4,500
2	500-1,000	7	4,500-5,500
3	1,000-1,500	8	5,500-6,500
4	1,500-2,500	9	6,500-11,000
5	2,500-3,500	M	Maximum range at maximum takeoff weight

Note:
1) Interpreted as being inclusive of the upper bound of each range

Source: FAA AEDT 2d User Guide, 2017

Although AEDT performance profiles range from stage length 1 through 9, many AEDT aircraft types do not have flight profiles defined for the longest stage lengths; many GA aircraft types have profiles only for

[14] AEDT's standard procedures determine the aircraft's modeled altitude, power setting, and speed along a modeled flight track.

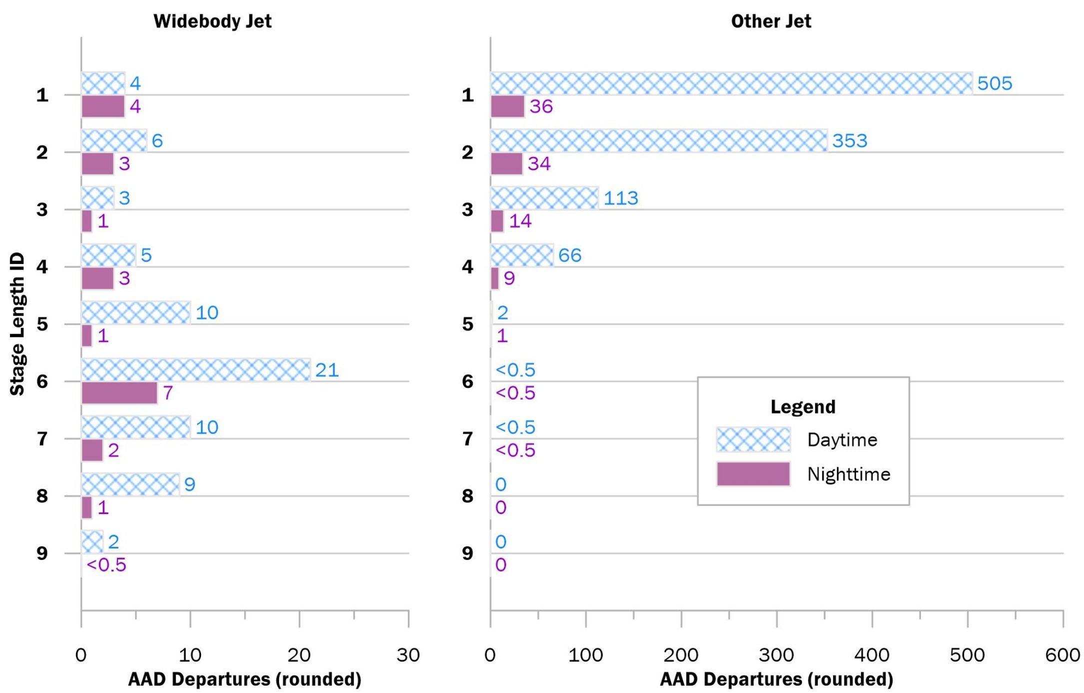
[15] An altitude control defines rules for what an aircraft's altitude should and should not be as it passes over a particular track point. Specifically, it establishes a target altitude that an aircraft should try to reach as it passes over the track point, as well as restricted altitude ranges that the aircraft is not allowed to occupy as it passes over the track point. Note that track points are not required to have altitude controls associated with them, and only one altitude control can be assigned to a given track point.

[16] Fuel load is the largest factor affecting variation in aircraft weight.

stage length 1. If the ANMS data indicated a departure stage length that exceeded that aircraft's available performance profiles, the profile for the greatest stage length available in the AEDT for that aircraft type was used. The modeled stage length distribution for the Existing Condition is depicted in **Figure F-2**, for the Widebody Jet and Other Jet categories.[17] The third category of aircraft, Non-jet, almost always has destinations within stage length 1 and therefore are not shown. For the purposes of the figure, AAD departures were rounded to the nearest departure.

For O'Hare, stage length 4 is key because stage lengths less than 4 (trip lengths of 1,500 NM or less) cover the majority of United States (U.S.) destinations (except the West Coast). Stage lengths of 4 or higher (trip lengths longer than 1,500 NM) imply West Coast and international destinations. As shown in the figure, about 30 percent of daytime or nighttime Widebody Jet flights were stage length 6. Most daytime or nighttime Other Jet flights were stage length 3 or less.

FIGURE F-2
DISTRIBUTION OF MODELED DEPARTURE STAGE LENGTHS FOR THE EXISTING CONDITION



Source: HMMH analysis, 2021

F.3.8 Maintenance Run-Up Operations

The CDA provided information on engine run-ups conducted at O'Hare from their maintenance run-ups notification log[18] for 2018, including airline, aircraft type, location, and start and end time. Run-up durations were computed from the start and end times. Of the log's 1,130 entries/events, 17 events had zero duration, and nine events had durations exceeding nearly seven hours. Excluding these 26 entries, 95 percent of the run-up events had durations of an hour or less, with an average run-up duration of 21.8

[17] The scales of the two sides of the figure are different because there are more than ten times as many Other Jet operations as there are Widebody Jet operations

[18] "ORD_Ground_run-ups_2018.xlsx" were provided by CDA on 6/3/2019.

minutes per event. The nine log entries having durations exceeding nearly seven hours were assumed to be in error and were assigned the average run-up duration of 21.8 minutes, as were the 17 events having zero duration.

For the Existing Condition, AEDT aircraft types were assigned by matching the aircraft types listed in the CDA logs with the modeled flight operations. Run-ups were modeled at 14 distinct locations, shown in **Figure F-6**. Most run-ups were conducted at O'Hare's Ground Run-up Enclosure (GRE). The GRE run-ups in the CDA log were conducted at the former location of the GRE, approximately 1,600 feet southwest from Taxiway C on the Scenic Hold Pad; the GRE has since been relocated approximately 1,100 feet to the northeast on the Scenic Hold Pad. GRE run-ups were modeled at the relocated GRE location (as shown in the exhibit) for the Existing Condition.

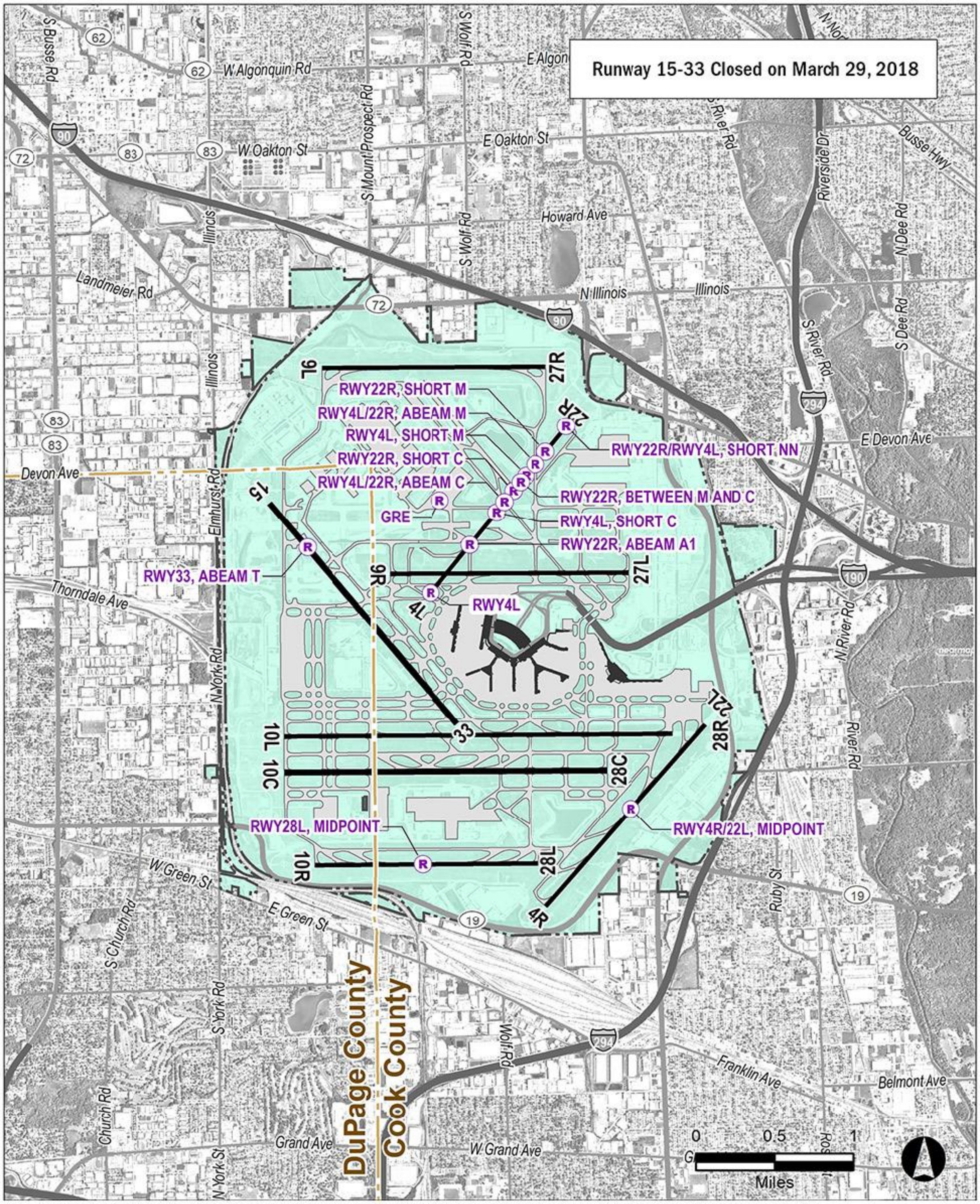
The CDA provided the magnetic headings of the aircraft during run-ups. All run-ups at the GRE were modeled at a heading of 315 degrees (i.e., towards the northwest or the open end of the GRE). Non-GRE run-ups were modeled to conform with the following CDA guidelines: "For jet blast protection purposes, aircraft utilizing an alternate run-up location must be aligned with the runway heading in the direction they are facing. Headings authorized are: 040, 220, 330 degrees respectfully with the assigned runway."[19] For run-ups along Runways 04 and 22, the modeled heading was either 040 or 220 degrees respectively. For run-ups on Runway 33, the modeled heading was 330 degrees. For run-ups on Runway 28L, the modeled heading was either 10 or 280 degrees.

Table F-14 and **Table F-15** summarize the modeled run-up operations for the Existing Condition; **Table F-14** presents the information by run-up location, and **Table F-15** presents totals. More than 90 percent of the modeled run-up operations were by Narrowbody Jets, and 86 percent were at the GRE. Nearly half of the run-up operations were conducted during the DNL nighttime period. The maximum nighttime event duration was 100 minutes; it was conducted by 737700 aircraft at the "Rwy4L, Short C" location. No Non-jet run-ups were conducted.

The CDA does not record power settings; therefore, aircraft run-ups were modeled with power settings of 7, 30, 85, and 100 percent of maximum thrust. Consistent with the air quality modeling, the noise modeling for run-ups equally divided the run-up operations among these four power settings. It was assumed all engines were operating simultaneously at these power settings for each run-up operation for the durations shown in **Table F-14**. All of the modeled aircraft types have two engines, except for three Widebody Jet aircraft which have three engines: DC1010, MD11GE, and MD11PW. Most modeled two-engined jet aircraft types have under-wing mounted engines; the others have rear-mounted engines.

The modeling of run-ups at the GRE location did not include the noise reduction capability of the GRE, as AEDT does not have the ability to model noise barriers. The run-ups in the GRE were modeled with the same four aforementioned power settings as for non-GRE locations, which is consistent with the air quality modeling.

[19] https://www.oharenoise.org/sitemedia/documents/Fly_Quiet_Program/ORD_Ground_Run-Up_Procedures_09142020.pdf, accessed March 16, 2021.



Source: HMMH, Ricondo & Associates, Illinois Geospatial Data Clearinghouse, Cook County Government GIS, DuPage County GIS, Environmental Systems Research Institute

Chicago O'Hare International Airport

Terminal Area Plan and Air Traffic Procedures Environmental Assessment

Modeled Maintenance Run-Up Locations for Existing Condition

Exhibit F-6

TABLE F-14
MODELED MAINTENANCE RUN-UP OPERATIONS FOR THE EXISTING CONDITION

Run-up Location	Heading (degrees magnetic)	AEDT Aircraft ID	Daytime Annual Events	Daytime Duration per Event (minutes)	Nighttime Annual Events	Nighttime Duration per Event (minutes)	Total Annual Events
Ground Run-Up Enclosure	315	767300	2	27.5	-	-	2
		777200	3	28.3	-	-	3
		7878R	2	33.5	-	-	2
		A300-622R	-	-	1	97.0	1
		737700	85	22.8	169	21.2	254
		U_737800	2	14.0	1	21.4	3
		757300	16	30.6	3	36.3	19
		757RR	1	10.0	-	-	1
		A319-131	18	34.7	4	30.0	22
		A320-211	2	12.0	-	-	2
		A320-232	11	23.3	9	18.0	20
		A321-232	3	23.3	3	73.3	6
		CL600	137	24.0	76	16.7	213
		CNA525C	1	14.0	-	-	1
		CNA750	1	60.0	-	-	1
		CRJ9-ER	60	20.6	60	14.8	120
		EMB145	2	25.0	-	-	2
		EMB14L	112	18.2	74	13.0	186
		EMB175	42	22.6	62	15.6	104
		EMB190	1	8.0	-	-	1
		MD83	3	38.3	2	15.0	5
		MD9025	2	105.0	-	-	2
Rwy22R/Rwy4L, Short NN	40	767300	1	45.0	1	21.4	2
		757300	3	23.3	-	-	3
	220	A320-232	1	10.0	-	-	1
		A321-232	1	30.0	-	-	1
		EMB14L	1	5.0	-	-	1
Rwy22R, Short M	40	737700	1	10.0	-	-	1
	220	737700	1	7.0	-	-	1
		757300	1	35.0	-	-	1
		A319-131	1	14.0	-	-	1
		EMB175	1	18.0	-	-	1
Rwy4L/22R, Abeam M	220	737700	1	18.0	-	-	1
Rwy4L, Short M	40	7878R	-	-	2	58.5	2
	220	7878R	1	20.0	-	-	1
		737700	1	20.0	1	12.0	2

