TARGETS

AEDT Environmental Plug-in Report

For

Minneapolis–Saint Paul International Airport

KMSP

Minneapolis, MN

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Minneapolis–Saint Paul International Airport **(**KMSP**)**

TARGETS Environmental Analysis Process

1. Purpose

The purpose of this report is to document the process used to analyze the noise impact of a proposed air traffic action at Minneapolis-Saint Paul International Airport (MSP). Figure 1-1 shows the airport diagram for MSP. This report shows the analysis of instrument flight procedures at MSP using the Terminal Area Route Generation, Evaluation, and Traffic Simulation (TARGETS) Aviation Environmental Design Tool (AEDT) Environmental Plug-In tool. Table 1-1 shows the procedure name and type. Figure 1-2 and Figure 1-3 show the location of the arrival procedures (STARS) and location of the RNPs with respect to MSP.

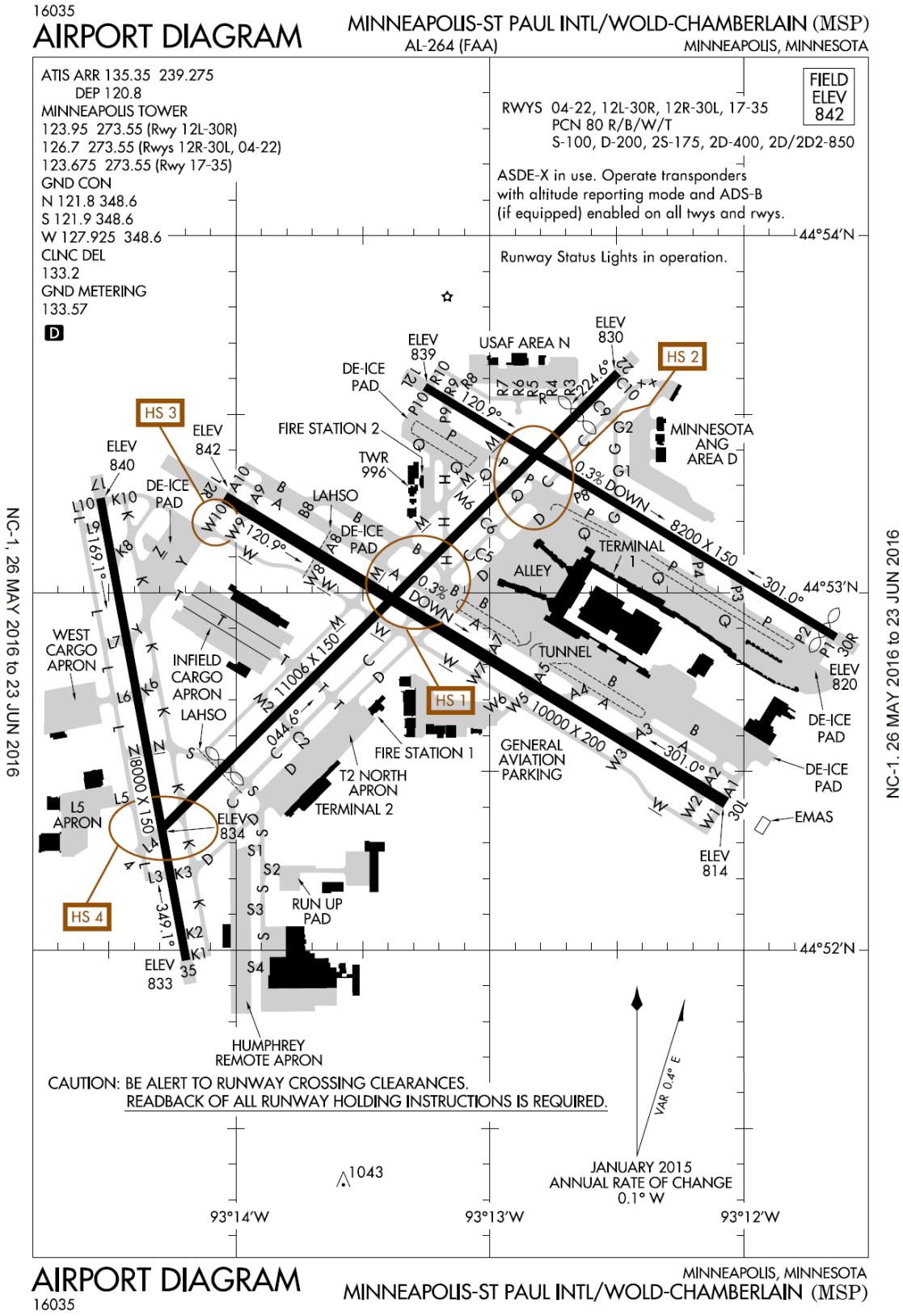

Figure 1-1: Airport Diagram of MSP

Procedure Name	Procedure Type
BAINY RNAV	STAR
BLUEM RNAV	STAR
KKILR RNAV	STAR
MUSCL RNAV	STAR
NITZR RNAV	STAR
TOGRY RNAV	STAR
RW 12R	RNP
RW 30L	RNP

