

Appendix C

Aviation Air Quality and Noise Emissions Forecast Memorandum

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TECHNICAL MEMORANDUM

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Subject: Airport Master Plan Study for Montgomery-Gibbs Executive Airport - 2037 Forecast Noise and Air Quality Modeling Assumptions

Reference: HMMH Project Number 308790

1. Background

HMMH is assisting the City of San Diego (California) in a Master Plan update at Montgomery-Gibbs Executive Airport (MYF). HMMH used the Aviation Environmental Design Tool (AEDT), Version 2d to generate noise contours and air quality emissions for the MYF 2037 Master Plan forecast using the required inputs.

The subsequent sections address the AEDT inputs and results:

- Physical description of the airport layout
- Aircraft operations
- Aircraft noise and performance characteristics
- Runway utilization
- Flight track geometry and use
- Meteorological conditions
- Terrain data
- Contour results
- Aircraft Methodology and Emissions Characteristics
- Emission results

The purpose of this technical memorandum is to summarize the changes in modeling from the baseline to the forecast aircraft noise and air quality emissions modeling assumptions, inputs, and results for the MYF Master Plan for calendar year 2037.

2. Physical Description of the Airport Layout

MYF is located in San Diego County and the City of San Diego, west of California Route 163 (Cabrillo Freeway) and directly south of Balboa Avenue. The airport layout is comprised of two parallel runways and a crosswind runway, Runway 10L/28R, Runway 10R/28L and Runway 5/23, respectively. Figure 1 shows the current airport diagram and Table 1 provides the runway specifications used in modeling the 2037 forecast. The runway specifications remained unchanged for the 2037 Forecast from the modeling in the 2017 baseline.

The number used to designate each runway end reflects, with the addition of a trailing "0", the magnetic heading of the runway to the nearest 10 degrees from the perspective of the pilot. The two parallel runways, Runway 10L/28R and Runway 10R/28L, are oriented on approximate magnetic headings of 100° and 280° and are 4,577 feet long by 150 feet wide and 3,401 feet long by 60 feet wide, respectively. The parallel runways are distinguished from each other with letter endings "L", meaning left, and "R", meaning right, again, from the perspective of the pilot. The crosswind runway, Runway 5/23, is oriented on approximate magnetic headings of 50° and 230° and is 3,400 feet long by 75 feet wide.

Runway length, runway width, instrumentation, and declared distances affect which runway an aircraft will use and under what conditions, and therefore, will determine the rate of utilization of a runway relative to the other runways at the airport.

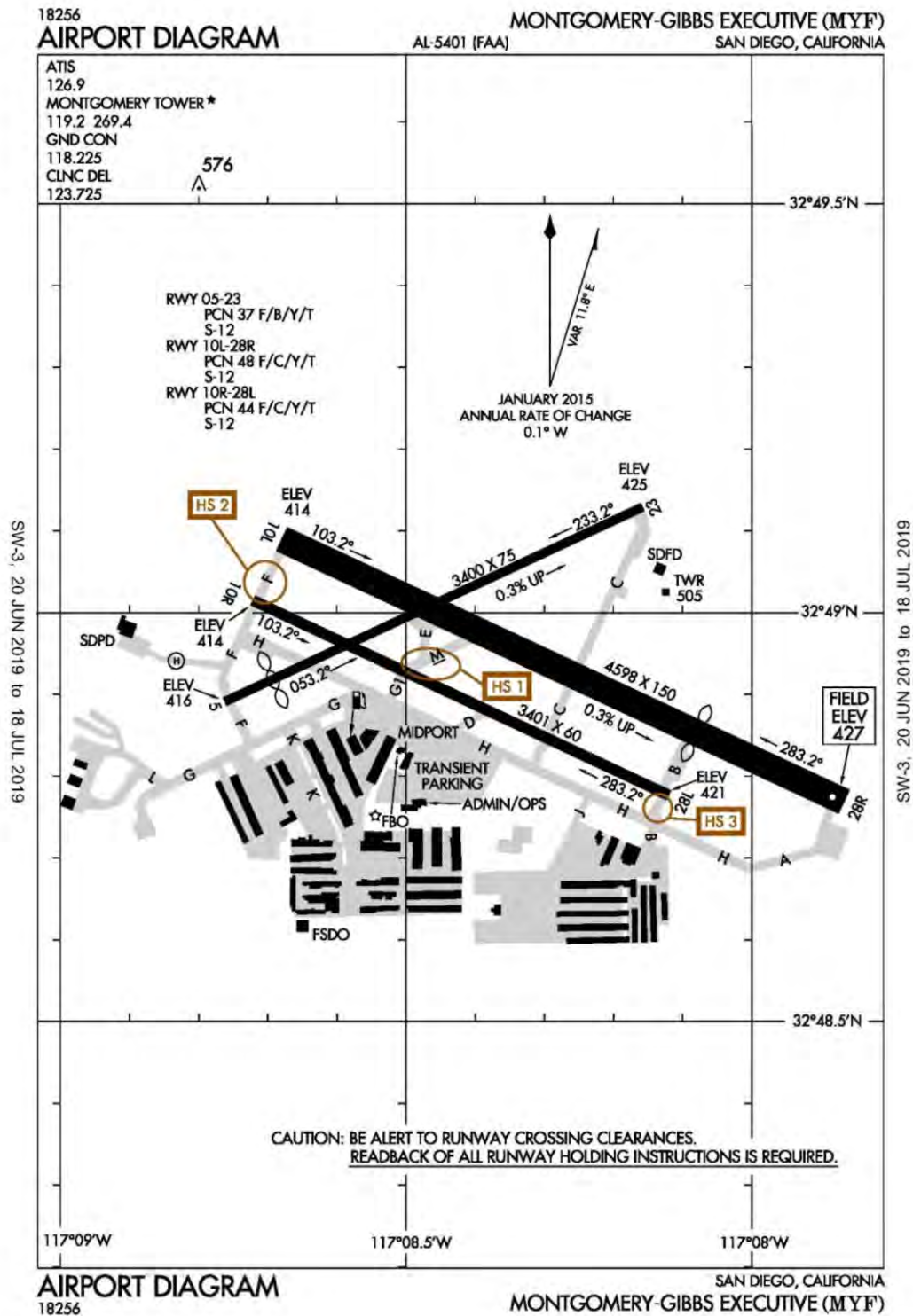


Figure 1: Airport Diagram

Source: FAA, effective, 20 June 2019 to 18 July 2019

Table 1: Current Runway Data

Source: Aviation Environmental Design Tool (AEDT) 2c Service Pack2 and FAA 5010 data accessed 08/28/17 at
http://www.faa.gov/airports/airport_safety/airportdata_5010/menu/

Runway End	Latitude	Longitude	Elevation (ft. MSL)	Length (ft.)	Approach Angle (degrees)	Displaced Thresholds
05	32.814853	-117.146005	415.7	3400	3	389
23	32.818803	-117.135978	425.4	3400	3	0
10L	32.818163	-117.144683	413.7	4577	3	0
28R	32.812851	-117.131182	427.3	4577	3	1176
10R	32.816917	-117.145367	414.1	3401	3	0
28L	32.812970	-117.135335	421.2	3401	3	0
H*	32.815783	-117.147239	414.0	N/A	N/A	N/A

*H denotes location of helipad

3. Aircraft Operations

The derivation of the fleet mix utilized existing aircraft operations at MYF and includes charter, local and itinerant general aviation aircraft. The operations described below comprise the proposed forecast 2037 conditions for submittal of the MYF Master Plan. The aircraft operations data entered into AEDT includes the number of day, evening, and night arrivals, departures, and pattern/touch-and-go operations (as appropriate). The number of operations is an expression of an annual average day, determined by dividing the annual operations by 365 days. Additional inputs include taxi time and auxiliary power unit (APU) time for each aircraft where applicable. Table 2 through Table 5 list the modeled annual average day arrival, departure, and circuit operations, respectively, by aircraft type at MYF for forecast 2037 conditions.



