Appendix Six

Noise Technical Report for the Master Plan Update

BFI

MASTER PLAN UPDATE

King County International Airport/ Boeing Field

Mead & Hunt

King County International Airport/Boeing Field

Noise Technical Report for the Master Plan Update

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1.0 Introduction

This Noise Technical Report summarizes the aircraft noise analysis in support of Boeing Field (BFI) Master Plan Update. The objective of this study is to analyze existing conditions (year 2018) and three future year scenarios for 2023 and 2035 to determine the noise exposure levels related to the proposed Master Plan.

For the purposes of this analysis, the aircraft-related noise exposure is described using noise contours prepared with the Federal Aviation Administration's (FAA) Aviation Environmental Design Tool (AEDT) Version 3b, in compliance with 14 CFR Part 150 *Airport Noise Compatibility Planning,* FAA Order 1050.1F and FAA Order 5050.4B the *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*, 42 U.S.C. 4332(2)(c), 49 U.S.C. 303, 23 U.S.C. 138, and the Council on Environmental Quality (CEQ) guidelines.

2.0 Noise and Effects on People

The following section provides basic information on noise and its characteristics, and the effects of noise on people.

2.1 Characteristics of Sound

Sound can be described in terms of amplitude (loudness), frequency (pitch), and duration (time). The standard unit of measurement of the loudness of sound is the decibel (dB). Decibels are based on the logarithmic scale. The logarithmic scale compresses the wide range in sound pressure levels to a more usable range of numbers in a manner similar to the Richter scale used to measure earthquakes.

The human hearing system is not equally sensitive to sound at all frequencies. Sound waves below 16 Hz are not heard at all but are "felt" as a vibration. Similarly, while people with extremely sensitive hearing can hear sounds as high as 20,000 Hz, most people cannot hear above 15,000 Hz. In all cases, hearing acuity falls off rapidly above about 10,000 Hz and below about 200 Hz. Since the human ear is not equally sensitive to sound at all frequencies, a frequency-dependent rating scale has been devised to relate noise to human sensitivity. The A-weighted decibel scale (dBA) performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear. Community noise levels are measured in terms of the A-weighted decibel abbreviated dBA or dB.

2.2 Propagation of Noise

Outdoor sound levels decrease as a result of several factors, including distance from the sound source, atmospheric absorption (characteristics in the atmosphere that absorb sound), and ground attenuation (characteristics on the ground that absorb sound). If sound is radiated from a source in a homogeneous and undisturbed manner, the sound travels in spherical waves. As the sound wave travels away from the source, the sound energy is spread over a greater area dispersing the sound power of the wave.

Temperature and humidity of the atmosphere also influence the sound levels received by the observer. The influence of the atmosphere and the resultant fluctuations increase with distance and become particularly important at distances greater than 1,000 feet. The degree of absorption depends on frequency of the sound as well as the humidity and air temperature. For example, when the air is cold and humid, and therefore denser, atmospheric absorption is lowest. Higher frequencies are more readily absorbed than the lower frequencies. Over large distances, lower frequency sounds become dominant as the higher frequencies are attenuated.

2.3 Noise Metrics

The analysis and reporting of community noise levels around communities has to account for the complexity of human response to noise and the variety of noise metrics that have been developed for describing noise impacts. Each of these metrics attempts to quantify noise levels with respect to community response.

Noise metrics can be divided into two categories: single event and cumulative. Single event metrics describe the noise levels from an individual event such as an aircraft flyover. Cumulative metrics average the total noise over a specific time period, which is typically from one to 24-hours for community noise levels. This study presents both single event and cumulative noise modeling results.

Maximum Noise Level (Lmax) is the peak sound level during an aircraft noise event. The metric only accounts for the instantaneous peak intensity of the sound, and not for the duration of the event. As an aircraft passes by an observer, the sound level increases to a maximum level and then decreases. Typical single event noise levels range from over 90 dBA close to the airport to 50-60 dBA at more distant locations.