Table 1-1: MSP Procedures to Be Modeled

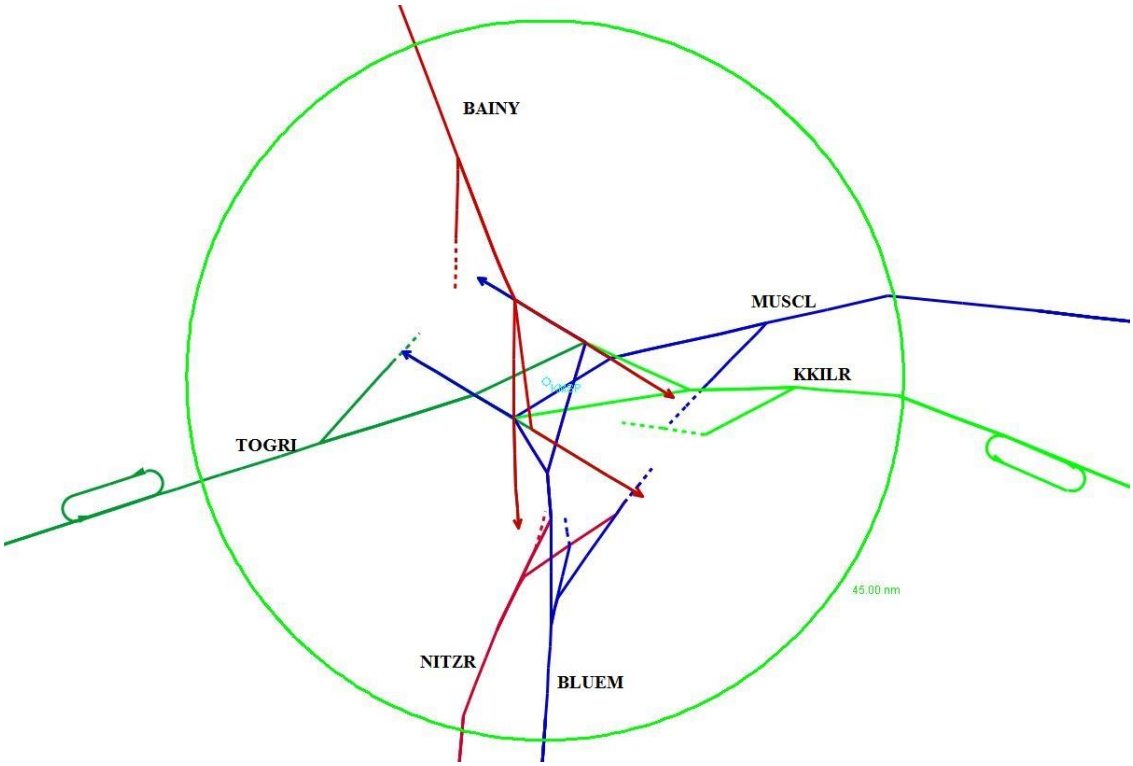

Figure 1-2: STARS at MSP

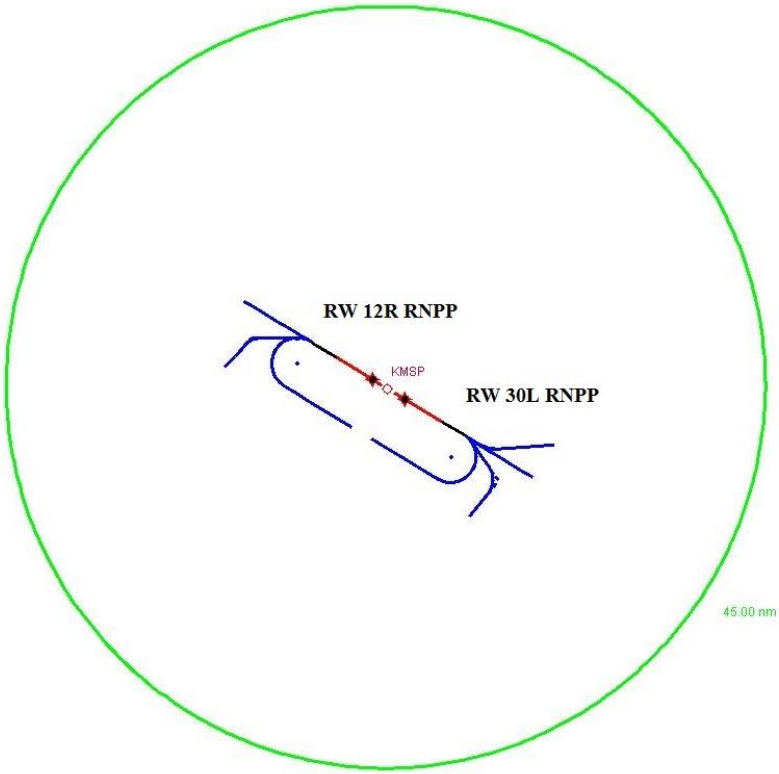

Figure 1-3: RNPs at MSP

2. Methodology

Historic radar track data for MSP was obtained from the FAA's National Offload Program (NOP) after receiving the dates from the environmental specialist.

Twenty eight days of radar track data totaling 31,165 tracks were selected for the MSP analysis representing a range of temperature and wind conditions as well as being representative of the average runway usage. The dates selected for this project were the following:

June 14 -20, 2015
October 18 - 24, 2015
December 13 - 19, 2015
March 13 - 19, 2016

These dates represent average traffic counts and traffic flows through various seasons and peak travel times for MSP. There were no significant runway outages or significant conditions that would otherwise result in abnormal traffic counts or traffic flows.

For this analysis, only six STARS and two RNPs were being modified and needed screening. In the correspondence between the facility and the environmental specialist, the facility indicated the following changes to each existing procedure (Table 2-1):

Procedure	Summary of Requested Design Change
RNP Y 12R	Change GREAK to an IF and move .11NM southeast (N44 48 19.398, W93 19 4.573). Alt restriction remains at 8,000, speed max 230KIAS.
	EFEXX AoA 6,000 TIETN AoA 7,500 EEDDN AoA 7,000 WDLND removed from procedure EFEXX AoA 6,000 EFEXX ties in at KRLSN (for RNP only) KRUGG..EFEXX..KRLSN..ZESTY
RNP Y 30L	Create a RNAV Y (RNP) approach to runway 30L off of the KKILR STAR, with GEEQU as an IAF, going to PIGZI, then to AABEZ (IF) to join the final
