Noise Exposure Map Update
Merrill Field Airport

Prepared for:

Municipality of Anchorage

Prepared by:

HARRIS MILLER MILLER & HANSON INC.

December 2013

Noise Exposure Map Update

Merrill Field Airport

In Compliance with

14 CFR Part 150

December 2013

Municipality of Anchorage

632 West 6th Ave
Anchorage, AK 99501

SPONSOR'S CERTIFICATION

The Noise Exposure Map (NEM) update for Merrill Field Airport, hereby submitted in accordance with Title 14 CFR Part 150, was prepared by our consultants HDR Alaska, Inc. and Harris Miller Miller & Hanson Inc. (HMMH) with the best available information and is certified as true and complete to the best of my knowledge and belief.

The noise contours representing the existing condition are identified as the 2013 Noise Exposure Map. The assumptions and activity levels used to develop the existing condition NEM are based on data from 2011/2012 with minor updates to reflect known changes expected in 2013. No significant change in operation at the airport since the 2011/2012 time period would create any substantial new noncompatible uses or significantly reduce noise exposure over noncompatible uses.

The assumption and activity levels used to develop the forecast condition NEM are based on reasonable forecasts and other planning assumptions. The forecast condition NEM is based on data generated for a timeframe five years in the future from the year of submission. The noise contours representing the forecast condition are identified as the 2018 Noise Exposure Map.

The NEM update was prepared in consultation with local public and planning agencies whose area or any portion of whose area of jurisdiction is within the DNL contour depicted on the existing and future condition NEMs. The consultation also included Federal officials having local oversight responsibility and regular aeronautic users of the airport. It is further certified that adequate opportunity has been afforded to interested persons to submit their views, data, and comments concerning the correctness and adequacy of the NEMs and the supporting documentation and forecasts.

12-18-13

Date of Signature

Paul Bowers, A.A.E.

Manager

Merrill Field Airport

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GLOSSARY

AAD - Annual Average Day

ANSI - American National Standards Institute

ASNA - Airport Safety and Noise Abatement Act

ATCT - Air Traffic Control Tower

CFR - Code of Federal Regulations

dB - Decibel

DNL - Day-Night Average Sound Level

EA - Environmental Assessment

FAA - Federal Aviation Administration

GIS - Geographic Information System

HUD - Department of Housing and Urban Development

INM - Integrated Noise Model

LD870 - Larson Davis Model 870 Noise Monitor

L_{eq} - Average or Equivalent Sound Level

L_{max} - Maximum Sound Level

MAAAC - Municipal Airports Aviation Advisory Committee

MOA - Municipality of Anchorage

MRI - Merrill Field Airport

NCP - Noise Compatibility Program

NEM - Noise Exposure Map

NIST - National Institute of Standards and Technology

SEL - Sound Exposure Level

USGS - United States Geological Survey

VFR - Visual Flight Rules

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1 INTRODUCTION

The emphasis on aircraft noise compatibility planning started with the passing of the Airport Safety and Noise Abatement Act of 1979 (ASNA). This act gave the Federal Aviation Administration (FAA) the authority to issue regulations on noise compatibility planning and to provide a means for federal funding for projects dedicated to improving the noise environment around an airport. These regulations became the impetus for publishing Title 14 of the Code of Federal Regulation (CFR) Part 150.

As a result, 14 CFR Part 150 "Airport Noise Compatibility Planning,"[1] sets forth standards for airport operators to use in documenting noise exposure in their airport environs and for establishing programs to minimize noise-related land use incompatibilities. While participation in this program by an airport is voluntary, over 250 airports, including Merrill Field Airport (MRI), have participated in the program, which assists in standardizing noise analysis at a national level. Airport participation provides access to federal funding for implementing any FAA-approved noise compatibility program measure. 14 CFR Part 150 includes two principal elements: (1) a Noise Exposure Map (NEM) and (2) a Noise Compatibility Program (NCP). The Municipality of Anchorage is updating the NEM only at this time.

This volume presents the updated Noise Exposure Map documentation for Merrill Field Airport, as required by the specific provisions of 14 CFR Part 150 Subpart B, Section 150.21, and Appendix A. A separate volume, "Noise Exposure Map Update Merrill Field Airport Appendices", includes the Appendices referenced in the NEM documentation.

The purpose and goals of this NEM update are to:

- Document aircraft noise exposure that reflects current and forecasted aircraft operations at MRI
- Collect, analyze and report information regarding current and forecasted operations as it relates to MRI aircraft noise and land use compatibility
- Share data and information with the public

All noise levels presented in this document are A-weighted unless otherwise specified. Appendix A of this document provides a reference to noise fundamentals and terminology.

This chapter provides a historical perspective of the 14 CFR Part 150 at MRI (Section 1.1); a brief summary of the location and setting (Section 1.2); an introduction to 14 CFR Part 150 (Section 1.3); project roles and responsibilities (Section 1.4); and a completed copy of the FAA NEM review checklist (Section 1.5).

1.1 Historical Perspective

In May of 1929 a group of citizens of the City of Anchorage petitioned the City to acquire land and construct the first municipal airport. This was followed by a supporting resolution from the Anchorage Chamber of Commerce. A resolution from the City Council in June 1929 established a committee to find an appropriate location within the municipality or within five miles thereof. Once the location was decided, various efforts were undertaken to derive an appropriate name for the aviation facility. Merrill Field Airport was selected as the name in honor of an early Alaska aviation pioneer, Russell Merrill.

Merrill Field Airport continued to grow into the commercial airport for Anchorage and in the early 1940's became a temporary home to some military aircraft while two military facilities (Elmendorf Air Force Base and Fort Richardson) were under construction. It provided a strategic location for military aviation

[1] Title 14 of the Code of Federal Regulations (CFR) Part 150 found at http://www.faa.gov/airports/environmental/airport_noise/

throughout World War II. At the end of the war and with the expansion of aviation worldwide, Merrill Field Airport saw an increase in operations as a vitally important stopover location for aircraft transiting to and from the Far East. Due to its limitations on being able to support the larger air transport aircraft, a study was begun in 1948 to construct a new international airport in Anchorage. When the new international airport was completed in 1952, Merrill Field Airport continued to flourish as the general aviation airport for the region. With the continued increase in growth of operations, in 1953 the two primary runways were extended in length to or nearly to the existing lengths currently accommodating the general aviation community.

The Municipality of Anchorage (MOA) owns/operates Merrill Field Airport. Advisory oversight of MRI operations is delegated to the Municipal Airports Aviation Advisory Commission as detailed in the Anchorage Municipal Code. This Code also restricts aircraft operations at Merrill Field Airport to those aircraft weighing less than 12,500 pounds, except medevac and repair and maintenance flights.

Merrill Field Airport prepared an initial 14 CFR Part 150 NEM study for 1988 and submitted documentation to the FAA in June 1991 for acceptance. The FAA issued a Record of Approval finding the NEMs in compliance with Part 150 requirements in January 1992 (Appendix B). Merrill Field Airport has never submitted a NCP study to the FAA.

1.2 Project Location and Setting

Merrill Field Airport is located within the Municipality of Anchorage east of downtown Anchorage. Residential neighborhoods and commercial centers are located to the north, south, east, and west of the airport.

Primary access to the airport is provided via 5th Ave on the north and 15th Ave on the south with additional access from Airport Heights Drive on the east and Orca St. to the west via controlled gate access. Interior airport access is provided by Merrill Field Drive which enters or exits the airport at 15th Ave. on the south and Airport Heights Drive on the east.

Figure 1 shows the airport and its surrounding area for reference.

1.3 14 CFR Part 150 Overview

14 CFR Part 150 sets forth a process for airport proprietors to follow in developing and obtaining FAA approval of programs to reduce or eliminate incompatibilities between aircraft noise and surrounding land uses. In establishing the requirements for the development of noise compatibility programs at airports, 14 CFR Part 150 prescribes specific standards and systems for:

- Measuring noise
- Estimating cumulative noise exposure
- Describing other means to assess the impacts of noise (including single aircraft event levels and cumulative levels)
- Coordinating Noise Compatibility Program development with local land use officials and other interested parties
- Documenting the analytical process used in developing a compatibility program
- Submitting documentation to the FAA
- Providing for FAA and public review processes

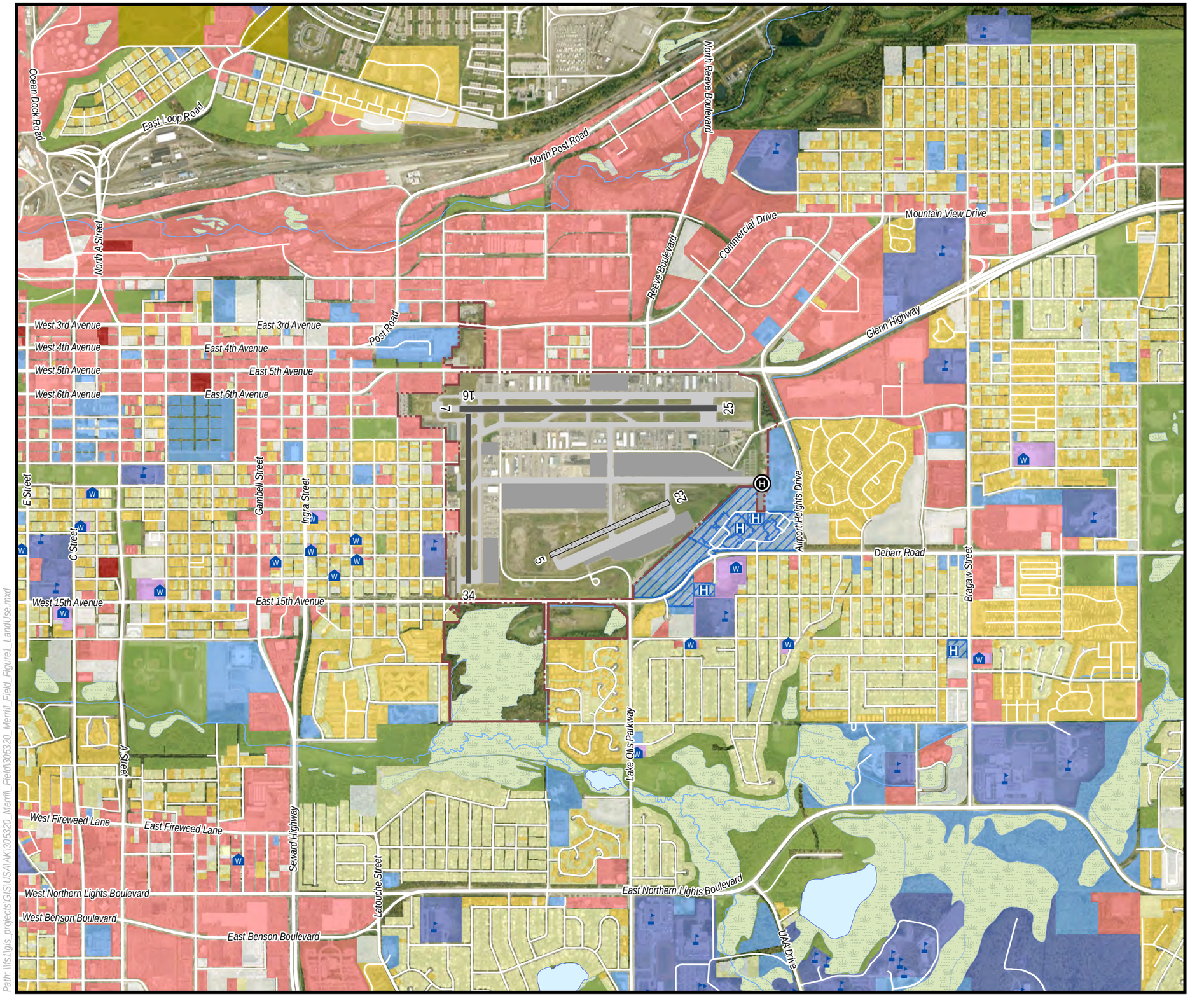
As a result of applying these specific standards and systems, as stated earlier, 14 CFR Part 150 includes two formal submissions to the FAA: the NEM and the NCP. **The MOA is updating the NEM only at this time.**

Merrill Field Airport

Anchorage, Alaska

14 CFR Part 150 Update

Figure 1
Merrill Field Airport and Surrounding Land Use



- Airport Boundary
- Runway (Paved)
- Runway (Gravel)
- Taxiway
- Apron
- Helipad
- School/University
- Place of Worship
- Hospital
- Single Family
- Multi Family
- School/University/Library
- Hospital
- Transient Lodging
- Place of Worship
- Water
- Park/Recreation/Open Space
- Public Use
- Commercial/Industrial
- Military
- Vacant/Undefined
- Wetland
- Stream

Data Sources:
Municipality of Anchorage GIS; (Land Use, Roads, Parks, Wetlands, Marine/Water)
Environmental Systems Research Institute (ESRI, Inc); (Roads, Airports, Shaded Relief)

0 1,500 3,000 Feet

Path: \\fs1\gis_projects\GIS\USAIAK\305320_Merrill_Field\305320_Merrill_Field_Figure1_LandUse.mxd

1.3.1 Noise Exposure Map

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

The primary objective is to describe the current and forecast conditions at the airport and the noise effects of the aircraft activity on the surrounding communities. While this description is normally processed into individual noise exposure maps, 14 CFR Part 150 requires more than a simple "map" to provide all the necessary information. The information required to provide the graphics and background for analysis include such tasks as:

- Collecting historical aviation activity data such as aircraft fleet mix, number and type of operations, aircraft departure weights, runway utilization
- Developing a forecast aircraft activity for a period at least five years in the future from the year representing the existing conditions
- Determining aircraft flight tracks and usage based on available data
- Creating the necessary inputs to the FAA Integrated Noise Model (INM) using the average annual input conditions to include airport configuration, meteorological data, operations, etc.
- Obtaining approval for user-specified aircraft substitutions from the FAA
- Conducting supplemental noise measurements in accordance with 14 CFR Part 150, §A150.5, to better characterize any special noise effects on the community (optional and included with this NEM update)
- Collecting data from local jurisdictions to establish detailed land use data in the airport environs
- Estimating population data within the local area

Therefore, in addition to the graphics, an extensive effort is made to document, through tabulated information and text discussions, the noise environment due to aircraft activity at the airport now and in the future. Thus, the NEM documentation describes the data collection and analysis undertaken in development and graphic depiction of existing and future noise exposure resulting from aircraft operations and the land uses in the airport environs. During the process, the airport initiates and maintains contact with the local airport community. After considering all stakeholder and public comments, the airport sponsor submits the NEM document to the FAA, and, subsequent to a thorough review, the FAA makes a determination of compliance with the 14 CFR Part 150 standards.

The year of submission for this update is 2013. Therefore, the existing conditions noise contours are for 2013 and the five-year forecast case contours are for 2018.

The NCP is essentially a list of the actions the airport proprietor proposes to undertake to minimize existing and future noise/land use incompatibilities. A formal NCP under 14 CFR Part 150 has not been undertaken at MRI; therefore, a review of NCP program measures and implementation is not included in this 2013 NEM. Nonetheless, MRI developed a "Fly Friendly" program with the objective to reduce

aircraft noise in its surrounding communities. Section 2 will review the existing noise abatement program and related initiatives at MRI.

1.3.2 Day-Night Average Sound Level, DNL

In simple terms, DNL is the average noise level over a 24-hour period except that noises occurring at night (defined as 10:00 p.m. to 7:00 a.m.) are artificially increased by 10 dB. This weighting is intended to reflect the added intrusiveness of nighttime noise events attributable to the fact that community background noise levels decrease at night. More information on DNL (and other commonly used noise metrics) can be found in Appendix A.

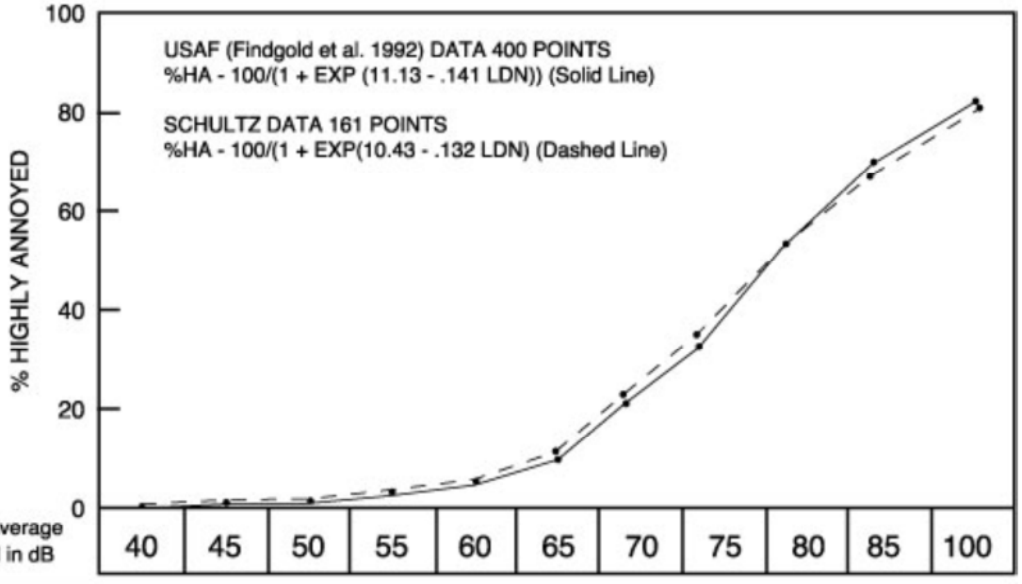
14 CFR Part 150 requires airport noise studies to be based on computer modeled DNL contour estimates depicted in terms of equal-exposure, specifically 65, 70 and 75 dB noise contours.