Sound Exposure Level (SEL) is calculated by summing the decibel levels during a noise event and compressing that noise into one second. The SEL value is the integration of all the acoustic energy contained within the noise event (for example, an aircraft overflight or automobile pass-by). This metric considers both the maximum noise level of the event and the duration of the event. For aircraft flyovers, the SEL value is approximately 10 dB higher than the maximum noise level.

Day-Night Average Sound Level (DNL) is a measure of twenty-four hours and applies a weighting factor which places greater significance on noise events occurring during the night hours. DNL is a 24-hour, time-weighted average noise level based on the A-weighted decibel. Time-weighted refers to the fact that noise which occurs during certain sensitive time periods is penalized for occurring at these times. The night time period (10 p.m. to 7 a.m.) is penalized by 10 dB. This penalty was selected to attempt to account for increased human sensitivity to noise during the quieter period of a day, where sleep is the most common activity. DNL levels near airports range from DNL 75 dB on airport property to below DNL 45 dB at more distant locations.

3.0 Noise Regulations and Policies

The noise analysis was conducted in compliance with 14 CFR Part 150 *Airport Noise Compatibility Planning,* FAA Order 1050.1F, and FAA Order 5050.4B. The thresholds for significant aircraft noise impact are defined using the DNL metric. According to the Land Use Guidance Table in 14 CFR Part 150, DNL 65 dB is the threshold to determine land use compatibility for noise-sensitive land uses (e.g., residences, schools, places of worship, etc.). In general, commercial, industrial, and outdoor recreation land uses are compatible with aircraft noise.

4.0 Existing and Future Noise Conditions

The existing aircraft noise environment at BFI was evaluated based upon the modeling of the aircraft operations in 2018. This section of the report provides a description of the data and assumptions used to develop the noise exposure map for 2018 existing conditions and future year 2023 and 2035 conditions. For this analysis, data from multiple sources were used, including:

- FAA System Wide Information Management (SWIM) radar data (January 2018 - December 2018)
- FAA Traffic Flow Management System Counts (TFMSC) operations and fleet mix data
- FAA Operations and Performance Data (OPSNET) tower counts
- FAA Terminal Area Forecast (TAF) data
- Airport Master Plan Update Forecasts

Runway utilization and day/night distribution were estimated based upon an analysis of annual aircraft operational data and radar tracks collected through the FAA data sources listed above.

The AEDT requires a variety of operational data to model the noise environment around an airport. These data include the following information, which are discussed in detail in the following paragraphs:

- Aircraft activity levels
- Aircraft fleet mix
- Time of day
- Stage length
- Runway utilization
- Flight paths and utilization

4.1 Existing Conditions Aircraft Activity

Activity levels for 2018 Existing Conditions at BFI were derived from the sources listed above in Section 4.0. The specific data for aircraft types, time of day, runway use, and flight tracks for 2018 existing conditions are discussed in this section.

4.1.1 Aircraft Operations

As shown below in **Table 1**, there were 183,402 operations at the Airport in 2018 (an average of 502 operations per day). An operation is one takeoff or one landing. As indicated by the table, the largest number of operations was conducted by single engine piston aircraft mostly conducted by training aircraft (i.e., touch and go operations) that accounted for 108,170 operations, or 59% of operations. Of note, commercial scheduled operations are those by Kenmore Air, which utilize a Cessna Caravan, a turbo propeller aircraft; unscheduled operations are operated by turbojet and turbo propeller aircraft, including JSX (Jet SuiteX) that operate Embraer turbojet aircraft.

The Boeing Company has a manufacturing facility at BFI with associated aircraft testing activities; aircraft activity related to this manufacturing facility account for 4,281 flights in 2018, or approximately 12 daily flights. There is also a robust corporate jet component at BFI, representing 29,482 flights in 2018, or approximately 80 daily flights.