	Move MAUER to N44 46 54.183, W93 15 51.417. Altitude restriction remains 8,000, speed max 210KIAS
	Change the restriction at HAPTN to AT 7,000, MAX 210 kts
	LEDRZ is added to previous MAUER location LEDRZ AoA 7,500 COATZ removed from procedure AABEZ is IF DBLEM AoA 6,000 DBLEM ties in at BBUCK (for RNP only) HAPTN..DBLEM..BBUCK..AABEZ
BAINY RNAV	Move OSMOH SE to N44 57 49.950, W93 06 34.250, 8k altitude restriction, at 210KIAS
	Move MAUER to N44 46 54.183, W93 15 51.417. Altitude restriction remains at 8,000, speed at 210KIAS.
	Rwy 30L transition - new route PRRPL - MAUER, no altitude change
BLUEM RNAV	Add new fix named CANDD at N44 36 22.81 W93 00 50.94, altitude at 7,000, speed at 230KIAS
	Add ELLKO to the BLUEM STAR, 5.8NM prior to SAVVG, at or above 100, at 250 kts
	Delete AHMIT fix
	Add speed at 280 kts and at or above 110 @ BLUEM
	Change GREAK to an IF and move .11NM southeast (N44 48 19.398, W93 19 4.573). Alt restriction remains at 8,000, speed at 230KIAS.
	Add fix 2.00 NM inside of FARBO named DNDIS on the Rwy 35 transition with an altitude restriction of at 9,000, airspeed restriction at 230KIAS. DNDIS location is N 44 24 37.21, W 93 11 43.55. New routing is FARBO - DNDIS - JAMEZ.
	Change altitude restriction at JAMEZ from at 7,000 to at or above 7,000 JAMEZ is IAF
KKILR RNAV	STUWE--new location is N44, 48', 47.598", W92, 38', 23.708" with altitude restriction of at 7,000.
	New JONZY location is N44, 50', 28.09", W93, 00', 35.66"
	Change altitude @ HUGGI to at or above 10,000
	Change GREAK to an IF and move .11NM southeast (N44 48 19.398, W93 19 4.573). Alt restriction remains at 8,000, speed at 230KIAS.