Run-up Location	Heading (degrees magnetic)	AEDT Aircraft ID	Daytime		Nighttime		Total Annual Events
			Annual Events	Duration per Event (minutes)	Annual Events	Duration per Event (minutes)	
Rwy4L, Short M	220	757300	1	10.0	1	57.0	2
		CRJ9-ER	1	9.0	-	-	1
Rwy22R, Between M and C	220	7878R	1	13.0	-	-	1
Rwy22R, Short C	220	767300	2	47.5	1	25.0	3
		777200	2	60.0	-	-	2
	40	7878R	1	40.0	-	-	1
		7878R	1	20.0	-	-	1
		737700	-	-	1	20.0	1
		757300	3	55.7	1	13.0	4
		757RR	1	25.0	-	-	1
		CL600	2	17.5	-	-	2
		CRJ9-ER	1	35.0	-	-	1
		EMB14L	1	20.0	-	-	1
		EMB175	1	7.0	-	-	1
Rwy4L/22R, Abeam C	220	767300	-	-	1	12.0	1
Rwy4L, Short C	40	767300	-	-	1	12.0	1
	220	767300	3	19.7	1	14.0	4
		777200	1	20.0	-	-	1
		777200	1	45.0	-	-	1
		7878R	2	17.0	-	-	2
		7878R	3	31.3	2	11.5	5
		DC1010	3	37.0	2	51.5	5
		737700	1	13.0	-	-	1
		737700	4	40.7	6	20.2	10
		U_737800	2	11.0	1	100.0	3
		757300	-	-	1	90.0	1
		757300	6	16.7	1	28.0	7
		757RR	3	20.0	1	30.0	4
		A319-131	1	30.0	-	-	1
		A320-232	2	35.0	-	-	2
		CL600	1	25.0	-	-	1
		CL600	2	18.5	-	-	2
		EMB14L	2	12.0	-	-	2
		EMB14L	2	25.0	-	-	2
Rwy22R, Abeam A1	220	767300	6	27.3	1	60.0	7
		777200	2	42.5	3	26.7	5
		7878R	-	-	2	16.5	2
		DC1010	1	20.0	-	-	1
	40	737700	-	-	1	15.0	1

Run-up Location	Heading (degrees magnetic)	AEDT Aircraft ID	Daytime		Nighttime		Total Annual Events
			Annual Events	Duration per Event (minutes)	Annual Events	Duration per Event (minutes)	
Rwy28L, Midpoint	280	737700	6	19.2	10	15.1	16
		U_737800	-	-	2	19.5	2
		757300	4	13.0	6	30.7	10
		A319-131	-	-	2	15.0	2
		A320-232	3	17.3	-	-	3
		A321-232	-	-	2	20.5	2
		EMB14L	2	12.5	-	-	2
		EMB175	1	10.0	-	-	1
Rwy4L	40	A319-131	1	15.0	-	-	1
Rwy33, Abeam T	330	757300	-	-	1	30.0	1
Rwy4R/22L, Midpoint	40	DC1010	1	25.0	-	-	1
Rwy28L, Midpoint	10	DC1010	1	25.0	-	-	1
	280	MD11GE	4	109.5	-	-	4
		MD11PW	4	40.5	-	-	4
		757RR	1	25.0	-	-	1

Source: CDA Run-Up Log, HMMH, 2020

TABLE F-15
SUMMARY OF MODELED MAINTENANCE RUN-UP OPERATIONS FOR THE EXISTING CONDITION

Aircraft Category	Aircraft Type	Daytime		Nighttime		Total	
		Annual Events	Annual Hours (see note 1)	Annual Events	Annual Hours (see note 1)	Annual Events	Annual Hours
WBJ	767300	15	7.3	5	2.2	20	9.5
WBJ	777200	10	6.1	3	1.3	13	7.4
WBJ	7878R	12	6.1	8	4.6	20	10.7
WBJ	A300-622R	-	-	1	1.6	1	1.6
WBJ	DC1010	4	1.4	-	-	4	1.4
WBJ	MD11GE	4	7.3	-	-	4	7.3
WBJ	MD11PW	4	2.7	-	-	4	2.7
OJ	737700	101	38.3	189	66.6	290	104.9
OJ	U_737800	2	0.5	4	2.5	6	3.0
OJ	757300	37	16.4	14	7.5	51	23.9
OJ	757RR	4	1.5	-	-	4	1.5
OJ	A319-131	22	12.1	6	2.5	28	14.6
OJ	A320-211	2	0.4	-	-	2	0.4
OJ	A320-232	16	5.7	9	2.7	25	8.4

Aircraft Category	Aircraft Type	Daytime		Nighttime		Total	
		Annual Events	Annual Hours (see note 1)	Annual Events	Annual Hours (see note 1)	Annual Events	Annual Hours
OJ	A321-232	4	1.7	5	4.3	9	6.0
OJ	CL600	143	56.3	76	21.2	219	77.5
OJ	CNA525C	1	0.2	-	-	1	0.2
OJ	CNA750	1	1.0	-	-	1	1.0
OJ	CRJ9-ER	62	21.4	60	14.8	122	36.2
OJ	EMB145	2	0.8	-	-	2	0.8
OJ	EMB14L	119	36.0	74	16.1	193	52.1
OJ	EMB175	45	16.4	62	16.1	107	32.5
OJ	EMB190	1	0.1	-	-	1	0.1
OJ	MD83	3	1.9	2	0.5	5	2.4
OJ	MD9025	2	3.5	-	-	2	3.5
Total		616	245.1	518	164.5	1,134	409.6
Subtotal by Location							
GRE		506	193.7	464	140.5	970	334.2
Rwy22R/Rwy4L, Short NN		7	2.7	1	0.4	8	3.1
Rwy22R, Short M		5	1.4	-	-	5	1.4
Rwy4L/22R, Abeam M		1	0.3	-	-	1	0.3
Rwy4L, Short M		4	1.0	4	3.1	8	4.1
Rwy22R, Between M and C		1	0.2	-	-	1	0.2
Rwy22R, Short C		15	9.4	3	1.0	18	10.4
Rwy4L/22R, Abeam C		-	-	1	0.2	1	0.2
Rwy4L, Short C		40	16.2	15	8.5	55	24.7
Rwy22R, Abeam A1		25	8.7	29	10.5	54	19.2
Rwy4L		1	0.2	-	-	1	0.2
Rwy33, Abeam T		-	-	1	0.5	1	0.5
Rwy4R/22L, Midpoint		1	0.4	-	-	1	0.4
Rwy28L, Midpoint		10	10.8	-	-	10	10.8
Total		616	245.1	518	164.5	1,134	409.6

Notes:
1) Computed from sum of seconds, rounded to the nearest 0.1 hour
WBJ = Widebody Jet; OJ = Other Jet; NJ = Non-jet

Source: CDA Run-Up Log, HMMH, 2020

F.3.9 Noise Exposure

Sections F.3.9.1 and **F.3.9.2** describe the resultant DNL contours and affected noise-sensitive facilities, respectively.

F.3.9.1 DNL Contours

Using the input data documented in the preceding sections, AEDT calculated DNL at more than 118,000 evenly-spaced grid points throughout the PSA and SSA. **Exhibit F-7** provides the resultant DNL contours for the Existing Condition.

For the Existing Condition, the DNL contours extend away from O'Hare on the east side in three main lobes (north, central, and south), on the west side in two main lobes (north and south), and in a single lobe on the south side.

- The north east-west lobe is due to flight operations to and from Runway 9L/27R. The east lobe of the 65 DNL contour includes residential areas of Des Plaines, and its east extent is at South River Road. The west lobe of the 65 DNL contour includes mainly commercial industrial parcels, and its west extent is just east of Busse Road.
- The central east lobe is due to flight operations to and from Runway 9R/27L. The lobe of the 65 DNL contour follows Interstate 90/Kennedy Expressway and includes residential areas of Rosemont extending to North Oriole Avenue.
- The south east-west lobe is due to flight operations to and from Runways 10L/28R and 10C/28C. The east lobe of the 65 DNL contour includes residential areas of Schiller Park and Norridge, extending along West Lawrence Avenue and ending just before North Oriole Avenue. The west lobe of the 65 DNL contour includes residential areas of Bensenville, Wood Dale, and Itasca, extending out nearly to the intersection of East Washington Street and Parkside Avenue.
- The south lobe of the 65 DNL contour is due to flight operations to and from Runway 4R/22L. It extends over industrial property, past Interstate 294, and into the residential area of Franklin Park near Wolf Road, ending before Grand Avenue.

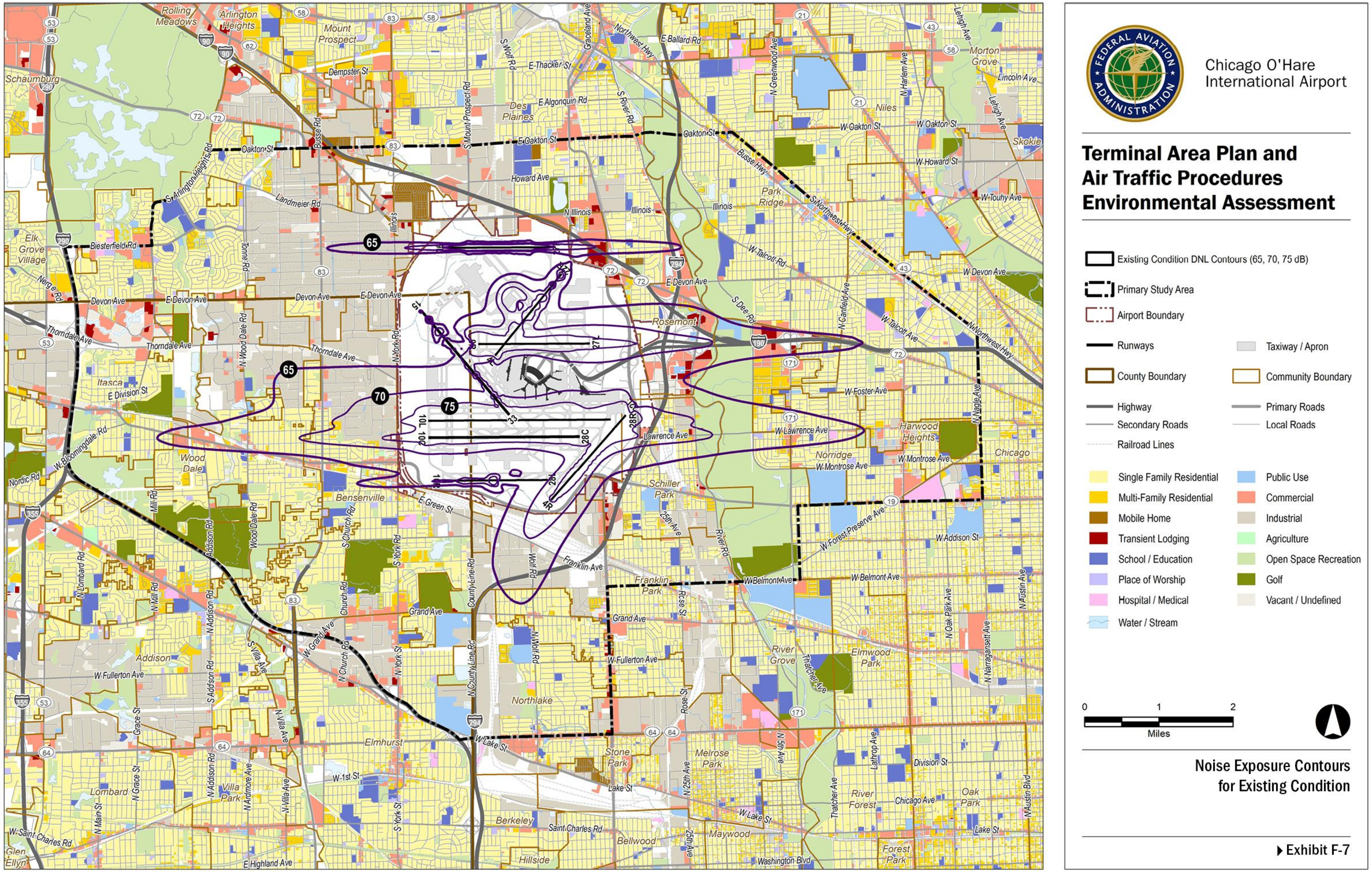
The 70 DNL contour for the Existing Condition includes residential parcels in two areas: 1) Schiller Park, east of Runway 28R, and 2) Bensenville, west of Runways 10L and 10C.

Table F-16 shows the land uses exposed to DNL greater than or equal to 65 dB for the Existing Condition. The top portion of the table quantifies acreage in each contour band by land use category. The remainder of the table provides the count of noise-sensitive facilities and estimates of population and number of housing units for each DNL band. For the Existing Condition, no non-compatible land use is exposed to DNL greater than or equal to 75 dB. Of the nearly 5,100 off-airport acres exposed to 65 DNL or greater, 22 percent (approximately 1,100 acres) consists of non-compatible land use.

Section F.3.9.2 addresses noise-sensitive facilities in further detail.

There were an estimated 18,894 people in 7,255 housing units within the 65 DNL. Of the 7,255 housing units, 4,844 have been sound-insulated by the CDA and 252 are scheduled to be sound-insulated as part of Phase 18 and 19 of the CDA's Residential Sound Insulation Program (RSIP). Most of the non-mitigated homes within the Existing Condition 65 DNL are currently not eligible as they are outside the DNL noise contour used for the ongoing RSIP for the OMP.[20]

[20] The current sound insulation program is based on the FAA-approved O'Hare Modernization Program Build-Out Noise Contour as defined by the FAA's Record of Decision for the Environmental Impact Statement (2005).



Source: HMMH 2018, USCB 2016, USCB 2010, Illinois Geospatial Data Clearinghouse, CMAP Data Hub, ESRI

TABLE F-16
NOISE EXPOSURE FOR THE EXISTING CONDITION

		DNL Contour Band			
	Compatibility	**65-70**	**70-75**	**75+**	**Total (65+)**
Land Use Area (acres)					
Single-Family Residential	Non-compatible	866.2	66.1	-	932.3
Multi-Family Residential		53.6	31.8	-	85.4
Transient Lodging (residential)		88.0	2.7	-	90.7
Mobile Home		-	-	-	-
School/Education		22.7	2.7	-	25.4
Commercial	Compatible	340.7	15.8	-	356.5
Industrial, Manufacturing, and Production		2,104.5	645.2	20.3	2,770.0
Recreational		555.6	26.3	-	581.9
Public Use (excluding School/Education)[1]		80.6	6.8	-	87.4
Undeveloped		125.8	8.9	0.4	135.1
Airport		2,196.9	1,457.2	1,545.4	5,199.5
Water		15.7	-	-	15.7
Subtotal Non-compatible Area (acres)		1,030.5	103.3	-	1,133.8
Subtotal Compatible Area (acres)		5,419.8	2,160.2	1,566.1	9,146.1
Total Area (acres)		**6,450.3**	**2,263.5**	**1,566.1**	**10,279.9**
Off-airport Total Area (acres)		**4,253.4**	**806.3**	**20.7**	**5,080.4**
Noise-Sensitive Facilities (count)					
Universities		1	-	-	1
Schools		6	1	-	7
Sound-Insulated Schools (Included above)		*5*	*1*	-	*6*
Libraries		-	-	-	-
Hospitals		-	-	-	-
Nursing Homes		1	-	-	1
Places of Worship		11	-	-	11
Parks and 4(f) Lands		22	3	-	25
Historic Properties		11	2	-	13
Total		**52**	**6**	**-**	**58**
Population and Housing (estimated)					
Population		15,565	3,329	-	18,894
Housing Units		5,967	1,288	-	7,255
Non-mitigated single-family housing units (Included above)[2]		*1,365*	*96*	-	*1,461*

Non-mitigated multi-family housing units (Included above)[2]	*950*	*-*	*-*	*950*
Sound-insulated single-family housing units (included above)	*3,645*	*1,181*	*-*	*4,826*
Sound-insulated multi-family housing units (included above)	*7*	*11*	*-*	*18*

Note 1 For the purposes of this document, Public Use (excluding School/Education) land use is considered compatible.
Note 2 The majority of the non-mitigated housing units (78.7%) are not eligible under the existing ORD RSIP because these units are outside the current RSIP DNL 65 dB contour.