Table 1 – Operations by Aircraft Category, 2018 Existing Conditions

Category	Annual Operations
Commercial (Scheduled and Non-Scheduled)	3,718
Boeing Jets	4,281
Air Cargo	13,664
Business Jets	29,482
Air Taxi	22,893
Piston Prop	108,170
Military	1,194
Grand Total	**183,402**

Source: Master Plan, 2019

4.1.2 Fleet Mix

Table 2 presents the operational data for 2018 used to develop this study's AEDT inputs. It includes the detailed fleet mix and operations by time of day for each type of aircraft used in the AEDT noise model during 2018. As shown, this table lists the specific aircraft in the 2018 fleet mix as well as identifies the AEDT category for each aircraft type.

There are several aircraft operating the in the BFI fleet that are unique to this airport. For example, cargo operators based at BFI operate several models of older narrow body aircraft that have been largely retired elsewhere. The existing operations (and the forecast for 2023 and 2035) include Boeing B-727 and DC-9 aircraft; the operators of these narrow body air cargo fleets at BFI do not have plans for replacement because the relatively low "sill height" of these aircraft is very important to them for cargo loading/unloading operations at the airport. The majority of the cargo operations are conducted by UPS with Boeing B-757 and B-767 aircraft, as well as Airpac Airlines with Cessna Caravan aircraft.

In addition to aircraft type, the time of day an operation occurs can affect the DNL contours due to the nighttime 10-dB penalty applied from 10:00pm to 7:00am. In this study, the approximate percentage of flights occurring during nighttime hours throughout the year was 8%. For a given aircraft category, this percentage varies, as commercial and cargo jet operations occur more than 8% at night and general aviation and piston aircraft operations occur less than 8% at night annually.

Table 2 – Fleet Mix for 2018 Existing Conditions

Category	AEDT ID	AEDT Description	2018 Operations
Commercial Service			
Kenmore Air	CNA208	Cessna 208 Caravan	1,857
Scheduled [Total]			**1,857**
Commercial Service	A319-131	Airbus A319-100 Series	95
Non-Scheduled	A320-211	Airbus A320-200 Series	58
	A321-232	Airbus A321-200 Series	22
	A330-301	Airbus A330-200 Series	37
	737300	Boeing 737-300 Series	251
	737400	Boeing 737-400 Series	609
	MD83	Boeing MD-83	126
	CL600	Bombardier CRJ-100	16
	CL600	Bombardier CRJ-200-LR	42
	CRJ9-LR	Bombardier CRJ-700-LR	123
	DHC830	Bombardier de Havilland Dash 8 Q400	134
	EMB145	Embraer ERJ145	123
	EMB170	Embraer ERJ170-LR	37
	EMB175	Embraer ERJ175	43
	EMB175	Embraer ERJ175-LR	9
	EMB190	Embraer ERJ190	135
Non-Scheduled [Total]			**1,861**
Boeing Operations	737MAX8	Boeing 737 MAX 7	92
	737MAX8	Boeing 737 MAX 8	353
	737700	Boeing 737-700 Series	216
	737800	Boeing 737-800 Series	2,681
	737800	Boeing 737-900-ER	356
	767CF6	Boeing 767-200 Series	506
	767CF6	Boeing 777-200-ER	11
	777200	Boeing 777-200-LR	25
	7773ER	Boeing 777-300 ER	4
	777300	Boeing 777-300 Series	4
	7878R	Boeing 787-8 Dreamliner	9
	7878R	Boeing 787-9 Dreamliner	25
Boeing [Total]			**4,281**
Air Cargo	A300-622R	Airbus A300F4-600 Series	97
	74720B	Antonov 124 Ruslan	2
	727EM2	Boeing 727-200 Series	31
	747400	Boeing 747-400 Series	12
	747400	Boeing 747-400 Series Freighter	2
	7478	Boeing 747-800 Series	8
	757RR	Boeing 757-200 Series	1,705
	767300	Boeing 767-300 Series	2,931
	DC910	Boeing DC-9-10 Series	44
	MD11PW	Boeing MD-11	320
	DHC6	C-26A	344
	CNA208	Cessna 208 Caravan	3,578
	CNA441	Cessna 441 Conquest II	147
	CVR580	Convair CV-580	13
	EMB120	Embraer EMB120 Brasilia	2,688
	DHC6	Fairchild SA-227-AC Metro III	1,632
	DHC6	Mitsubishi MU-2	110
Air Cargo [Total]			**13,664**
Air Taxi	(All)	(All)	
Air Taxi [Total]			**24,339**
General Aviation	(All)	(All)	
Corporate Jet			
Corporate [Total]			**28,036**
General Aviation	(All)	(All)	
Recreational/Training			
Recreational/Training [Total]			**108,170**
Military	737800	BOEING 737-800 Poseidon	161
	CH47D	Boeing CH-46 Sea Knight	13
	F-18	Boeing F/A-18 Hornet	79
	A37	Cessna T-37 Tweet	158
	C130	Lockheed C-130 Hercules	38
	CNA208	North American T-6 Texan II (FAS)	590
	F5AB	Northrop F-5E/F Tiger II	9
	T-38A	T-38 Talon	147
Military [Total]			**1,194**
Grand Total			**183,402**