Table 2: Modeled Average Daily Arrivals - Aircraft Fleet Mix and Operations at MYF for 2037

AEDT Type	Engine	Taxi Time (seconds)	Annual Average Day Operations – Arrivals			
			Day	Evening	Night	Total
ECLIPSE500	PW610F-A	258.8	2.579	0.226	0.148	2.953
LEAR35	TFE731-2-2B ¹	258.8	0.390	0.034	0.022	0.447
LEAR35	TFE731-3	258.8	0.528	0.046	0.030	0.605
LEAR35	TFE731-2-2B ¹	258.8	0.158	0.014	0.009	0.181
CNA560U	JT15D-5,-5A,-5B	258.8	0.266	0.023	0.015	0.305
CNA560E	PW530	258.8	0.266	0.023	0.015	0.305
CNA55B	JT15D-5,-5A,-5B	258.8	0.645	0.056	0.037	0.738
CNA55B	PW530	258.8	0.645	0.056	0.037	0.738
CNA500	BIZLIGHTJET_F	258.8	2.291	0.201	0.132	2.623
CNA172	O-320	277.6	13.327	1.262	0.413	15.002
COMSEP	TIO-540-J2B2	277.6	1.962	0.186	0.061	2.209
GASEPF	O-200	277.6	4.742	0.449	0.147	5.338
GASEPF	PT6A-42	258.8	0.698	0.038	0.054	0.791
GASEPF	O-320	277.6	2.453	0.232	0.076	2.761
GASEPF	IO-360-B	277.6	2.453	0.232	0.076	2.761
GASEPV	TIO-540-J2B2 ²	277.6	48.431	4.587	1.500	54.518
GASEPV	TIO-540-J2B2 ²	277.6	20.471	1.939	0.634	23.044
BEC58P	TIO-540-J2B2	277.6	7.046	0.580	0.377	8.004
BEC58P	TIO540 ³	277.6	7.549	0.622	0.404	8.575
BEC58P	TIO540 ³	277.6	5.033	0.415	0.269	5.717
BEC58P	TIO540 ³	277.6	5.536	0.456	0.296	6.288
BEC58P	TIO540 ³	277.6	1.007	0.083	0.054	1.143
PA42	PT6A-114A	258.8	0.875	0.048	0.068	0.990
DHC6	PT6A-42	258.8	4.071	0.223	0.315	4.609
DHC6	TPE331-10	258.8	0.431	0.024	0.033	0.488
EC130	TPE331-3	277.6	1.098	0.272	0.526	1.897
R44	TIO-540-J2B2	277.6	0.879	0.218	0.421	1.517
SA355F	250B17B	277.6	1.373	0.340	0.658	2.371
Subtotal			137.202	12.887	6.829	156.918

¹ Repeated LEAR35 aircraft with engine type TFE731-2-2B indicate multiple AEDT equipment IDs used for airframe identification

² Repeated GASEPV aircraft with engine type TIO-540-J2B2 indicate multiple AEDT equipment IDs used for airframe identification.

³ Repeated BEC58P aircraft with engine type TIO540 indicate multiple AEDT equipment IDs used for airframe identification.

Note: Totals may not match exactly due to rounding. Repeated Aircraft and engine type indicates change in AEDT equipment ID.



Table 3. Modeled Average Daily Departures - Aircraft Fleet Mix and Operations at MYF for 2037

Aircraft	Engine	Taxi Time (seconds)	Stage Length	Annual Average Day Operations – Departures			
				Day	Evening	Night	Total
ECLIPSE500	PW610F-A	258.8	1	2.611	0.120	0.222	2.953
LEAR35	TFE731-2-2B ¹	258.8	1	0.395	0.018	0.034	0.447
LEAR35	TFE731-3	258.8	1	0.535	0.025	0.045	0.605
LEAR35	TFE731-2-2B ¹	258.8	1	0.160	0.007	0.014	0.181
CNA560U	JT15D-5,-5A,-5B	258.8	1	0.270	0.012	0.023	0.305
CNA560E	PW530	258.8	1	0.270	0.012	0.023	0.305
CNA55B	JT15D-5,-5A,-5B	258.8	1	0.653	0.030	0.055	0.738
CNA55B	PW530	258.8	1	0.653	0.030	0.055	0.738
CNA500	BIZLIGHTJET_F	258.8	1	2.320	0.107	0.197	2.623
CNA172	O-320	277.6	1	13.813	0.440	0.749	15.002
COMSEP	TIO-540-J2B2	277.6	1	2.034	0.065	0.110	2.209
GASEPF	O-200	277.6	1	4.915	0.157	0.266	5.338
GASEPF	PT6A-42	258.8	1	0.649	0.031	0.110	0.791
GASEPF	O-320	277.6	1	2.542	0.081	0.138	2.761
GASEPF	IO-360-B	277.6	1	2.542	0.081	0.138	2.761
GASEPV	TIO-540-J2B2 ²	277.6	1	50.198	1.599	2.720	54.518
GASEPV	TIO-540-J2B2 ²	277.6	1	21.218	0.676	1.150	23.044
BEC58P	TIO-540-J2B2	277.6	1	7.292	0.326	0.386	8.004
BEC58P	TIO540 ³	277.6	1	7.813	0.349	0.413	8.575
BEC58P	TIO540 ³	277.6	1	5.209	0.233	0.275	5.717
BEC58P	TIO540 ³	277.6	1	5.730	0.256	0.303	6.288
BEC58P	TIO540 ³	277.6	1	1.042	0.047	0.055	1.143
PA42	PT6A-114A	258.8	1	0.813	0.039	0.138	0.990
DHC6	PT6A-42	258.8	1	3.786	0.180	0.643	4.609
DHC6	TPE331-10	258.8	1	0.401	0.019	0.068	0.488
EC130	TPE331-3	277.6	1	1.301	0.193	0.403	1.897
R44	TIO-540-J2B2	277.6	1	1.041	0.154	0.322	1.517
SA355F	250B17B	277.6	1	1.627	0.241	0.503	2.371
Subtotal				141.833	5.526	9.559	156.918

¹ Repeated LEAR35 aircraft with engine type TFE731-2-2B indicate multiple AEDT equipment IDs used for airframe identification
² Repeated GASEPV aircraft with engine type TIO-540-J2B2 indicate multiple AEDT equipment IDs used for airframe identification.
³ Repeated BEC58P aircraft with engine type TIO540 indicate multiple AEDT equipment IDs used for airframe identification.
Note: Totals may not match exactly due to rounding. Repeated Aircraft and engine type indicates change in AEDT equipment ID.

Table 4: Modeled Average Daily Circuits - Aircraft Fleet Mix and Operations at MYF for 2037

Aircraft	Engine	Taxi Time (seconds)	Annual Average Day Operations – Circuits			
			Day	Evening	Night	Total
CNA172	O-320	277.6	153.221	0.000	0.000	153.221
COMSEP	TIO-540-J2B2	277.6	22.560	0.000	0.000	22.560
GASEPF	O-200	277.6	54.520	0.000	0.000	54.520
GASEPF	O-320	277.6	28.200	0.000	0.000	28.200
GASEPF	IO-360-B	277.6	28.200	0.000	0.000	28.200
EC130	TPE331-3	277.6	1.265	0.000	0.000	1.265
R44	TIO-540-J2B2	277.6	4.552	0.000	0.000	4.552
SA355F	250B17B	277.6	1.581	0.000	0.000	1.581
Subtotal			294.099	0.000	0.000	294.099

Note: Totals may not match exactly due to rounding. Repeated Aircraft and engine type indicates change in AEDT equipment ID.

Table 5. Modeled Average Daily Operations at MYF for 2037

Operation	Annual Average Day Operations			
	Day	Evening	Night	Total
Arrivals	137.202	12.887	6.829	156.918
Departures	141.833	5.526	9.559	156.918
Circuits	294.099	0.000	0.000	294.099
Subtotal	573.134	18.413	16.388	607.935

Note: Totals may not match exactly due to rounding.

4. Aircraft Noise and Performance Characteristics

AEDT requires the use of specific noise and performance data for each aircraft type operating at the airport. Noise data is in the form of Sound Exposure Level (SEL) at a range of distances (from 200 feet to 25,000 feet) from a particular aircraft with engines at a range of thrust levels. Performance data include thrust, speed and altitude profiles for takeoff and landing operations. The AEDT database contains standard noise and performance data for over 300 different fixed-wing aircraft types, most of which are civilian aircraft.

Within the AEDT database, it is standard for aircraft takeoff or departure profiles to be defined by a range of trip distances identified as “stage lengths.” Higher stage lengths (longer trip distances) are associated with a heavier aircraft due to the increase in fuel requirements for the flight. For the MYF Master Plan, stage lengths are defined using city pair distances, determined by the great-circle distance from the originating airport to the planned arrival city.

Aside from identifying the aircraft type in the database, AEDT has STANDARD and International Civil Aviation Organization (ICAO) aircraft flight profiles for takeoffs, landings, and flight patterns or touch-and-go operations. HMMH used STANDARD profiles for all aircraft types in the modeling of the MYF Master Plan.

5. Runway Utilization

The primary factor affecting runway use at airports is weather; specifically, the wind direction and wind speed. An additional factor that may affect runway use includes the position of the facility or ramp relative to the runway.

HMMH utilized 2016 radar data obtained from the City of San Diego’s Symphony EnvironmentalVue® environmental monitoring system to compile runway use tables and categorized this information by arrival or departure as well as day, evening, and night.

Table 6 and Table 7 present the runway utilization rates used to model the CNEL contours for the forecast 2037 operations at MYF. There is only one helipad used for modeling at MYF and it therefore has a utilization rate of 100%. The helipad is located northwest of Runway End 05 along Taxiway F.