Sources: ORD Residential Sound Insulation Program, January 2021 database: City of Chicago
2020 U.S. Census Bureau Census Block Population Data
Existing Condition Noise Contours, Land Use, Noise-Sensitive Facilities, Population, and Housing data: HMMH Analysis, October 2021

F.3.9.2 Noise-Sensitive Facilities

As listed in **Table F-16** and **Table F-17**, and as shown in **Exhibit F-8**, 58 noise-sensitive facilities in the PSA, primarily parks and Section 4(f) lands, are exposed to 65 DNL or greater. None are exposed to 75 DNL or greater. No hospitals or libraries are exposed to DNL greater than 65 dB. All learning institutions exposed to 65 DNL or greater have been sound-insulated by the CDA except the Logos Evangelical Seminary and the Transition Learning Center (Noise-Sensitive Facility IDs U01 and S07, respectively) in Bensenville. Three of the 25 parks and Section 4(f) lands (Bensenville Theater, Rosemont Theater, and The Dome at the Parkway Bank Sports Complex; IDs P005, P186 and P188, respectively) exposed to DNL greater than 65 dB do not have outdoor use. Noise results for all sites modeled within the PSA are provided in **Attachment F-5.**

TABLE F-17
NOISE-SENSITIVE FACILITIES WITH A DNL OF AT LEAST 65 DB FOR THE EXISTING CONDITION

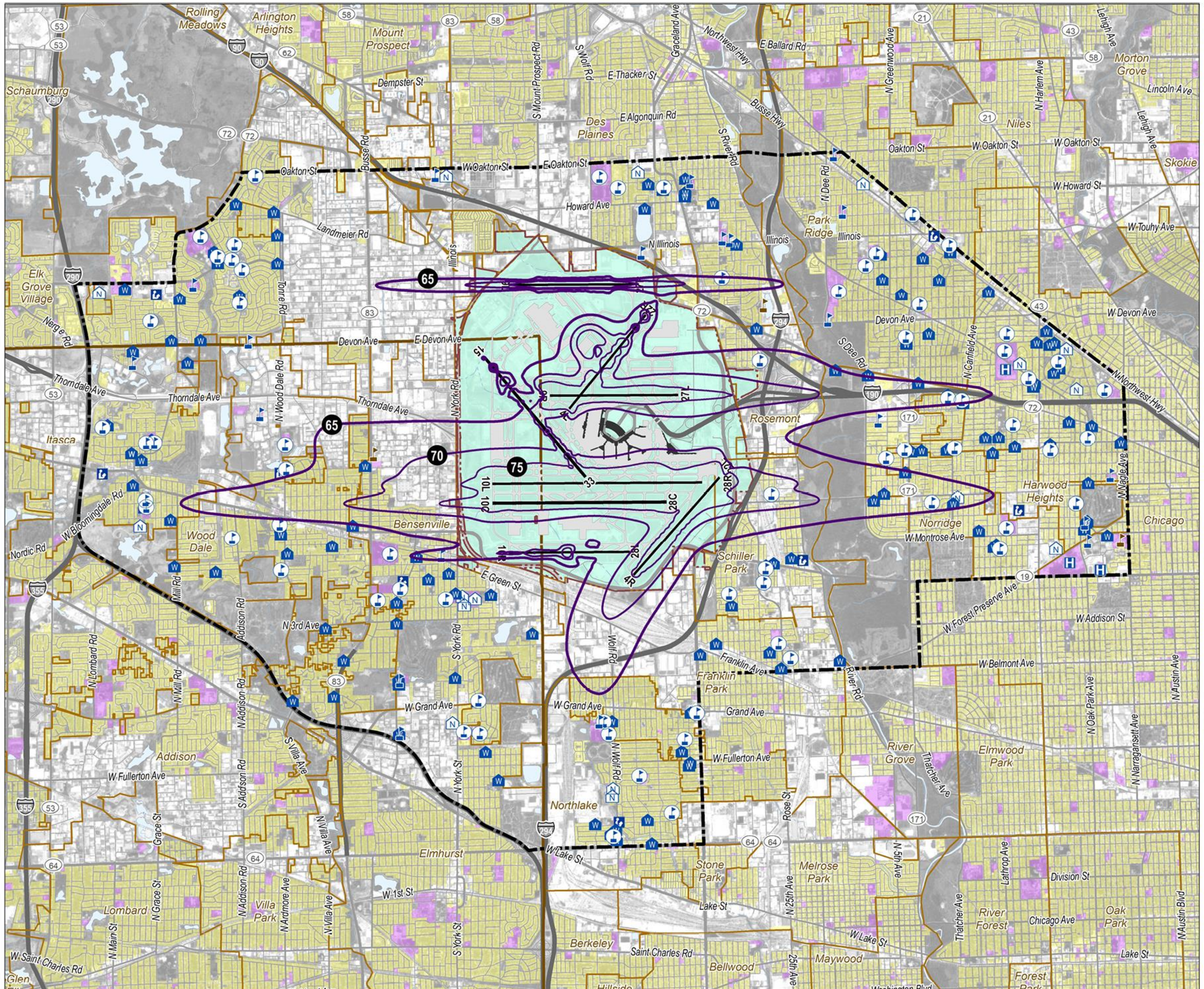
			DNL (dB) in DNL Contour Band		
Map ID	**Municipality**	**Name**	**65 - 70**	**70 - 75**	**Note**
Learning Institutions					
U01	Bensenville	Logos Evangelical Seminary	67.9	-	-
S07	Bensenville	Transition Learning Center	66.4	-	-
S21	Chicago	St. Paul Lutheran School	65.3	-	1
S22	Chicago	St. Sava Academy	65.7	-	1
S28	Des Plaines	Orchard Place Elementary School	65.4	-	1
S58	Norridge	J Leigh Elementary School	66.1	-	1
S77	Rosemont	Rosemont Elementary School	66.7	-	1
S81	Schiller Park	Washington Elementary School	-	71.4	1
Health Care Facilities					
N12	Norridge	Central Baptist Village	65.8	-	-
Places of Worship					
W006	Bensenville	First Baptist Church	67.8	-	-
W012	Bensenville	Manav Seva Mandir	65.2	-	-
W018	Chicago	All Saints Polish National Catholic Church	65.2	-	-
W024	Chicago	Evangelical Covenant Church	65.3	-	-

Map ID	Municipality	Name	DNL (dB) in DNL Contour Band 65 - 70	70 - 75	Note
W026	Chicago	Holy Resurrection Serbian Orthodox Cathedral	65.8	-	-
W034	Chicago	Our Lady Mother of the Church Roman Catholic Church	67.9	-	-
W038	Chicago	St. Joseph Ukrainian Church	65.2	-	-
W040	Chicago	St. Paul Evangelical Lutheran Church	65.0	-	-
W090	Norridge	Church Of Our Savior	65.6	-	-
W095	Norridge	Zion Evangelical Lutheran Church	67.5	-	-
W111	Park Ridge	St. Paul Lutheran Church and Ministries	65.2	-	-
Parks and 4(f) Lands					
FP06	Chicago	Robinson Woods South	69.0	-	-
FP26	Schiller Park	River Bend Family Picnic Area	66.9	-	-
FP27	Schiller Park	Robinson Homestead Family Picnic Area	66.0	-	-
P005	Bensenville	Bensenville Theatre	65.7	-	2
P019	Bensenville	Mohawk Park	-	72.1	-
P027	Bensenville	Poplar Park	-	70.5	-
P066	Des Plaines	Orchard Place Elementary School Park	66.2	-	-
P150	Melrose Park	Westdale Park	65.1	-	-
P152	Norridge	Norridge Park	65.1	-	-
P177	Rosemont	Donald E. Stephens Athletic Complex	66.8	-	-
P180	Rosemont	Dunne Park	65.9	-	-
P181	Rosemont	Margaret J. Lange Park	65.6	-	-
P183	Rosemont	Parkway Bank Park Entertainment District	66.1	-	-
P186	Rosemont	Rosemont Theatre	65.0	-	2
P188	Rosemont	The Dome at the Parkway Bank Sports Complex	69.4	-	2
P189	Rosemont	Westin Park	65.5	-	-
P190	Schiller Park	"Bark" Park	68.7	-	-
P193	Schiller Park	Fairview Park	67.3	-	-
P195	Schiller Park	North Village Park	-	72.0	-
P200	Schiller Park	Dooley Memorial Park	66.5	-	-
P205	Wood Dale	Central Park	67.9	-	-
P211	Wood Dale	Lionwood Park	65.0	-	-
P212	Wood Dale	Mohawk Manor Park	65.9	-	-
P213	Wood Dale	Veteran's Memorial Park	66.5	-	-
P216	Wood Dale	Wood Dale Water Park	67.1	-	-
Historic Properties					
HN03	Chicago	Bridge over JFK Expressway (I-90) carrying Canfield Avenue	65.4	-	-
HN08	Chicago	Rest Haven Cemetery	-	70.8	-
HN09	Chicago	Old Control Tower	65.7	-	-
HN10	Chicago	United Terminal 1	65.6	-	-
HN11	Chicago	Rotunda	67.1	-	-
LS056	Bensenville	Private Home (1919)	65.9	-	1

			DNL (dB) in DNL Contour Band		
Map ID	**Municipality**	**Name**	**65 - 70**	**70 - 75**	**Note**
LS057	Bensenville	Private Home (1923)	66.0	-	1
LS058	Bensenville	Private Home (1923)	66.0	-	1
LS059	Bensenville	Private Home (1919)	66.0	-	1
LS060	Bensenville	Private Home (1907)	65.3	-	1
LS061	Bensenville	Private Home (1872)	65.0	-	1
LS246	Schiller Park	20 Corner Store	-	71.0	-
LS249	Wood Dale	Residence	65.0	-	1

Notes:
1) Sound-insulated
2) No outdoor use

Source: HMMH, 2021



Source: HMMH 2018, USCB 2016, USCB 2010, Illinois Geospatial Data Clearinghouse, CMAP Data Hub, ESRI

Chicago O'Hare International Airport

Terminal Area Plan and Air Traffic Procedures Environmental Assessment

- Existing Condition DNL Contours (65, 70, 75 dB)
- Primary Study Area
- Airport Boundary
- Runways
- Taxiway / Apron
- County Boundary
- Community Boundary
- Highway
- Primary Roads
- Secondary Roads
- Local Roads
- Railroad Lines
- School
- Library
- Sound Insulated School
- Nursing Home
- College/University
- Hospital
- Place of Worship
- Residential
- Public, Hospital, Institutional
- Compatible
- Water / Stream

0 1 2 Miles

Noise Exposure Contours for Existing Condition and Noise Sensitive Facilities

Exhibit F-8

F.4 DATA DEVELOPMENT AND NOISE EXPOSURE FOR THE INTERIM NO ACTION

The Interim Condition of the No Action Alternative is abbreviated herein as the "Interim No Action."

Sections F.4.1 through **F.4.8** address the data input to AEDT for the aircraft noise modeling of Interim No Action. **Section F.4.9** presents the resultant Interim No Action noise exposure.

F.4.1 Airfield Layout

Table F-18 presents and Build Out Conditions for the No Action and Proposed Action Alternatives. The runway coordinates and elevations were provided by the CDA. Changes from the Existing Condition would result from the O'Hare Modernization Program and are not part of the project that is the subject of this EA.

The airfield layout would change, relative to the Existing Condition, in the following ways:

Runway 15/33 no longer exists. It was decomissioned in March 2018.

- Runway 9R/27L was lengthened by 3,290 feet. The lengthening was accomplished by shifting the centerline endpoint of Runway 9R to the west by 3,590 feet and shifting the centerline endpoint of Runway 27L to the west by 300 feet.
- Runway 9R would allow intersection departures (Runway 9RX). The Runway 9R centerline endpoint would increase in elevation by eight feet.
- Runway 27L would allow intersection departures (Runway 27LX). The Runway 27L centerline endpoint would increase in elevation by less than one foot. The Threshold Crossing Height would increase by three feet.
- Runway 9C/27C was constructed and would be available for use.
- Runway 4L would not be available for arrivals and Runway 22R would not be available for departures.

Runways 9RX, 10LX, 27LX, and 28RX are not "official" runways but are runways modeled in AEDT for (taxiway) intersection departures from Runways 9R, 10L, 27L, and 28R, respectively. **Exhibit F-9** depicts the modeled runway layout.

