# TECHNICAL MEMORANDUM

## AIRCRAFT NOISE MODELING ANALYSIS

## RELOCATION OF TWO F-16 FORMAL TRAINING UNITS TO EITHER HOLLOMAN AFB OR JBSA-LACKLAND (KELLY FIELD)

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**Technical Memorandum regarding potential noise impacts from implementing the interim relocation of two F-16 FTUs to either Holloman AFB, NM or JBSA-Lackland (Kelly Field, TX)**

During the preparation of the Environmental Assessment (EA) for the interim relocation of two Formal Training Units (FTUs) from Hill Air Force Base (AFB) to either Holloman AFB or JBSA-Lackland (Kelly Field), an analysis of potential noise impacts around each installation through an aircraft noise modeling effort was conducted. Based on that analysis it was determined that no significant aircraft noise impacts at Holloman AFB with two F-16 FTUs and at Kelly Field under limited operations of new F-16 FTU would occur and the detailed modeling analysis is provided in this Technical Memorandum rather than in the EA.

# 1.0 NOISE

## 1.1 Introduction

This appendix describes the procedures and methodologies used to model baseline and proposed condition noise levels at Holloman Air Force Base (AFB) and Joint Base San Antonio (JBSA)-Lackland (Kelly Field).

The noise analysis was conducted to update the 2014 noise contours at both bases to reflect the most recent flying conditions i

ncluding aircraft engine maintenance runups. In order to determine noise-relevant parameters, intensive on-base interviews with the airfield manager, air traffic controller, pilots, and engine maintenance personnel were conducted in the weeks of October 24, 2016 at Holloman AFB and October 31, 2016 at JBSA-Lackland (Kelly Field), respectively. The major baseline condition updates were performed for Holloman AFB since the existing noise model was essentially developed during the 2012 F-35A AETC Training Beddown EIS process that is considered somewhat out of date. For JBSA-Lackland, the AFCEC-established baseline condition in 2014 remains valid since it reflects airfield operations in the past before the C-5A model was replaced in late 2016. Therefore the data collected at JBSA-Lackland (Kelly Field) were used for purposes of establishing the noise conditions under the proposed condition. The major updates of noise analysis input parameters at both installations include:

***Holloman AFB***

- Update of number of flight operations and add MQ-9 operational element.
- Runway usage redistribution.
- Flight track and profile update including amending those for pattern ops for C-12.
- Adding MQ-9 tracks.
- Update engine maintenance runups.
- Determination of operational parameters for two new F-16 squadrons under the Proposed Action.

***JBSA-Lackland (Kelly Field)***

- Update of number of flight operations, runway usage, flight tracks and profiles, if necessary.
- C-5A replaced by C-5M with a much quieter engine model.
- Addition of departure to and pattern ops from south for C-5M.
- Addition of nighttime C-5M operation for refueling missions.
- Update engine maintenance runups.

- Determination of operational parameters for two new F-16 squadrons under the Proposed Action.

## 1.2 Noise Metrics

The sound environment around an air installation is typically described using a measure of cumulative exposure that results from all aircraft operations. The metric used to account for this is day-night average sound level (DNL) and is the standard noise metric used by the U.S. Department of Housing and Urban Development, Federal Aviation Administration, U.S. Environmental Protection Agency, and DoD. In the State of California, Studies of community response to numerous types of environmental noise show that DNL correlates well with the level of annoyance. A more detailed description of DNL follows:

- In general, DNL can be thought of as an accumulation of all of the sound produced by individual events that occur throughout a 24-hour period. The sound of each event is accounted for by an integration of the changing sound level over time. These integrated sound levels for individual events are called sound exposure levels (SELs). The logarithmic accumulation of the SELs from all operations during a 24-hour period determines the DNL for the day at that location.

- DNL also takes into account the time of day the events occur. The measure recognizes that events during nighttime hours may be more intrusive, and therefore more annoying, than the same events during daytime hours, when background sound levels are higher. To account for this additional annoyance, a penalty of 10 dB is added to each event that takes place during “acoustic” nighttime hours, defined as 10 p.m. to 7 a.m. the next day.

- DNL values around an air installation are presented not just for a single specific 24-hour period, but rather for an annual average day.

DoD NOISEMAP BASEOPS Model was used to calculate DNL noise zones based on the validated data. The effects of terrain on noise propagation were also included in noise modeling. NMPlot software was used to plot the DNL levels in 5-dB increments, ranging from 65 dB DNL to 80 dB DNL.

## 1.3 Noise Prediction Models

The NOISEMAP model was developed by the U.S. Air Force, which serves as the lead DoD agency for developing military aircraft noise models. It consists of a series of integrated programs, including:

- BASEOPS (Version 7.358), which allows for entry of runway coordinates, airfield information, flight tracks, flight profiles (engine powers, altitudes, and speeds) along each track by each aircraft, number of flight operations, run-up coordinates, run-up profiles, and run-up operations.