MUSCL RNAV	Add speed at 280 kts @ MUSCL & JERMN
	Add new fix named KROIX at N44 53 23.697, W92 43 45.431, altitude at 7,000, at 230KIAS
NITZR RNAV	Add new fix named CANDD at N44 36 22.81 W93 00 50.94, altitude at 7,000, speed at 230KIAS
	Move WRSAW 1.5 NM south to N 44 14 53.82, W 93 25 55.06, altitude at or above 11,000
	Connect to ILS Z or LOC 30L, from HAPTN to DBLEM (AoA 5,000), to AABEZ (AoA 4,000), STAR speed AT 210.
TORGY RNAV	Add point 2.00NM from KRUGG (N44 53 54.586, W93 42 15.102) named SPUKI, altitude at 7,000, speed at 230KIAS. This point will only be on the TORGY STAR, not on the RNP (Y 12R).
	Move MAUER to N44 46 54.183, W93 15 51.417. Altitude restriction remains at 8,000, speed at 210KIAS.
	Move OSMOH SE to N44 57 49.950, W93 06 34.250, at 8,000 altitude restriction, speed at 210KIAS.
	Connect to ILS or LOC 12R, from KRUGG to EFEXX (at or above 6,000), to ZESTY (AoA 4,000).
	Tie to RNAV (GPS) 12R,from KRUGG to EFEXX (at or above 6,000), to ZESTY (AoA 4,000)

Table 2-1: Detailed Changes to Procedures

Historical radar track data (figures 2-1 and 2-2) was used to create a baseline noise exposure, which provides lateral path definition, aircraft fleet mix, departure/arrival stream proportions for each runway, and day/night traffic ratios. A legend (Table 2-2) shows, by color, the altitudes of the track data.

After the baseline scenario was built, aircraft operations assigned to the proposed procedure were modeled as flying the proposed procedure instead of their historical tracks, which gives us the alternative scenario.

The analysis does not take into account terrain. All calculations were based on "above field elevation" (AFE) using the airport's reference elevation. The altitude controls of the RNAV procedures were used to adjust the vertical profile for each modeled aircraft flying the proposed procedure. When a range of altitudes was given for a particular waypoint, the lowest point of the range was used in order to model the most conservative environmental case.

The TARGETS Environmental Plug-in uses 0.3 nautical mile dispersion on either side of the centerline of a procedure as its default dispersion value. In cases where the model generated by the TARGETS Flyability function tracks do not line up on the centerline of a procedure, the dispersion value is assigned using 0.3 nautical miles on either side of the outside flyability tracks as the guideline. Where aircraft are vectored on departure and for the final approach, the historic vectoring patterns are used as the guide for the dispersion.

Once the baseline and alternative scenarios were built, the TARGETS Environmental Plug-in Tool was used to generate noise outputs for both scenarios. The Environmental Plug-in Tool uses the Aviation Environmental Design Tool version 2b (AEDT 2b) to calculate noise. The noise output files from AEDT 2b for both the baseline and alternative noise exposures consist of a series of equally spaced grid points, each assigned a day-night average noise level (DNL) value. This data is then loaded back into TARGETS by the Environmental Plug-in Tool, which generates three outputs: baseline noise exposure, alternative noise exposure, and noise impact. The noise impact is a comparison between the baseline and the alternative noise exposure that depicts reportable and significant noise changes at all affected locations per the criteria indicated in FAA Order 1050.1F ("Environmental Impacts: Policies and Procedures") and Chapter 32 of FAA Order 7400.2K ("Procedures for Handling Airspace Matters"). The reportable and significant noise increases and decreases (if any) are then depicted on an aerial photograph using Google Earth as well as on a sectional chart.