The Interim No Action Alternative would have the same terminal layout as the Existing Condition except for two areas: the Terminal 3 Concourse L Stinger, which added two gates, and the Terminal 5 Concourse M extension. Both of these changes were previously approved through seperate NEPA reviews and documentation.[21]

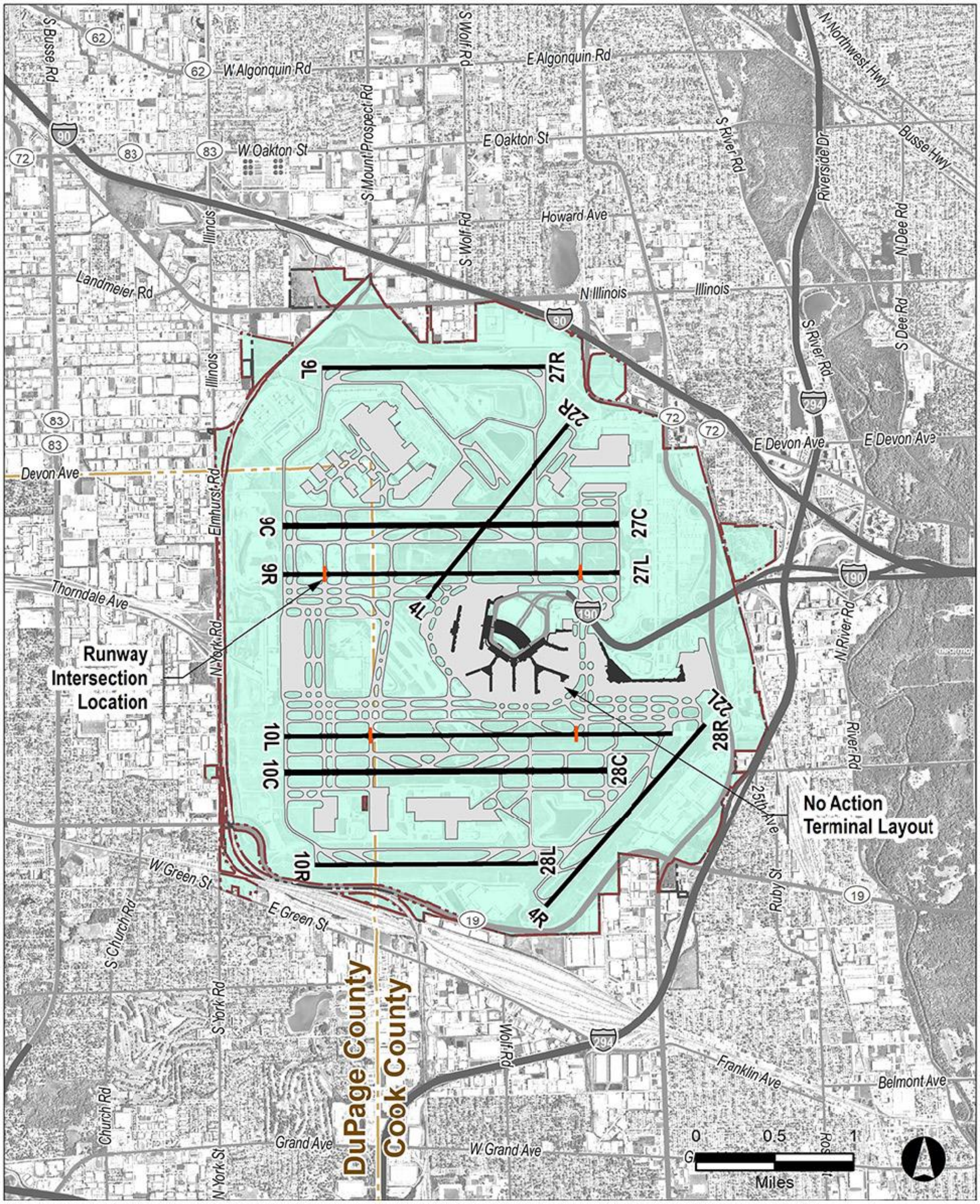
[21] OM EIS Re-Evaluation Memo: Terminal 3 Concourse L Stinger Two-Gate Addition and Associated Apron Pavement, Approved 7/20/2020 and OM EIS Re-Evaluation Memo: Terminal 5 East Expansion and Associated Apron Pavement, Approved 8/2/2018

TABLE F-18
RUNWAY DATA FOR THE INTERIM AND BUILD OUT CONDITIONS

Runway ID	Latitude (degrees North)	Longitude (degrees West)	Elevation (feet MSL)	Displaced Landing Threshold (feet)	Glide Slope (degrees)	Threshold Crossing Height (feet)
9L	42.00283	-87.92668	668.0	None	3	55
9C	41.98830	-87.93157	673.2	None	3	55
9R	41.98389	-87.93157	668.2	None	3	59
9RX[1]	41.98389	-87.92646	664.9	n/a	n/a	n/a
10L	41.96899	-87.93153	672.1	None	3	56
10LX[2]	41.96901	-87.92084	665.7	n/a	n/a	n/a
10C	41.96570	-87.93152	669.4	None	3	55
10R	41.95720	-87.92786	680.0	None	3	55
4L	41.98166	-87.91392	655.7	n/a	n/a	n/a
4R	41.95333	-87.89942	661.4	None	3	52
27R	42.00283	-87.89908	663.6	None	3	55
27C	41.98831	-87.89021	652.4	None	3	56
27L	41.98390	-87.89015	650.3	None	3	58
27LX[1]	41.98390	-87.89493	651.2	n/a	n/a	n/a
28R	41.96907	-87.88373	651.4	None	3	54
28RX[2]	41.96905	-87.89555	650.4	n/a	n/a	n/a
28C	41.96577	-87.89181	650.1	None	3	55
28L	41.95725	-87.90029	658.0	None	3	55
22L	41.96992	-87.87974	654.4	None	3	55
22R	41.99754	-87.89637	647.7	None	3	49

Notes:
1) Runways 9RX and 27LX are not "official" runways; their coordinates represent the location for intersection departures for Runways 9R and 27L.
2) Runways 10LX and 28RX are not "official" runways; their coordinates represent the location for intersection departures for Runways 10L and 28R.

Source: CDA, 2019 and 2020



Source: HMMH, Ricondo & Associates, Illinois Geospatial Data Clearinghouse, Cook County Government GIS, DuPage County GIS, Environmental Systems Research Institute

Chicago O'Hare International Airport

Terminal Area Plan and Air Traffic Procedures Environmental Assessment

Runway Layout for the Interim and Build Out Conditions

Exhibit F-9

F.4.2 Meteorological and Terrain Data

The meteorological and terrain data for the Interim No Action is the same as that described for the Existing Condition (**Section F.3.2**).

F.4.3 Aircraft Noise and Performance Data

The aircraft noise and performance data for the Interim No Action (AEDT standard data except the approved non-standard 737-800) is the same as that described for the Existing Condition (**Section F.3.3**).

F.4.4 Aircraft Flight Operations

The CDA's forecast[22] for the EA calls for 952,489 annual flight operations for the Interim Condition, which equates to 2,610 AAD flight operations. Compared to the Existing Conditions, the Interim Condition forecast includes retirements of older aircraft types such as 767-200, A340, DC10, 737-300, MD80 and MD90. Details on the forecast can be found in **Appendix C**. For purposes of studying airfield and airspace capacity, CDA modeled O'Hare with the Total Airspace and Airport Modeller (TAAM), which outputs flight operations from the forecast's Design Day Flight Schedule (DDFS).[23] The DDFS, totaling 2,820 flight operations for the Interim Condition, represents a single-day flight schedule during the peak month of the year. Dividing the AAD total (2,610) by the DDFS total (2,820) yields a scale factor of 0.93. As some aircraft could remain at O'Hare overnight, the DDFS can be unbalanced, meaning total arrivals do not equal total departures. For the purposes of the EA, the operations were balanced by summing the arrivals and departures and then dividing by two for each AEDT aircraft type. Finally, the DDFS operations were multiplied by the scale factor to prepare the data for AEDT input.

After assigning each AEDT aircraft type to a body category using **Table F-4**, the resultant annual flight operations by body category are shown in **Table F-19**. The total number of flight operations (952,490) is different from the forecast by one annual operation due to rounding. Widebody Jet operations would account for approximately nine percent of the total operations. Approximately 90 percent of the total operations are expected to be conducted by Other Jet operations. Non-jet operations would be less than one percent of the total operations. Overall, nighttime operations at O'Hare would comprise nearly 12 percent of the total operations for the Interim No Action.

TABLE F-19
ANNUAL FLIGHT OPERATIONS FOR THE INTERIM NO ACTION

Body Category	Arrivals			Departures			Total			Total Percent
	Day	Night	Total	Day	Night	Total	Day	Night	Total	
Widebody Jet	32,995	10,585	43,580	33,315	10,265	43,580	66,310	20,850	87,160	9.2%
Other Jet	372,955	56,332	429,287	394,385	34,902	429,287	767,340	91,234	858,574	90.1%
Non-jet	3,040	338	3,378	3,378	0	3,378	6,418	338	6,756	0.7%
Total	**408,990**	**67,255**	**476,245**	**431,078**	**45,167**	**476,245**	**840,068**	**112,422**	**952,490**	**100.0%**

22 CDA Design Day Forecast provided on 3/27/2020 (ORD_TAP_and_ATP_EA_TAAM_Schedules_with_OAG_AC_Types_20200327.xlsx)
23 Details on the forecast are contained in Appendix C.

Body Category	Arrivals			Departures			Total			Total Percent
	Day	Night	Total	Day	Night	Total	Day	Night	Total	
Percent	43%	7%	50%	45%	5%	50%	88%	12%	100%	
Source: CDA, 2020; HMMH analysis, 2021										

Table F-20 details the Interim No Action's 2,610 AAD flight operations by aircraft type. Rounding to two decimal places caused the total AAD count to differ from 2,610 by less than one AAD operation. The forecast has fewer aircraft types than the Existing Condition (shown in **Table F-7**), especially for Non-jet aircraft.

TABLE F-20
AAD FLIGHT OPERATIONS BY AIRCRAFT TYPE FOR THE INTERIM NO ACTION

Aircraft ID (AEDT)	Arrivals Day	Arrivals Night	Arrivals Total	Departures Day	Departures Night	Departures Total	Total
Widebody Jet							
747400	1.85	4.63	6.48	5.55	0.93	6.48	12.96
7478	2.78	3.70	6.48	1.85	4.63	6.48	12.96
767300	5.03	4.22	9.25	2.52	6.73	9.25	18.50
777200	8.70	1.94	10.64	9.76	0.88	10.64	21.28
777300	1.85	3.70	5.55	3.70	1.85	5.55	11.10
7773ER	8.48	0.78	9.26	7.41	1.84	9.25	18.51
7878R	28.63	3.76	32.39	28.63	3.76	32.39	64.78
A300-622R	0.93	1.85	2.78	0.39	2.39	2.78	5.56
A300B4-203	0.93	-	0.93	-	0.93	0.93	1.86
A330-301	0.93	-	0.93	0.93	-	0.93	1.86
A330-343	27.32	0.91	28.23	25.00	3.23	28.23	56.46
A380-841	1.85	-	1.85	1.85	-	1.85	3.70
A380-861	0.93	-	0.93	0.90	0.03	0.93	1.86
MD11GE	-	1.85	1.85	1.85	-	1.85	3.70
MD11PW	0.20	1.65	1.85	0.93	0.93	1.86	3.71
Widebody Jet Subtotals	**90.41**	**28.99**	**119.40**	**91.27**	**28.13**	**119.40**	**238.80**
Other Jet							
717200	11.55	0.48	12.03	11.10	0.93	12.03	24.06
737700	16.66	2.78	19.44	16.66	2.78	19.44	38.88
U_737800	183.17	38.91	222.08	194.50	27.59	222.09	444.17
7378MAX	46.63	8.43	55.06	48.61	6.45	55.06	110.12
757300	11.34	5.32	16.66	15.07	1.59	16.66	33.32

Aircraft ID (AEDT)	Arrivals			Departures			Total
	Day	Night	Total	Day	Night	Total	
757RR	0.93	1.85	2.78	0.93	1.85	2.78	5.56
A319-131	54.69	5.45	60.14	51.79	8.36	60.15	120.29
A320-211	5.03	2.37	7.40	4.63	2.78	7.41	14.81
A320-232	45.25	12.12	57.37	54.65	2.72	57.37	114.74
A321-232	51.95	16.07	68.02	59.54	8.48	68.02	136.04
CRJ9-ER	171.70	17.06	188.76	176.91	11.86	188.77	377.53
EMB170	23.13	2.78	25.91	25.37	0.54	25.91	51.82
EMB175	138.37	11.54	149.91	140.32	9.58	149.90	299.81
CL600	115.44	14.11	129.55	126.33	3.22	129.55	259.10
CNA55B	-	0.93	0.93	0.93	-	0.93	1.86
CNA560XL	0.93	-	0.93	0.93	-	0.93	1.86
CNA680	1.85	-	1.85	1.85	-	1.85	3.70
CNA750	0.93	-	0.93	0.93	-	0.93	1.86
EMB145	3.70	-	3.70	3.70	-	3.70	7.40
EMB14L	137.62	14.13	151.75	144.85	6.91	151.76	303.51
LEAR35	0.93	-	0.93	0.93	-	0.93	1.86
Other Jet Subtotals	**1,021.80**	**154.33**	**1,176.13**	**1,080.53**	**95.64**	**1,176.17**	**2,352.30**
Non-jet							
BEC58P	3.70	-	3.70	3.70	-	3.70	7.40
CNA208	4.63	0.93	5.56	5.55	-	5.55	11.11
Non-jet Subtotals	**8.33**	**0.93**	**9.26**	**9.25**	**-**	**9.25**	**18.51**
Grand Totals	**1,120.54**	**184.25**	**1,304.79**	**1,181.05**	**123.77**	**1,304.82**	**2,609.61**

Source: HMMH analysis, 2021

F.4.5 Runway Use

The runway use for the Interim Condition was derived from CDA's TAAM simulation data. It is impractical to model all possible runway configurations, so CDA's TAAM modeling was limited to the most prevalent configurations, which cover over 98 percent of possible operating conditions. The CDA provided results for six operational experiments in TAAM for the Interim No Action and six experiments for the Interim Proposed Action. These experiments are listed in **Table F-21**, including the resulting percent contribution (weighting) to the total yearly operations for each configuration. Using the weightings, the CDA developed annualized runway usage rates for the EA's noise and air quality modeling. On an annual basis, 56.5 percent of the flight operations would be in west flow, and 43.5 percent would be in east flow.

TABLE F-21
ANNUALIZED OPERATING CONFIGURATION WEIGHTINGS FOR THE INTERIM NO ACTION AND INTERIM PROPOSED ACTION

Operating Configuration	Weather Condition	Experiment Number (No Action/Proposed Action)	Annualized Weightings
VFR West With LAHSO	VFR	901/921	37.7%
VFR West Without LAHSO	VFR	902/922	14.5%
IFR West Without LAHSO	IFR	903/923	4.3%
VFR East With LAHSO	VFR	904/924	24.3%
VFR East Without LAHSO	VFR	905/925	16.1%
IFR East Without LAHSO	IFR	906/926	3.1%
		Total	**100.0%**
VFR = Visual Flight Rules; IFR = Instrument Flight Rules; LAHSO = Land and Hold Short			
Source: CDA, 2020			

The annualized runway use TAAM simulation results for the Interim No Action are presented in **Table F-22.** The TAAM modeling assigned no arrivals to Runway 4L and no departures from Runway 22R since Runway 4L/22R is a uni-directional runway (arrivals are not allowed to Runway 4L and departures are not allowed from Runway 22R). Due to the simulation of the primary operational configurations, the TAAM modeling resulted in several runways showing no use. The blank cells in **Table F-22** indicate the so-called "zero runway use" runways for each combination of runway, type of operation, and period. For example, the TAAM modeling did not predict any departures from Runway 9L during the daytime or nighttime periods. While departures do not normally occur on that runway, the runway could be used for departures.