Source: BridgeNet International, 2020; Master Plan, 2019

Note: Totals are subject to rounding +/- 1 operation. Air taxi and general aviation are shown only as subtotals to save space.

4.1.3 Departure Stage Length

Aircraft departures were grouped within the following five stage length categories:

- Departure stage length 1: 0 to 500 nautical miles (great circle distance[1])
- Departure stage length 2: 501 to 1,000 nautical miles
- Departure stage length 3: 1,001 to 1,500 nautical miles
- Departure stage length 4: 1,501 miles to 2,500 nautical miles
- Departure stage length 5: 2,501 nautical miles or greater

An aircraft with a short stage length is assumed to be carrying less fuel, passengers, and cargo than an aircraft with a long stage length. Aircraft with longer stage lengths are assumed to be heavier, with longer stage lengths requiring more fuel. Stage length impacts noise levels because weight affects aircraft performance and resulting noise levels.

4.1.4 Runway Use

An additional consideration in developing the noise exposure contours is the percentage of time each runway is utilized. The speed and direction of the wind and other operational factors dictate the runway direction that is utilized by an aircraft. From a safety standpoint it is desirable, and usually necessary, to arrive and depart an aircraft into the wind. When the wind direction changes, the operations are shifted to the runway end that favors the wind direction.

Table 3 shows the runway use percentage as based on the runway use compiled from the above-referenced FAA data sources. As a part of the noise analysis, runway use assumptions were confirmed with a spatial analysis of the radar track geometry for each category of aircraft. The annual 2018 runway use was assessed using the full year of radar track data.

[1] Great circle distance is the shortest distance between any two points on the surface of the earth.

Table 3 – Runway Utilization, Existing Conditions 2018

ARRIVALS							
Category	**14L**	**14R**	**32L**	**32R**	**H1**	**H2**	**Total**
Kenmore Air	5.9%	65.0%	29.1%				**100%**
Non-Scheduled	1.9%	79.2%	18.0%	1.0%			**100%**
Boeing		70.9%	29.1%				**100%**
Air Cargo	1.5%	68.4%	29.8%	0.2%			**100%**
Air Taxi	1.1%	73.7%	25.2%				**100%**
Corporate	0.7%	69.9%	29.3%				**100%**
Recreational/Training	2.2%	59.1%	35.6%	0.4%	2.4%	0.3%	**100%**
Military		74.6%	24.5%			0.9%	**100%**
All Arrivals	**1.5%**	**66.4%**	**30.8%**	**0.2%**	**0.9%**	**0.1%**	**100%**
DEPARTURES							
Category	**14L**	**14R**	**32L**	**32R**	**H1**	**H2**	**Total**
Kenmore Air	3.2%	66.6%	27.8%	2.4%			**100%**
Non-Scheduled	3.7%	68.1%	26.4%	1.8%			**100%**
Boeing		75.3%	24.7%				**100%**
Air Cargo	1.5%	70.9%	26.2%	1.4%			**100%**
Air Taxi	1.1%	70.7%	27.4%	0.8%			**100%**
Corporate	0.9%	73.3%	25.2%	0.6%			**100%**
Recreational/Training	2.4%	54.6%	34.3%	3.5%	4.9%	0.3%	**100%**
Military	1.4%	80.4%	15.9%	0.9%	1.4%		**100%**
All Departures	**1.6%**	**65.0%**	**29.3%**	**1.9%**	**2.0%**	**0.1%**	**100%**

Source: BridgeNet International, 2020
Note: Totals and percentages are subject to rounding of +/- 0.1%. Blank cell indicates 0%.