1.4 Community Annoyance

Numerous psychoacoustic surveys provide substantial evidence that individuals' reactions to noise vary widely for a given noise exposure level. However, since the early 1970's, researchers have determined, and subsequently confirmed, that a community's aggregate response is generally predictable and relates reasonably well to measures of cumulative noise exposure, such as DNL. Figure 2 shows the widely recognized relationship between environmental noise and the percentage of people "highly annoyed," annoyance being the key indicator of community response usually cited in the referenced Federal Interagency Committee on Noise report.

Figure 2 Percentage of People Highly Annoyed

Source: Federal Interagency Committee on Noise, Vol. 2, Technical Report. "Federal Agency Review of Selected Airport Noise Analysis Issues". August 1992. (From data provided by USAF Armstrong Laboratory). pp. 3-6.



Day - Night Average Sound Level in dB		40	45	50	55	60	65	70	75	80	85	100
Calculated %HA Points	USAF	0.41	0.831	1.66	3.31	6.48	12.29	22.1	36.47	53.74	70.16	82.64
	SCHULTZ	0.576	1.11	2.12	4.03	7.52	13.59	23.32	37.05	53.25	68.78	81

This relationship shows that 12 to 13 percent of the exposed population will be highly annoyed at DNL values of 65 dB, and that the percentage of people highly annoyed begins to increase more sharply for

DNL values above 65 dB. For example the percent highly annoyed increases to 22 to 23 percent at DNL values of 70 dB.

1.4.1 Noise/Land Use Compatibility Guidelines

The FAA, other federal agencies, and several states have used the information on community reaction to noise to create guidelines for identifying the land uses that are compatible with particular noise exposure levels – the more noise-sensitive the land use, the lower the noise exposure should be in order to achieve compatibility.

According to these FAA guidelines, all identified land uses, even the more noise-sensitive ones, normally are compatible with aircraft noise at DNL values below 65 dB. The significance of this level is supported in a formal way by standards adopted by the U. S. Department of Housing and Urban Development (HUD). Part 51 of the Code of Federal Regulations indicates that areas exposed to DNL values less than or equal to 65 dB are acceptable for HUD funding. Areas exposed to noise levels between 65 dB DNL and 75 dB DNL are "normally unacceptable," and require special abatement measures and review. Those at 75 dB DNL and above are "unacceptable" except under very limited circumstances.

FAA land use guidelines, as defined in 14 CFR Part 150 and reproduced here in Table 1, are used for this NEM update.

Table 1 14 CFR PART 150 Noise/Land Use Compatibility Guidelines

Source: 14 CFR Part 150, Appendix A, Table 1

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

Numbers in parentheses refer to notes.

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

Key to Table 1

– Notes are presented on the following page

SLUCM: Standard Land Use Coding Manual.

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

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

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

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

Notes for Table 1

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

1.5 Project Roles and Responsibilities

Several groups were involved in the development of the NEM update, including the Municipality of Anchorage, the Federal Aviation Administration, the public from neighboring communities, and the consulting team. The respective roles and responsibilities for the development of this NEM update are provided below.

1.5.1 Municipality of Anchorage (MOA)

As the "airport operator", the MOA has authority over the NEM update study elements and submission to FAA. The MOA retained a team of consultants to conduct the technical work required to fulfill the NEM analysis and documentation requirements, and to assist in public outreach and consultation. Section 1.5.4 describes the composition of the consulting team and the general assignment of responsibilities among its members.

The Municipality utilized the Municipal Airports Aviation Advisory Commission (MAAAC), members of local government, FAA, and aviation and community stakeholders to ensure appropriate representation and involvement in this NEM update.

1.5.2 Federal Aviation Administration

For the NEM update, the FAA responsibility includes a review of the submission to determine that the technical work, consultation, and documentation comply with 14 CFR Part 150 requirements. The FAA must also approve non-standard modeling requests. The final role of the FAA is to accept or not accept the NEM update. FAA involvement includes participation by staff from at least two levels in the agency:

The ***Alaskan Region FAA, Airports Division*** evaluates and accepts (or does not accept) the NEM and supporting documentation in accordance with 49 U.S.C. Section 47503 (enabled by the Aviation Safety and Noise Abatement Act of 1979).

FAA headquarters, in particular the ***Airport Planning and Environmental Division (APP-400) and the Office of Environment and Energy Noise Division (AEE-100)*** reviews and approves (or disapproves) of non-standard data inputs to the FAA Integrated Noise Model (INM). Airport Improvement Program (AIP) grant funding through the FAA was used to complete the NEM update.

1.5.3 Public from neighboring communities

Public meetings at the initiation of the study provided valuable input and comments on the general noise environment around the airport as observed by the neighboring communities. Inputs assisted in identifying potential noise measurement sites in the communities as well as development of noise modeling inputs such as observed flight paths from the airport runways. The public was also offered opportunity to review and comment on the NEM update.

1.5.4 Consulting team

The MOA contracted with the consulting firm of HDR Alaska, Inc. and Harris Miller Miller & Hanson Inc. (HMMH) to complete the technical work required for the NEM update. HDR has overall project management responsibility for the NEM update and HMMH has responsibility for all noise-related technical elements, as well as assistance with airspace procedures, land-use, airport plan, public outreach, and preparation of the NEM update documentation for the MOA.

1.6 FAA Checklist

The FAA has developed checklists for their internal use in reviewing NEM submissions. The FAA prefers that the Noise Exposure Map documentation include copies of the checklists. Table 2 presents a completed copy of the NEM checklist including information as to where in the document the item is addressed to assist the FAA in their review.

Table 2 14 CFR Part 150 Noise Exposure Map Checklist
Source: FAA/APP, Washington, DC, March 1989; revised June 2005; FAA reviewed for currency 12/2007[2]

14 CFR PART 150 NOISE EXPOSURE MAP CHECKLIST-PART I			
Airport Name: Merrill Field Airport	**REVIEWER:**		
	Yes	**No**	**Supporting Pages/Review Comments**
I. Submitting and Identifying the NEM:			
A. Submission is properly identified:			
1. 14 C.F.R. Part 150 NEM?	X		Cover page, Section 1, p. 1
2. NEM and NCP together?		X	N/A Only NEM update
3. Revision to NEMs FAA previously determined to be in compliance with Part 150?	X		Section 1.1, p. 2
B. Airport and Airport Operator's name are identified?	X		Certification, p. iii
C. NCP is transmitted by operator's dated cover letter, describing it as a Part 150 submittal and requesting appropriate FAA determination?	X		Cover letter
II. Consultation: [150.21(b), A150.105(a)]			
A. Is there a narrative description of the consultation accomplished, including opportunities for public review and comment during map development?	X		Section 7, p. 61
B. Identification of consulted parties:			
1. Are the consulted parties identified?	X		Section 7, p. 61

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

14 CFR PART 150 NOISE EXPOSURE MAP CHECKLIST-PART I			
Airport Name: Merrill Field Airport	**REVIEWER:**		
	Yes	**No**	**Supporting Pages/Review Comments**
2. Do they include all those required by 150.21(b) and A150.105 (a)?	X		Section 7, p. 61
3. Agencies in 2., above, correspond to those indicated on the NEM?	X		Section 7, p. 61
C. Does the documentation include the airport operator's certification, and evidence to support it, that interested persons have been afforded adequate opportunity to submit their views, data, and comments during map development and in accordance with 150.21(b)?	X		Certification p. iii and Section 7
D. Does the document indicate whether written comments were received during consultation and, if there were comments that they are on file with the FAA regional airports division manager?	X		Section 7 and Appendix J
III. General Requirements: [150.21]			
A. Are there two maps, each clearly labeled on the face with year (existing condition year and one that is at least 5 years into the future)?	X		Existing (2013) NEM is Figure 11; Forecast (2018) NEM is Figure 12
B. Map currency:			
1. Does the year on the face of the existing condition map graphic match the year on the airport operator's NEM submittal letter?	X		Cover letter; Figure 11 is 2013 existing NEM
2. Is the forecast year map based on reasonable forecasts and other planning assumptions and is it for at least the fifth calendar year after the year of submission?	X		Cover letter; Figure 12 is 2018 5-year forecast NEM; Appendix E
3. If the answer to 1 and 2 above is no, the airport operator must verify in writing that data in the documentation are representative of existing condition and at least 5 years' forecast conditions as of the date of submission?	N/A		
C. If the NEM and NCP are submitted together:	N/A		
1. Has the airport operator indicated whether the forecast year map is based on either forecast conditions without the program or forecast conditions if the program is implemented?	N/A		
2. If the forecast year map is based on program implementation:			
a. Are the specific program measures that are reflected on the map identified?	N/A		
b. Does the documentation specifically describe how these measures affect land use compatibilities depicted on the map?	N/A		

14 CFR PART 150 NOISE EXPOSURE MAP CHECKLIST-PART I			
Airport Name: Merrill Field Airport	**REVIEWER:**		
	Yes	**No**	**Supporting Pages/Review Comments**
3. If the forecast year NEM does not model program implementation, the airport operator must either submit a revised forecast NEM showing program implementation conditions [B150.3 (b), 150.35 (f)] or the sponsor must demonstrate the adopted forecast year NEM with approved NCP measures would not change by plus/minus 1.5 DNL? [150.21(d)]	N/A		
IV. MAP SCALE, GRAPHICS, AND DATA REQUIREMENTS: [A150.101, A150.103, A150.105, 150.21(a)]			
A. Are the maps of sufficient scale to be clear and readable (they must not be less than 1" to 2,000'), and is the scale indicated on the maps? (Note (1) if the submittal uses separate graphics to depict flight tracks and/or noise monitoring sites, these must be of the same scale, because they are part of the documentation required for NEMs.) (Note (2) supplemental graphics that are not required by the regulation do not need to be at the 1" to 2,000' scale)	x		NEM graphics are at 1" to 1,800' scale in the document. Flight track graphics are at 1" to 6,500' scale in main document with 1" to 1,800'' scale maps of flight tracks included in pocket folders
B. Is the quality of the graphics such that required information is clear and readable? (Refer to C. through G., below, for specific graphic depictions that must be clear and readable)	X		All figures
C. Depiction of the airport and its environs.			
1. Is the following graphically depicted to scale on both the existing condition and forecast year maps:			
a. Airport boundaries	X		Figure 11 (2013) and Figure 12 (2018) NEMs
b. Runway configurations with runway end numbers	X		
2. Does the depiction of the off-airport data include?			
a. A land use base map depicting streets and other identifiable geographic features	X		Figures with geographic information delineate the land uses all within the Municipality of Anchorage in an area well beyond the DNL 65 dB
b. The area within the DNL 65 dB (or beyond, at local discretion)	X		
c. Clear delineation of geographic boundaries and the names of all jurisdictions with planning and land use control authority within the DNL 65 dB (or beyond, at local discretion)	X		
D. 1. Continuous contours for at least DNL 65, 70, and 75 dB?	X		All contour figures
2. Has the local land use jurisdiction(s) adopted a lower local standard and, if so, has the sponsor depicted this on the NEMs?		X	

14 CFR PART 150 NOISE EXPOSURE MAP CHECKLIST-PART I			
Airport Name: Merrill Field Airport	**REVIEWER:**		
	Yes	**No**	**Supporting Pages/Review Comments**
3. Based on current airport and operational data for the existing condition year NEM, and forecast data representative of the selected year for the forecast NEM?	X		Certification letter, p. iii and Section 5.2 presents current and forecast operational data and other modeling inputs
E. Flight tracks for the existing condition and forecast year timeframes (these may be on supplemental graphics which must use the same land use base map and scale as the existing condition and forecast year NEM), which are numbered to correspond to accompanying narrative?	X		Figures 6 through 10 including large scale maps (Figures 6, 7, 8, 9 and 10) in pocket folders
F. Locations of any noise monitoring sites (these may be on supplemental graphics which must use the same land use base map and scale as the official NEMs)	X		Figure 3, Section 3.4
G. Noncompatible land use identification:			
1. Are noncompatible land uses within at least the DNL 65 dB noise contour depicted on the map graphics?	X		Depicted on Figure 11 (2013) and Figure 12 (2018) NEMs. There are no noise-sensitive public buildings or historic properties within the depicted NEM contours. Section 6.3
2. Are noise sensitive public buildings and historic properties identified? (Note: If none are within the depicted NEM noise contours, this should be stated in the accompanying narrative text.)	X		
3. Are the noncompatible uses and noise sensitive public buildings readily identifiable and explained on the map legend?	X		
4. Are compatible land uses, which would normally be considered noncompatible, explained in the accompanying narrative?	N/A		
V. NARRATIVE SUPPORT OF MAP DATA: [150.21(a), A150.1, A150.101, A150.103]			
A. 1. Are the technical data and data sources on which the NEMs are based adequately described in the narrative?	X		Section 5 presents current and forecast operational data and other modeling inputs; Appendices E, F, G, and H
2. Are the underlying technical data and planning assumptions reasonable?	X		
B. Calculation of Noise Contours:			
1. Is the methodology indicated?	X		Section 5, p. 31; INM 7.0c
a. Is it FAA approved?	X		Section 5, p. 31; INM 7.0c

14 CFR PART 150 NOISE EXPOSURE MAP CHECKLIST-PART I			
Airport Name: Merrill Field Airport	**REVIEWER:**		
	Yes	**No**	**Supporting Pages/Review Comments**
b. Was the same model used for both maps? (Note: The same model also must be used for NCP submittals associated with NEM determinations already issued by FAA where the NCP is submitted later, unless the airport sponsor submits a combined NEM/NCP submittal as a replacement, in which case the model used must be the most recent version at the time the update was started.)	X		
c. Has AEE approval been obtained for use of a model other than those that have previous blanket FAA approval?	N/A		
2. Correct use of noise models:			
a. Does the documentation indicate, or is there evidence, the airport operator (or its consultant) has adjusted or calibrated FAA-approved noise models or substituted one aircraft type for another that was not included on the FAA's pre-approved list of aircraft substitutions?	X		Letter requesting FAA approval and FAA response for aircraft substitutes See Appendices F, and G
b. If so, does this have written approval from AEE, and is that written approval included in the submitted document?	X		
3. If noise monitoring was used, does the narrative indicate that Part 150 guidelines were followed?	X		Section 3, p.19
4. For noise contours below DNL 65 dB, does the supporting documentation include an explanation of local reasons? (Note: A narrative explanation, including evidence the local jurisdiction(s) have adopted a noise level less than DNL 65 dB as sensitive for the local community(ies), and including a table or other depiction of the differences from the Federal table, is highly desirable but not specifically required by the rule. However, if the airport sponsor submits NCP measures within the locally significant noise contour, an explanation must be included if it wants the FAA to consider the measure(s) for approval for purposes of eligibility for Federal aid.)	N/A		
C. Noncompatible Land Use Information:			
1. Does the narrative (or map graphics) give estimates of the number of people residing in each of the contours (DNL 65, 70 and 75, at a minimum) for both the existing condition and forecast year maps?	X		Section 6.3 Table 18, p.54
2. Does the documentation indicate whether the airport operator used Table 1 of Part 150?	X		Section 1.4.1, p.7
a. If a local variation to table 1 was used:			

14 CFR PART 150 NOISE EXPOSURE MAP CHECKLIST-PART I			
Airport Name: Merrill Field Airport	**REVIEWER:**		
	Yes	**No**	**Supporting Pages/Review Comments**
(1) Does the narrative clearly indicate which adjustments were made and the local reasons for doing so?	N/A		
(2) Does the narrative include the airport operator's complete substitution for table 1?	N/A		
3. Does the narrative include information on self-generated or ambient noise where compatible or noncompatible land use identifications consider non-airport and non-aircraft noise sources?	N/A		
4. Where normally noncompatible land uses are not depicted as such on the NEMs, does the narrative satisfactorily explain why, with reference to the specific geographic areas?	N/A		
5. Does the narrative describe how forecast aircraft operations, forecast airport layout changes, and forecast land use changes will affect land use compatibility in the future?	X		Section 4, p. 27; Section 6.3, p. 54
VI. MAP CERTIFICATIONS: [150.21(b), 150.21(e)]			
A. Has the operator certified in writing that interested persons have been afforded adequate opportunity to submit views, data, and comments concerning the correctness and adequacy of the draft maps and forecasts?	X		Certification, p. iii
B. Has the operator certified in writing that each map and description of consultation and opportunity for public comment are true and complete under penalty of 18 U.S.C. § 1001?	X		

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2 EXISTING NOISE ABATEMENT PROGRAM

MRI and the FAA share the responsibility for the aircraft operations at the airport. The airport's authority is primarily focused on the physical airport structures to include runways and taxiways, maintenance of obstacle free access to these areas, airfield operational security, ground access, and various leasehold sites for aircraft operators or support functions. The FAA is primarily focused on the aircraft movement on the airport as well as the flight procedures and aircraft traffic (ground taxi, arrivals, departures, and flight patterns). Both entities work together to provide a safe and responsible flight environment.

While MRI has not completed a formal 14 CFR Part 150 Noise Compatibility Program, the airport has identified several measures or guidelines in conjunction with the FAA Air Traffic Control Tower (ATCT). Among these measures are "Fly Friendly" guidelines, an FAA Letter to Airmen on pattern procedures, and a memorandum on procedures and coordination for processing noise complaints.