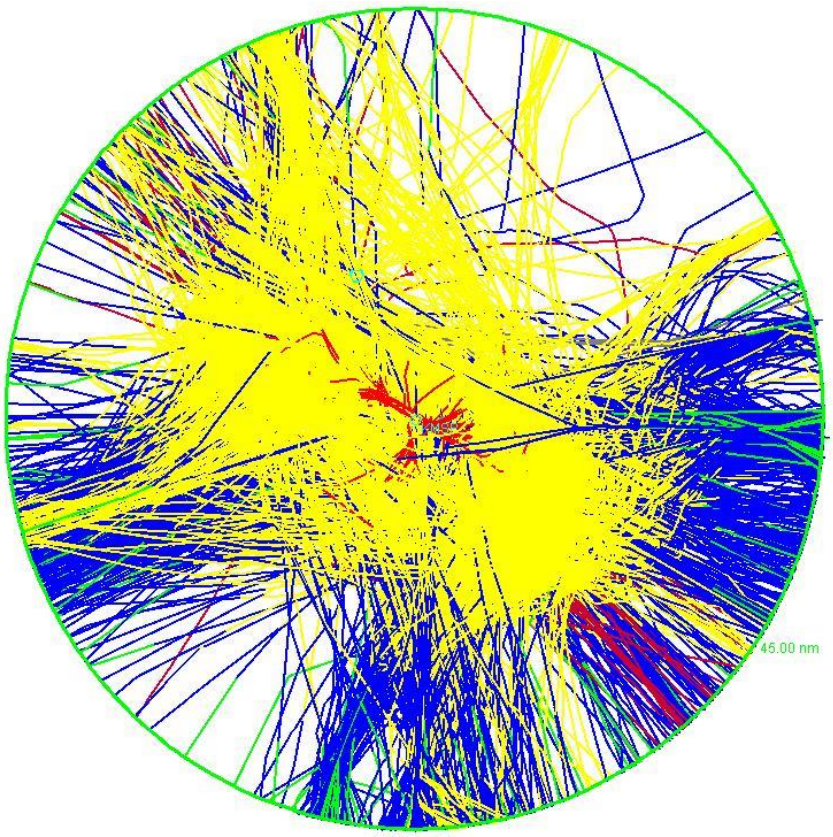

Figure 2-1: MSP Arrival Traffic Used in Analysis

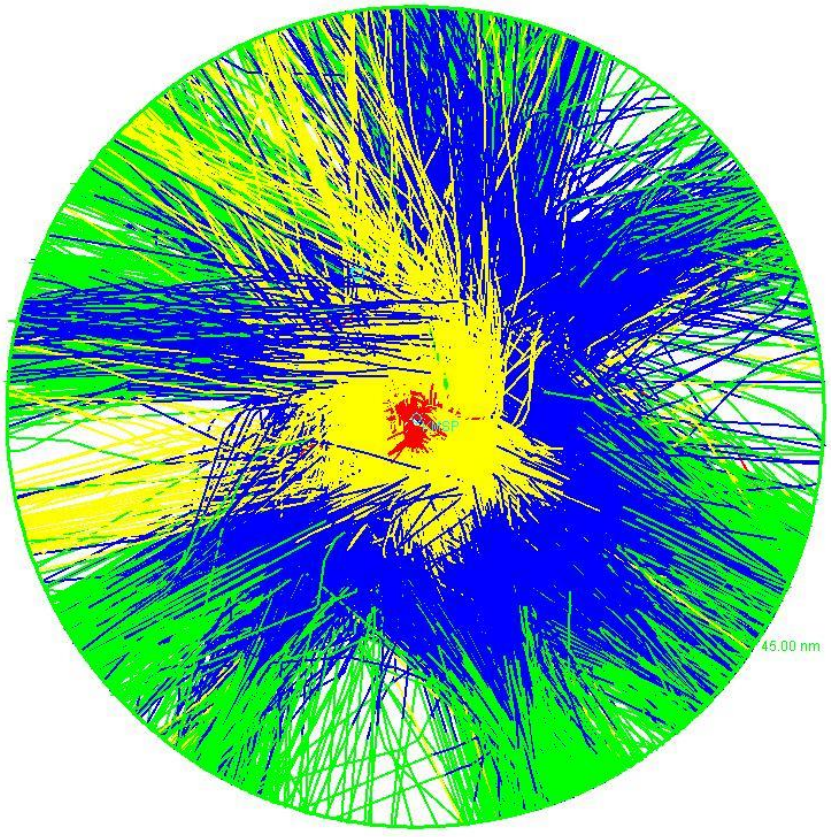

Figure 2-2: MSP Departure Traffic Used in Analysis

Track Data Legend with Field Elevation					
Airport: MSP			***Field Elevation In Feet***		***841***
AGL Altitudes		**MSL Altitudes**		**Legend Colors**	
1000		1841			
2000		2841			
3000		3841			
4000		4841			
5000		5841			
6000		6841			
7000		7841			
8000		8841			
9000		9841			
10000		10841			
11000		11841			
12000		12841			
13000		13841			
14000		14841			
15000		15841			
16000		16841			
17000		17841			
18000		18841			
Above					

Table 2-2: Legend for Baseline Arrival and Departure Traffic

3. Baseline Noise Exposure