4.1.5 Flight Paths and Flight Path Utilization

The identification of the location and use of the flight tracks was based upon radar data provided by the airport. Radar tracks from October 2017 to September 2018 were used in the development of the AEDT flight paths. A sample of over 22,000 flight tracks was derived from all of the flight paths flown throughout the year.

4.2 Existing Conditions Noise Exposure

The compiled data as described in the preceding sections was used as input to the FAA's AEDT computer model for the calculation of noise in the airport environs. The DNL contours do not represent the noise levels present on any specific day; rather, they represent the daily energy-average of all 365 days of operation during the year. The noise contour pattern extends from the Airport, from the runway ends, reflective of the flight tracks used. The relative distance of the contours from the Airport along each route is a function of the frequency of use of each runway for total arrivals and departures, time of day, and the type of aircraft assigned to it.

Based upon the operational conditions presented previously DNL contours were developed. The existing conditions noise exposure contours are presented in **Figure 1**. This figure presents the DNL 55, 60, and

65 dB noise exposure contours. **Table 4** summarizes noise exposure for 2018 Existing Conditions. As shown, there are 214 persons located within the DNL 65 dB and higher noise contour; however, there are no persons located in areas with a DNL greater than 70 dB.

Table 4 – Summary of Noise Exposure 2018 Existing Conditions

Category	Noise Level Range (DNL)				
	>55 dB	>60 dB	>65 dB	>70 dB	>75 dB
Population Count (persons)	18,365	3,588	214	0	0
Land Area (acres)	6,717	2,456	937	409	218

Sources: AEDT version 3b, 2020; U.S. Census 2010

4.3 Future Year Noise Conditions – Year 2023 and 2035

The future noise environment for BFI was analyzed based upon year 2023 and 2035 operational conditions as compared to existing conditions in 2018. The aircraft operational levels and fleet mix were from the approved aviation forecast from the ongoing Master Plan Update. **Table 5** shows a summary of the forecast data and **Table 6** shows the detailed fleet mix data for the two future years.

Table 5 – Forecast Operations by Aircraft Category

Category	Annual Operations			
	2023 Operations Forecast	2023 Change from 2018	2035 Operations Forecast	2035 Change from 2018
Commercial (Scheduled and Non-Scheduled)	4,159	+ 441	5,178	+ 1,460
Boeing Jets	5,747	+ 1,466	6,819	+ 2,538
Air Cargo	13,296	– 368	15,052	+ 1,388
Business Jets	30,537	+ 1,055	39,208	+ 9,726
Air Taxi	24,918	+ 2,025	34,076	+ 11,183
Piston Prop	75,881	– 32,289	68,756	– 39,414
Military	1,701	+ 507	1,867	+ 673
Grand Total	**156,239**	**– 27,163**	**170,955**	**– 12,447**

Source: Master Plan, 2019

Note: Subject to rounding of +/- 1 operation.