MRI staff and FAA ATCT personnel have been working with neighboring communities and the aviation community to develop a "Fly Friendly" program with the objective to reduce aircraft noise and the number of noise complaints from the area communities as a result of aircraft operations at MRI. These procedures are not intended to request any unsafe flight practices but to encourage pilot awareness of the proximity of noise-sensitive residential areas near the airport and to help the airport and its operators to be good neighbors. The following guidelines are provided to pilots to help reduce aircraft noise over the neighborhoods:

- Utilize the entire length of the runway except for helicopter operators doing pattern work to "land long" (i.e., midfield)
- Follow the established traffic pattern and do not make an early crosswind turn on departure
- Depart Runway 23 following Runway 16 Chester Creek Departure Route
- Maintain the lowest propeller RPM setting necessary for safe flight; do not overpower your aircraft
- Plan training activity during daytime hours to the degree practical; to not conduct training activities (touch & goes) during late night hours; and minimize late night operations

These guidelines are posted at various locations around the airport and on the airport's website to reach the maximum number of pilots. The full text is included in Appendix C.

An FAA Letter to Airmen on traffic pattern procedures was published by the FAA ATCT (Appendix C) to support the "Fly Friendly" program. The Letter defines the normal extents of the Runway 7-25 traffic pattern using ground reference points to help define turns and addresses expected departure procedures from Runway 5-23.

Based on discussions with neighboring community members and pilots, these guidelines are providing some relief from aircraft noise in the community, however there is not total compliance with these procedures. Early turns on departure or deviations from the Visual Flight Rules (VFR) procedures for departing and arriving aircraft generated the most discussion with community members.

MRI, in collaboration with FAA ATCT, has established procedures for processing and responding to noise complaints. Upon receipt of a noise complaint, the airport staff and control tower personnel work together to provide feedback to the complainant and to contact the pilot regarding the complaint and to reinforce the need to "Fly Friendly".

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3 NOISE MEASUREMENTS

Noise measurements provide important input for understanding the noise environment around an airport. While 14 CFR Part 150 does not require noise monitoring for the development of the NEMs, the regulation[3] provides specific guidelines for data acquisition and refinement for airports that desire to conduct noise measurements and report the results in the NEM. Ultimately Part 150 requires that the Integrated Noise Model (INM) be used for obtaining DNL contours for the following reasons: (a) measurements are practical only for obtaining DNL values for a limited numbers of points, (b) in the absence of a permanently installed monitoring system, noise measurements only cover relatively short time periods, and (c) noise measurements are snapshots of existing conditions and cannot be used to predict or evaluate future conditions.

The airport does not have a permanent noise monitoring program. Thus, noise measurements were conducted using portable noise monitoring equipment in accordance with accepted acoustical measurement methodology and the guidelines provided in 14 CFR Part 150, Appendix A, Part A, Section A150.5. This chapter provides a description of the noise measurement program undertaken at the airport as part of this NEM update.

3.1 Noise Measurement Objectives

The portable noise measurement program was designed to determine significant non-aircraft noise sources and background noise levels in the community and to compare to the aircraft modeling results generated using the INM. As such, there were two principle objectives:

- To obtain noise measurement samples of cumulative noise levels at a variety of noise-sensitive locations in order to obtain data to characterize ambient and aircraft noise levels. Cumulative exposure is important for land use planning purposes, for evaluating noise exposure trends in the long term, and for evaluating procedures that affect the distribution of noise levels over large areas.
- To obtain representative information on aircraft and non-aircraft single-event noise levels at a broad range of sites, primarily in residential areas. Single-event levels are important for responding to citizen concerns about specific operations, evaluating noise abatement flight tracks and comparing the relative noisiness of different aircraft types.

To accomplish these objectives, consultant staff conducted noise measurements during two different periods or seasons – late spring measurements at seven locations from June 7 to June 18, 2012 and late fall measurements at two locations from November 29 to December 7, 2012. During visits to each site, observers calibrated the instrumentation; checked and changed batteries, as needed; and logged and reviewed activities occurring during the measurement periods to aid in identifying aircraft and community noise sources. Two sites were setup and monitored data for the entire 11-12 day measurement period in June while the other five sites were short-term measurement sites of up to approximately two days at each site. The same two "long-term" sites in June were setup in November-December to monitor data for the seven complete-day measurement period.

3.2 Noise Measurement Site Selection and Location

To accomplish the measurement objectives, community members were involved in volunteering their residences as possible site locations. The consultants then reviewed the site locations and their potential to fulfill the measurement objectives and to provide the best measurement data for identifying the number of aircraft operations and corroborating the extent of the noise impact contours.

[3] 14 CFR Part 150 Appendix A, Part A, Section A150.5

Some factors that influenced site selection included:

- Location in residential areas or near other noise-sensitive land uses, to focus on the most noise-sensitive land use
- Near major flight corridors, to maximize the number of operations monitored
- Reasonable isolation from unusual non-aircraft noise sources
- Security of equipment
- Access for measurement staff/observers
- Line-of-sight views from the microphone to the most common overflight paths

Overall, the group of sites was selected to provide representative data on the broadest range of aircraft operations and geographic areas near the airport.

Table 3 lists the locations at which portable noise measurements were conducted for this study providing the addresses, times and approximate hours of data collection for both the June 2012 and November-December 2012 noise measurement periods. Figure 3 displays the seven locations with respect to the airport.

Table 3 Summary of Noise Measurement Sites
Source: HMMH

Site	Location	Start		End		Approximate Hours of Data
		Date	Time	Date	Time	
June 2012 Measurement Sites						
1	West end of Runway 25	6/7/12	1424	6/18/12	1453	262
2	1200 Block of Medfra St	6/7/12	1537	6/18/12	0844	254
3	900 Block of E. 9th Ave.	6/8/12	1344	6/10/12	1101	45
4	1500 Block of Nelchina St.,	6/10/12	1146	6/12/12	1228	48
5	1400 Block of Garden St	6/12/12	1419	6/14/12	1440	48
6	2400 Block of Sprucewood St	6/14/12	1544	6/16/12	1832	51
7	600 Block of E. 3rd Ave	6/16/12	1923	6/18/12	1348	43
November – December 2012 Measurement Sites						
1	West end of Runway 25	11/29/12	1446	12/7/12	1413	186
2	1200 Block of Medfra St	11/29/12	1517	12/7/12	1443	176

Merrill Field Airport

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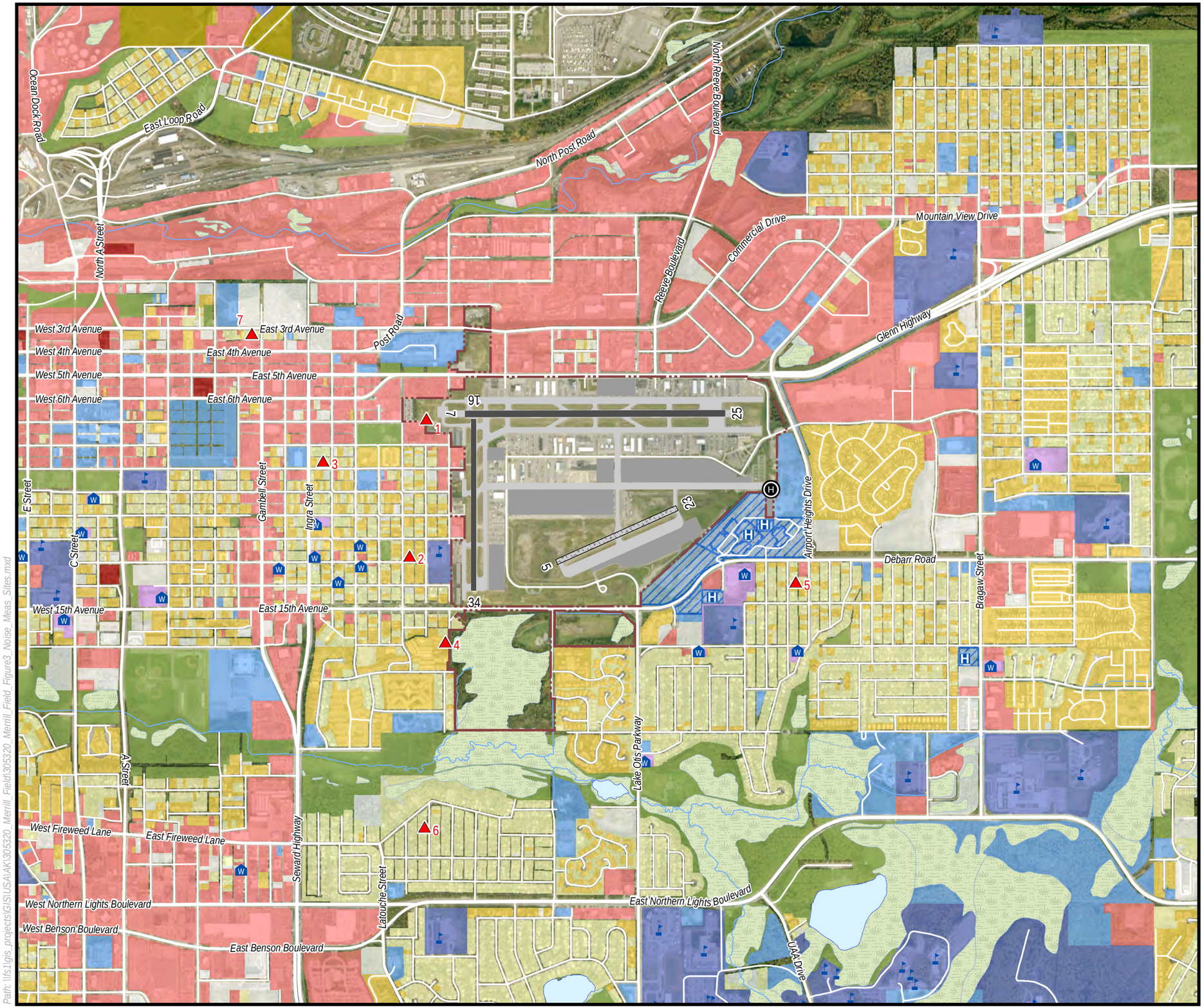
Figure 3
Noise Measurement Site Locations



- Airport Boundary
- Runway (Paved)
- Runway (Gravel)
- Taxiway
- Apron
- Helipad
- Noise Measurement Site Location
- School/University
- Place of Worship
- Hospital
- Single Family
- Multi Family
- School/University/Library
- Hospital
- Transient Lodging
- Place of Worship
- Water
- Park/Recreation/Open Space
- Public Use
- Commercial/Industrial
- Military
- Vacant/Undefined
- Wetland
- Stream

Noise Measurement Site Address Locations:
1 - West end of Runway 25
2 - 1200 Block of Medfra St.
3 - 900 Block of E. 9th Ave.
4 - 1500 Block of Nelchina St.
5 - 1400 Block of Garden St.
6 - 2400 Block of Sprucewood St.
7 - 600 Block of E. 3rd Ave.

Data Sources:
Municipality of Anchorage GIS; (Land Use, Roads, Parks, Wetlands, Marine/Water)
Environmental Systems Research Institute (ESRI, Inc); (Roads, Airports, Shaded Relief)

0 1,500 3,000 Feet

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3.3 Noise Measurement Instrumentation, Staffing, and Procedures

Measurements were conducted with Larson-Davis Model 870 ("LD 870") noise monitors. These instruments meet the American National Standards Institute (ANSI) S1.4-1983 standards for a Type I "precision" sound level meter, and meet or exceed the accuracy requirements defined in 14 CFR Part 150 Section A150.5. The measurement staff calibrated the equipment in the field on a daily basis. The calibrations are traceable to the United States National Institute of Standards and Technology (NIST).

The LD 870's were programmed to record cumulative noise levels, such as hourly equivalent sound level (L_{eq}) and DNL, and single-event levels, such as Maximum Sound Level (L_{max}) and Sound Exposure Level (SEL). All noise levels were acquired using the A-weighted filter as is industry standard for community noise measurements. Appendix A provides definitions of these metrics.

The measurement units operated on a 24-hour basis during the 12-day measurement session, with breaks for battery changes, calibration, basic maintenance requirements, and moving the equipment to a new site. The clocks on the portable noise monitors were synchronized to local time using the NIST clock in Boulder, Colorado to facilitate the correlation of aircraft noise events measured at multiple sites.

Due to the weather conditions during the measurement periods (heavy rains in June and cold temperatures in November-December) some measurement data were lost due to malfunctioning battery connections or dead batteries. These periods are indicated in the data display in Appendix D. These lapses were only temporary and they did not affect the acquired data or results.

3.4 Noise Measurement Results

This section provides the results of the noise measurement program in terms of cumulative exposure in terms of DNL and single-event noise levels in terms of the maximum noise level.

3.4.1 Measurement site DNL results

Table 4 summarizes the daily DNL measurement results for each of the measurement sites. The displayed DNL measurement data include all noise sources not merely the DNL from aircraft sources that the modeling process provides.

Table 4 Summary of Day-Night Average Sound Level Measurements - All Sources
Source: HMMH

Site #	Total Daily DNL (dB)									
	June 2012 Measurements									
	Fri. 6/8/12	Sat. 6/9/12	Sun. 6/10/12	Mon. 6/11/12	Tue. 6/12/12	Wed. 6/13/12	Thu. 6/14/12	Fri. 6/15/12	Sat. 6/16/12	Sun. 6/17/12
1	66	65	66	65	62	66	67	67	68	67
2	57	56	57	57	54	57	54	56	55	56
3	P	59	P	-	-	-	-	-	-	-
4	-	-	P	60	P	-	-	-	-	-
5	-	-	-	-	P	55	P	-	-	-
6	-	-	-	-	-	-	P	54	P	-
7	-	-	-	-	-	-	-	-	P	62

	November-December 2012 Measurements							
	Fri. 11/30/12	Sat. 12/1/12	Sun. 12/2/12	Mon. 12/3/12	Tue. 12/4/12	Wed. 12/5/12	Thu. 12/6/12	
1	64	65	63	65	65	66	65	
2	56	56	56	55	P	55	P	

As shown in Table 4, the highest levels were recorded for Site 1 (which was just off the west side of Runway 7-25) and Sites 3, 4 and 7 which were near or under the dominant arrival or departure flight paths. These data include all noise sources that were detected during the time the monitors were collecting data at the particular sites. The highest DNL value recorded on airport was 68 dB. The highest DNL value in the nearby community was 62 dB on E. 3rd Ave (Site 7).

Aircraft only DNL data were estimated by reviewing each logged noise event that exceeded the set monitor threshold of 65 dB. If an event exceeded this threshold for at least five seconds, the monitor would log the event and all the various noise metrics to include L_{max}, SEL, the average or equivalent noise level (L_{eq}), and duration in seconds that the threshold was exceeded. Since there were no full time observations at each site, efforts were made to corroborate the data through detailed comparisons with other sites where aircraft identification was more reliable. When it was unclear as to whether the noise event was from an aircraft or another noise source, the event was included in the aircraft DNL computation. Since the aircraft DNL is part of the total DNL, the aircraft DNL will be less than the total DNL for each site shown in Table 4. Table 5 shows the estimated aircraft DNL at each site and day based on analysis of the noise measurement data. The highest "aircraft" DNL value estimated on airport was 67 dB and 59 dB in the nearby community at Site 7. The aircraft DNL at Sites 3 and 7 were exactly 3 dB less than the overall DNL value, which implies aircraft noise is equal to the total of the other noise sources at those sites.

Table 5 Summary of Estimated Aircraft Day-Night Average Sound Level Measurements
Source: HMMH

Site #	Estimated Aircraft Daily DNL (dB)									
	June 2012 Measurements									
	Fri. 6/8/12	Sat. 6/9/12	Sun. 6/10/12	Mon. 6/11/12	Tue. 6/12/12	Wed. 6/13/12	Thu. 6/14/12	Fri. 6/15/12	Sat. 6/16/12	Sun. 6/17/12
1	65	65	66	65	60	65	66	67	67	66
2	50	48	50	54	47	49	47	53	50	48
3	P	56	P	-	-	-	-	-	-	-
4	-	-	P	54	P	-	-	-	-	-
5	-	-	-	-	P	46	P	-	-	-
6	-	-	-	-	-	-	P	49	P	-
7	-	-	-	-	-	-	-	-	P	59
	November-December 2012 Measurements									
	Fri. 11/30/12	Sat. 12/1/12	Sun. 12/2/12	Mon. 12/3/12	Tue. 12/4/12	Wed. 12/5/12	Thu. 12/6/12			
1	62	64	61	63	65	65	64			
2	45	45	47	48	P	49	P			

3.4.2 Summary of single-event results

The number of noise events measured at each site depended on the site location, aircraft activity, and the length of time that the site actively collected data. Noise from all sources was captured by the noise monitoring equipment; however, each site had an event threshold set into the monitor, which limited the identification of events to noise levels that had a greater effect on the noise environment. The set event noise threshold was the same for every site, 65 dB. The thresholds were generally set to capture as many noise events as feasible; i.e., as low as possible without being so low that background noise would cause events to merge together.

Appendix D provides a site-by-site description of the aircraft and non-aircraft sound levels measured in terms of the L_{max}. The sound levels actually "heard" during the different periods of the day and night may be from individual sound sources or combinations thereof. Some sites located under or nearly under flight tracks had a greater number of aircraft activity which provided a better predictor of aircraft noise levels to expect. Those to the sideline of the runways or located off of runways with fewer aircraft operations had fewer aircraft events detected and subsequently less contribution to determining the aircraft noise levels experienced at a particular site.

Table 6 shows the estimated number of aircraft noise events at each site for each day and the range of the aircrafts' single-event noise levels in terms of Maximum Sound Level, L_{max}.