TABLE F-22
TAAM-OUTPUT RUNWAY USE PERCENTAGES FOR THE INTERIM NO ACTION

Runway	Arrival (see notes 1 and 2)		Departure (see notes 1 and 2)	
	Day	Night	Day	Night
9L	15.8	5.4	-	-
9C	12.3	8.0	-	1.2
9R	-	-	0.9	1.6
9RX[3]	n/a	n/a	20.6	27.7
10L	-	19.1	0.1	4.5
10LX[3]	n/a	n/a	21.7	9.2
10C	14.7	10.2	0.1	-
10R	0.7	0.5	-	-
4L	n/a	n/a	-	-
4R	-	-	-	-
27R	21.1	7.5	-	-
27C	17.1	12.8	-	1.7
27L	-	-	1.1	2.3
27LX[3]	n/a	n/a	16.1	15.6
28R	-	24.2	0.3	5.4
28RX[3]	n/a	n/a	21.1	22.1
28C	18.4	12.2	0.1	-
28L	-	-	-	-
22L	-	-	17.8	8.7
22R	-	-	n/a	n/a

Notes:
1) Each column sums vertically to 100±0.1%.
2) Daytime is defined as 7:00:00 a.m. to 9:59:59 p.m.; nighttime is defined as 10:00:00 p.m. to 6:59:59 a.m. (local time).
3) The "X" notation means intersection departures from that runway; this runway would not be applicable to arrival operations.

Source: CDA, 2020

It is anticipated that all available runways[24] would be used (to some extent) for arrival and departure operations over the course of a year to allow for safe and efficient operations during unforeseen circumstances such as runway maintenance closures or adverse weather. Therefore, the TAAM results were adjusted to allocate at least 0.1 percent of the flights to the runways where operations would be expected but where the TAAM modeling did not include or assign operations. In general, the adjustment methodology was to shift small percentages of operations from one runway to another by selecting the nearest runway with the same operation type and flow so that flights would remain over similar areas to the extent possible. For example, Runway 9R departures could be shifted to nearby Runway 9L because both runways are in the same (easterly) flow and are on the same side of the airfield.

[24] With the exception of Runway 4L arrivals and Runway 22R departures.

Except for nighttime departures from Runways 10C, 28C, and 4L, the value of 0.1 percent was chosen as the runway use percentage to be assigned[25] because a) it was the minimum non-zero runway usage produced by the TAAM modeling and b) it was the average of Existing Condition runway use percentages less than or equal to 1.0 percent.[26]

Runways 10C, 28C, and 4L have Existing Condition nighttime departure usage greater than 1.0 percent but no usage assigned by the TAAM modeling. For each of these three runways, the following logic was applied to derive a reasonable percentage of night departure usage:

- For Runway 10C: The Existing Condition usage is 1.8 percent on Runway 10C and a combined 17.6 percent for Runways 10L and 10LX. The TAAM modeling assigned a combined 13.7 percent to Runways 10L and 10LX for the Interim No Action. From 17.6 to 13.7 is a 22.2 percent reduction, so the 1.8 percent for Runway 10C was correspondingly reduced 22.2 percent. Therefore, the Runway 10C night departure percentage was set to 1.4 percent for the Interim No Action.
- For Runway 28C: The Existing Condition usage is 3.8 percent on Runway 28C and a combined 39.0 percent for Runways 28R and 28RX. The TAAM modeling assigned a combined 27.5 percent to Runways 28R and 28RX for the Interim No Action. From 39.0 to 27.5 is a 29.5 percent reduction, so the 3.8 percent for Runway 28C was correspondingly reduced 29.5 percent. Therefore, the Runway 28C night departure percentage was set to 2.7 percent for the Interim No Action.
- For Runway 4L: The Existing Condition usage is 2.4 percent on Runway 4L and a combined 20.0 percent for Runways 9R and 9RX. The TAAM modeling assigned a combined 29.3 percent to Runways 9R and 9RX for the Interim No Action. From 20.0 to 29.3 is a 46.5 percent increase, so the 2.4 percent for Runway 4L was correspondingly increased 46.5 percent. Therefore, the Runway 4L night departure percentage was set to 3.5 percent for the Interim No Action.

The process had two additional customizations: 1) If departures needed to be shifted from Runway 10L/28R or 9R/27L, only departures from their runway intersections were moved; non-intersection departures were not adjusted. 2) Widebody Jet and Non-jet departures were excluded from being shifted to Runways 9L/27R and 10R/28L because it would be unlikely for Widebody Jet and Non-jet aircraft to use either of these runways.

The resultant runway use percentages for the Interim No Action are shown in **Tables F-23** through **F-25** for arrivals, departures, and overall flight operations, respectively, in terms of AAD operations and EDO. At nearly 13 percent of total operations, Runway 28R would be the most used runway at O'Hare, followed by Runways 10L and 9R, with about 12 and 11 percent of total operations, respectively. During the nighttime hours, Runway 28R would be the most used runway at 24 percent, followed by Runway 10L with 16 percent of nighttime operations.

[25] In comparison, the 2015 EIS Re-Evaluation and the IFQ Re-Evaluation chose 0.5 percent and 0.2 percent, respectively, as their adjustment values.

[26] For the purposes of averaging, the Existing Condition runway use percentages shown as "<0.05 percent" were assumed to be 0.025 percent.

TABLE F-23
RUNWAY USE PERCENTAGES FOR ARRIVALS FOR THE INTERIM NO ACTION

		Daytime (see notes 1 and 2)				Nighttime (see notes 1 and 2)				Overall (see notes 1, 2, and 3)	
Flow	**Runway ID (d)**	**WBJ**	**OJ**	**NJ**	**Overall**	**WBJ**	**OJ**	**NJ**	**Overall**	**AAD**	**EDO**
E	9L	-	17.2	14.5	15.8	-	6.3	43.5	5.5	14.3	9.4
E	9C	34.2	10.3	12.0	12.2	10.3	7.5	-	7.9	11.6	9.6
E	9R	0.3	0.1	0.1	0.1	0.1	0.1	-	0.1	0.1	0.1
E	10L	0.1	0.1	0.1	0.1	21.3	18.7	-	19.0	2.8	11.8
E	10C	9.1	14.9	16.3	14.5	10.8	10.2	-	10.2	13.9	11.8
E	10R	0.1	0.8	0.3	0.7	-	0.6	-	0.5	0.7	0.6
E	4L	-	-	-	-	-	-	-	-	-	-
E	4R	0.1	<0.05	0.1	<0.05	0.6	0.2	-	0.2	0.1	0.2
W	27R	-	22.8	21.8	21.0	-	8.6	56.5	7.5	19.1	12.6
W	27C	23.4	16.5	9.4	17.0	13.0	12.6	-	12.6	16.4	14.3
W	27L	0.1	0.1	0.1	0.1	0.1	0.1	-	0.1	0.1	0.1
W	28R	0.2	0.1	0.1	0.1	27.0	23.5	-	24.0	3.5	14.9
W	28C	32.3	16.7	24.9	18.0	17.0	11.4	-	12.3	17.2	14.4
W	28L	-	0.1	-	0.1	-	0.1	-	0.1	0.1	0.1
W	22L	0.2	0.1	0.1	0.1	0.1	0.1	-	0.1	0.1	0.1
W	22R	-	0.1	0.1	0.1	0.1	0.1	-	0.1	0.1	0.1

Notes:
1) Each column sums vertically to 100±0.2%.
2) Daytime is defined as 7:00;00 a.m. to 9:59:59 p.m.; nighttime is defined as 10:00:00 p.m. to 6:59;59 a.m. (local time).
3) AAD pertains to annual average daily flight operations; EDO pertains to equivalent daily flight operations, i.e., daytime plus 10 times nighttime.
WBJ = Widebody Jet; OJ = Other Jet; NJ = Non-jet

Source: HMMH analysis, 2020

TABLE F-24
RUNWAY USE PERCENTAGES FOR DEPARTURES FOR THE INTERIM NO ACTION

		Daytime (see notes 1 and 2)				Nighttime (see notes 1 and 2)				Overall (see notes 1, 2, and 3)	
Flow	**Runway ID (d)**	**WBJ**	**OJ**	**NJ**	**Overall**	**WBJ**	**OJ**	**NJ**	**Overall**	**AAD**	**EDO**
E	9L	-	0.1	-	0.1	-	0.1	-	0.1	0.1	0.1
E	9C	0.1	0.1	0.1	0.1	5.2	-	-	1.2	0.2	0.7
E	9R	12.5	-	-	1.0	7.2	-	-	1.6	1.0	1.3
E	9RX[4]	18.9	20.4	25.8	20.3	10.7	28.1	-	24.1	20.7	22.3

		Daytime (see notes 1 and 2)				Nighttime (see notes 1 and 2)				Overall (see notes 1, 2, and 3)	
Flow	**Runway ID (d)**	**WBJ**	**OJ**	**NJ**	**Overall**	**WBJ**	**OJ**	**NJ**	**Overall**	**AAD**	**EDO**
E	10L	1.4	<0.05	-	0.1	16.8	0.8	-	4.5	0.5	2.3
E	10LX[4]	8.7	22.6	19.9	21.5	2.7	9.1	-	7.6	20.2	14.4
E	10C	1.3	-	-	0.1	0.6	1.7	-	1.4	0.2	0.8
E	10R	-	0.1	-	0.1	-	0.1	-	0.1	0.1	0.1
E	4L	0.1	0.1	0.1	0.1	1.6	4.1	-	3.5	0.4	1.9
E	4R	<0.05	0.1	0.1	0.1	<0.05	0.1	-	0.1	0.1	0.1
W	27R	-	0.1	-	0.1	-	0.1	-	0.1	0.1	0.1
W	27C	0.1	0.1	0.1	0.1	7.4	-	-	1.7	0.3	0.9
W	27L	14.5	-	-	1.1	10.0	-	-	2.3	1.2	1.7
W	27LX[4]	17.3	15.8	9.8	15.9	11.6	16.6	-	15.5	15.9	15.7
W	28R	3.3	-	-	0.3	17.4	1.9	-	5.4	0.7	2.9
W	28RX[4]	19.4	21.0	43.5	21.1	7.8	22.7	-	19.3	20.9	20.2
W	28C	1.7	-	-	0.1	1.1	3.2	-	2.7	0.4	1.4
W	28L	-	0.1	-	0.1	-	0.1	-	0.1	0.1	0.1
W	22L	0.6	19.3	0.5	17.8	-	11.2	-	8.7	16.9	13.1
W	22R	-	-	-	-	-	-	-	-	-	-

Notes:
1) Each column sums vertically to 100±0.1%.
2) Daytime is defined as 7:00:00 a.m. to 9:59:59 p.m.; nighttime is defined as 10:00:00 p.m. to 6:59:59 a.m. (local time).
3) AAD pertains to annual average daily flight operations; EDO pertains to equivalent daily flight operations, i.e., daytime plus 10 times nighttime.
4) The "X" notation means intersection departures from that runway.
WBJ = Widebody Jet; OJ = Other Jet; NJ = Non-jet

Source: HMMH analysis, 2020

TABLE F-25
OVERALL RUNWAY USE PERCENTAGES FOR THE INTERIM NO ACTION

		Daytime (see notes 1 and 2)				Nighttime (see notes 1 and 2)				Overall (see notes 1, 2, and 3)	
Flow	**Runway ID**	**WBJ**	**OJ**	**NJ**	**Overall**	**WBJ**	**OJ**	**NJ**	**Overall**	**AAD**	**EDO**
E	9L	-	8.4	6.9	7.7	-	3.9	43.5	3.3	7.2	5.2
E	9C	17.1	5.1	5.8	6.0	7.8	4.7	-	5.2	5.9	5.6
E	9R[4]	15.9	10.5	13.7	11.0	8.9	10.8	-	10.4	10.9	10.6
E	10L[4]	5.1	11.7	10.5	11.1	20.5	15.3	-	16.2	11.7	14.1
E	10C	5.2	7.3	7.7	7.1	5.8	6.9	-	6.7	7.1	6.9
E	10R	<0.05	0.4	0.2	0.4	-	0.4	-	0.4	0.4	0.4

		Daytime (see notes 1 and 2)				Nighttime (see notes 1 and 2)				Overall (see notes 1, 2, and 3)	
Flow	**Runway ID**	**WBJ**	**OJ**	**NJ**	**Overall**	**WBJ**	**OJ**	**NJ**	**Overall**	**AAD**	**EDO**
E	4L	<0.05	0.1	0.1	0.1	0.8	1.6	-	1.4	0.2	0.8
E	4R	0.1	0.1	0.1	0.1	0.1	0.1	-	0.1	0.1	0.1
W	27R	-	11.1	10.3	10.3	-	5.3	56.5	4.5	9.6	7.0
W	27C	11.7	8.1	4.5	8.3	10.3	7.8	-	8.2	8.3	8.3
W	27L[4]	16.0	8.2	5.2	8.8	10.7	6.4	-	7.2	8.6	7.9
W	28R[4]	11.5	10.8	23.0	11.0	26.1	23.9	-	24.3	12.6	18.6
W	28C	17.0	8.1	11.8	8.9	9.2	8.3	-	8.4	8.8	8.6
W	28L	-	0.1	-	0.1	-	0.1	-	0.1	0.1	0.1
W	22L	0.4	10.0	0.3	9.2	0.1	4.4	-	3.5	8.5	5.9
W	22R	-	0.1	<0.05	<0.05	0.1	0.1	-	0.1	<0.05	0.1

Notes:
1) Each column sums vertically to 100±0.4%.
2) Daytime is defined as 7:00:00 a.m. to 9:59:59 p.m.; nighttime is defined as 10:00:00 p.m. to 6:59:59 a.m. (local time).
3) AAD pertains to annual average daily flight operations; EDO pertains to equivalent daily flight operations, i.e., daytime plus 10 times nighttime.
4) The departure operations indicated for runways "9RX", "10LX", "27LX" and "28RX" are included in this table in the overall use of Runways 9R, 10L 27L and 28R, respectively.
WBJ = Widebody Jet; OJ = Other Jet; NJ = Non-jet

Source: HMMH analysis, 2020

F.4.6 Modeled Flight Tracks and Operational Assignments

The modeled flight tracks for the Interim No Action were primarily based on the modeled flight tracks for the Existing Condition but were modified to account for the changes in airfield layout (described in **Section F.4.1**) and the TAAM modeling. The modeled flight tracks for the Interim No Action and their distribution of operations were also informed by the routings (backbone flight tracks) for the CDA's TAAM modeling. The biggest differences from the Existing Condition are:

- The lengthening/westward shift of Runway 9R/27L. Westerly relocation by 3,590 feet of the Runway 9R endpoint would mean a corresponding westerly relocation to the modeled (departure start of track and arrival end of track) flight tracks for Runway 9R. The relocating of the endpoint of Runway 27L to the west by 300 feet would have a more subtle effect.
- The introduction of Runway 9C/27C. Modeled flight tracks for Runway 9C/27C were developed by replicating and modifying Runway 9R/27L flight tracks, maintaining to the extent possible the distribution of track use modeled for the Existing Condition across a track bundle. The TAAM track distribution was used to adjust the track bundle locations as necessary for the Interim No Action.
- The final approach segments of arrival tracks to Runways 10R (on the west side of the airport) and to Runway 28L (on the east side of the airport) would be modified to coincide with their extended runway centerlines. In other words, the offset arrival procedures were removed.
- The southside downwind segments of arrival tracks to all west side runway ends and the southside downwind approach to Runway 28L would be modified in accordance with the changes to the

offset final approach segments (described in the previous bullet), making the downwind segments and final approach segments parallel.