Table 6 – Forecast Fleet Mix for Years 2023 and 2035

Category	AEDT ID	AEDT Description	2023 Operations	2035 Operations
Commercial Service				
Kenmore Air	CNA208	Cessna 208 Caravan	1,932	2,100
Scheduled [Total]			**1,932**	**2,100**
Commercial Service	A319-131	Airbus A319-100 Series	114	157
Non-Scheduled	A320-211	Airbus A320-200 Series	69	95
	A321-232	Airbus A321-200 Series	27	37
	A330-301	Airbus A330-200 Series	44	61
	737300	Boeing 737-300 Series	301	416
	737400	Boeing 737-400 Series	729	1,008
	MD83	Boeing MD-83	150	208
	CL600	Bombardier CRJ-100	20	27
	CL600	Bombardier CRJ-200-LR	50	69
	CRJ9-LR	Bombardier CRJ-700-LR	148	204
	DHC830	Bombardier de Havilland Dash 8 Q400	161	222
	EMB145	Embraer ERJ145	148	204
	EMB170	Embraer ERJ170-LR	44	61
	EMB175	Embraer ERJ175	52	71
	EMB175	Embraer ERJ175-LR	10	14
	EMB190	Embraer ERJ190	161	223
Non-Scheduled [Total]			**2,227**	**3,078**
Boeing Operations	737MAX8	Boeing 737 MAX 7	124	147
	737MAX8	Boeing 737 MAX 8	474	562
	737700	Boeing 737-700 Series	290	344
	737800	Boeing 737-800 Series	3,600	4,271
	737800	Boeing 737-900-ER	478	567
	767CF6	Boeing 767-200 Series	679	805
	767CF6	Boeing 777-200-ER	14	17
	777200	Boeing 777-200-LR	33	39
	7773ER	Boeing 777-300 ER	5	6
	777300	Boeing 777-300 Series	6	7
	7878R	Boeing 787-8 Dreamliner	12	14
	7878R	Boeing 787-9 Dreamliner	33	39
Boeing [Total]			**5,747**	**6,819**
Air Cargo	A300-622R	Airbus A300F4-600 Series	95	107
	74720B	Antonov 124 Ruslan	0	0
	727EM2	Boeing 727-200 Series	30	34
	747400	Boeing 747-400 Series	11	13
	747400	Boeing 747-400 Series Freighter	2	3
	7478	Boeing 747-800 Series	9	11
	757RR	Boeing 757-200 Series	1,659	1,878
	767300	Boeing 767-300 Series	2,852	3,228
	DC910	Boeing DC-9-10 Series	43	49
	MD11PW	Boeing MD-11	311	352
	DHC6	C-26A	335	379
	CNA208	Cessna 208 Caravan	3,482	3,941
	CNA441	Cessna 441 Conquest II	143	162
	CVR580	Convair CV-580	13	15
	EMB120	Embraer EMB120 Brasilia	2,615	2,961
	DHC6	Fairchild SA-227-AC Metro III	1,588	1,798
	DHC6	Mitsubishi MU-2	107	121
Air Cargo [Total]			**13,296**	**15,052**
Air Taxi	(All)	(All)		
Air Taxi [Total]			**24,918**	**34,076**
General Aviation	(All)	(All)		
Corporate Jet				
Corporate [Total]			**30,537**	**39,208**
General Aviation	(All)	(All)		
Recreational/Training				
Recreational/Training [Total]			**75,881**	**68,756**
Military	737800	BOEING 737-800 Poseidon	229	251
	CH47D	Boeing CH-46 Sea Knight	18	20
	F-18	Boeing F/A-18 Hornet	113	124
	A37	Cessna T-37 Tweet	224	246
	C130	Lockheed C-130 Hercules	54	59
	CNA208	North American T-6 Texan II (FAS)	841	923
	F5AB	Northrop F-5E/F Tiger II	13	14
	T-38A	T-38 Talon	209	229
Military [Total]			**1,701**	**1,867**
Grand Total			**156,239**	**170,955**

Source: BridgeNet International, 2020; Master Plan, 2019
Note: Totals are subject to rounding +/- 1 operation. Air taxi and general aviation are shown only as subtotals to save space.

These forecast data show that for year 2023, a total of 156,239 operations are anticipated to occur at BFI. This equates to an average of 428 operations per day. For future year 2035, a total of 170,955 operations are anticipated to occur, or an average of 468 operations per day. The future year 2023 and 2035 forecasts both include an *overall reduction* of operations from existing year operations. This reflects a reduction in general aviation training operations. However, there is an *increase* of *all other* aircraft categories, including air cargo and other jet operations which primarily comprise the noise levels surrounding the airport. The noise modeling inputs for runway utilization, flight tracks, and flight track use were kept the same as the existing conditions for each future year.