Table 6 Estimated Number of Aircraft Events and Range of Maximum Noise Levels
Source: HMMH

Site #	Estimated Number of Aircraft Events above 65 dB and Maximum Noise Level Range										
	June 2012 Measurements										
	Fri. 6/8/12	Sat. 6/9/12	Sun. 6/10/12	Mon. 6/11/12	Tue. 6/12/12	Wed. 6/13/12	Thu. 6/14/12	Fri. 6/15/12	Sat. 6/16/12	Sun. 6/17/12	Range (dB)
1	175	162	184	264	81	211	293	238	222	136	68-107
2	121	60	74	131	46	91	54	66	66	45	65 - 82
3		93									65 - 92
4				85							65 - 93
5						27					65 - 79
6								28			65 - 82
7										62	65 - 96
November-December 2012 Measurements											
	Fri. 11/30/12	Sat. 12/1/12	Sun. 112/2/12	Mon. 12/3/12	Tue. 12/4/12	Wed. 12/5/12	Thu. 12/6/12	Range (dB)			
1	198	123	120	94	68	100	90	65-102			
2	36	32	25	35	11	54	15	65-84			

Note: Since the noise level threshold for the noise monitor was set to 65 dB, noise events less than 65 dB were not included.

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4 LAND USE

A review was made of the land use controls that are currently in effect in the vicinity of the airport as well as within the airport boundary. There are no anticipated changes to the existing land use for the forecast year. An understanding of the existing methods of land use controls forms the basis for evaluating the relationship of the existing and future DNL contours to existing land uses.

4.1 Land Use in the Vicinity of the Airport

MRI is located within the jurisdiction of the Municipality of Anchorage. A draft Anchorage Bowl Land Use Plan Map was approved in 2006 concluding the first part in updating the land use plan for Anchorage. After public review and revisions, in February 2013 the Assembly approved the rewrite of Title 21 which is a "section of the municipal code that regulates land use and development in order to protect and enhance the public health, safety, and general welfare, and to implement the comprehensive plan."[4] Title 21 forms the basis for the various allowable land uses within the Municipality.

In the vicinity of MRI, there are four community councils: (1) Mountain View, the area to the north, is mostly commercial and light industrial with a small number of residential and public use areas in close proximity; (2) Fairview, the area to the west, is primarily residential near the airport and becomes more commercial and industrial towards the downtown area; Fairview Elementary School is located in this area a few blocks from the south end of Runway 16/34; (3) Rogers Park is a mostly residential neighborhood south/southwest of Runway 16/34, largely under that runway's flight path; and (4) Airport Heights is south and east of the airport with a mix of residential, commercial, and the Alaska Regional Hospital. Figure 4 shows the regional land use around MRI categorized using 14 CFR Part 150 land use guidelines as described below.

To create the Geographic Information System (GIS) base map layers, land use data were collected and processed from the Municipality of Anchorage. The airport layers include the airport property line, taxiway, runway information and airport buildings.

Land uses were grouped in the following twelve categories: Single-family Residential, Multi-family Residential, School/University/Library, Hospital, Transient Lodging, Places of Worship, Park/Recreation/Open Space, Public Use, Commercial/Industrial, Military, Vacant/Undefined, and Wetland. The single-family category includes all types of detached residential units, whereas the multi-family category includes all types of attached dwelling units, including duplexes, townhouses, and apartments. The public use category includes Municipality-owned properties, community centers, and the arena area. The commercial/industrial category includes all types of retail and business uses, as well as offices, manufacturing, and warehousing. The parks/recreation/open space category includes all publicly or privately owned lands held for park, conservation, or golf course uses and cemeteries.

4.2 Aircraft Noise and Compatible Land Use Analysis

The FAA has developed land use guidelines that relate the compatibility of aircraft activity to areas surrounding an airport. Table 1 in 14 CFR Part 150, provided in Table 1, identifies land use activities that are acceptable within the DNL 65, 70 and 75 dB contours. FAA guidance indicates that virtually all land uses below DNL 65 dB are considered to be compatible with the effects of aircraft noise and therefore will not fund mitigation programs below DNL 65 dB. It is important to note that the FAA allows local land use planning agencies to adopt a lower compatibility level that may be more stringent than FAA guidelines.

[4] http://www.muni.org/Departments/OCPD/Planning/Projects/t21/Pages/CurrentWork.aspx

Attention is focused on areas within the DNL 65 dB contour because the FAA considers aircraft noise exposure levels of DNL 65 dB and greater to be non-compatible with noise sensitive uses. The DNL 65 dB contour also identifies the limits the FAA considers the most crucial for eligibility of funding of noise abatement and mitigation measures. The DNL 65 dB contour was chosen by the FAA to represent the point of compatibility versus non-compatibility based on two factors: scientific social survey results regarding levels of community annoyance due to aircraft noise, and reasonable public policy investments (Appendix A, Section A.5). When developing 14 CFR Part 150 regulations, the FAA had to strike a balance between aircraft noise levels where annoyance was minimal and the ability of the federal government to provide funding for noise mitigation programs within a defined area around each airport in the country. The so-called "Schultz Curve"[5] is based on scientific analysis of noise levels and people's associated annoyance level. The funding factor is related to the thousands of homes and noise sensitive sites across the country that would potentially be mitigated using federal funds. The balance was reached by selecting the DNL 65 dB.

Based on the Schultz Curve, approximately 14% of people are "highly annoyed" at DNL 65 dB. The DNL 65 dB contour provided a boundary where the annoyance level was reasonably low and the potential noise sensitive locations located within that contour level across the country was at a manageable level from a federal funding viewpoint.

The FAA recognizes, however, that noise does not stop at DNL 65 dB and is heard by people located in close proximity to approach, departure, and flight pattern corridors. The airport sponsor can attempt to address noise concerns with possible modifications to flight procedures that are beyond the limits of the DNL 65 dB.

[5] Federal Interagency Committee on Noise. *Federal Agency Review of Selected Airport Noise Analysis Issues*. August 1992

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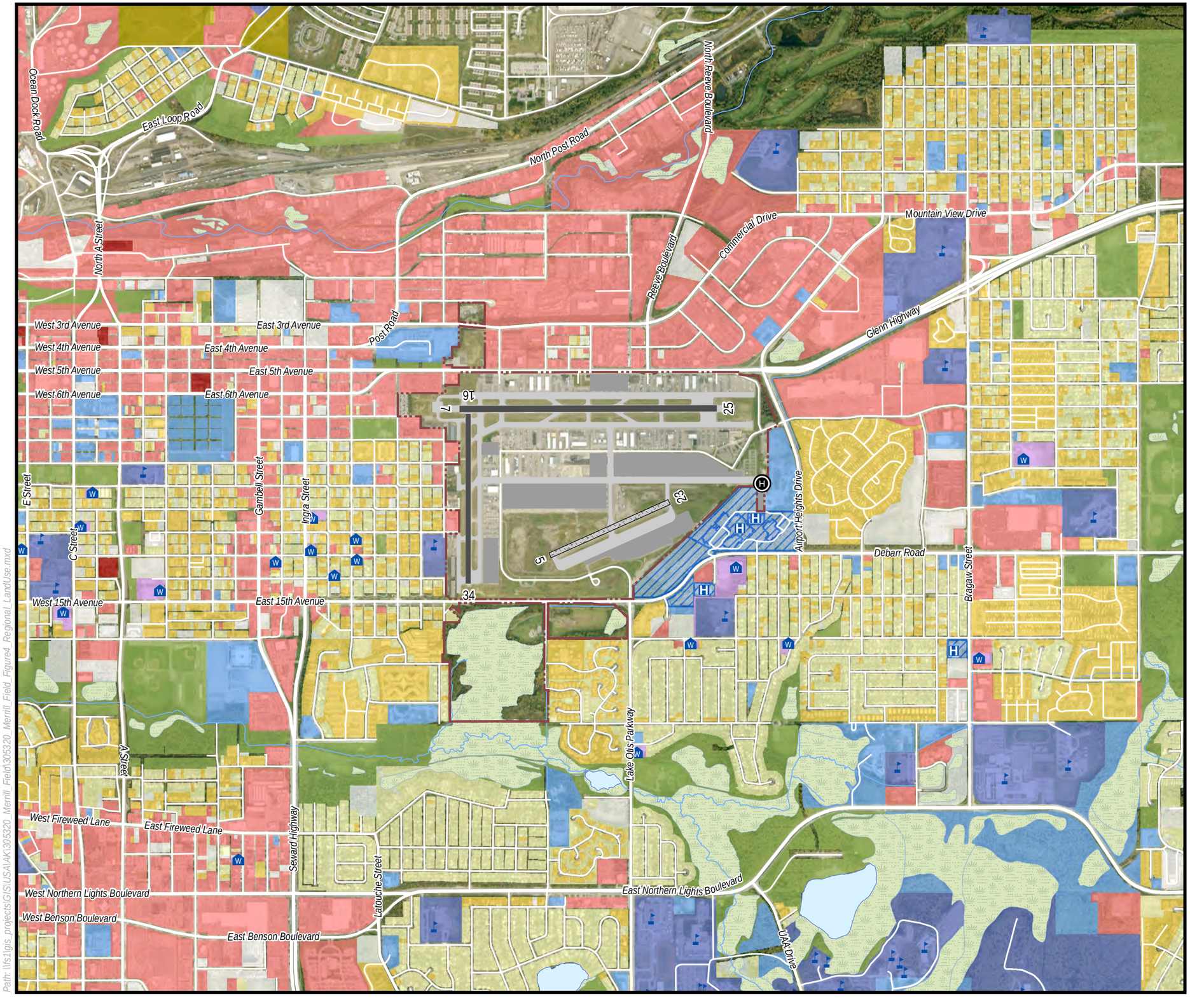
Figure 4
Merrill Field Airport
Regional Land Use



- Airport Boundary
- Runway (Paved)
- Runway (Gravel)
- Taxiway
- Apron
- Helipad
- School/University
- Place of Worship
- Hospital
- Single Family
- Multi Family
- School/University/Library
- Hospital
- Transient Lodging
- Place of Worship
- Water
- Park/Recreation/Open Space
- Public Use
- Commercial/Industrial
- Military
- Vacant/Undefined
- Wetland
- Stream

Data Sources:
Municipality of Anchorage GIS; (Land Use, Roads, Parks, Wetlands, Marine/Water)
Environmental Systems Research Institute (ESRI, Inc); (Roads, Airports, Shaded Relief)

0 1,500 3,000 Feet

Path: \\fs1\gis_projects\GIS\USAIAK\305320_Merrill_Field\305320_Merrill_Field_Figure4_Regional_LandUse.mxd

5 DEVELOPMENT OF NOISE CONTOURS

The DNL contours were prepared using the most recent release of the FAA's Integrate Noise Model (INM) available at the time the data were collected and the model initially setup, Version 7.0c. The INM requires inputs in the following categories:

- Physical description of the airport layout
- Number and mix of aircraft operations
- Day-night split of operations (by aircraft type)
- Runway utilization rates
- Prototypical flight track descriptions
- Flight track utilization rates
- Meteorological conditions
- Terrain

This section presents this information for the existing condition (2013) and forecast condition (2018) noise contours.

5.1 Airport Physical Parameters

Merrill Field Airport, denoted by a three-letter designation MRI by the FAA and PAMR by the International Civil Aeronautics Organization (ICAO), is located just east of downtown Anchorage on 436 acres. The airport has a set of three runways: Runway 7/25 (4,000 feet by 100 feet), Runway 16/34 (2,640 feet by 75 feet) and Runway 5/23 (gravel strip 2,000 feet by 60 feet). There are no displaced runway thresholds. Figure 5 shows the Airport Diagram and Table 7 shows the specific runway information. There are no anticipated changes to the airport configuration for the forecast year 2018.

Each end of the runways is designated by a number that, with the addition of a trailing "0", reflects the approximate magnetic heading of the runway to the nearest ten degrees, as seen by the pilot. Thus, the primary east-west runway, 7-25, has the designation "7" at the west end of the pavement looking eastward, indicating that it is aligned on a magnetic heading of approximately 070º, while the opposite end of the same piece of pavement has the designation "25" indicating its orientation on an approximate heading of 250º. Runway 7-25 is 4,000 feet long and 100 feet wide. The north-south runway, Runway 16-34, is oriented on approximate magnetic headings of 160º and 340º and is 2,640 feet long and 75 feet wide. In addition a gravel strip, Runway 5-23, is oriented on approximate magnetic headings of 050° and 230° and is 2,000 feet in length and 60 feet wide.

Runway length, runway width, surface conditions, prevailing wind and speed, instrumentation, and declared distances may affect which aircraft might use a particular runway and under what conditions, and therefore how often a runway would be used relative to the other runways at the airport.

Figure 5 presents the existing MRI airport layout and Table 7 provides the actual coordinates and parameters for each runway end. Based on meetings with airport operators and FAA Air Traffic Control Tower (ATCT) personnel, helicopter operations were modeled from three different locations[6]:

- A formal helipad identified on the airport near the Alaska Regional Hospital
- Helicopter ramp north of taxiway Q and west of Taxiway G (Evergreen)
- Helicopter ramp north of Taxiways A and C near the west end of Runway 7-25 (Alyeska)

[6] At the outset of the modeling process, Tanalian Aviation was not operating at MRI and therefore operations from the Tanalian Aviation helipad were not included in the modeling.

No physical changes to runway/taxiway dimensions or orientation that would affect noise modeling are expected within the 5-year time frame for this project and therefore, the runway layout modeled for the 2013 base year and the 2018 forecast year is identical.

Figure 5 Existing MRI Airport Layout
Source: FAA, digital Terminal Procedures, effective August 22, 2013 to October 17, 2013

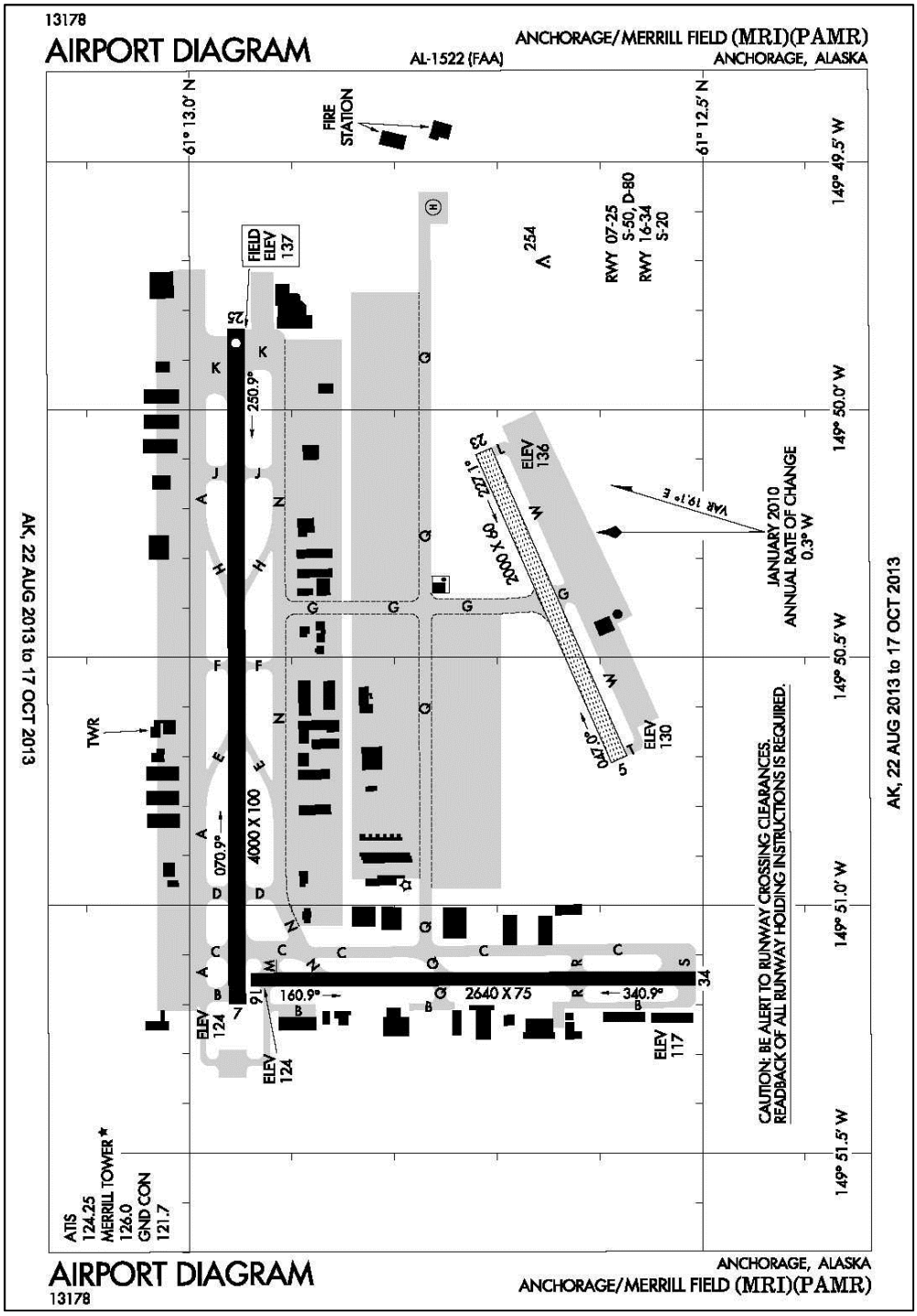


Table 7 Runway and Helipad Details
Source: National Flight Data Center (NFDC) 5010 Data, accessed 7/11/2013[7], Helicopter Operators

Runway/ Helipad	Latitude (deg-min-sec)	Longitude (deg-min-sec)	Elevation (ft, MSL)	Displaced Threshold	Glide Slope	Threshold Crossing Height (ft)	Magnetic Orientation (degrees)
7	61-12-57.250N	149-51-11.900W	124.4	0	3.75	43	071
25	61-12-57.240N	149-49-50.240W	136.7	0	3	21	251
16	61-12-56.450N	149-51-09.060W	124.4	0	3	22	161
34	61-12-30.460N	149-51-09.090W	117.1	0	3	21	341
5	61-12-34.819N	149-50-42.506W	130.0	0	-	-	047
23	61-12-42.785N	149-50-05.156W	136.0	0	-	-	227
Hospital	61-12-42.804N	149-49-38.525W	137.0	n/a	n/a	n/a	n/a
Alyeska	61-13-00.898N	149-51-01.516W	125.0	n/a	n/a	n/a	n/a
Evergreen	61-12-47.556N	149-50-42.371W	121.0	n/a	n/a	n/a	n/a
Note: At the outset of the modeling process, Tanalian Aviation was not operating at MRI and therefore the associated helipad was not modeled. Approximate helipad location is 61° 13' 00"N, 149° 49' 55" W.							