The baseline noise exposure is shown in Figure 3-1, which depicts the levels and locations of the noise produced by the historical radar track data for arrivals and departures. Table 3-1 is the legend for the baseline noise exposure figures.

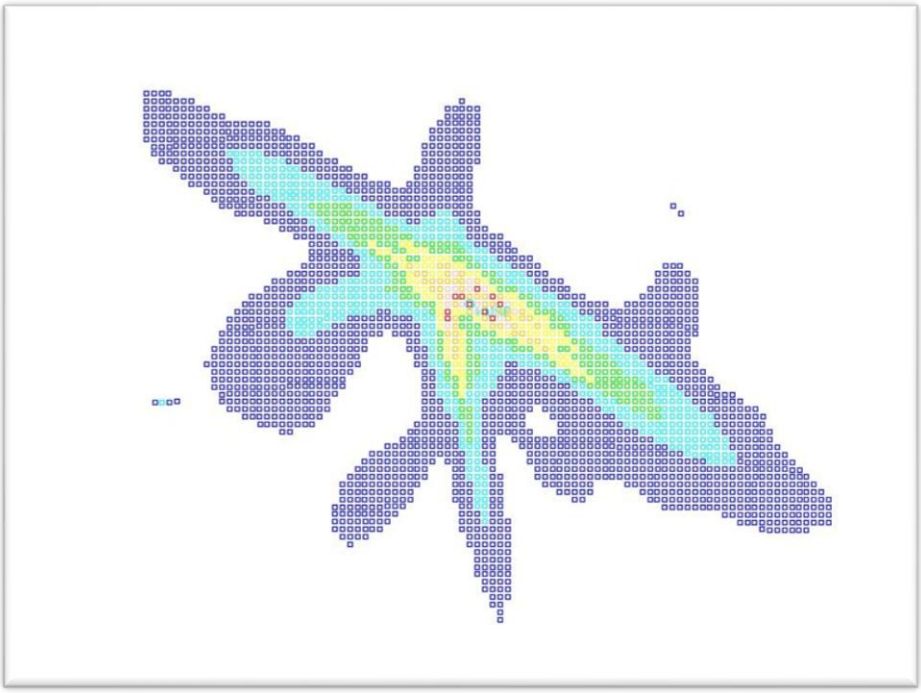

Figure 3-1: Baseline Noise Exposure for the Proposed Procedures in TARGETS

GEOMETRIC SHAPE	COLOR	DNL VALUE
SQUARE	BLUE	45–50 dB
SQUARE	LIGHT BLUE	50–55 dB
SQUARE	GREEN	55–60 dB
SQUARE	YELLOW	60–65 dB
SQUARE	ORANGE	65–70 dB
SQUARE	PINK	70–75 dB
SQUARE	RED	75 dB OR MORE

Table 3-1: Legend for Noise Exposure

4. Alternative Noise Exposure

The alternative noise exposure is shown in Figure 4-1, which depicts the levels and locations of the noise using the proposed procedures. Table 4-1 is the legend for the alternative noise exposure figures.