Subsequent to the original noise analysis for existing and future year conditions conducted in 2019, a second future year scenario was added and analyzed in July 2020. This scenario includes extending Runway 14R by 300 feet to the north. The same noise model and version (AEDT version 3b) was used for this scenario.

The future year operations assumptions remain the same for the runway extension scenario; the only change was to the departure and arrival points on Runway 14R. All the flight tracks modeled were from radar, which tracks an aircraft position every four seconds and each track is usually made of approximately 150 points. That information is then used to create flight tracks used to model the future year scenarios. For the Runway 14R extension, the first of these points for each departure was moved to the new runway end. And for arrivals, the last point in the track was moved to reflect the new landing point. No displaced thresholds were modeled for the runway extension.

Based upon the forecast operational conditions, the future year DNL contours were developed. The year 2018, 2023 and 2035 noise exposure contours (without runway extension) are presented in **Figure 1.** This figure presents DNL 55, 60, and 65 dB noise exposure contours. **Figure 2** shows the DNL 55, 60, and 65 dB noise exposure contours for 2018 and 2035 (with and without the runway extension).

Table 7 summarizes the noise exposure effects for 2023 and 2035 future year conditions. In 2023, the population exposed to 65-70 DNL increases by 13 persons as a result of the future year operations. And in 2035, the population exposed increases 157 persons compared to existing conditions. There are also increases in the population between 60-65 DNL in both years.

Of note, the population and overall land area affected by DNL 65 dB and greater noise levels would change in the future in comparison to 2018 noise exposure due to the forecast increase in jet operations each year (despite the lower overall total operations).

Table 7 – Noise Exposure Summary for Years 2023 and 2035

Category	>55 dB	>60 dB	>65 dB	>70 dB	>75 dB
Year 2023					
	Noise Level Range (DNL)				
Population Count (persons)	18,019	3,662	227	0	0
Land Area (acres)	6,674	2,484	959	422	229
Change from Existing 2018:					
Population Count (persons)	-346	+74	+13	0	0
Land Area (acres)	-43	+28	+22	+12	+11
Year 2035					
Category	**>55 dB**	**>60 dB**	**>65 dB**	**>70 dB**	**>75 dB**
Population Count (persons)	21,853	4,397	371	0	0
Land Area (acres)	7,577	2,829	1,085	457	244
Change from Existing 2018:					
Population Count (persons)	+3,488	+809	+157	0	0
Land Area (acres)	+859	+373	+148	+48	+26
Year 2035 with Runway Extension					
Category	**>55 dB**	**>60 dB**	**>65 dB**	**>70 dB**	**>75 dB**
Population Count (persons)	21,836	4,403	356	0	0
Land Area (acres)	7,565	2,815	1,085	464	249
Change from Existing 2018:					
Population Count (persons)	+3,471	+815	+142	0	0
Land Area (acres)	+848	+359	+148	+55	+31

Sources: AEDT version 3b, 2020; U.S. Census, 2010

Note: Totals and difference calculations subject to rounding of +/- 1 acre or +/- 1 population count.

5.0 Summary

This analysis considered the noise exposure levels due to aircraft sources, for existing conditions in 2018 and future forecast scenarios in 2023 and 2035. The existing conditions aircraft noise contours encompass residences near the airport, and some are within the 65 DNL contour. In both future scenarios, the area affected by the 65 DNL noise contour would increase compared to existing conditions. The increase in DNL from existing to future conditions is due to the growth in jet aircraft operations projected for 2023 and 2035 (with and without the runway extension), despite the decrease in total operations. The future year aircraft activity increases the number of persons exposed to aircraft noise between DNL 65 and 70 dB as compared to the existing conditions. According to the Land Use Guidance Table in 14 CFR Part 150, DNL 65 dB is the threshold to determine land use compatibility for noise-sensitive land uses (e.g., residences, schools, places of worship, etc.). In general, commercial, industrial, and outdoor recreation land uses are compatible with aircraft noise.