5.2 Airport Operations

14 CFR Part 150 and its table of noise/land use compatibility guidelines require the calculation of "yearly DNL" values. That is, the daily noise exposure (in DNL) averaged over a year – usually a calendar year. The INM produces these values of exposure utilizing an "average annual day" of airport operations. In this NEM update, MRI aircraft activity data from the FAA-approved Aviation Demand Forecast[8], were used to develop the average annual day's operations for both the existing condition 2013, and the forecast condition 2018.

5.2.1 Development of aircraft operations

The Aviation Demand Forecast from the Draft Airport Master Plan provided in Appendix E was used to determine the overall aircraft operations for 2013 and 2018. Table 3-15 "MRI 20-Year Air Traffic Forecast Levels and Growth Rates" of the Forecast provides annual forecast aircraft operations for both itinerant and local general aviation and the annual operations forecast for the gravel runway (Runway 5-23). Itinerant operations are those arrivals and departures that originate or terminate outside of or away from the airport. Local operations primarily include those operations contained within the local traffic pattern or within sight of the airport and those operations known to be departing for or arriving from local practice areas in close proximity to the airport.

The aircraft fleet mix or types of aircraft operating at MRI were determined through two sources:

- Discussions with select primary operators at MRI
- Review of the "Annual Aircraft Inventory", dated June 12, 2012

Using these two references, the based aircraft were grouped by associated INM aircraft types.

The itinerant aircraft operations were then allocated based on either the provided operators' data or the based aircraft inventory and an aircraft type's percentage of the total inventory. For local aircraft

[7] https://nfdc.faa.gov/nfdcApps/services/airportLookup/airportDisplay.jsp?airportId=MRI
[8] HDR-Alaska, Inc., "Merrill Field Airport Master Plan Update and Noise Study", Chapter 3 Aviation Demand Forecasts, approved by the FAA, June 18, 2013.

operations, representative aircraft types in the category of twin-engine, single-engine, or helicopter aircraft were selected and the operations distributed based on operator inputs or fleet mix percentage.

5.2.2 Operations in 2013

This section presents the detailed average daily aircraft activity summaries developed for calendar year 2013 as described in the previous section. The aircraft operations forecast for MRI in terms of itinerant and local operations found in the Aviation Demand Forecast of the Master Plan for the year 2013 is listed below in Table 8. Both the annual operations and the annual average day (AAD) operations are shown.

Table 8 2013 Operations Summary
Source: MRI Master Plan Aviation Demand Forecast (March 2013)

Category	Number of Annual Operations Forecast	Number of Daily Average Operations Modeled
General Aviation - Itinerant	69,354	190.0120
General Aviation - Local	60,277	165.1436
Total	**129,631**	**355.1556**

Table 9 shows the distribution by Integrated Noise Model (INM) aircraft type of the number of annual average daily aircraft arrivals and departures, as well as whether they occur during the day or night time period – 7 a.m. to 10 p.m. and 10 p.m. to 7 a.m., respectively. The day/night breakdown is critical to the calculation of DNL because the metric weights night operations by a factor of 10 (mathematically equivalent to adding ten decibels to the noise level produced by aircraft operating at night).

Table 9 Modeled Average Daily Aircraft Operations for 2013
Source: Master Plan Aviation Demand Forecast (2013), Annual Aircraft Inventory 2012, HMMH

Aircraft Category	INM Aircraft Type	Annual Ops	AAD Arrivals		AAD Departures		AAD Patterns[1]		AAD Total Ops[2]
			Day	Night	Day	Night	Day	Night	
Twin-Engine Prop/ TProp	BEC58P	4,190	1.3840	0.0428	1.3840	0.0428	4.1839	0.1294	11.4802
	CNA441	298	0.3954	0.0122	0.3954	0.0122	0.0000	0.0000	0.8152
	PA30	533	0.7080	0.0219	0.7080	0.0219	0.0000	0.0000	1.4598
	PA31	2,232	2.9657	0.0917	2.9657	0.0917	0.0000	0.0000	6.1148
	PA42	149	0.1977	0.0061	0.1977	0.0061	0.0000	0.0000	0.4076
Twin-Engine Subtotal		**7,401**	**5.6508**	**0.1747**	**5.6508**	**0.1747**	**4.1839**	**0.1294**	**20.2776**
Single-Engine Prop/ TProp	CNA172	32,284	20.8871	0.6460	20.8871	0.6460	22.0107	0.6807	88.4490
	CNA182	7,589	4.9410	0.1529	4.9410	0.1529	5.1426	0.1590	20.7910
	CNA182FLT	446	0.5931	0.0184	0.5931	0.0184	0.0000	0.0000	1.2230
	CNA206	20,467	13.0788	0.4045	13.0788	0.4045	14.1168	0.4367	56.0736
	CNA208	298	0.3954	0.0122	0.3954	0.0122	0.0000	0.0000	0.8152
	CNA20T	5,735	7.6207	0.2357	7.6207	0.2357	0.0000	0.0000	15.7128
	COMSEP	2,530	1.6470	0.0509	1.6470	0.0509	1.7142	0.0530	6.9302
	DHC-2FLT	365	0.4844	0.0150	0.4844	0.0150	0.0000	0.0000	0.9988

Aircraft Category	INM Aircraft Type	Annual Ops	AAD Arrivals		AAD Departures		AAD Patterns[1]		AAD Total Ops[2]
			Day	Night	Day	Night	Day	Night	
	GASEPF	33,762	21.8404	0.6754	21.8404	0.6754	23.0219	0.7121	92.4996
	GASEPV	12,292	7.4599	0.2307	7.4599	0.2307	8.8734	0.2744	33.6768
	PA28	802	1.0658	0.0330	1.0658	0.0330	0.0000	0.0000	2.1976
Single-Engine Subtotal		**116,570**	**80.0136**	**2.4747**	**80.0136**	**2.4747**	**74.8796**	**2.3159**	**319.3676**
Helicopter	B206L	446	0.5932	0.0184	0.5932	0.0184	0.0000	0.0000	1.2232
	B212	595	0.7910	0.0246	0.7910	0.0246	0.0000	0.0000	1.6312
	BO105	149	0.1978	0.0062	0.1978	0.0062	0.0000	0.0000	0.4080
	H500D	149	0.1978	0.0062	0.1978	0.0062	0.0000	0.0000	0.4080
	R22	1,351	1.1969	0.0370	1.1969	0.0370	0.5985	0.0185	3.7018
	R44	977	0.8653	0.0268	0.8653	0.0268	0.4326	0.0134	2.6762
	SA350D	1,398	1.8582	0.0576	1.8582	0.0576	0.0000	0.0000	3.8316
	SA355F	149	0.1977	0.0061	0.1977	0.0061	0.0000	0.0000	0.4076
	SC300C	446	0.5931	0.0183	0.5931	0.0183	0.0000	0.0000	1.2228
Helicopter Subtotal		**5,660**	**6.4910**	**0.2012**	**6.4910**	**0.2012**	**1.0311**	**0.0319**	**15.5104**
Total		**129,631**	**92.1554**	**2.8506**	**92.1554**	**2.8506**	**80.0946**	**2.4772**	**355.1556**

Notes: 1. Pattern operations count as two operations – one arrival and one departure
2. AAD Total Ops = Arrivals + Departures + Patterns x 2
3. Any discrepancies between the total numbers of operations from the average daily operations are due to rounding.
4. Tanalian Aviation R-22 helicopter flight patterns expected are approximately 730 annually.

5.2.3 Operations in 2018

As was done in Table 8 for 2013, Table 10 presents the 2018 operations forecast as approved by FAA, and the associated daily average modeled operations. The five-year forecast shows an equal increase in itinerant, local, and total operations of approximately 4% over the five years.

Table 10 2018 Operations Summary
Source: MRI Master Plan Aviation Demand Forecast (March 2013)

Category	Number of Annual Operations Forecast	Number of Daily Average Operations Modeled
General Aviation - Itinerant	72,100	197.5358
General Aviation - Local	62,666	171.6866
Total	**134,766**	**369.2224**

Table 11 shows distribution by INM aircraft type of the number of annual average daily aircraft arrivals and departures, as well as whether they occur during the day or night time period – 7 a.m. to 10 p.m. and 10 p.m. to 7 a.m., respectively. Detailed aircraft assignments were based on several sources, including discussions with operators. The split between day/night operations was assumed to be the same as the existing operations, unless additional operator information was available.

Table 11 Modeled Average Daily Aircraft Operations for 2018
Source: Master Plan Aviation Demand Forecast (2013), Annual Aircraft Inventory 2012, HMMH

Aircraft Category	INM Aircraft Type	Annual Ops	AAD Arrivals		AAD Departures		AAD Patterns[1]		AAD Total Ops[2]
			Day	Night	Day	Night	Day	Night	
Twin-Engine Prop/ TProp	BEC58P	4,888	1.3459	0.0415	1.3459	0.0415	5.1493	0.1593	13.3920
	CNA441	289	0.3846	0.0119	0.3846	0.0119	0.0000	0.0000	0.7930
	PA30	924	1.2287	0.0380	1.2287	0.0380	0.0000	0.0000	2.5334
	PA31	2,171	2.8841	0.0892	2.8841	0.0892	0.0000	0.0000	5.9466
	PA42	145	0.1923	0.0059	0.1923	0.0059	0.0000	0.0000	0.3964
Twin-Engine Subtotal		**8,417**	**6.0356**	**0.1865**	**6.0356**	**0.1865**	**5.1493**	**0.1593**	**23.0614**
Single-Engine Prop/ TProp	CNA172	36,275	23.7764	0.7354	23.7764	0.7354	24.4241	0.7554	99.3826
	CNA182	7,380	4.8050	0.1485	4.8050	0.1485	5.0010	0.1546	20.2182
	CNA182FLT	434	0.5768	0.0179	0.5768	0.0179	0.0000	0.0000	1.1894
	CNA206	19,904	12.7190	0.3934	12.7190	0.3934	13.7286	0.4246	54.5312
	CNA208	289	0.3846	0.0119	0.3846	0.0119	0.0000	0.0000	0.7930
	CNA20T	5,698	7.5718	0.2342	7.5718	0.2342	0.0000	0.0000	15.6120
	COMSEP	2,460	1.6017	0.0495	1.6017	0.0495	1.6670	0.0515	6.7394
	DHC-2FLT	355	0.4712	0.0146	0.4712	0.0146	0.0000	0.0000	0.9716
	GASEPF	34,866	22.8593	0.7070	22.8593	0.7070	23.4698	0.7259	95.5240
	GASEPV	11,954	7.2546	0.2244	7.2546	0.2244	8.6293	0.2669	32.7504
	PA28	780	1.0364	0.0321	1.0364	0.0321	0.0000	0.0000	2.1368
Single-Engine Subtotal		**120,395**	**83.0567**	**2.5689**	**83.0567**	**2.5689**	**76.9198**	**2.3789**	**329.8486**
Helicopter	B206L	434	0.5768	0.0178	0.5768	0.0178	0.0000	0.0000	1.1893
	B212	579	0.7692	0.0238	0.7692	0.0238	0.0000	0.0000	1.5858
	BO105	145	0.1924	0.0060	0.1924	0.0060	0.0000	0.0000	0.3964
	H500D	145	0.1924	0.0060	0.1924	0.0060	0.0000	0.0000	0.3964
	R22	1,587	1.4057	0.0435	1.4057	0.0435	0.7028	0.0217	4.3474
	R44	1,120	0.9923	0.0307	0.9923	0.0307	0.4962	0.0153	3.0691
	SA350D	1,366	1.8146	0.0562	1.8146	0.0562	0.0000	0.0000	3.7414
	SA355F	145	0.1923	0.0059	0.1923	0.0059	0.0000	0.0000	0.3964
	SC300C	434	0.5768	0.0178	0.5768	0.0178	0.0000	0.0000	1.1893
Helicopter Subtotal		**5,954**	**6.7125**	**0.2077**	**6.7125**	**0.2077**	**1.1990**	**0.0370**	**16.3124**
Total		**134,766**	**95.8048**	**2.9631**	**95.8048**	**2.9631**	**83.2681**	**2.5752**	**369.2224**

Notes: 1. Pattern operations count as two operations – one arrival and one departure
2. AAD Total Ops = Arrivals + Departures + Patterns x 2
3. Any discrepancies between the total number of operations from the average daily operations are due to rounding.
4. Tanalian Aviation R-22 helicopter flight patterns expected are approximately 2,190 annually.

5.3 Aircraft Noise and Performance Characteristics

Specific noise and performance data must be entered into the INM for each aircraft type operating at the airport. Noise data are included in the form of sound exposure level (SEL – see Appendix A) at a range of distances (from 200 feet to 25,000 feet) from a particular aircraft with engines at a specific thrust level. Performance data include thrust, speed and altitude profiles for takeoff and landing operations. The INM database contains standard noise and performance data for over one hundred different fixed-wing aircraft types, most of which are civilian aircraft. The INM automatically accesses the noise and performance data for takeoff and landing operations by those aircraft.

Within the INM database, aircraft takeoff or departure profiles are usually defined by a range of trip distances identified as "stage lengths." A longer trip distance or higher stage length is associated with a heavier aircraft due to the increase in fuel requirements for the flight. General aviation aircraft all have a standard stage length of 1.

This study included many different aircraft types. While many aircraft could be modeled by direct assignments from the standard INM database, some were not in the INM database. For those aircraft types not in the INM standard database, FAA-approved substitutions were used to model the aircraft with a similar type.

User defined aircraft/substitutions were submitted to FAA on July 16, 2012 (Appendix F) with FAA approval or recommendation response received on August 28, 2012 (Appendix G).

5.4 Runway Utilizations

The runway utilization is based on a number of factors: the prevailing wind direction, calm wind procedures, informal preferential runway for departures and arrivals, seasonal variations, and accommodation of traffic. Through interviews and discussion with MRI staff and the FAA ATCT staff, there seemed to be consensus that Runway 25 was the predominant runway for 80-85% of the operations with 10-15% on Runway 16/34 and about 2% on Runway 5/23. This differs significantly from the runway use assumptions for the Environmental Assessment (EA) for the proposed addition of the gravel/ski runway project where there was greater activity assumed for the new runway[9]. Based on the discussions and observations of aircraft activity in June 2012, the runway use for arrivals, departures and local patterns is shown in Table 12. Daytime and nighttime uses were assumed to be the same except for Runway 5/23 where operations were limited to daytime. Helicopters used the various leaseholds and the identified helipad near the Alaska Regional Hospital complex. Therefore, helicopter operations were split between the north and south helicopter ramps and helipad in a 40%, 40%, 20% split, respectively.

[9] "Merrill Field Proposed Gravel/Ski Runway Project", Final Environmental Assessment, Aries Consultants Ltd., June 2001

Table 12 Overall Runway Use Percentages for 2013 and 2018
Source: Airport, FAA ATCT Discussions; HMMH

Runway	Arrivals	Departures	Patterns
Runway 7	3%	3%	3%
Runway 25	83%	83%	97%
Runway 16	2%	10%	0%
Runway 34	10%	2%	0%
Runway 5	1%	1%	0%
Runway 23	1%	1%	0%
Total	100%	100%	100%

5.5 Flight Track Geometry and Utilization

In addition to runway usage, aircraft Visual Flight Rules (VFR) arrival and departure flight depictions/procedures provided an ideal source of information for identifying where aircraft fly (Appendix H). Discussions with the airport staff, operators, and ATCT and on-site observations provided information on how often the different flight corridors are used in the vicinity of MRI. From these data, prototypical flight tracks were developed for noise modeling. These tracks follow the central tendency of more dispersed paths flown by aircraft along each major flight corridor. Figure 6 through Figure 8 depict all of the modeled arrival and departure flight tracks used for modeling the aircraft operations for both the existing and forecast conditions.

Aircraft are "assigned" to a specific track based on observations and discussions with the FAA ATCT staff, MRI staff, and pilots interviewed. For each fixed-wing aircraft arrival or departure flight track, the track designator begins with the associated runway, followed by an "A" if an arrival track, and then a two or three letter identifier of the procedure flown. For example for Runway 25, "25SC" is a departure track that departs Runway 25 and turns to follow Ship Creek to over Knik Arm. Likewise, an arrival track to Runway 16 from over Ship Creek would be designated 16 (runway), A (arrival), SC (for Ship Creek, or 16ASC. These procedure designators are further defined in Table 13 displaying the model track utilization percentages for the model tracks presented in the figures described above. Model track utilization percentages for local pattern operations depicted in Figure 9 are presented in Table 14. The designation for the patterns (e.g., 25T1 and T25T1A) indicates some slight variation in the length of downwind to account for modeled aircraft performance and aircraft separation when the pattern has additional traffic.

Modeled helicopter flight tracks originate and terminate at the three respective helipads[10]: Alyeska (north of Runway 7 approach), Evergreen (north of Taxiway Q), and Alaska Regional Hospital (hospital helipad). Helicopter flight training patterns fly to and from the runway numbers for Runway 25 (east end of runway). Figure 10 depicts the modeled helicopter tracks and Table 15 shows the track utilization percentages.