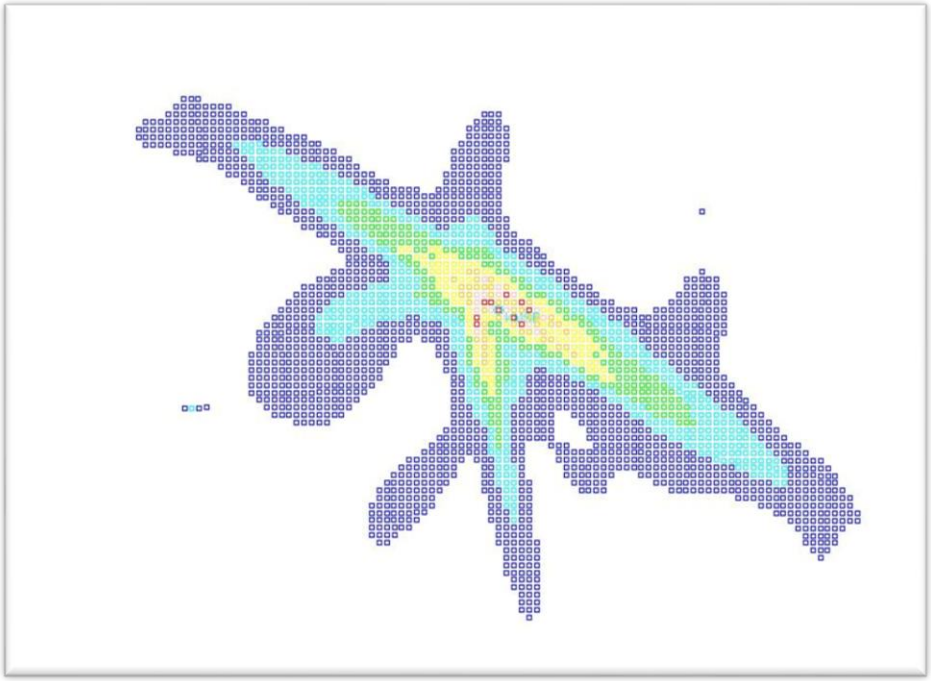

Figure 4-1: Alternative Noise Exposure for the Proposed Procedures in TARGETS

GEOMETRIC SHAPE	COLOR	DNL VALUE
SQUARE	BLUE	45–50 dB
SQUARE	LIGHT BLUE	50–55 dB
SQUARE	GREEN	55–60 dB
SQUARE	YELLOW	60–65 dB
SQUARE	ORANGE	65–70 dB
SQUARE	PINK	70–75 dB
SQUARE	RED	75 dB OR MORE

Table 4-1: Legend for Noise Exposure

5. Comparison of Baseline and Alternative Noise Exposure

In the case of these procedures, the baseline and alternative noise exposures were generated by the TARGETS AEDT Environmental plug-in, and **there are no increases or decreases in noise** that are significant enough to show up per the appropriate criteria in FAA Order 1050.1F (shown in Table 5-1).

GEOMETRIC SHAPE	COLOR	DNL DIFFERENCE
SQUARE	PURPLE	45-60 DB BASELINE WITH A DECREASE OF 5.0 DB OR GREATER IN THE ALTERNATIVE
SQUARE	BLUE	60-65 DB BASELINE WITH A DECREASE OF 3.0 DB OR GREATER IN THE ALTERNATIVE
SQUARE	GREEN	65 DB BASELINE OR GREATER WITH A DECREASE OF 1.5 DB OR GREATER IN THE ALTERNATIVE
OVAL	RED	65 DB OR GREATER ALTERNATIVE WITH AN INCREASE OF 1.5 DB OR GREATER OVER THE BASELINE
OVAL	ORANGE	60-65 DB ALTERNATIVE WITH AN INCREASE OF 3.0 DB OR GRTEATER OVER THE BASELINE
OVAL	YELLOW	45-60 ALTERNATIVE DB WITH AN INCREASE OF 5.0 DB OR GREATER OVER THE BASELINE

Table 5-1: Legend for Noise Impact

Table 5-2 shows the results of the impact report generated by TARGETS AEDT Environmental Plug-in, showing no change in noise exposure between the baseline and alternative scenarios.

% Red	% Orange	% Yellow	% NoChange	% Green	% Blue	% Purple
0	0	0	100	0	0	0

Table 5-2: Targets Noise Impact Report