Table 6. Runway Utilization for Fixed-wing Aircraft

Operation	Runway	Day	Evening	Night
Arrival	05	0.1%	0.2%	1.4%
	23	1.0%	1.1%	1.5%
	10L	0.7%	2.5%	5.3%
	10R	0.5%	0.5%	2.3%
	28L	26.6%	9.1%	11.6%
	28R	71.1%	86.6%	77.9%
	Total	100.0%	100.0%	100.0%
Departure	05	1.1%	1.2%	1.3%
	23	3.2%	3.7%	0.7%
	10L	0.9%	2.1%	4.0%
	10R	0.9%	8.1%	8.5%
	28L	45.8%	34.6%	27.6%
	28R	48.1%	50.2%	57.9%
	Total	100.0%	100.0%	100.0%
Circuit ¹	05	0.0%	0.0%	0.0%
	23	0.1%	0.0%	0.0%
	10L	18.8%	0.0%	0.0%
	10R	0.4%	0.0%	0.0%
	28L	0.0%	0.0%	0.0%
	28R	80.7%	0.0%	0.0%
	Total	100.0%	0.0%	0.0%

¹ No evening or nighttime circuit operation provided in MYF fleet mix
Note: Totals may not match exactly due to rounding

Table 7. Average Daily Runway Utilization

Arrival/Departure	Runway						Total
	05	23	10L	10R	28L	28R	
Arrivals	0.1%	1.0%	0.9%	0.5%	25.2%	72.2%	100.0%
Departures	1.1%	3.1%	1.1%	1.5%	44.5%	48.7%	100.0%
Circuits	0.0%	0.1%	17.8%	0.3%	0.0%	76.1%	100.0%

Note: Totals may not match exactly due to rounding

6. Flight Track Geometry and Use

HMMH used an industry-standard method to develop model tracks that entails analyzing all radar data for MYF by splitting the flight tracks into similar and manageable groups. The standard procedure entails separating tracks by operation type, (e.g., arrival or departure) and runway end. Next, the destination direction (e.g. northeast, south, west, etc.) define flight track groups. HMMH analyzed flight tracks with the same operation type, runway end, and destination direction for similar geometry and this resulted in the final flight track bundles used to create model tracks. For example, Runway 28R Arrivals (A28RJ10) that originated north of MYF were bundled into one geometrically similar group. Geometrically similar groups with wide dispersion have a 'backbone' track and one 'dispersion' sub tracks on either side of the backbone, for three tracks (one backbone and 2 'dispersion' tracks). All other geometrically similar groups were assigned one backbone track. Figure 2 through Figure 5 on pages 8 through 11 show the modeled tracks layered over the airport base map.