[10] At the outset of the modeling process, Tanalian Aviation was not operating at MRI and therefore no flight tracks were modeled specifically from the approximate Tanalian Aviation helipad although they have noted to fly the same routes as those helicopters modeled.

Table 13 Modeled Aircraft Departure and Arrival Track Use for 2013 and 2018
Source: Airport, FAA ATCT and Operator Discussions; HMMH

Runway	Departure		Arrival	
	Track ID	Percent Use	Track ID	Percent Use
7	7SC	75%	7ASC	90%
	7SE	10%	7ASE	10%
	7ST	15%		
	Total	**100%**	**Total**	**100%**
25	25SC	70%	25ASC	90%
	25CH	5%	25ASE	10%
	25SE	10%		
	25RT	15%		
	Total	**100%**	**Total**	**100%**
16	16CC	70%	16ASC	100%
	16CCE	15%		
	16CH	5%		
	16SE	10%		
	Total	**100%**	**Total**	**100%**
34	34SC	88%	34ACC	100%
	34CH	12%		
	Total	**100%**	**Total**	**100%**
5	5SC	100%	5ACC	100%
	Total	**100%**	**Total**	**100%**
23	23CC	60%	23ACC	45%
	23CCE	20%	23ASC	45%
	23CH	5%	23ASE	10%
	23SC	5%		
	23SE	10%		
	Total	**100%**	**Total**	**100%**

Note: SC = Ship Creek
SE = South East (Campbell)
ST = Straight
RT = Right Turn
CH = City High
CC = Chester Creek
CCE = Chester Creek Early

Table 14 Modeled Flight Pattern Track Use for 2013 and 2018
Source: Airport, FAA ATCT and Operator Discussions; HMMH

Runway	Track ID	Percentage
7	7T/7TA	100%
	Total	**100%**
25	25T1/T1A	60%
	25T2/T2A	30%
	25T3/T3A	10%
	Total	**100%**
25 (end of runway) (Helicopters)	25T	100%

Table 15 Modeled Helicopter Departure and Arrival Track Use for 2013 and 2018
Source: Airport, FAA ATCT and Operator Discussions; HMMH

Helipad	Departure		Arrival	
	Track ID	Percent Use	Track ID	Percent Use
Alaska Regional Hospital (20K)	20KDS	90%	20KAS	90%
	20KEDS	10%	20KEAS	10%
	Total	**100%**	**Total**	**100%**
Alyeska	AHWY	60%	AAHWY	60%
	ASC	40%	AASC	40%
	Total	**100%**	**Total**	**100%**
Evergreen	EHDE	50%	EHAE	50%
	EHDS	50%	EHAS	50%
	Total	**100%**	**Total**	**100%**

Note: DS = Depart to south AS = arrive from south

EDS = Early departure route to south EAS = arrive early from south

AHWY = along Highway east AAHWY = arrive along Highway

ASC = ALY depart to Ship Creek AASC - Arrive ALY from Ship Creek

EHDE = EVER depart east EHAE = EVER arrive from east

EHDA = EVER depart south EHAS = EVER arrive from south

At the outset of the modeling process, Tanalian Aviation was not operating at MRI and therefore no flight tracks were modeled specifically from the approximate Tanalian Aviation helipad although they have noted to fly the same routes as those helicopters modeled.

5.6 Meteorological Conditions

The INM has several settings that affect aircraft performance profiles and sound propagation based on meteorological data. Meteorological settings include average annual temperature (degrees Fahrenheit), barometric sea-level pressure (inches of mercury), relative humidity at the airport (percent), and average headwind speed (nautical miles per hour or knots). The MRI 2011 annual average values for the climatological data were extracted from the National Climatic Data Center (NCDC)[11] and input into the model as follows:

- Average temperature of 36.7°F
- Average sea-level pressure of 29.74 inches of mercury
- Average relative humidity of 71%

The average headwind speed was set to the INM default of 8 knots.

5.7 Terrain

Terrain data describe the elevation of the ground surrounding the airport and on airport property. The INM uses terrain data to adjust the ground level under the flight paths. The terrain data do not affect the aircraft's performance or emitted noise levels, but do affect the vertical distance between the aircraft and a "receiver" on the ground. This in turn affects the noise levels received at a particular point on the ground. The terrain data were obtained from the United States Geological Survey (USGS).[12]

[11] www.ncdc.noaa.gov

[12] Data downloaded from http://gisdata.usgs.gov/website/seamless/viewer.htm on 8/1/2012 in 2 arc-second resolution Gridfloat format. Gridfloat is a data format of the National Elevation Dataset (NED).

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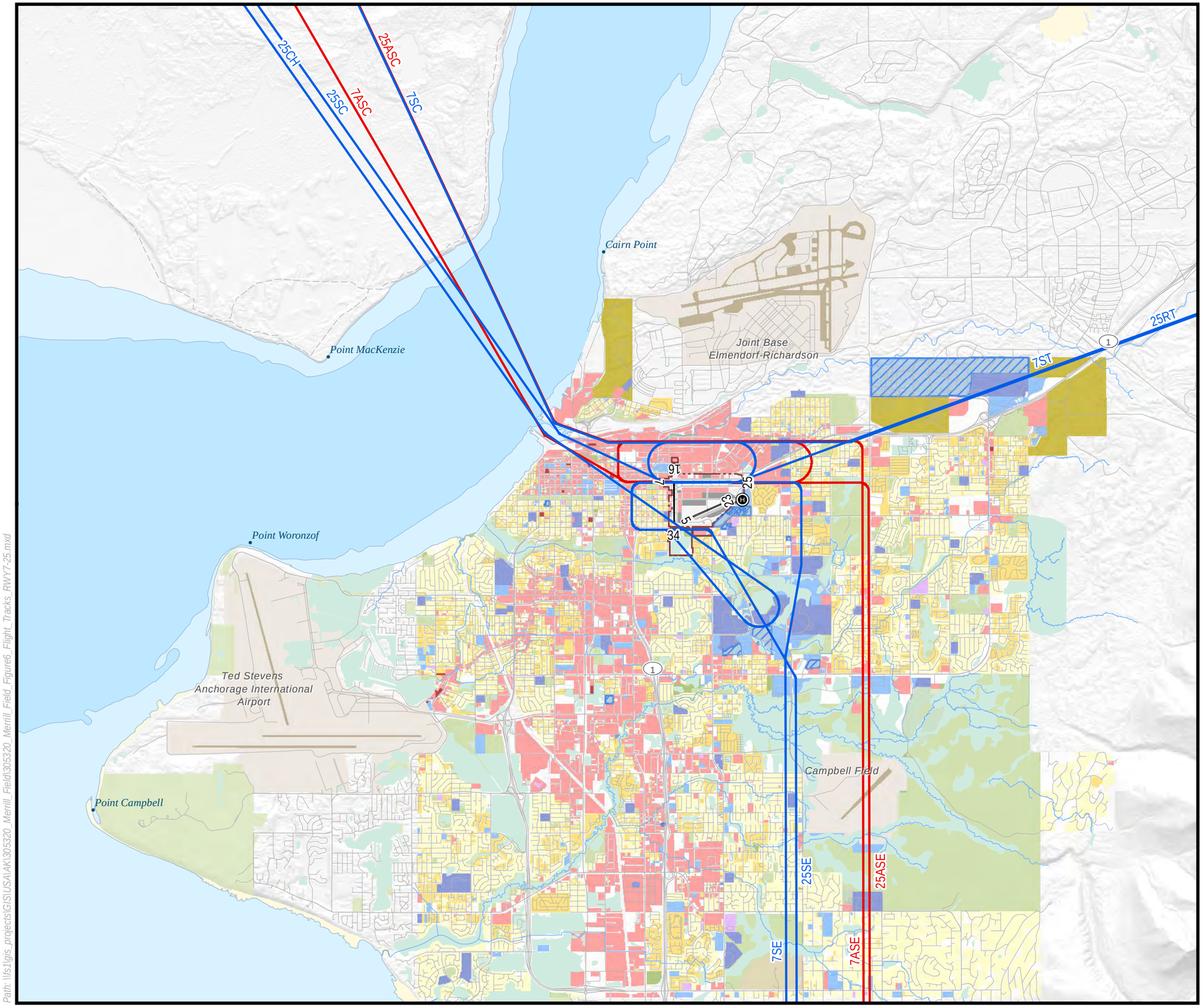
Merrill Field Airport

Anchorage, Alaska

14 CFR Part 150 Update

Figure 6
Runway 7-25 Modeled Flight Tracks



- Arrival Track
- Departure Track
- Airport Boundary
- Runway (Paved)
- Runway (Gravel)
- Taxiway
- Apron
- Helipad
- Single Family
- Multi Family
- School/University/Library
- Hospital
- Transient Lodging
- Place of Worship
- Water
- Park/Recreation/Open Space
- Public Use
- Commercial/Industrial
- Military
- Vacant/Undefined
- Wetland
- Stream

Data Sources:
Municipality of Anchorage GIS; (Land Use, Roads, Parks, Wetlands, Marine/Water)
Environmental Systems Research Institute (ESRI, Inc); (Roads, Airports, Shaded Relief)

0 5,000 10,000 Feet

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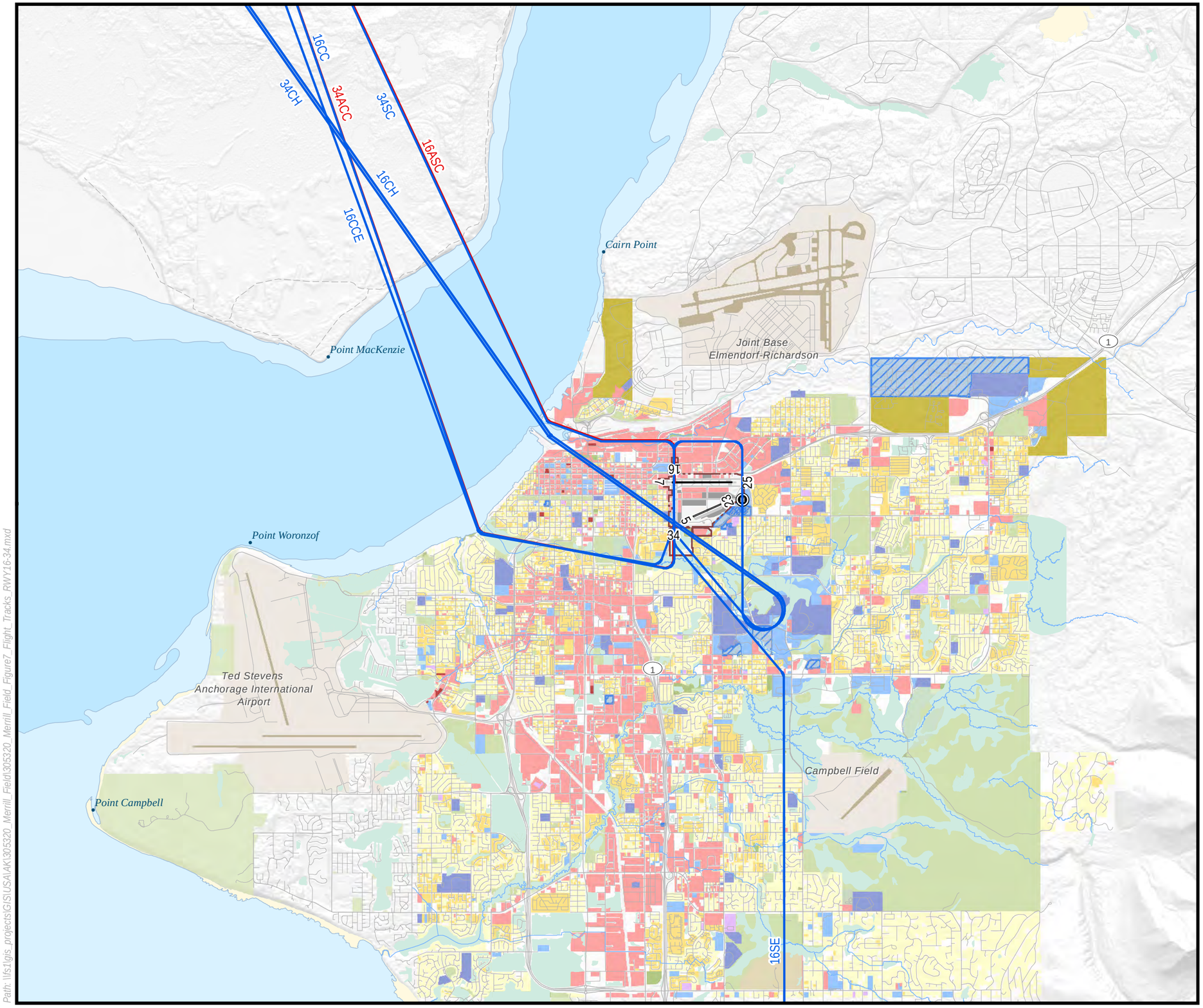
Merrill Field Airport

Anchorage, Alaska

14 CFR Part 150 Update

Figure 7
Runway 16-34 Modeled Flight Tracks



- Arrival Track
- Departure Track
- Airport Boundary
- Runway (Paved)
- Runway (Gravel)
- Taxiway
- Apron
- Helipad
- Single Family
- Multi Family
- School/University/Library
- Hospital
- Transient Lodging
- Place of Worship
- Water
- Park/Recreation/Open Space
- Public Use
- Commercial/Industrial
- Military
- Vacant/Undefined
- Wetland
- Stream

Data Sources:
Municipality of Anchorage GIS; (Land Use, Roads, Parks, Wetlands, Marine/Water)
Environmental Systems Research Institute (ESRI, Inc); (Roads, Airports, Shaded Relief)

0 5,000 10,000 Feet

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Merrill Field Airport

Anchorage, Alaska

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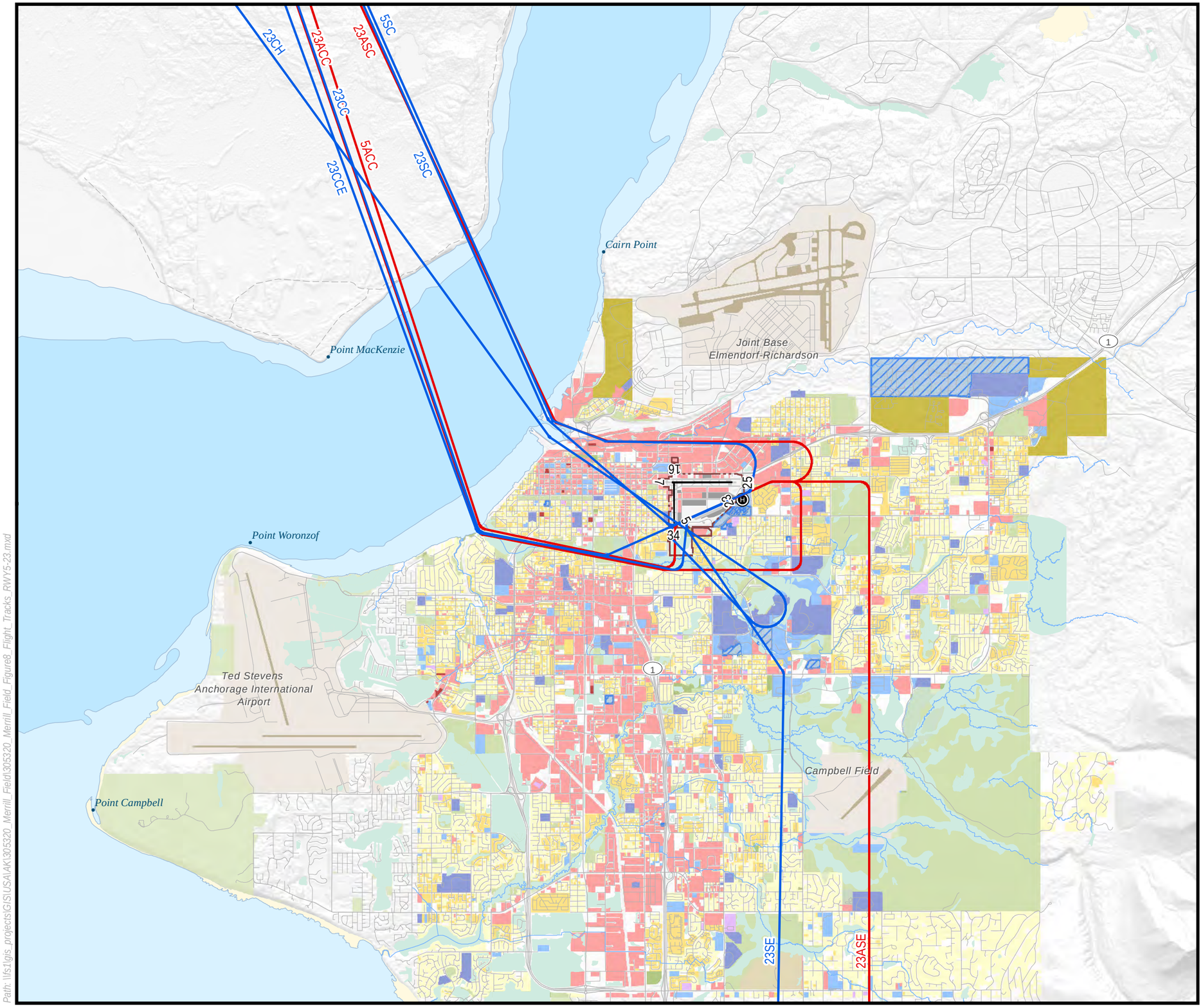
Figure 8
Runway 5-23 Modeled Flight Tracks