6.0 Figures

Figure 1 – 2018, 2023, and 2035 without Runway Extension DNL Contours

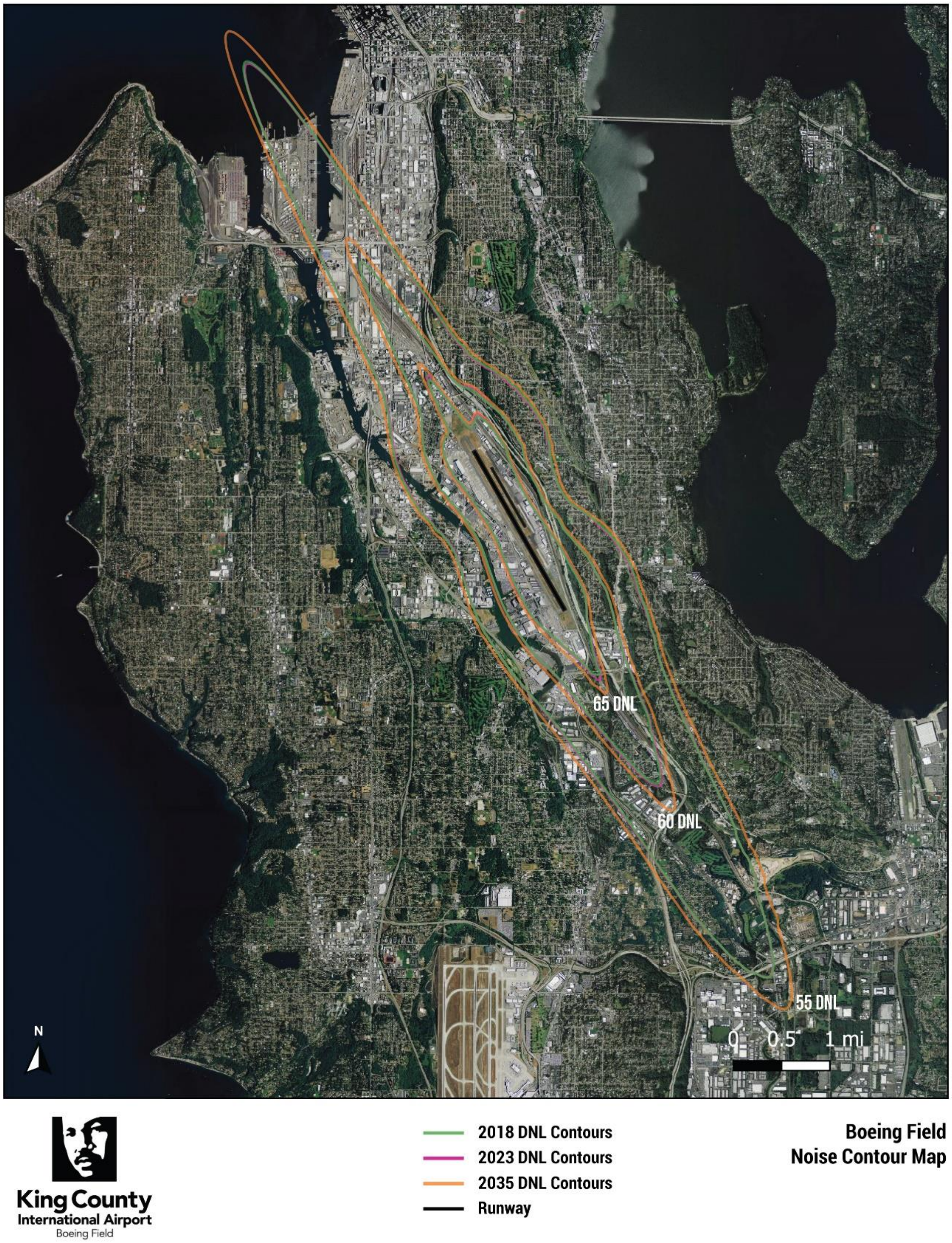

Figure 2 – 2018, 2035 without Runway Extension, and 2035 with Runway Extension DNL Contours