Table F-26 lists the resultant counts of flight tracks by type of operation. Due to the complex nature of the airspace at O'Hare, 1,508 unique backbone tracks were developed, each having up to six sub-tracks, to represent the 952,490 annual flight operations at O'Hare for the Interim Condition. Of these track bundles, 747 were repeated for the purpose of separate modeling with ACC. Altitude data of the radar tracks in each bundle were used to determine average altitudes. **Section F.4.7** contains more information regarding ACC.

Attachment F-3 contains the flight track use percentages and modeled flight track depictions for arrivals and departures by runway end for each flow.

TABLE F-26
COUNTS OF FLIGHT TRACKS BY TYPE OF OPERATION FOR THE INTERIM NO ACTION

Track Set	Aircraft Category	Traffic Flow	Arrival Track Bundles (see note 1)			Departure Track Bundles (see note 1)			Total Track Bundles (see note 1)		
			Day	Night	Total	Day	Night	Total	Day	Night	Total
Regular Tracks (see note 1)	WBJ	East	79	74	153	63	82	145	142	156	298
		West	66	70	136	88	53	141	154	123	277
	OJ	East	116	115	231	72	89	161	188	204	392
		West	113	112	225	86	102	188	199	214	413
	NJ	East	24	6	30	35	0	35	59	6	65
		West	18	2	20	43	0	43	61	2	63
	Subtotals by Traffic Flow										
	East		219	195	414	170	171	341	389	366	755
	West		197	184	381	217	155	372	414	339	753
	Subtotals by Aircraft Category										
	WBJ		145	144	289	151	135	286	296	279	575
	OJ		229	227	456	158	191	349	387	418	805
	NJ		42	8	50	78	0	78	120	8	128
	Total Regular Tracks		**416**	**379**	**795**	**387**	**326**	**713**	**803**	**705**	**1,508**
Flight Tracks duplicated for Altitude Control Code Modeling (see note 2)	WBJ		67	78	145	97	62	159	164	140	304
	OJ		143	91	234	112	80	192	255	171	426
	NJ		9	0	9	8	0	8	17	0	17
	Total Duplicate Tracks		**219**	**169**	**388**	**217**	**142**	**359**	**436**	**311**	**747**
Total Flight Track Bundles (see note 2)	WBJ		212	222	434	248	197	445	460	419	879
	OJ		372	318	690	270	271	541	642	589	1231
	NJ		51	8	59	86	0	86	137	8	145
	Grand Total		**635**	**548**	**1,183**	**604**	**468**	**1,072**	**1,239**	**1,016**	**2,255**

Track Set	Aircraft Category	Traffic Flow	Arrival Track Bundles (see note 1)			Departure Track Bundles (see note 1)			Total Track Bundles (see note 1)		
			Day	Night	Total	Day	Night	Total	Day	Night	Total

Notes:
1)Numbers indicate 'backbone' tracks only; each backbone track may have up to six associated sub-tracks to model dispersion around the backbone; "regular" flight tracks section excludes duplicate tracks for altitude control code modeling.
2)Numbers indicate duplicated tracks with ACC added to account for flight profile level off or hold downs.
WBJ = Widebody Jet; OJ = Other Jet; NJ = Non-jet

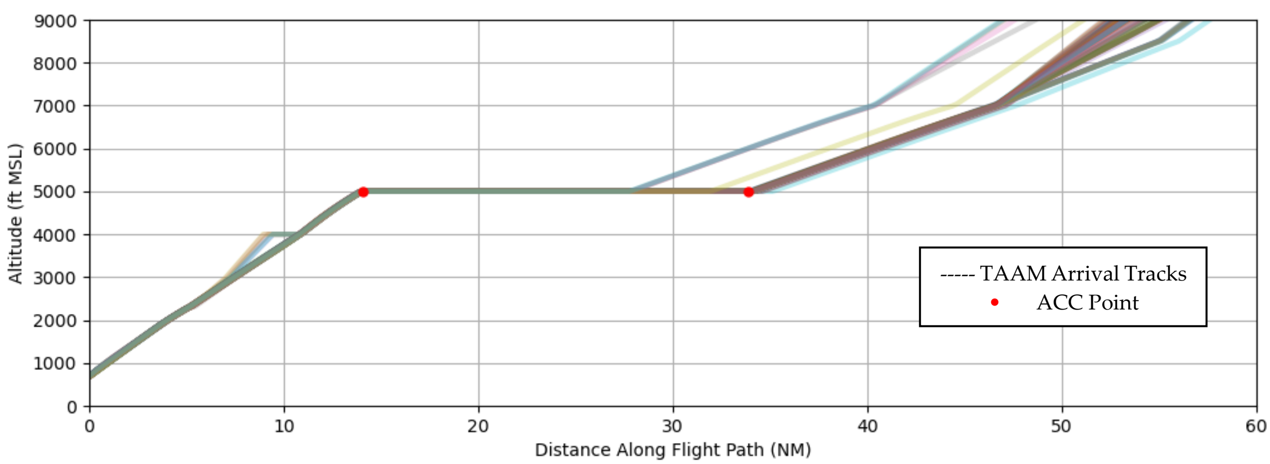
Source: HMMH, 2021

F.4.7 Flight Profiles

With the same methodology as used for the Existing Condition (**Section F.3.7**), the EA team modeled the O'Hare arrival and departure operations for the Interim Condition using the standard AEDT flight profiles in conjunction with ACC methodology to accurately represent aircraft altitudes along level flight segments. For the Interim Condition, however, the application of ACCs were informed by the TAAM modeling as opposed to using radar flight track data.

The default AEDT flight profile data was adjusted to incorporate all lengthy level flight segments (three NM or longer) below 8,000 feet MSL[27] that were simulated in TAAM. **Figure F-3** provides an example of TAAM-simulated level segments at 5,000 feet MSL along the TRTLL STAR.[28] The red dots indicate where along the AEDT-modeled flight track ACCs were added to model a level flight segment at an altitude of 5,000 feet MSL along this route. Every modeled track in the TAAM simulations was checked for these level segments, and the data was added to the AEDT-modeled tracks for the Interim Condition.

FIGURE F-3
EXAMPLE TAAM PROFILES WITH ALTITUDE HOLD AT 5,000 FT MSL FOR RUNWAY 28C DAYTIME JET ARRIVALS VIA THE TRTLL STAR



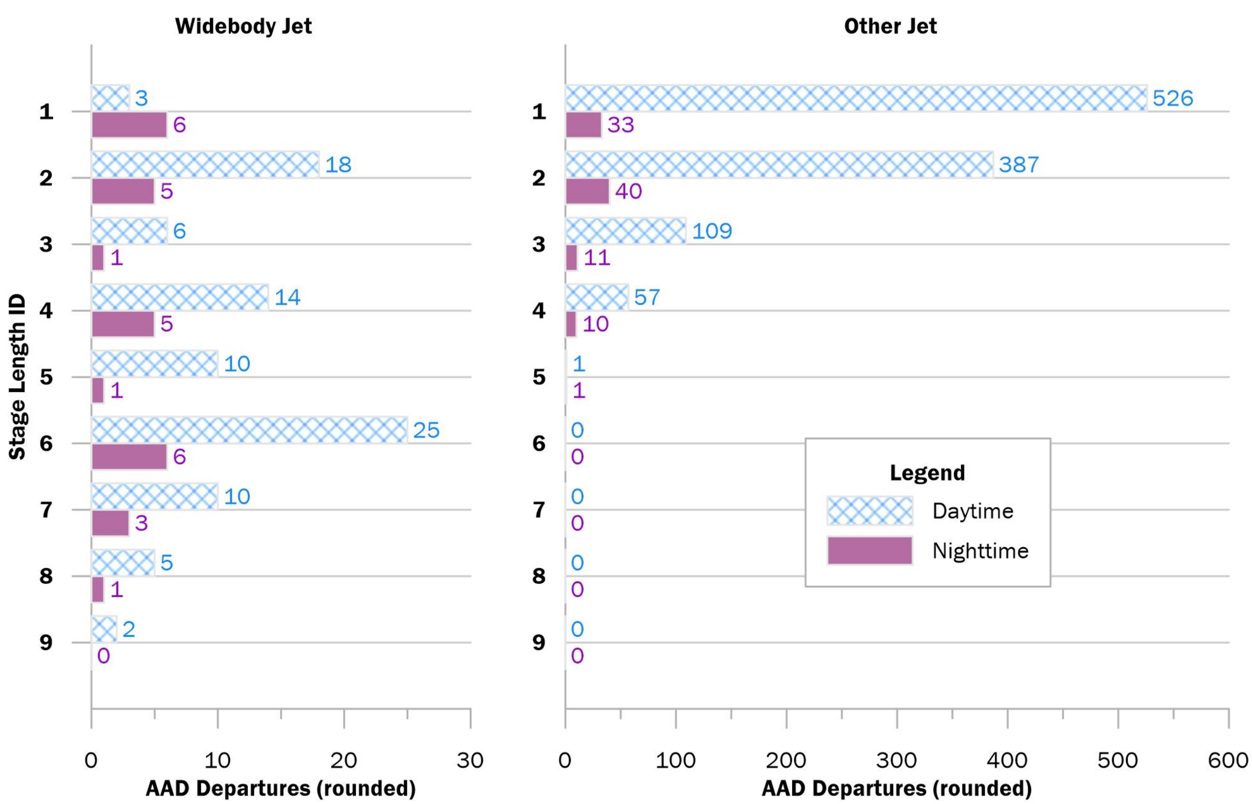
Source: CDA, 2020; HMMH analysis, 2020

27 An altitude cutoff of 8,000 feet MSL was used in order to include any level segments at or below 7,000 feet MSL, ensuring that all aircraft activity below 7,000 feet AGL was accounted for in the modeling.
28 The TRTLL STAR is a Standard Arrival Route from the southwest into O'Hare airspace.

The forecast's DDFS indicated destinations for each departure flight for the Interim No Action. Using the distance between O'Hare and the destination airport, the EA team assigned an AEDT stage length (shown in **Table F-13**) to each departure. The modeled stage length distribution for the Interim No Action is depicted in **Figure F-4**, for the Widebody Jet and Other Jet categories.[29] The third category of aircraft, Non-jet, nearly always has destinations within the stage length 1 range and thus are not shown. For the purposes of the figure, AAD departures were rounded to the nearest departure. As shown in the figure, the majority (about 70 percent of daytime and 60 percent of nighttime) of Widebody Jet flights were stage length 4 or higher, implying West Coast and international destinations. Most daytime or nighttime Other Jet flights would be stage length 3 or less.

Although AEDT performance profiles range from stage length 1 through 9, many AEDT aircraft types do not have flight profiles defined for the longest stage lengths. Many GA aircraft types have a profile only for stage length 1. If the forecast indicated a departure stage length that exceeded that aircraft's available performance profiles, the profile for the greatest stage length available for that aircraft type was used.

FIGURE F-4
DISTRIBUTION OF MODELED DEPARTURE STAGE LENGTHS FOR THE INTERIM NO ACTION



Source: HMMH analysis, 2021

[29] The scales of the two sides of the figure are different because there are more than ten times as many Other Jet operations as there are Widebody Jet operations.

F.4.8 Maintenance Run-Up Operations

The CDA provided estimates of future maintenance run-ups operations, locations, and durations for the Interim Condition, including aircraft type. AEDT aircraft types were assigned by matching the CDA-specified aircraft types with the modeled Interim Condition flight operations. Run-ups were modeled at seven[30] distinct locations as shown in **Exhibit F-10**. Most run-ups would be conducted at O'Hare's GRE at the same location as modeled for the GRE run-ups in the Existing Condition.

The CDA provided the magnetic headings of the aircraft during run-ups. All run-ups at the GRE were modeled at a heading of 315 degrees (i.e., toward the northwest, or the open end of the GRE). Headings of non-GRE run-ups were modeled at 220, 220, 315, 135, 100, and 280 for Spots 1 through 6, respectively.