Arrival Track
Departure Track

Airport Boundary
Runway (Paved)
Runway (Gravel)
Taxiway
Apron
Helipad

Single Family
Multi Family
School/University/Library
Hospital
Transient Lodging
Place of Worship
Water
Park/Recreation/Open Space
Public Use
Commercial/Industrial
Military
Vacant/Undefined
Wetland
Stream

Data Sources:
Municipality of Anchorage GIS; (Land Use, Roads, Parks, Wetlands, Marine/Water)
Environmental Systems Research Institute (ESRI, Inc); (Roads, Airports, Shaded Relief)

0 5,000 10,000 Feet

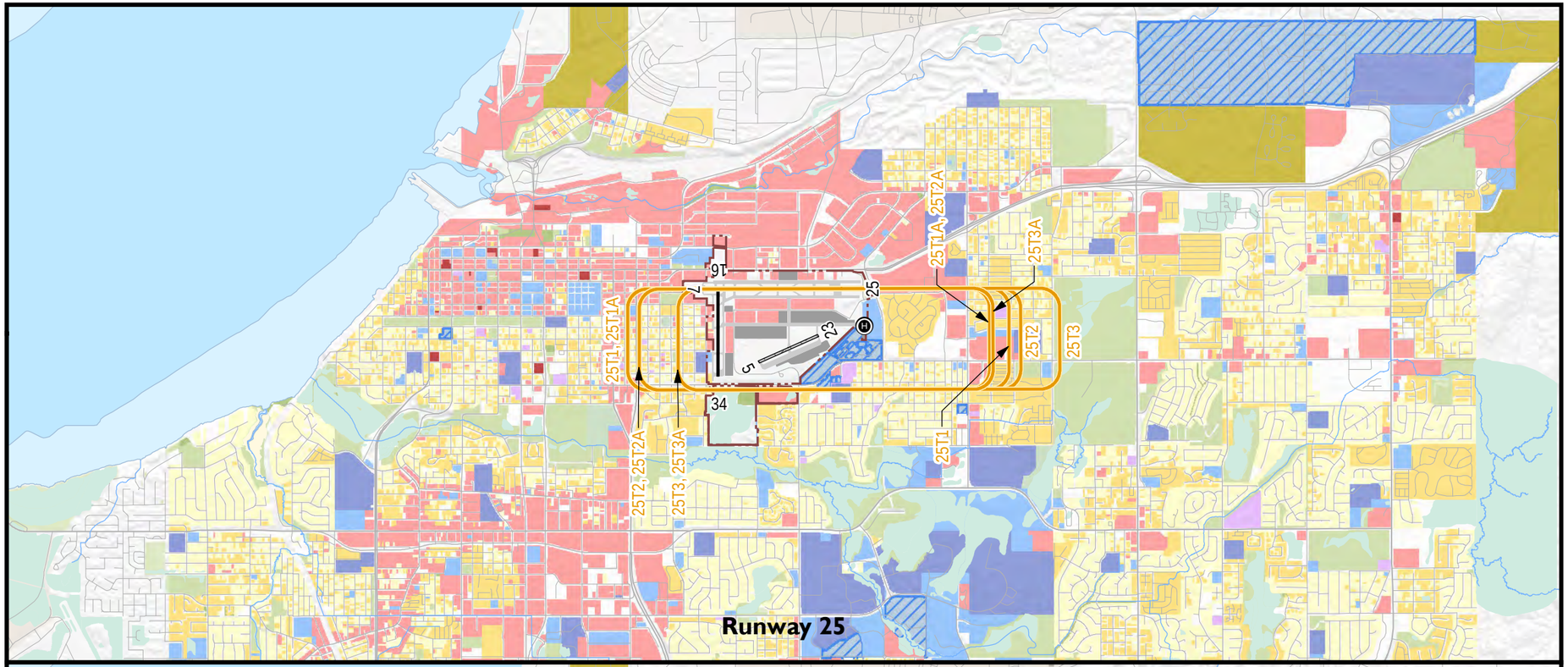
Path: \\fs1\gis_projects\GIS\USA\AK\305320_Merrill_Field\305320_Merrill_Field_Figure8_Flight_Tracks_RWY5-23.mxd

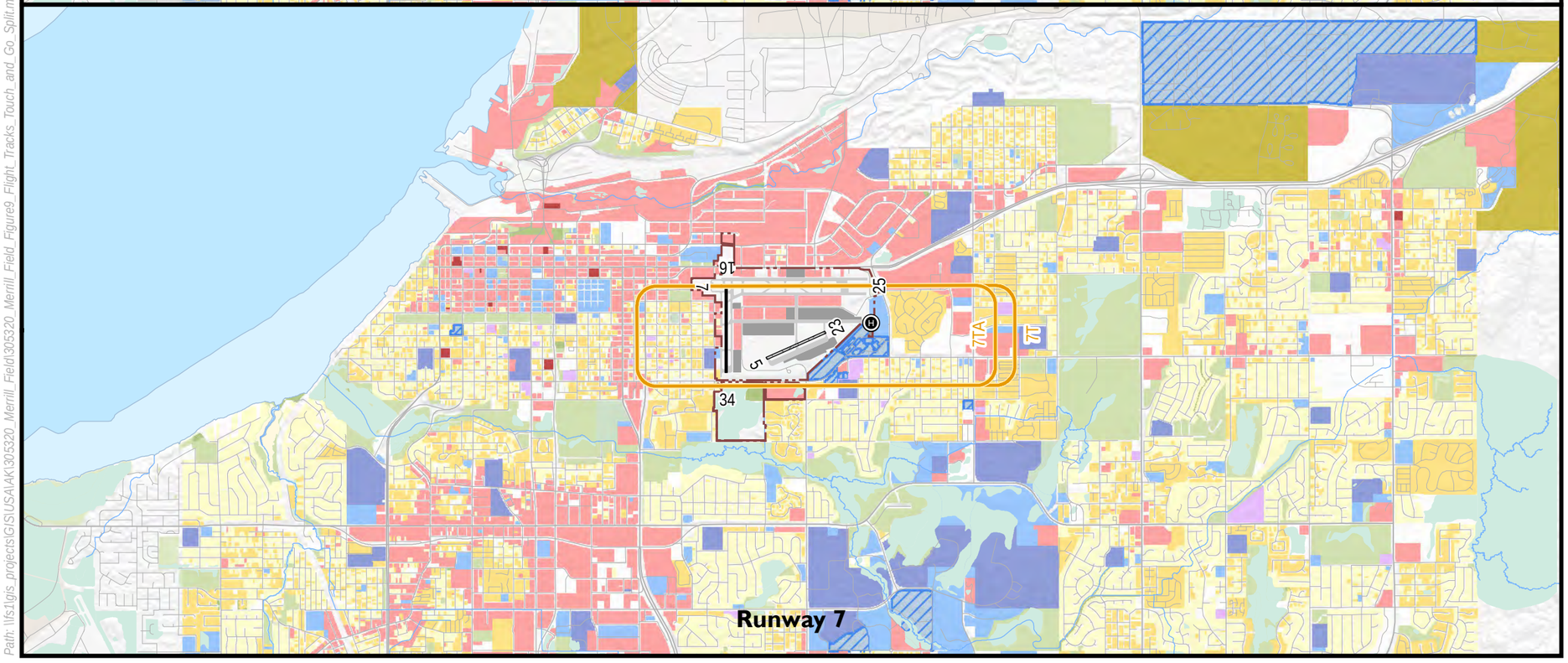
Merrill Field Airport

Anchorage, Alaska

14 CFR Part 150 Update

Figure 9
Modeled Traffic Pattern Flight Tracks





- Touch and Go Track
- Airport Boundary
- Runway (Paved)
- Runway (Gravel)
- Taxiway
- Apron
- Helipad

- Single Family
- Multi Family
- School/University/Library
- Hospital
- Transient Lodging
- Place of Worship
- Water
- Park/Recreation/Open Space
- Public Use
- Commercial/Industrial
- Military
- Vacant/Undefined
- Wetland
- Stream

Data Sources:
Municipality of Anchorage GIS; (Land Use, Roads, Parks, Wetlands, Marine/Water)
Environmental Systems Research Institute (ESRI, Inc); (Roads, Airports, Shaded Relief)

0 4,000 8,000 Feet

Path: \\fs1\gis_projects\GIS\USA\AK\305320_Merrill_Field\305320_Merrill_Field_Figure9_Flight_Tracks_Touch_and_Go_Split.mxd

Merrill Field Airport

Anchorage, Alaska

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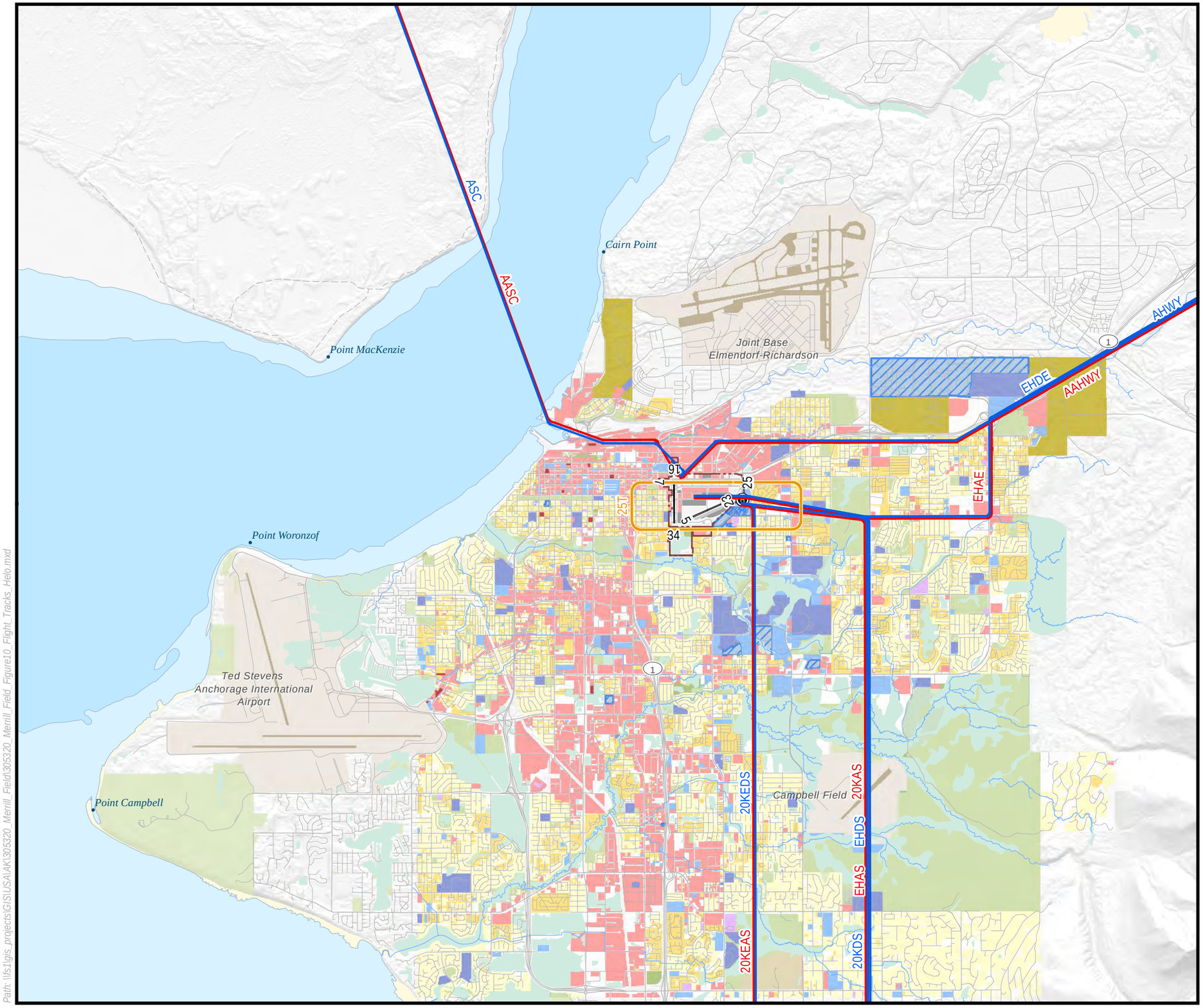
Figure 10
Helicopter Modeled Flight Tracks



Arrival Track
Departure Track
Helicopter Pattern

Airport Boundary
Runway (Paved)
Runway (Gravel)
Taxiway
Apron
Helipad

Single Family
Multi Family
School/University/Library
Hospital
Transient Lodging
Place of Worship
Water
Park/Recreation/Open Space
Public Use
Commercial/Industrial
Military
Vacant/Undefined
Wetland
Stream

Data Sources:
Municipality of Anchorage GIS; (Land Use, Roads, Parks, Wetlands, Marine/Water)
Environmental Systems Research Institute (ESRI, Inc); (Roads, Airports, Shaded Relief)

0 5,000 10,000 Feet

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6 EXISTING AND FORECAST NOISE EXPOSURE MAPS

The development of the NEM update requires the use of an FAA approved methodology or computer program, which for this project is Version 7.0c of the Integrated Noise Model (INM). The fundamental noise elements of the NEM are DNL contours for existing and five-year forecast conditions: i.e., 2013 and 2018 in this NEM update. Figure 11 and Figure 12 present the contours for existing conditions and forecast conditions, respectively. Figure 13 depicts the existing and forecast conditions contours together for ease of visual comparison.

6.1 Comparison to Measured Noise Exposure

As discussed in Section 3.4 DNL measurements were made at seven sites. Two of the sites collected noise data for at least seven days during both the June 2012 and November-December 2012 measurement periods. The other five sites collected noise data for over 24 hours during the June 2012 measurement period. Section 3.4.1 provides the analysis of the measured noise events at each site that were correlated to derive an estimated aircraft DNL for each site as described in and shown in Table 5.

Table 16 compares the measurement results to the INM-modeled DNL for the existing 2013 annual-average day at each of the measurement locations. As shown, the modeled DNL values are greater than or equal to the average measured DNL values. With the on-airport noise monitor showing 1 dB lower DNL than modeled along with all the modeled levels being greater than measured during the short time periods, the modeled DNL contours may be considered a conservative representation of the aircraft noise environment around MRI.

Table 16 Comparison of Measured and Modeled (2013) Aircraft Noise Exposure (DNL)
Source: INM, HMMH

Site No.	Location	Average DNL in dB	
		Measured	Modeled
June 2012 Period			
1	West end of Runway 25	66	67
2	1200 Block of Medfra St	50	59
3	900 Block of E. 9th Ave.	56	62
4	1500 Block of Nelchina St.	54	58
5	1400 Block of Garden St	46	52
6	2400 Block of Sprucewood St	49	50
7	600 Block of E. 3rd Ave	59	59
November-December 2012 Period			
1	West end of Runway 25	64	67
2	1200 Block of Medfra St	47	59

6.2 Comparison of 2013 Existing Contours and 2018 Forecast Contours

The modeling assumptions related to airport layout, runway use, and flight track use remain unchanged from 2013 to 2018. The total aircraft operations, presented in Section 5.2, show an approximate 4% increase from 2013 to 2018. Figure 13 shows contours for both 2013 and 2018.

The visual comparison shows little to no change to the noise exposure with the only visible difference to the west of Runway 7/25, which is where the DNL 65 dB contour is slightly larger in 2018 as compared

to 2013. Table 17 shows an increase of less than two acres in overall area beyond the airport boundary and within the DNL 65 dB contour from 2013 to 2018 or less than 6%.

Table 17 Comparison of Land Area beyond the Airport Boundary Enclosed by the 2013 and 2018 DNL Contours
Source: HMMH

Noise Level DNL (dB)	Contour Land Area				
	Existing Contours 2013		Forecast Contours 2018		Percent Change
	Sq. Miles	Acres	Sq. Miles	Acres	
65-70	0.044235	28.310304	0.046791	29.946292	5.8%
70+	0.000037	0.023365	0.000027	0.017073	-24.1%
Total 65+	**0.044272**	**28.333669**	**0.046818**	**29.963365**	**5.8%**
Note: DNL 75 dB contours within airport boundary Percent change denoted is relative to the existing condition (2013) contours.					

6.3 Compatible Land Use Analysis

The objective of airport noise compatibility planning is to promote the compatible growth and development of airports with their surrounding communities. The Municipality uses the FAA's land-use compatibility guidelines, as set forth in 14 CFR Part 150, Appendix A, Table 1, which is reproduced in Table 1, Section 1.4.1 of this document. As the table indicates, the FAA considers all land uses to be compatible with aircraft-related DNL below 65 dB.

Based on the provided land use data, the existing and forecast conditions DNL contours, presented in the 2013 and 2018 Noise Exposure Maps, do not include any identified historic resources or non-residential noise sensitive land uses outside of the airport boundary.

Residential population and housing unit count estimates for the 2013 and 2018 DNL contours were calculated using Municipality parcel data and Census 2010 data. Utilizing the smallest enumeration unit; Census block data, and Geographic Information Systems (GIS) tools, the contours were intersected with the Census block data for each DNL noise contour interval (65-70 dB, 70-75 dB, >75 dB). One multi-family residential parcel is identified as being on the edge and within the DNL 65 dB contour for both the existing and forecast conditions, which results in a total of 1 housing unit and 2 persons residing within the DNL 65 dB contour for MRI. There are no housing units or people exposed to greater than DNL 65 dB. The estimated population and housing counts are shown in Table 18.