Figure 2: Fixed-Wing Arrival Model Tracks

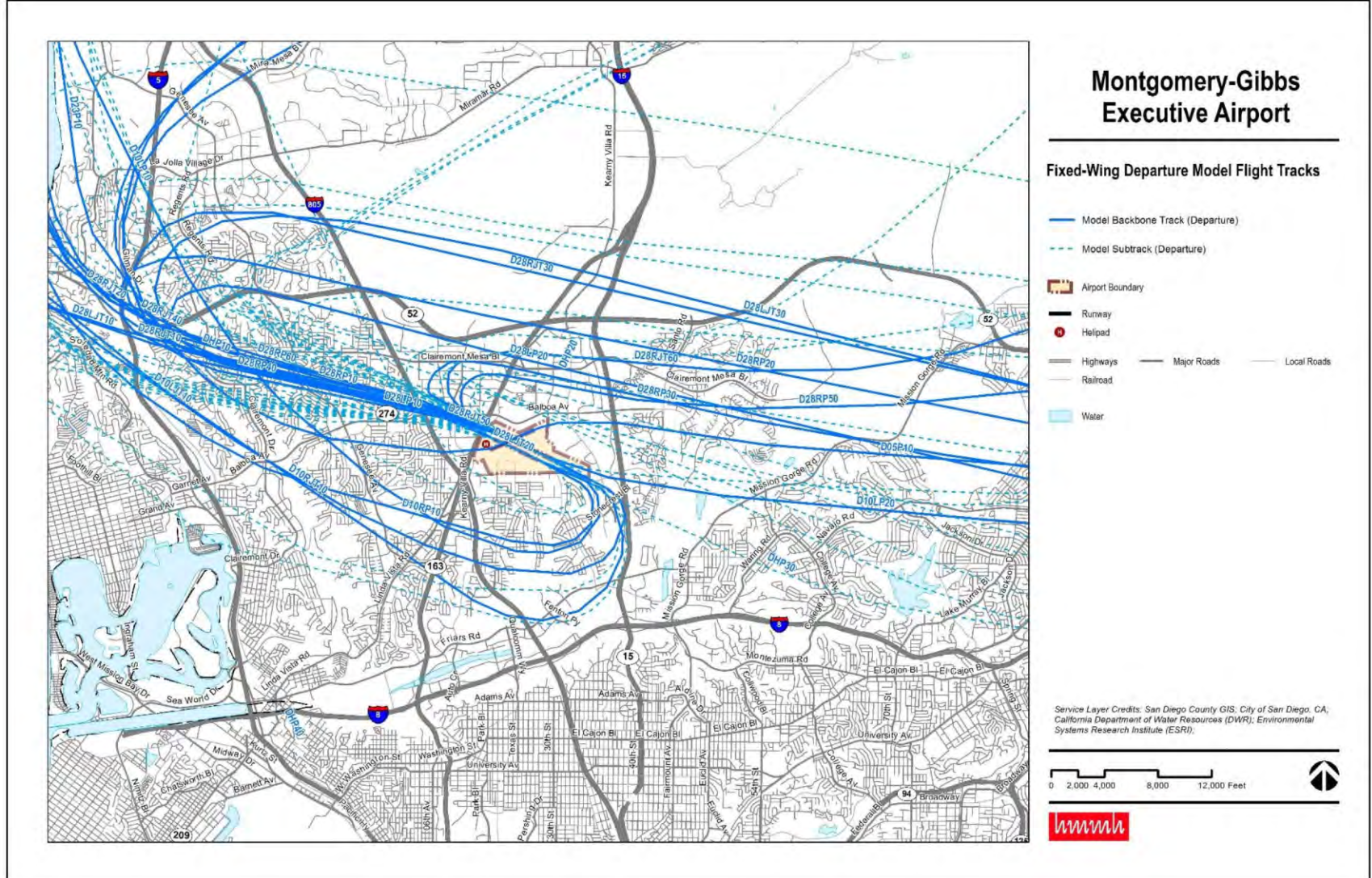


Figure 3: Fixed-Wing Departure Model Tracks

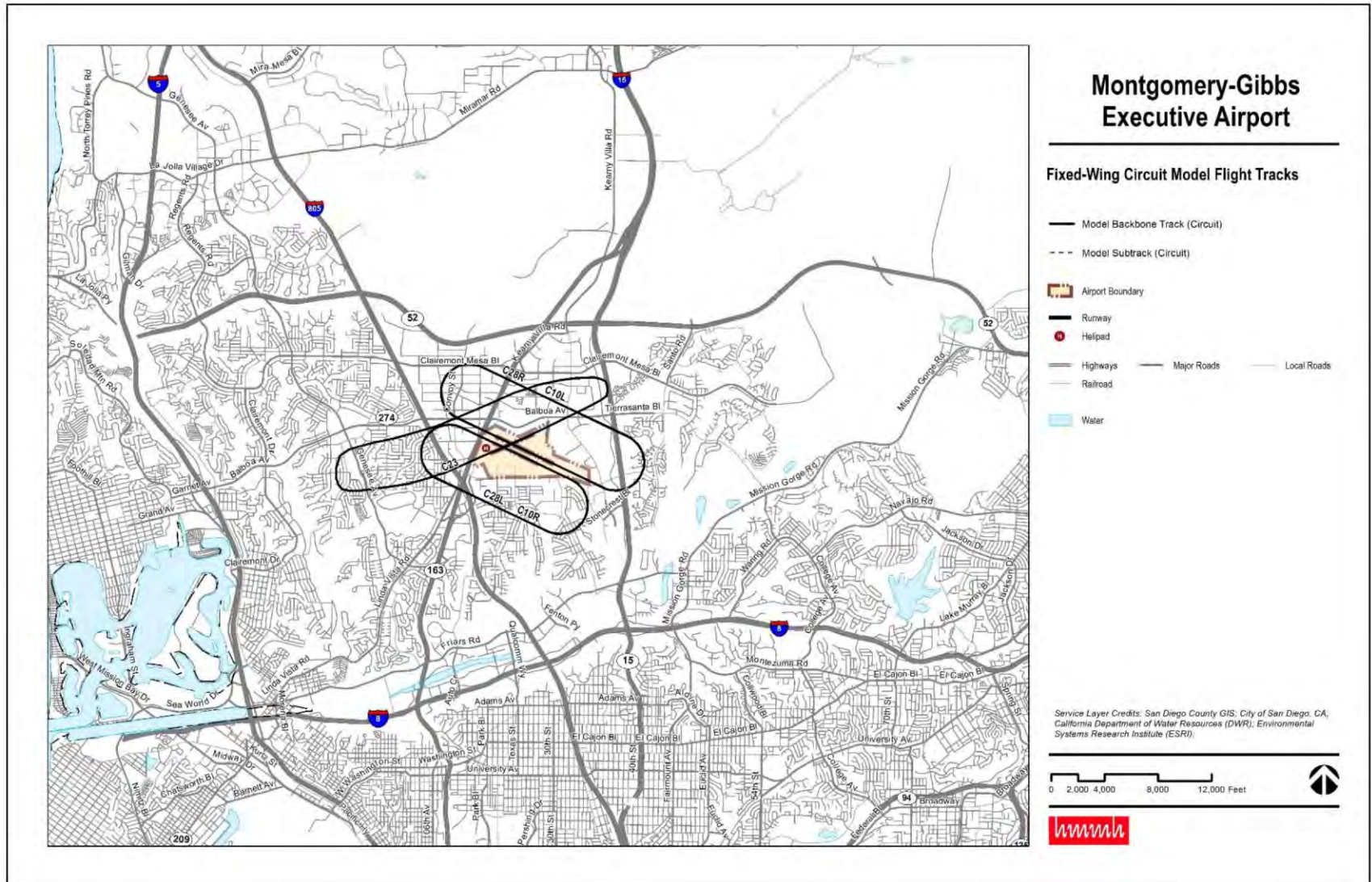


Figure 4: Fixed-Wing Circuit Model Tracks

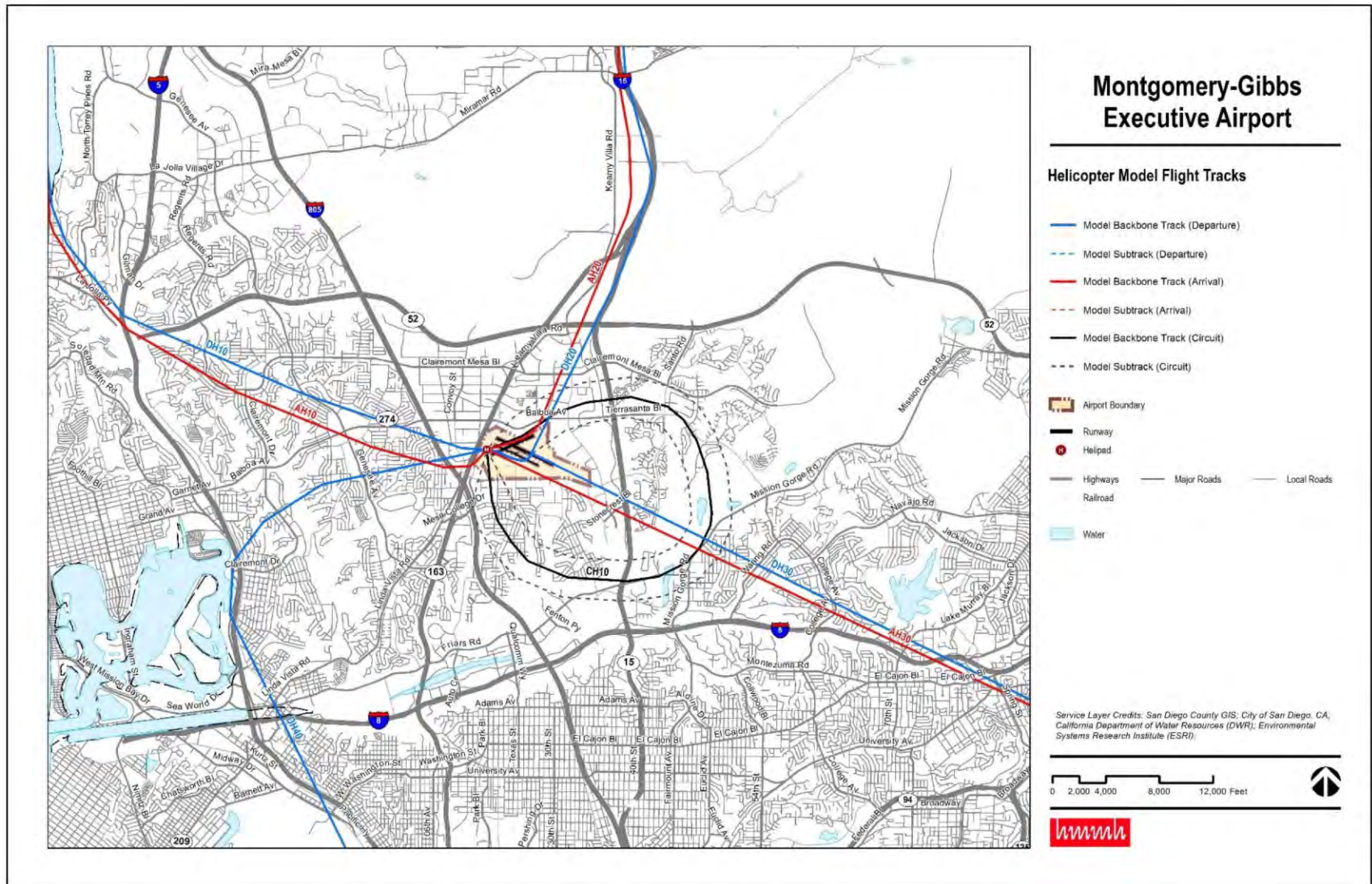


Figure 5: Helicopter Model Track

Table 8 presents the utilization rates for each of the developed model tracks. The relative ratio of flight track usage is consistent with those ratios in the entire radar dataset.

Table 8. Flight Track Utilization

Operation Type	Runway	Track ID	Percent Use
Arrivals	05	A05P1	100.00%
	Rwy 05 Arrival Subtotal		100%
	23	A23P1	63.00%
		A23P2	2.20%
		A23P3	34.80%
	Rwy 23 Arrival Subtotal		100%
	10L	A10LJT1	22.70%
		A10LJT2	29.10%
		A10LP1	48.20%
	Rwy 10L Arrival Subtotal		100.00%
	10R	A10RP1	100.00%
	Rwy 10R Arrival Subtotal		100%
	28L	A28LP1	76.50%
		A28LP2	12.20%
		A28LP3	11.30%
	Rwy 28L Arrival Subtotal		100%
	28R	A28RP1	15.40%
		A28RP2	16.30%
		A28RP3	9.10%
		A28RP4	9.20%
		A28RP5	4.90%
		A28RP6	11.40%
		A28RJT1	10.60%
		A28RJT2	8.10%
		A28RJT3	5.20%
		A28RJT4	9.60%
	Rwy 28R Arrival Subtotal		100%
	Ⓜ	AH1	31.40%
		AH2	26.40%
		AH3	42.10%
	Ⓜ Arrival Subtotal		100%
Departures	05	D05P1	100.00%
	Rwy 5 Departure Subtotal		100%
	23	D23P1	100.00%
	Rwy 23 Departure Subtotal		100%
	10L	D10LJT1	32.40%
		D10LP1	47.10%
		D10LP2	20.60%
	Rwy 10L Departure Subtotal		100%
	10R	D10RJT1	22.70%
		D10RP1	77.30%
	Rwy 10R Departure Subtotal		100%
	28L	D28LJT1	17.30%
		D28LJT2	4.10%
		D28LJT3	6.90%
		D28LP1	65.50%
		D28LP2	6.10%
	Rwy 28L Departure Subtotal		100%
	28R	D28RJT1	13.50%
		D28RJT2	4.80%
		D28RJT3	6.10%
		D28RJT4	0.90%
		D28RJT5	7.20%

Operation Type	Runway	Track ID	Percent Use
Departures (Continued)	28R (Continued)	D28RJT6	0.80%
		D28RP1	42.20%
		D28RP2	3.30%
		D28RP3	6.70%
		D28RP4	4.40%
		D28RP5	4.50%
		D28RP6	5.50%
	Rwy 28R Departure Subtotal		100%
	Ⓜ	DH1	36.20%
		DH2	34.80%
		DH3	10.60%
		DH4	18.40%
Ⓜ Departure Subtotal		100%	
Circuits	05	N/A	N/A
	Rwy 5 Circuit Subtotal		N/A
	23	C23	100.00%
	Rwy 23 Circuit Subtotal		100%
	10L	C10L	100.00%
	Rwy 10L Circuit Subtotal		100%
	10R	C10R	100.00%
	Rwy 10R Circuit Subtotal		100%
	28L	C28L	100.00%
	Rwy 28L Circuit Subtotal		100%
	28R	C28R	100.00%
	Rwy 28R Circuit Subtotal		100%
	Ⓜ	CH10	100.00%
Ⓜ Circuit Subtotal		100%	
Note: Totals may not match exactly due to rounding			

Note: Totals may not match exactly due to rounding

7. Meteorological Conditions

The AEDT has several settings that affect aircraft performance profiles and sound propagation based on meteorological data. Meteorological settings include average annual temperature, barometric pressure, and relative humidity at the airport. The AEDT holds the following default values for annual average weather conditions at MYF:

- Temperature: 62.0° F
- Sea-level Pressure: 1015.4 millibars
- Relative Humidity 67.42%
- Dew Point: 51.19° F
- Wind Speed: 5.23 Knots

8. Terrain Data

Terrain data describes the elevation of the ground surrounding the airport and on airport property. The AEDT uses terrain data to adjust the ground level under the flight paths. The terrain data does not change the aircraft's performance or noise levels, but does alter the vertical distance between the aircraft and a "receiver" on the ground. This affects assumptions about how noise propagates over ground. HMMH obtained the terrain data from the United States Department of Agriculture (USDA) Geospatial Data Gateway and utilized this in conjunction with the terrain feature of the AEDT to generate the noise contours and air quality emissions for the MYF Master Plan.