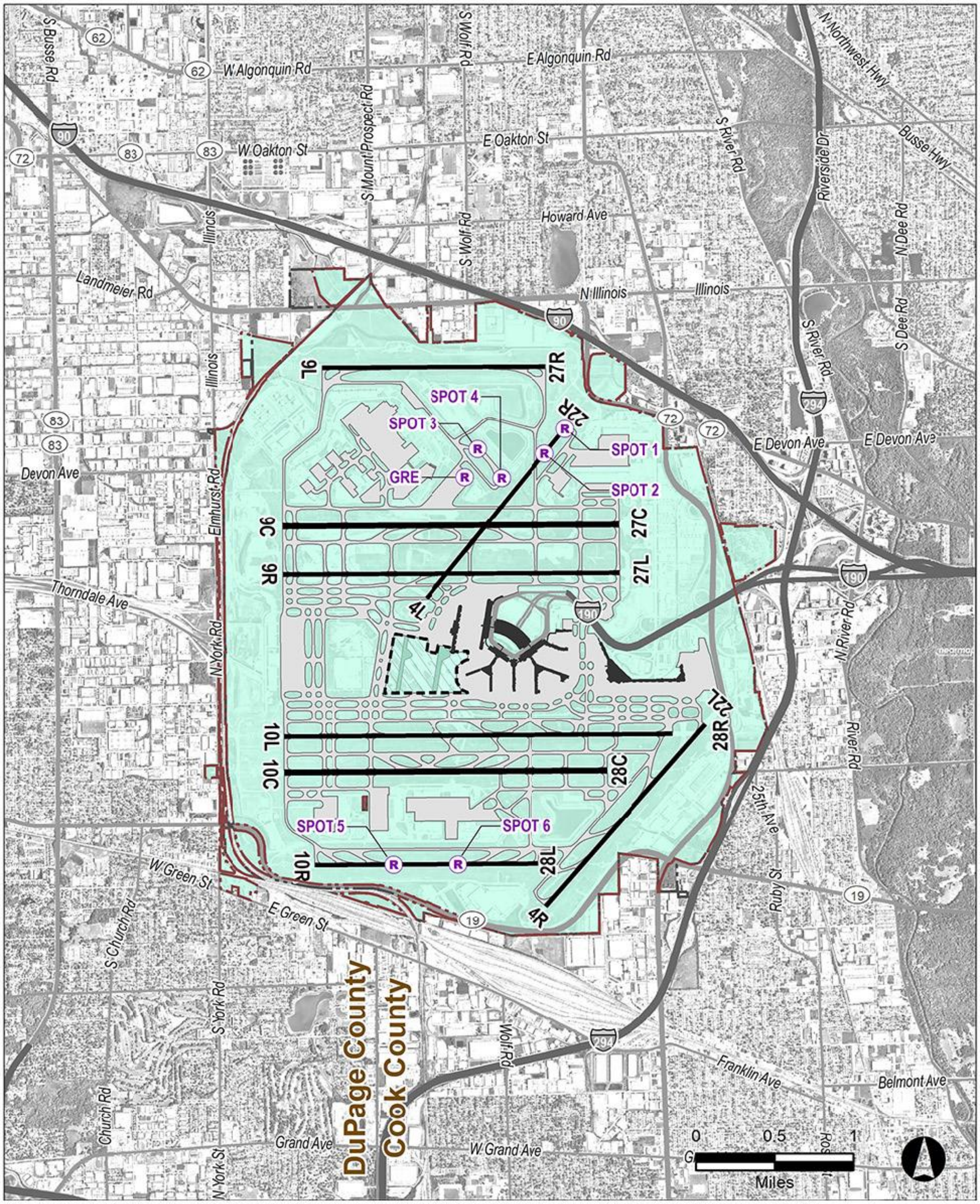
Table F-27 and **Table F-28** summarize the modeled run-up operations for the Interim Condition. **Table F-27** presents the information by run-up location, while **Table F-28** presents totals. More than 94 percent of the modeled run-up operations would be by Narrowbody Jets and 90 percent would occur at the GRE. Nearly 40 percent of the run-up operations would be conducted during the DNL nighttime period. The maximum nighttime event duration would be 88 minutes, conducted by 7378MAX aircraft at Spot 4 location. No Non-jet run-ups would be conducted.

In comparison to the Existing Condition, the Interim Condition excludes run-ups of the A300-622R, DC1010, MD11GE, MD11PW, 757RR, CNA525C, CNA750, EMB145, EMB190, MD83, and MD9025 aircraft but newly includes run-ups by 747400, 7773ER, A330-343, 7378MAX, CNA55B, EMB170, and GV aircraft. All aircraft types modeled for run-up operations are also represented in the flight operations modeling (which was based on the DDFS schedule) except for the GV. The few annual run-up operations modeled with the GV[31] represent business jets conducting run-ups in the future conditions.

The CDA does not record power settings; therefore, aircraft run-ups were modeled with the same four power settings used for the Existing Condition: 7, 30, 85, and 100 percent of maximum thrust. Consistent with air quality modeling, noise modeling for run-ups are equally divided the run-up operations among these four power settings. It was assumed that all engines would operate simultaneously at these power settings for each run-up operation for the durations shown in **Table F-27.** All modeled aircraft types have two engines, except for one Widebody Jet aircraft, 747400, which has four. Most two-engined jet aircraft types modeled have under-wing mounted engines; the others have rear-mounted engines.

Modeling of run-ups at the GRE location did not include the noise reduction capability of the GRE, as AEDT does not have the ability to model noise barriers. The run-ups in the GRE were modeled with the same four aforementioned power settings as for non-GRE locations which is consistent with the air quality modeling.

[30] CDA identified the seven run-up locations: Spots 1 through 6 and the GRE.
[31] The AEDT aircraft type GV represents the Gulfstream 650, a new large business jet.



Source: HMMH, Ricondo & Associates, Illinois Geospatial Data Clearinghouse, Cook County Government GIS, DuPage County GIS, Environmental Systems Research Institute

Chicago O'Hare International Airport

Terminal Area Plan and Air Traffic Procedures Environmental Assessment

Modeled Maintenance Run-Up Locations for Interim and Build Out Conditions

Exhibit F-10

TABLE F-27
MODELED MAINTENANCE RUN-UP OPERATIONS FOR THE INTERIM CONDITION

Run-up Location	Heading (degrees magnetic)	AEDT Aircraft ID	Daytime Annual Events	Daytime Duration per Event (minutes)	Nighttime Annual Events	Nighttime Duration per Event (minutes)	Total Annual Events
Ground Run-Up Enclosure	315	737700	3	16.7	-	-	3
		757300	13	28.7	7	24.3	20
		767300	1	20.0	1	10.0	2
		7378MAX	37	20.4	29	32.0	66
		U_737800	135	27.2	90	27.8	225
		7878R	1	10.0	1	45.0	2
		A319-131	38	26.3	24	17.5	62
		A320-211	3	10.0	2	15.0	5
		A320-232	23	22.8	25	31.5	48
		A321-232	27	24.1	19	25.2	46
		A330-343	1	10.0	2	15.0	3
		CL600	80	27.6	60	26.0	140
		CNA55B	1	20.0	1	20.0	2
		CRJ9-ER	156	26.2	77	22.3	233
		EMB14L	111	27.2	75	25.0	186
		EMB170	23	18.0	21	23.0	44
		EMB175	91	20.6	67	25.1	158
		GV	2	27.5	2	15.0	4
Spot 1	220	747400	1	10.0	-	-	1
		777200	-	-	1	10.0	1
		7878R	2	10.0	1	10.0	3
		A330-343	1	10.0	2	25.0	3
		CL600	-	-	1	20.0	1
		CRJ9-ER	-	-	1	10.0	1
Spot 2	220	747400	1	20.0	-	-	1
		777200	2	66.7	1	10.0	3
		7878R	6	18.3	2	10.0	8
		A330-343	2	15.0	1	20.0	3
		CL600	2	10.0	-	-	2
Spot 3	315	777200	1	30.0	1	10.0	2
		7378MAX	-	-	1	20.0	1
		U_737800	9	29.8	5	20.0	14

Run-up Location	Heading (degrees magnetic)	AEDT Aircraft ID	Daytime Annual Events	Daytime Duration per Event (minutes)	Nighttime Annual Events	Nighttime Duration per Event (minutes)	Total Annual Events
		7773ER	1	88.4	-	-	1
		7878R	3	16.7	3	54.5	6
		A319-131	1	10.0	-	-	1
		A320-232	2	15.0	2	20.0	4
		A321-232	1	10.0	2	20.0	3
		A330-343	4	22.5	4	34.6	8
		CL600	7	50.7	-	-	7
		EMB14L	-	-	1	20.0	1
Spot 4	135	757300	-	-	1	45.0	1
		777200	2	15.0	1	10.0	3
		7378MAX	2	20.0	1	88.4	3
		U_737800	5	30.0	6	21.7	11
		7878R	3	16.7	3	39.5	6
		A319-131	2	27.5	-	-	2
		A320-232	2	15.0	2	20.0	4
		A321-232	2	27.5	2	49.2	4
		A330-343	3	13.3	3	20.0	6
		CL600	4	47.1	1	20.0	5
		CRJ9-ER	1	30.0	-	-	1
		EMB14L	-	-	2	32.5	2
Spot 5	100	747400	1	20.0	-	-	1
		767300	1	10.0	-	-	1
		777200	2	20.0	-	-	2
		7878R	3	13.3	-	-	3
		A330-343	2	20.0	-	-	2
Spot 6	280	747400	1	20.0	-	-	1
		767300	1	10.0	-	-	1
		777200	1	10.0	-	-	1
		7773ER	1	10.0	-	-	1
		7878R	1	30.0	-	-	1

Source: CDA, 2020; HMMH analysis, 2020

TABLE F-28
SUMMARY OF MODELED MAINTENANCE RUN-UP OPERATIONS FOR THE INTERIM CONDITION

Aircraft Category	Aircraft Type	Daytime		Nighttime		Total	
		Annual Events	Annual Hours (see note 1)	Annual Events	Annual Hours (see note 1)	Annual Events	Annual Hours (see note 1)
WBJ	747400	5	1.7	-	-	5	1.7
WBJ	767300	3	0.7	1	0.2	4	0.9
WBJ	777200	8	4.1	4	0.7	12	4.8
WBJ	7773ER	2	1.6	-	-	2	1.6
WBJ	7878R	19	5.2	10	5.9	29	11.1
WBJ	A330-343	13	3.7	12	5.0	25	8.7
OJ	737700	3	0.8	-	-	3	0.8
OJ	U_737800	149	68.2	101	45.6	250	113.8
OJ	7378MAX	39	13.2	31	17.3	70	30.5
OJ	757300	13	6.2	8	3.6	21	9.8
OJ	A319-131	41	17.8	24	7.0	65	24.8
OJ	A320-211	3	0.5	2	0.5	5	1.0
OJ	A320-232	27	9.7	29	14.4	56	24.1
OJ	A321-232	30	11.9	23	10.3	53	22.2
OJ	CL600	93	46.3	62	26.6	155	72.9
OJ	CNA55B	1	0.3	1	0.3	2	0.6
OJ	CRJ9-ER	157	68.7	78	28.8	235	97.5
OJ	EMB14L	111	50.3	78	32.6	189	82.9
OJ	EMB170	23	6.9	21	8.1	44	15.0
OJ	EMB175	91	31.2	67	28.0	158	59.2
OJ	GV	2	0.9	2	0.5	4	1.4
Total		**833**	**349.8**	**554**	**235.3**	**1,387**	**585.1**
Subtotal by Location							
Ground Run-up Enclosure		746	312.9	503	212.7	1,249	525.6
Spot 1		4	0.7	6	1.7	10	2.4
Spot 2		13	5.2	4	0.8	17	6.0
Spot 3		29	15.5	19	8.9	48	24.4
Spot 4		26	11.1	22	11.3	48	22.4
Spot 5		9	2.5	-	-	9	2.5

Aircraft Category	Aircraft Type	Daytime		Nighttime		Total	
		Annual Events	Annual Hours (see note 1)	Annual Events	Annual Hours (see note 1)	Annual Events	Annual Hours (see note 1)
Spot 6		6	1.8	-	-	6	1.8
Total		**833**	**349.8**	**554**	**235.3**	**1,387**	**585.1**
Notes: 1) computed from sum of seconds, rounded to the nearest 0.1 hour WBJ = Widebody Jet; OJ = Other Jet; NJ = Non-jet							
Source: CDA, 2020; HMMH analysis, 2020							

F.4.9 Noise Exposure

Sections F.4.9.1 and **F.4.9.2** describe the resultant DNL contours and affected noise-sensitive facilities, respectively.

F.4.9.1 DNL Contours

Using the input data documented in the preceding sections, AEDT calculated DNL at over 118,000 evenly-spaced grid points throughout the PSA and SSA. **Exhibit F-11** provides the resultant DNL contours for the Interim No Action.

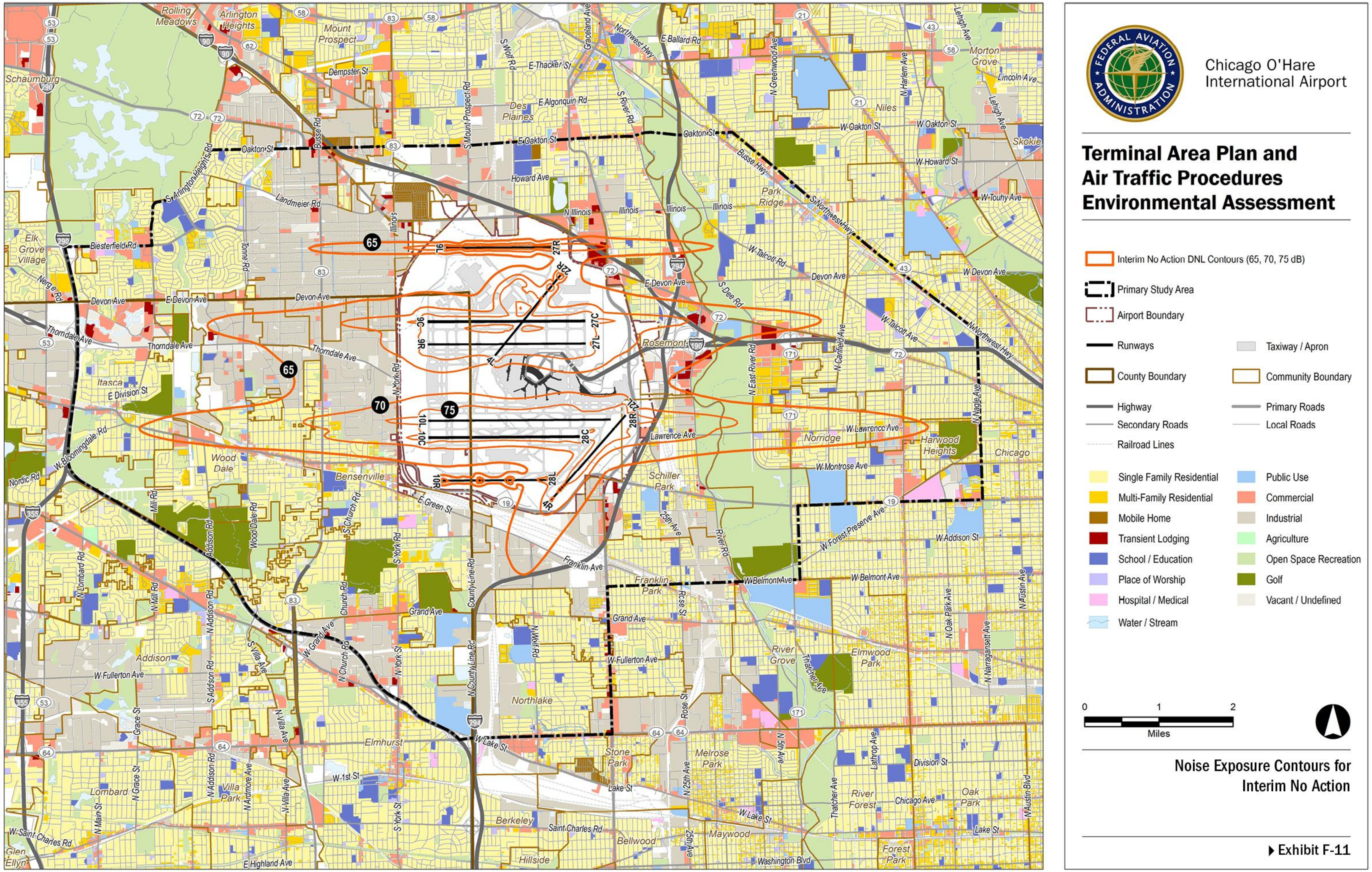
The DNL contours extend away from O'Hare on the east and west side in three main lobes (north, central, and south), and in a single lobe on the south side.