Table 18 Estimated Residential Population within 2013 and 2018 DNL Contours
Source: Census 2010, Municipality of Anchorage, HMMH

Noise Level, DNL (dB)	Existing Contours - 2013			Forecast Contours - 2018		
	Estimated Population	Estimated Single Family Houses	Estimated Multi-Family Housing Units	Estimated Population	Estimated Single Family Houses	Estimated Multi-Family Housing Units
65-70	2	0	1	2	0	1
70-75	0	0	0	0	0	0
75+	0	0	0	0	0	0
Total	**2**	**0**	**1**	**2**	**0**	**1**

Merrill Field Airport

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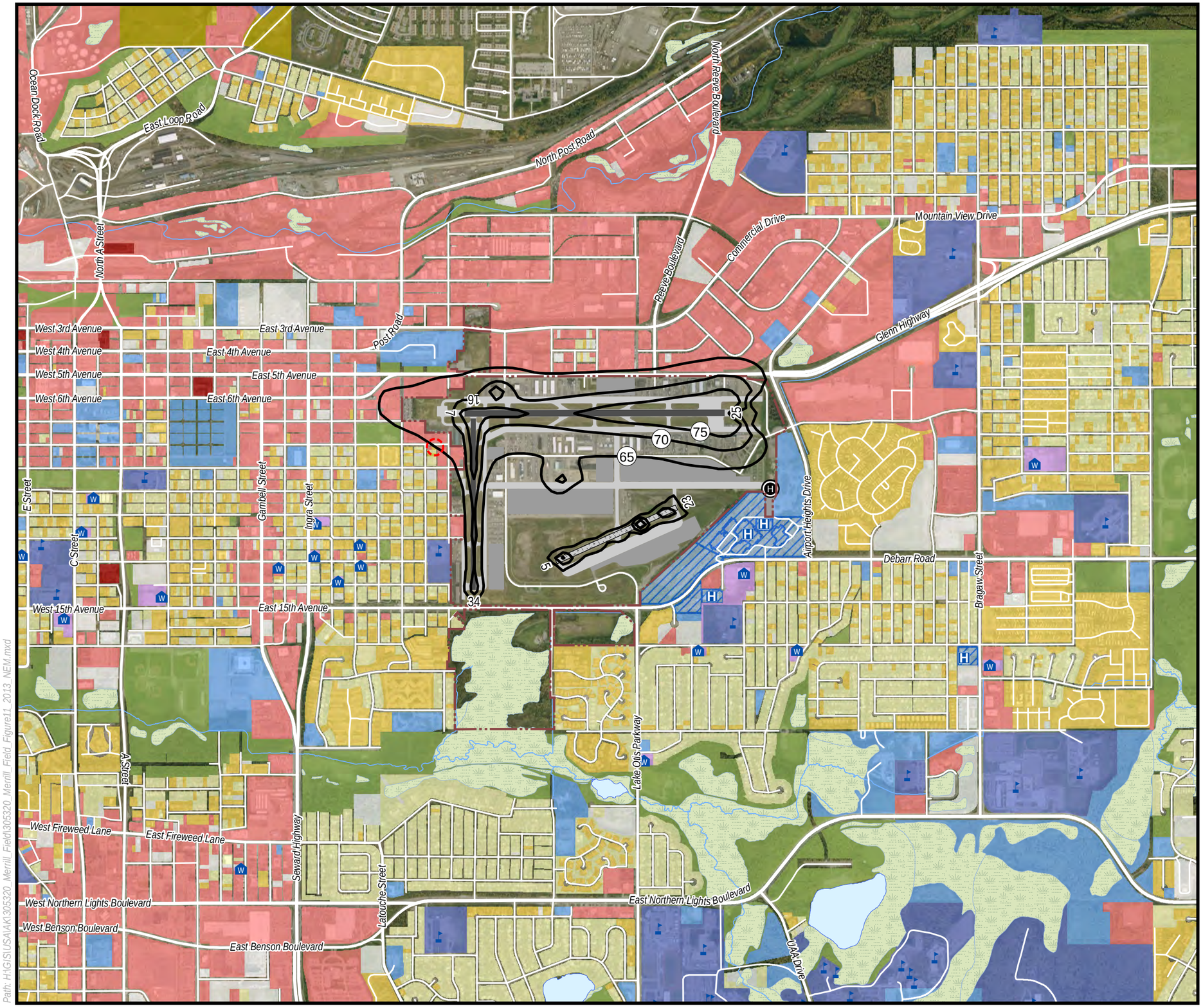
Figure 11
Existing Condition (2013)
Noise Exposure Map



2013 DNL Noise Contour

Estimated Parcel on/within DNL 65 dB Contour

Airport Boundary

Runway (Paved)

Runway (Gravel)

Taxiway

Apron

Helipad

School/University

Place of Worship

Hospital

Single Family

Multi Family

School/University/Library

Hospital

Transient Lodging

Place of Worship

Water

Park/Recreation/Open Space

Public Use

Commercial/Industrial

Military

Vacant/Undefined

Wetland

Stream

Data Sources:
Municipality of Anchorage GIS; (Land Use, Roads, Parks, Wetlands, Marine/Water)
Environmental Systems Research Institute (ESRI, Inc); (Roads, Airports, Shaded Relief)

0 1,500 3,000 Feet

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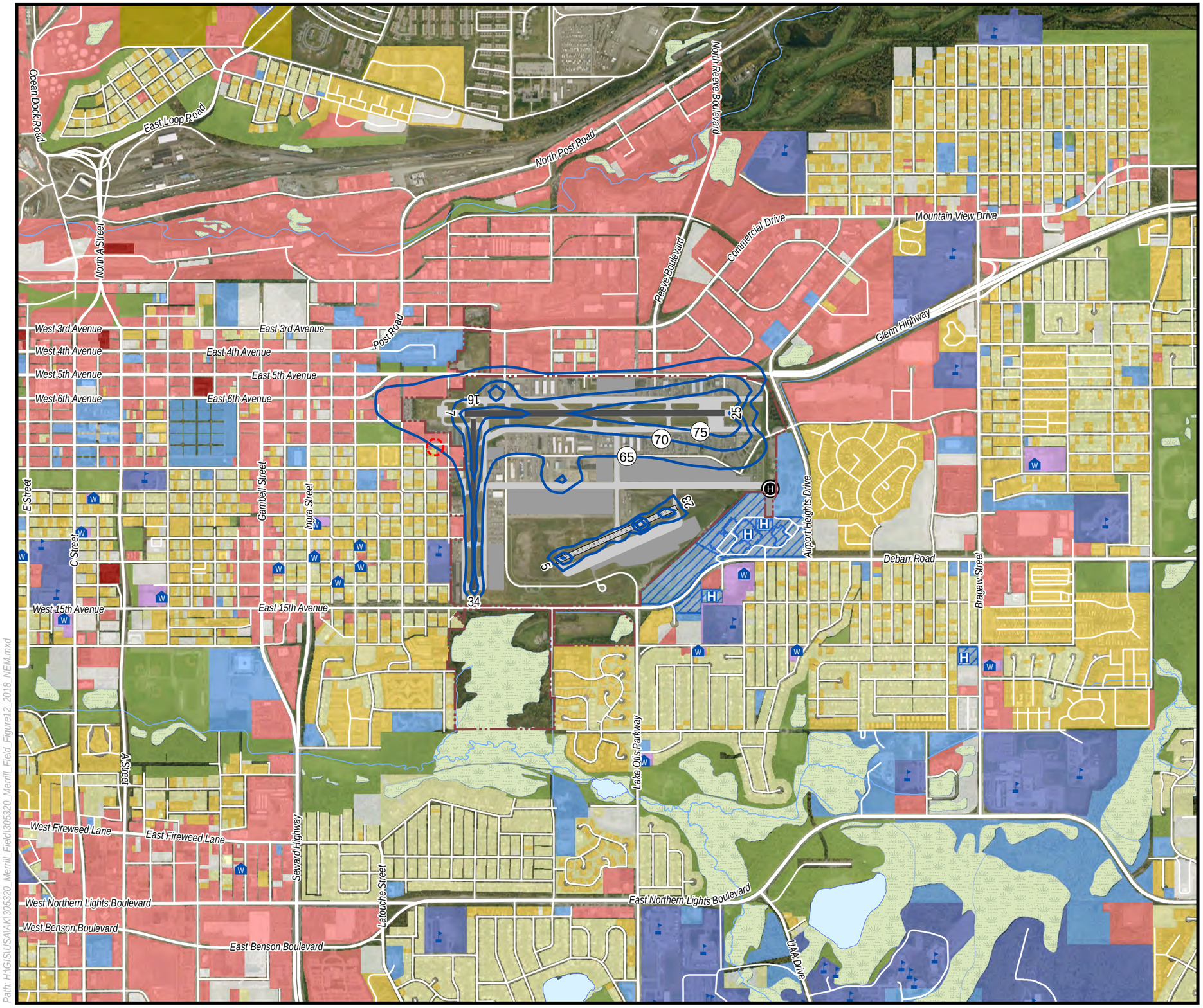
Merrill Field Airport

Anchorage, Alaska

14 CFR Part 150 Update

Figure 12
Forecast Condition (2018)
Noise Exposure Map



2018 DNL Noise Contour

Estimated Parcel on/within DNL 65 dB Contour

Airport Boundary

Runway (Paved)

Runway (Gravel)

Taxiway

Apron

Helipad

School/University

Place of Worship

Hospital

Single Family

Multi Family

School/University/Library

Hospital

Transient Lodging

Place of Worship

Water

Park/Recreation/Open Space

Public Use

Commercial/Industrial

Military

Vacant/Undefined

Wetland

Stream

Data Sources:
Municipality of Anchorage GIS; (Land Use, Roads, Parks, Wetlands, Marine/Water)
Environmental Systems Research Institute (ESRI, Inc); (Roads, Airports, Shaded Relief)

0 1,500 3,000 Feet

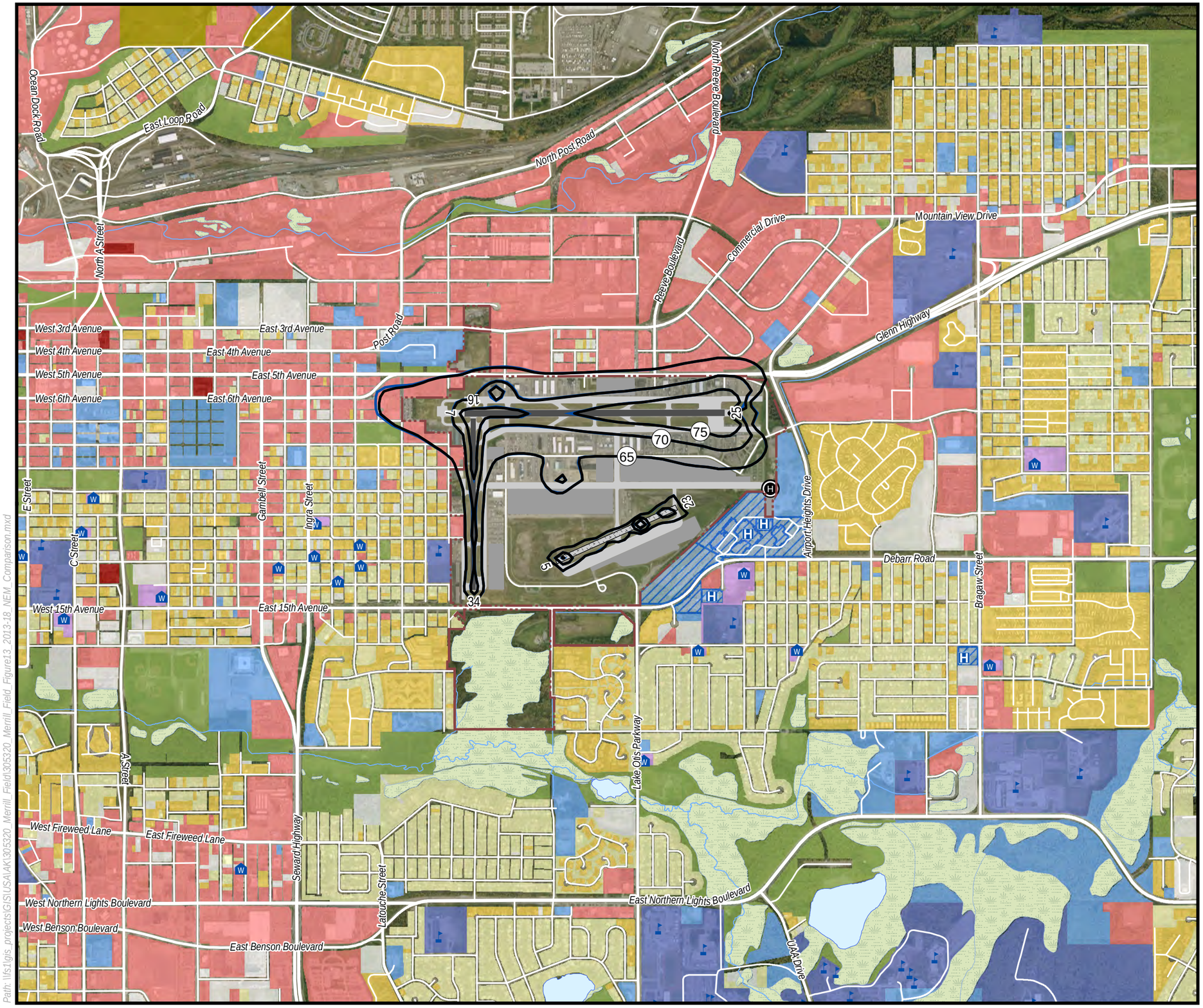
Path: H:\GIS\USA\AK\305320_Merrill_Field\305320_Merrill_Field_Figure12_2018_NEM.mxd

Merrill Field Airport

Anchorage, Alaska

14 CFR Part 150 Update

Figure 13
Comparison of Existing (2013) and Forecast (2018) Noise Exposure Maps



2013 DNL Noise Contour

2018 DNL Noise Contour

Airport Boundary

Runway (Paved)

Runway (Gravel)

Taxiway

Apron

Helipad

School/University

Place of Worship

Hospital

Single Family

Park/Recreation/Open Space

Multi Family

Public Use

School/University/Library

Commercial/Industrial

Hospital

Military

Transient Lodging

Vacant/Undefined

Place of Worship

Wetland

Water

Stream

Data Sources:
Municipality of Anchorage GIS; (Land Use, Roads, Parks, Wetlands, Marine/Water)
Environmental Systems Research Institute (ESRI, Inc); (Roads, Airports, Shaded Relief)

0 1,500 3,000 Feet

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7 PUBLIC PARTICIPATION

The Municipality of Anchorage is conducting this 14 CFR Part 150 update in conjunction with an Airport Master Plan. Included in this process is consultation with all members of the airport public, including MRI users, fixed-base operators, pilots, and potentially affected residents of the airport environs. The public consultation process exceeds 14 CFR Part 150 requirements for NEM updates.

7.1 Public Information Workshops

An initial newsletter in April 2012 introduced the master plan concept to the MRI community and announced the May 10, 2012 kickoff meeting for the Airport Master Plan and Noise Study. The kickoff meeting provided the initial opportunity to reach out to the public and ask for their involvement in the overall process. For the Part 150 study, additional meetings were held with the public on June 6 and 7, 2012 to solicit input on potential noise monitoring locations, to identify aircraft activities associated with operations at MRI, and to share information about the noise evaluation process through a Part 150 study. Approximately 30 members of the public and airport or government stakeholders attended the two meetings. Summaries of the questions and answers, as well as sign-in sheets, documented the exchange of information. Documentation and support material including public meeting notice flyers, overview presentations, handouts, meeting sign-in sheets, and comment summaries are included in Appendix I. The exchange of information was a key step in the initial process of gathering data and developing the necessary inputs for determining the aircraft noise exposure and effects around MRI.

Upon completion of the draft documentation in October 2013, HDR Alaska Inc. representatives attended five community meetings to announce the upcoming public workshop on the Airport Master Plan and Noise Study and encouraged interested members to attend. The five communities, all in near proximity to MRI, included Russian Jack (October 9), Fairview (October 10), Rogers Park (October 14), Mountain View (October 14), and Airport Heights (October 17). An announcement was also sent through a local email list that publicizes upcoming meetings. The Merrill Field Airport Master Plan and Noise Study website included an announcement of the workshop and provided reference documents available for public review.

Three separate presentations of the results of the NEM update were held – October 21, 2013 to the Airport Advisory Group, October 21, 2013 to members of the Fairview Community, and October 22, 2013 at the second Part 150 public workshop, held in conjunction with an update on the Airport Master Plan. All three presentations provided opportunity to present the results of the noise study conducted in accordance with 14 CFR Part 150 guidelines and to allow the public who attended the meetings and workshop to provide comments for inclusion in the final report. Appendix J provides a copy of the Airport bulletin (September 2013) and Airport newsletter (October 2013) announcing the workshop, the noise study presentation at the three separate venues, noise handouts available to attendees, and attendee sign-in sheets.

7.2 Opportunity for Public Review and Comment

To provide a wider opportunity for review of the information in the NEM documents, a hard copy of the draft documentation was located at the following locations beginning October 21, 2013 for a 30-day period:

- Merrill Field Airport Administrative Office, 800 Merrill Field Drive
- ZJ Loussac Public Library, 3600 Denali Street
- Mountain View Branch Library, 120 Bragaw Street
- HDR Alaska, Suite 305, 2525 C Street
- UAA Aviation Technology Division, 2811 Merrill Field Drive

In addition, an electronic version of the draft NEM documentation was placed on the "Merrill Field Airport Master Plan and Noise Study" website (http://www.merrillfieldmasterplan.com/Documents.html) and was available for download by any interested party. Notifications of the opportunity for review were published in the airport bulletin (published quarterly) and on the airport website.

The document availability provided opportunity for the interested public to review and submit any comments in accordance with 14 CFR Part 150 §150.21(b). All comments received during the public review period (October 21 – November 22) and from attendees at the two meetings and public workshop are included in Appendix J.