9. Contour Results

Figure 6 presents the 2037 forecast Master Plan CNEL contour at MYF. Figure 7 presents a comparison of the 2017 baseline and 2037 forecast CNEL contours at MYF.

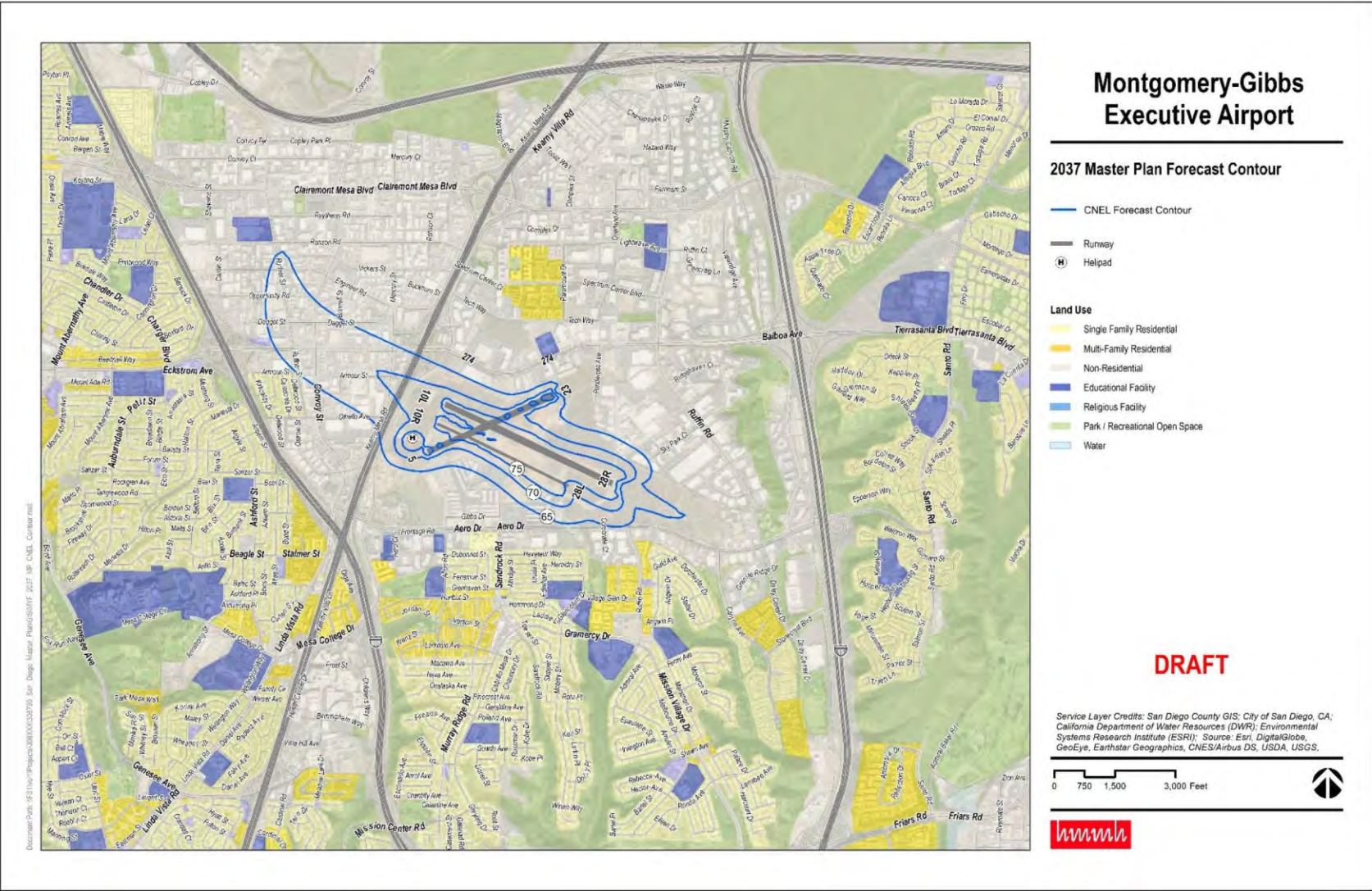


Figure 6: CNEL 2037 Forecast Contour

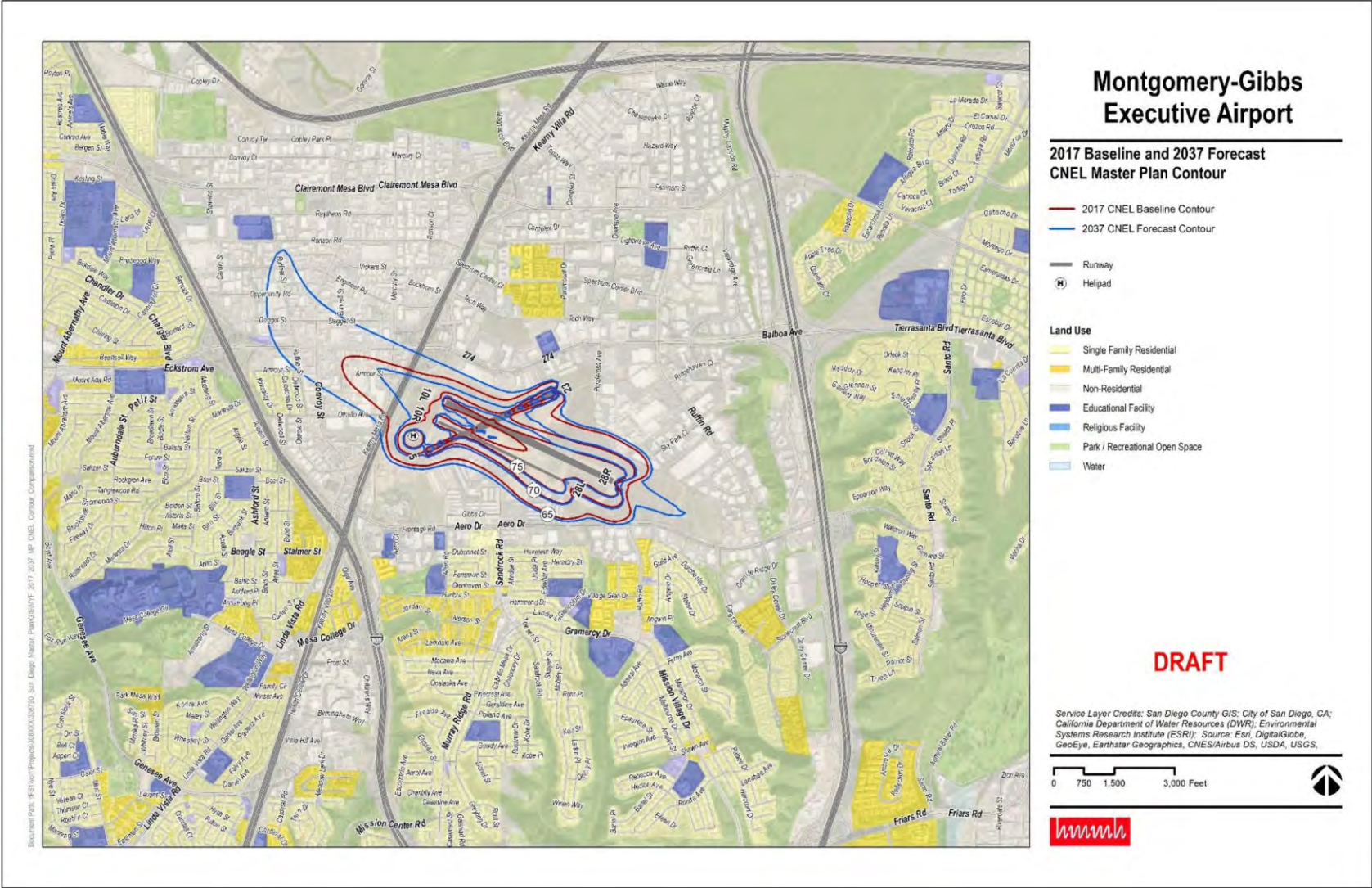


Figure 7: 2017 Baseline and 2037 Forecast CNEL Contour Comparison

10. Aircraft Methodology and Emissions Characteristics

The sources assessed in this emission inventory include aircraft engines and auxiliary power units (APU), where applicable.¹ HMMH conducted the analysis following FAA's *Aviation Emissions and Air Quality Handbook, Version 3 Update 1²* and AEDT. AEDT is the FAA-required computer model for assessing air emissions associated with airports. The fleet mix, LTO and touch and go operations were consistent with the noise analysis.