- The north east-west lobe would be due to flight operations to and from Runway 9L-27R. The east lobe of the 65 DNL contour would include residential areas of Des Plaines; it would extend into Chippewa Woods south of West Talcott Road, ending west of South Dee Road. The west lobe of the 65 DNL contour would include mainly commercial industrial parcels west of Busse Road.
- The central east-west lobe would be due to flight operations to and from Runways 9C-27C and 9R-27L. The east lobe of the 65 DNL contour would include residential areas of Rosemont and the southern reaches of Park Ridge extending almost to South Ashland Avenue. The west lobe of the 65 DNL contour would include primarily commercial industrial parcels and residential areas of Bensenville south of State Route 390, extending south of Devon Avenue westward to just east of the Salt Creek Golf Club.
- The south east-west lobe would be due to flight operations to and from Runways 10L-28R and 10C-28C. The east lobe of the 65 DNL contour would include residential areas of Schiller Park, Norridge, and Harwood Heights, ending just west of the Ridgemoor Country Club golf course. The west lobe of the 65 DNL contour would include residential areas of Bensenville, Wood Dale, and Itasca, extending just west of the intersection of Irving Park Road and South Princeton Avenue.
- The south lobe of the 65 DNL contour, due to flight operations to and from Runway 4R-22L, extends over industrial property to Interstate 294.

The 70 DNL contour for the Interim No Action would include residential parcels primarily in three areas: 1) Rosemont just east of Runway 27C, 2) Schiller Park east of Runway 28R, and 3) Bensenville west of Runways 10L and 10C.

Table F-29 shows the land uses that would be exposed to DNL greater than or equal to 65 dB for the Interim No Action. The top portion of the table quantifies acreage within each contour band by land use category. The remainder of the table provides the counts of noise-sensitive facilities and estimates of population and number of housing units for each DNL. Under the Interim No Action, no non-compatible land use would be exposed to DNL greater than or equal to 75 dB. Of the nearly 6,000 off-airport acres that would be exposed to DNL of 65 or greater, 22 percent (approximately 1,300 acres) would consist of non-compatible land use.

There were an estimated 23,415 people in 9,359 housing units within the 65 DNL. Of the 9,359 housing units, 4,567 have been sound-insulated by the CDA and 228 are scheduled to be sound-insulated as part of Phase 18 and 19 of the CDA RSIP. Most non-mitigated homes within the Interim No Action 65 DNL are currently not eligible as they are outside the DNL noise contour used for the ongoing RSIP for the OMP. Ineligible locations include areas of Itasca and Wood Dale west of Runways 10C and 10L, areas of Norridge and Harwood Heights east of Runways 28C and 28R, and a small area of Rosemont northeast of Runway 27C.



Source: HMMH 2018, USCB 2016, USCB 2010, Illinois Geospatial Data Clearinghouse, CMAP Data Hub, ESRI

TABLE F-29
NOISE EXPOSURE FOR THE INTERIM NO ACTION

		DNL Contour Bands			
Land Use (Acres)	**Compatibility**	**65-70**	**70-75**	**75+**	**Total**
Single-Family Residential	Non-compatible	1,032.4	65.6	-	1,098.0
Multi-Family Residential		83.6	31.8	-	115.4
Transient Lodging (residential)		58.1	7.6	-	65.7
Mobile Home		-	-	-	-
School/Education		15.0	4.7	-	19.7
Commercial	Compatible	303.3	15.8	-	319.1
Industrial, Manufacturing, and Production		2,899.3	557.1	16.6	3,473.0
Recreational		491.3	75.0	-	566.3
Public Use (excluding School/Education)[1]		90.7	2.8	-	93.5
Undeveloped		171.1	22.3	0.4	193.8
Airport		2,241.2	1,714.8	1,852.1	5,808.1
Water		18.1	1.7	-	19.8
Subtotal Non-compatible Area (acres)		1,189.1	109.7	-	1,298.8
Subtotal Compatible Area (acres)		6,215.0	2,389.5	1,869.1	10,473.6
Total Area (acres)		**7,404.1**	**2,499.2**	**1,869.1**	**11,772.4**
Off-airport Total Area (acres)		**5,162.9**	**784.4**	**17.0**	**5,964.3**
Noise Sensitive Facilities (count)					
Universities		1	-	-	1
Schools		4	1	-	5
Sound-Insulated Schools (Included above)		*4*	*1*	-	*5*
Libraries		1	-	-	1
Hospitals		-	-	-	-
Nursing Homes		1	-	-	1
Places of Worship		7	-	-	7
Parks and 4(f) Lands		26	2	-	28
Historic Properties		4	1	-	5
Total		**44**	**4**	**-**	**48**
Population and Housing (count)					
Population		19,964	3,451	-	23,415
Housing Units		8,029	1,330	-	9,359
Non-mitigated single-family housing units (Included above)[2]		*2,668*	*78*	-	*2,746*
Non-mitigated multi-family housing units (Included above)[2]		*2,046*	-	-	*2,046*
Sound insulated single-family housing units (included above)		*3,299*	*1,252*	-	*4,551*
Sound insulated multi-family housing units (included above)		*16*	-	-	*16*

Note 1: For the purposes of this document, Public Use (excluding School/Education) land use is considered compatible.
Note 2: The majority (88.8%) of the non-mitigated housing units are not eligible under the existing ORD RSIP because these units are outside the current RSIP DNL 65 dB contour.

Sources: ORD Residential Sound Insulation Program, January 2021 database: City of Chicago
2020 U.S. Census Bureau Census Block Population Data
Interim No Action Noise Contours, Land Use, Noise-Sensitive Facilities, Population and Housing data: HMMH Analysis, October 2021

F.4.9.2 Noise-Sensitive Facilities

As listed in **Table F-29** and **Table F-30**, and shown in **Exhibit F-12**, 48 noise-sensitive facilities in the PSA, primarily parks and Section 4(f) lands, would be exposed to 65 DNL or greater. None would be exposed to 75 DNL or greater. No hospitals in the PSA would be exposed to DNL greater than 65 dB. Seven learning institutions, consisting of a University (Logos Evangelical Seminary), five schools, and a library (Wood Dale Public Library; L08) would be exposed to 65 DNL or greater. One school (Washington Elementary School; S81) would be exposed to a DNL of approximately 71 dB. All five (Kindergarden to 12th Grade) schools exposed to 65 DNL or greater have been sound-insulated by the CDA. Three of the 28 parks and Section 4(f) lands that would be exposed to DNL greater than 65 dB (Norridge Rec Center–East, The Dome at the Parkway Bank Sports Complex, and Wood Dale Recreation Complex (IDs P132, P188, and P215, respectively)) do not have outdoor use. Noise results for all sites modeled within the PSA are provided in **Attachment F-5.**

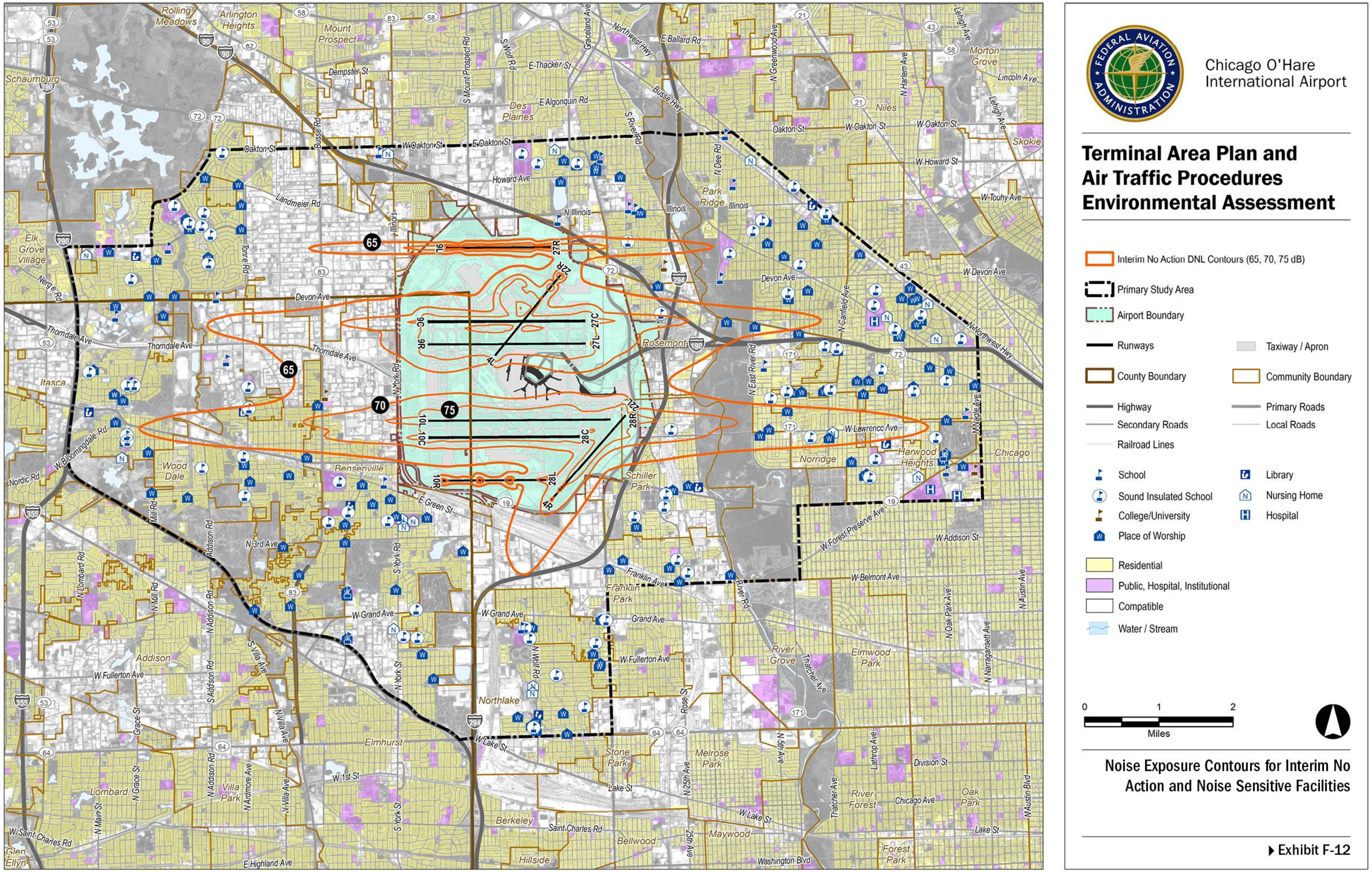
TABLE F-30
NOISE-SENSITIVE FACILITIES WITH A DNL OF AT LEAST 65 DB FOR THE INTERIM NO ACTION

			DNL (dB) in DNL Contour Band		
Map ID	**Municipality**	**Name**	**65 - 70**	**70 - 75**	**Note**
Learning Institutions					
U01	Bensenville	Logos Evangelical Seminary	66.8	-	-
S28	Des Plaines	Orchard Place Elementary School	66.7	-	1
S58	Norridge	J Leigh Elementary School	66.9	-	1
S77	Rosemont	Rosemont Elementary School	69.0	-	1
S81	Schiller Park	Washington Elementary School	-	71.3	1
S83	Wood Dale	Early Childhood Education Center	65.5	-	1
L08	Wood Dale	Wood Dale Public Library District	66.2	-	-
Health Care Facilities					
N12	Norridge	Central Baptist Village	67.1	-	-
Places of Worship					
W006	Bensenville	First Baptist Church	67.3	-	-
W018	Chicago	All Saints Polish National Catholic Church	68.1	-	-
W025	Chicago	Evangelical Lutheran Church In America	66.6	-	-
W034	Chicago	Our Lady Mother of the Church Roman Catholic Church	68.3	-	
W038	Chicago	St. Joseph Ukrainian Church	66.2	-	-
W090	Norridge	Church Of Our Savior	66.5	-	-
W095	Norridge	Zion Evangelical Lutheran Church	68.7	-	-
Parks and 4(f) Lands					
FP06	Chicago	Robinson Woods South	68.8	-	-
FP26	Schiller Park	River Bend Family Picnic Area	66.5	-	-

			DNL (dB) in DNL Contour Band		
Map ID	**Municipality**	**Name**	**65 - 70**	**70 - 75**	**Note**
FP27	Schiller Park	Robinson Homestead Family Picnic Area	65.5	-	-
P019	Bensenville	Mohawk Park	-	70.6	-
P027	Bensenville	Poplar Park	69.5	-	-
P066	Des Plaines	Orchard Place Elementary School Park	67.5	-	-
P089	Elk Grove Village	Pocket Park #5	65.4	-	-
P132	Harwood Heights	Norridge Rec Center-East	65.4	-	2
P143	Itasca	Schiller Park	65.4	-	-
P152	Norridge	Norridge Park	66.6	-	-
P162	Park Ridge	Brickton Park	65.2	-	-
P172	Park Ridge	Southwest Park	65.3	-	-
P177	Rosemont	Donald E. Stephens Athletic Complex	69.4	-	-
P180	Rosemont	Dunne Park	67.9	-	-
P181	Rosemont	Margaret J. Lange Park	67.5	-	-
P182	Rosemont	Monument Park	65.2	-	-
P183	Rosemont	Parkway Bank Park Entertainment District	65.5	-	-
P188	Rosemont	The Dome at the Parkway Bank Sports Complex	68.2	-	2
P189	Rosemont	Westin Park	67.7	-	-
P190	Schiller Park	"Bark" Park	68.0	-	-
P193	Schiller Park	Fairview Park	66.5		
P195	Schiller Park	North Village Park	-	71.5	
P200	Schiller Park	Dooley Memorial Park	65.6	-	-
P205	Wood Dale	Central Park	69.4	-	-
P212	Wood Dale	Mohawk Manor Park	65.9	-	-
P213	Wood Dale	Veteran's Memorial Park	65.7	-	-
P215	Wood Dale	Wood Dale Recreation Complex	65.1	-	2
P216	Wood Dale	Wood Dale Water Park	67.1	-	-
Historic Properties					
HN08	Chicago	Rest Haven Cemetery	68.9	-	-
HN09	Chicago	Old Control Tower	67.5	-	-
HN10	Chicago	United Terminal 1	68.6	-	-
HN11	Chicago	Rotunda	67.8	-	-
LS246	Schiller Park	20 Corner Store	-	71.6	-

Notes:
1) Sound-insulated
2) No outdoor use

Source: HMMH, 2021



Source: HMMH 2018, USCB 2016, USCB 2010, Illinois Geospatial Data Clearinghouse, CMAP Data Hub, ESRI