The U.S. Environmental Protection Agency (EPA) enforces the Clean Air Act (CAA), established in 1970 and last amended in 1990, which established National Ambient Air Quality Standards (NAAQS) for six principal criteria. Prior to the CAA, in 1959, the California State Department of Public Health received direction from their state legislature to develop California Ambient Air Quality Standards (CAAQS), established in 1962. In 1967, the legislature created the Air Resources Board (ARB). In 1969, the CAAQS became under the jurisdiction of the ARB, prior to any federal law on air quality.³ CAAQS criteria pollutants include all six NAAQS criteria pollutants, plus an additional four, two of which are covered under particulate matter, one odor-based, and the final a historical CAAQS, in place should sources of it arise again. The six overlapping criteria air pollutants analyzed for the purposes of the MYF master plan include:⁴

1. Carbon monoxide (CO)
2. Nitrogen dioxide (NO₂); calculated and expressed as NO_x
3. Particulate Pollution PM (PM₁₀) and (PM_{2.5})
4. Sulfur dioxide (SO₂)
5. Lead (Pb)
6. Ozone (O₃)

It should be noted that ozone is an indirect or secondary pollutant that occurs due to chemical reactions primarily between NO_x and volatile organic compounds (VOCs). As a result, volatile organic compounds (VOCs) and NO_x, the primary precursors to ozone formation, provide surrogate information for assessing ozone levels. In addition, HMMH estimated carbon dioxide (CO₂) emissions as a greenhouse gas, though this estimation does not account for the varying greenhouse gases and their associated emissions factors in comparison to CO₂.

AEDT requires additional input data for air quality analysis including aircraft type operating at the airport. Engine type, taxi times, and auxiliary power unit (APU) usage is needed to determine air quality pollutant emissions; including greenhouse gas emissions and fuel burn. The analysis of aircraft taxi activity to and from the ramps included both aircraft types selected from the 2017 baseline fleet mix at MYF and default taxi times from the AEDT as inputs. Similarly, HMMH assumed default AEDT APU times for each aircraft type. Annual aircraft emissions are a function of the number of aircraft operations expressed as landing and takeoff (LTO) cycles, the aircraft fleet mix (types of aircraft used), and the length of time aircraft spend in each of the modes of operation defined in AEDT. For this analysis, estimates for emissions came from the following aircraft modes⁵:

- Startup;
- Taxiing;
- Takeoff ground roll;
- Climb to mixing height and Descend from mixing height; and
- Landing ground roll.

Pollutant emissions for aircraft operations using the above assumptions were estimated using AEDT for the LTO modes and touch and go (e.g. circuit model) operations below the mixing height including idle, taxiing, climb, and descent. Per standard, HMMH assumed a default mixing height of 3,000 feet above ground level. Lead emissions are associated with leaded aviation fuel used in GA piston engine aircraft. AEDT does not estimate

¹ There are no APUs currently present at MYF, so emissions data for APUs are not included in this document; should MYF acquire APUs, they would be included in air quality and emissions analysis.

² FAA. *Aviation Emissions and Air Quality Handbook*.

https://www.faa.gov/regulations_policies/policy_guidance/envir_policy/airquality_handbook/media/Air_Quality_Handbook_Appendices.pdf

³ ARB. 2017. CAAQS. <https://www.arb.ca.gov/research/aaqs/caaqs/caaqs.htm>. Accessed September 20, 2017.

⁴ EPA. 2017. NAAQS Table. <https://www.epa.gov/criteria-air-pollutants/naaqs-table>. Accessed September 20, 2017.

⁵ In the AEDT output, these modes are all represented in the "ClimbBelowMixingHeight" and "DescendBelowMixingHeight" source grouping.

lead emissions directly. Therefore, HMMH calculated these emissions separately based on fuel consumption and lead fuel content consistent with FAA/EPA methodology described in the Handbook.⁶

11. Emission Results

Table 9 presents a comparison of the 2017 baseline and 2037 forecast pollutant emissions in tons per year (TPY) for all MYF aircraft operations.⁷ The first six pollutants are the overlapping NAAQS/CAAQS criteria pollutant (PM10 and PM2.5 are considered in the CAA as one Pollutant category Particle Pollution PM) according to the EPA and California ARB, as discussed in Section 10. HMMH has also chosen to report tons of CO₂ from the AEDT model for the baseline in order to continually track this number, though it is not a criteria pollutant, it is standard to report this number when assessing air quality emissions.⁸ The results show that a slight increase in emissions is expected for all pollutants except PM10 and PM2.5 which we believe is attributable to future fleet mix changes.

Table 9. Baseline 2017 and Forecast 2037 Aircraft Emissions (Tons Per Year) at MYF

Source	CO	NO _x	PM10	PM2.5	SO ₂	VOC	Lead (Pb)	CO ₂
2017 Baseline Aircraft Total	1,424.595	3.691	1.530	1.530	1.836	36.207	1.070	4,945.538
2037 Forecast Aircraft Total	1,793.822	5.602	1.470	1.470	2.762	68.461	1.185	7,439.402
Difference (2037-2017)	369.227	1.911	-0.060	-0.060	0.926	32.254	0.115	2,493.864

Note: All emissions were modeled using AEDT as the model and Aviation Emissions and Air Quality Handbook, Version 3 Update 1 aside from Lead (Pb) which utilized guidance given in the Handbook; specifically Equation A1-3 – Lead Emission Calculation. See Section 10 and footnote 6 for further information.

12. Master Plan Alternative-Background

The master plan alternative includes the removal of the 1,176 foot displaced arrival threshold on Runway 28R. Runway 28R has an effective runway length (useable pavement) for landing of 3,401 feet when considering the displaced threshold of 1,176 feet. Removing the displaced threshold allows for more runway length when arriving from the east to Runway 28R. Figure 7 shows the current airport diagram and location of Runway 28R Displaced Threshold.

⁶ FAA. Equation A1-3 (Lead Emission Calculation) found on page 4 of Appendix A, page 119 of the full document. *Aviation Emissions and Air Quality Handbook*.

https://www.faa.gov/regulations_policies/policy_guidance/envir_policy/airquality_handbook/media/Air_Quality_Handbook_Appendices.pdf

⁷ APU emissions would normally be separated from aircraft emissions and both combined would be reported as a total; however, there are no APU emissions at MYF and it has therefore been excluded from the table and calculations.

⁸ CO₂ emissions alone do not account for the full range of greenhouse gas emissions at an airport but is a useful metric to track for that purpose.

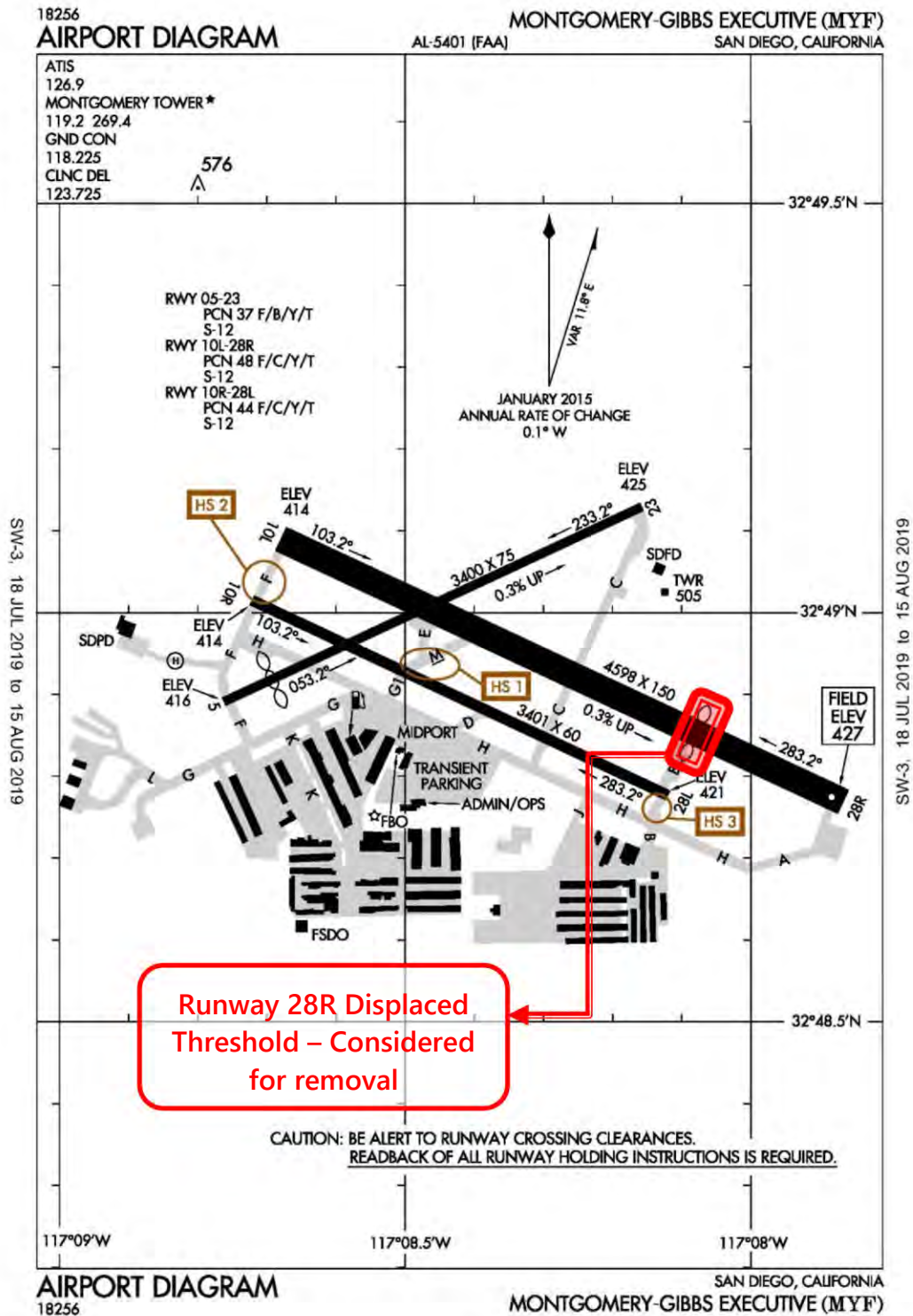


Figure 7: Airport Diagram

Source: FAA, effective, 18 July 2019 to 15 August 2019

13. Modeling Inputs

The data entered into AEDT for the Master Plan Alternative remains unchanged from the Forecast 2037 Baseline analysis. Table 2 through Table 5 show the modeled annual average day arrival, departure, and circuit operations, respectively, by aircraft type at MYF. Table 6 and Table 7 show the runway utilization rates used to model the Master Plan Alternative CNEL contours at MYF. There is only one helipad used for modeling at MYF and it therefore has a utilization rate of 100%. The helipad is located northwest of Runway End 05 along Taxiway F. Figure 2 through Figure 5 on pages 8 through 11 show the modeled tracks layered over the airport base map. Table 8 presents the utilization rates for each of the developed model tracks. The relative ratio of flight track usage is consistent with those ratios in the entire radar dataset.

14. Contour Results

Figure 8 presents the 2037 Master Plan alternative scenario contours at MYF. Figure 9 presents a comparison of the 2037 baseline and 2037 alternative scenario CNEL contours at MYF. Figure 10 presents a comparison of the 2017 alternative and 2037 alternative scenario CNEL contours at MYF. The departure lobe to the west of the airport remains unchanged from the 2037 baseline contour. Removal of the displaced threshold introduces an arrival lobe in the 65 dB CNEL contour, west of Runway 28R, over non-residential land-use.



15. Emissions Results

Table 10 presents the forecast compared to the alternative scenario pollutant emissions in tons per year for all 2037 MYF aircraft operations⁹. Table 11 presents the 2017 alternative scenario baseline and the 2037 alternative scenario pollutant emissions in tons per year for all aircraft operations¹⁰. Similar to Table 9, the first six are the overlapping NAAQS/CAAQS criteria pollutant (PM10 and PM2.5 are considered in the CAA as one Pollutant category Particle Pollution PM) according to the EPA and California ARB, as discussed above in Section 10. HMMH has also chosen to report tons of CO₂ directly from AEDT for the baseline in order to continually track this number, though it is not a criteria pollutant, it is standard to report this number when assessing air quality emissions.¹¹ Overall, the alternative scenario results in a slight increase in all pollutant emissions except lead emissions due to an increase in distance flown between the mixing height (3,000 feet) and 1,000 feet.

Table 10. Alternative 2037 Aircraft Emissions (Tons Per Year) at MYF

Source	CO	NO _x	PM10	PM2.5	SO ₂	VOC	Lead (Pb)	CO ₂
2037 Forecast Aircraft Total	1,793.822	5.602	1.470	1.470	2.762	68.461	1.185	7,439.402
2037 Forecast Alternative Aircraft Total	1,809.814	5.635	1.589	1.589	2.781	68.657	1.185	7,492.308
Difference (Alternative – Baseline)	15.992	0.033	0.119	0.119	0.019	0.196	0.000	52.906

Note: All emissions were modeled using AEDT as the model and Aviation Emissions and Air Quality Handbook, Version 3 Update 1 aside from Lead (Pb) which utilized guidance given in the Handbook; specifically Equation A1-3 – Lead Emission Calculation. See Section 10 and footnote 6 for further information.

Table 11. Alternative Baseline 2017 and Forecast 2037 Aircraft Emissions (Tons Per Year) at MYF

Source	CO	NO _x	PM10	PM2.5	SO ₂	VOC	Lead (Pb)	CO ₂
2017 Alternative Aircraft Total 2017	1,441.485	3.719	1.563	1.563	1.854	36.398	1.070	4,995.262
2037 Alternative Aircraft Total	1,809.814	5.635	1.589	1.589	2.781	68.657	1.185	7,492.308
Difference (2037 Alternative – 2017 Alternative)	368.329	1.916	0.026	0.026	0.927	32.259	0.115	2,497.046

Note: All emissions were modeled using AEDT as the model and Aviation Emissions and Air Quality Handbook, Version 3 Update 1 aside from Lead (Pb) which utilized guidance given in the Handbook; specifically Equation A1-3 – Lead Emission Calculation. See Section 10 and footnote 6 for further information.

⁹ APU emissions would normally be separated from aircraft emissions and both combined would be reported as a total; however, there are no APU emissions at MYF and it has therefore been excluded from the table and calculations.

¹⁰ APU emissions would normally be separated from aircraft emissions and both combined would be reported as a total; however, there are no APU emissions at MYF and it has therefore been excluded from the table and calculations.

¹¹ CO₂ emissions alone do not account for the full range of greenhouse gas emissions at an airport but is a useful metric to track for that purpose.

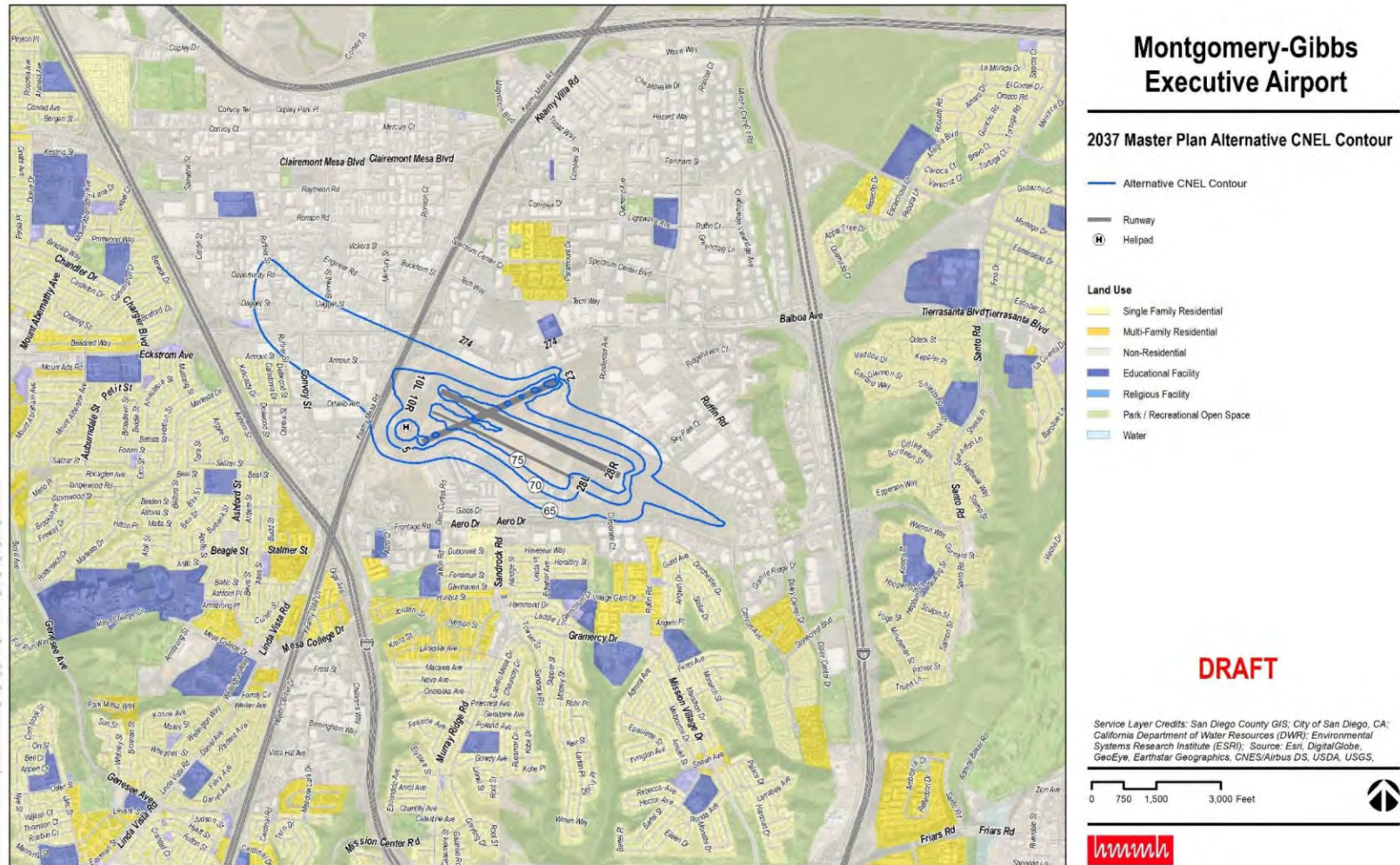


Figure 8: 2037 Master Plan Alternative CNEL Contour

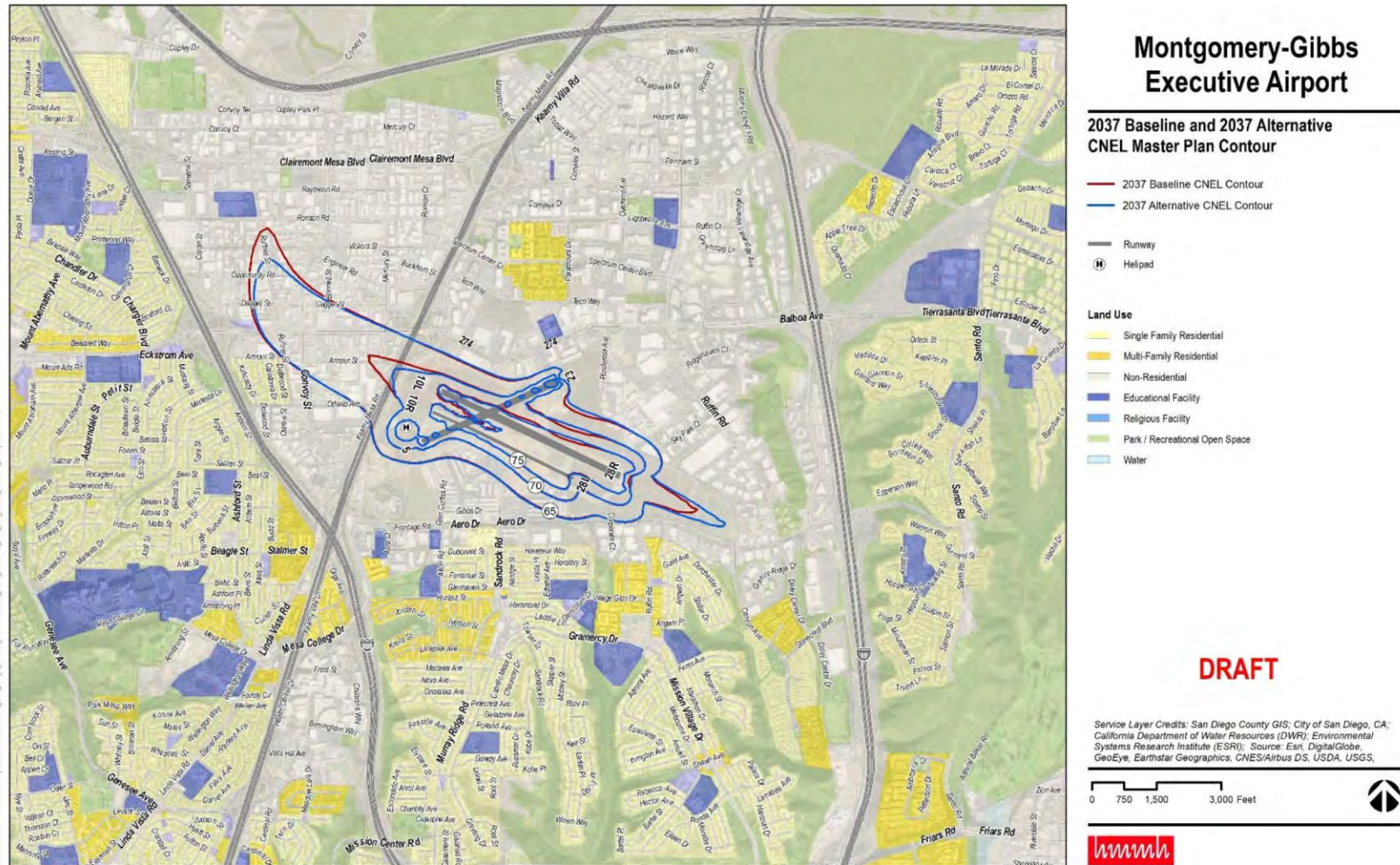


Figure 9: 2037 Baseline and 2037 Alternative CNEL Master Plan Contour

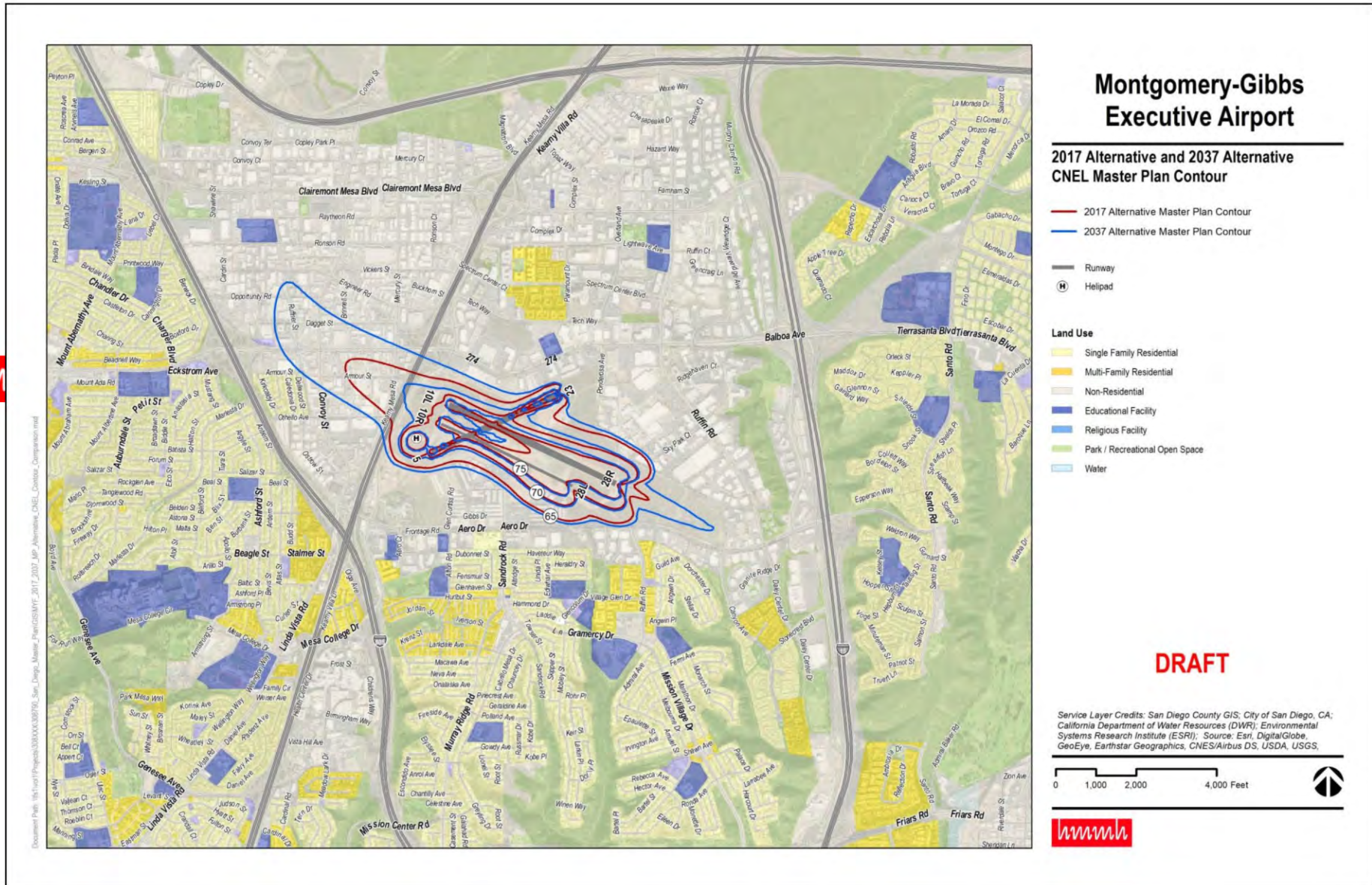


Figure 10: 2017 Alternative and 2037 Alternative CNEL Master Plan Contour