- NOISEFILE, which is a noise database for most models of aircraft.

- OMEGA10, which extrapolates/interpolates the sound exposure levels for each model of aircraft from the NOISEFILE database, taking into consideration the specified speeds, engine thrust settings, and environmental conditions appropriate to each type of flight operation.

- OMEGA11, which calculates the maximum A-weighted sound levels for each model of aircraft, taking into consideration the engine thrust settings and environmental conditions appropriate to run-up operations.

- NMAP, which is a core NOISEMAP program and incorporates the number of daytime and nighttime operations, flight paths, and profiles of the aircraft to calculate DNL levels at various points on the ground around an airport or an air station.

- NMPLOT (Version 4.967), which plots contours of equal DNL for overlay onto land use maps.

## 1.4 Aircraft Flight Operations

To assemble flight operation input data to predict baseline and proposed condition noise contours using the DoD NoiseMap model requires a range of data from many sources. These sources provide descriptions of the types, frequency, and location of noise-generating operations occurring at and around airfields. For this Environmental Assessment (EA), the data sources include interviews with pilots, maintenance personnel, planners, schedulers, and air traffic controllers. The data from these sources are compiled and integrated into a description of the noise generating activities. The operational description includes the frequency of flight operations from various aircraft types, airfield layout, runway utilization, flight tracks and flight profiles. Flight operations involve a variety of departure, arrival, and closed pattern procedures.

The modeled aircraft operations are defined by the number of takeoffs and landings; therefore, patterns are counted as two aircraft operations as each pattern flight includes a landing and takeoff. Tabular aircraft operations data for each airfield is organized by flying unit, aircraft, operation type, and sortie type where a sortie describes the specific flight mission of one aircraft.

Table 1 provides the existing baseline aircraft annual flight operations at Holloman AFB and Table 2 summarizes the additional F-16 annual operations as a result of the Proposed Action under Alternative 1 at Holloman AFB. Tables 3 and 4 provide annual operations and net increase in F-16 flight operations under the Proposed Action at JBSA-Lackland (Kelly Field). The operations distribution on an annual basis were further divided by 365 days per year to determine average annual day operations input in the model to produce average annual day and night DNL noise contours. The flight operation parameters interviewed and estimated for each flying squadron or unit includes:

- Annual operations
- Annual operations estimate
- Runway coordinates
- Runway use
- Traffic flow
- Day/night distribution
- Operation type
- Maintenance operations.

These compiled operation input parameters were further sent back to each squadron and validated before commencing the model development.

**Table 1. Baseline Flight Operations at Holloman AFB**

| Unit | Aircraft | Departures | Arrivals | Closed Patterns | Total Ops |
|---|---|---|---|---|---|
| 54 FG | F-16C | 8,640 | 8,640 | 27,648 | 44,928 |
| 49 WG | MQ-9 | 3,000 | 3,000 | 29,250 | 35,250 |
| 586 FTS | T-38 | 305 | 305 | 1,647 | 2,257 |
| | C-12 | 155 | 155 | 465 | 775 |
| Army | C-12 | 200 | 200 | 40 | 440 |
| | OH-58 | 750 | 750 | 0 | 1,500 |
| 82 ATRS | QF-16C | 400 | 400 | 2,280 | 3,080 |
| AeroClub | CESSNA-441 TPROP | 328 | 328 | 0 | 657 |
| | COMPOS 1985 PISTON | 402 | 402 | 0 | 803 |
| **Based** | **All** | **14,180** | **14,180** | **61,330** | **89,690** |
| Transient | A-10A | 6 | 6 | 0 | 12 |
| | B747-200 | 37 | 37 | 0 | 74 |
| | C-12 | 32 | 32 | 0 | 64 |
| | C-130E | 47 | 47 | 0 | 94 |
| | C-17 | 15 | 15 | 0 | 30 |
| | C-20 | 24 | 24 | 0 | 48 |
| | C-5M | 6 | 6 | 0 | 12 |
| | F-16C | 33 | 33 | 0 | 66 |
| | F-18A/C | 43 | 43 | 0 | 86 |
| | OH58 | 36 | 36 | 0 | 72 |
| | T-34 | 6 | 6 | 0 | 12 |
| | T-38C | 132 | 132 | 0 | 264 |
| | T-6 | 7 | 7 | 0 | 14 |
| | All | 424 | 424 | 0 | 848 |
| **All Units** | **All** | **14,604** | **14,604** | **61,330** | **90,538** |

**Table 2. Proposed Net Increase in Flight Operations at Holloman AFB**

| Unit | Aircraft | Departures | Arrivals | Closed Patterns | Total Ops |
|---|---|---|---|---|---|
| 54 FG | F-16C | 9,600 | 9,600 | 30,720 | 49,920 |

**Table 3. Proposed Condition Flight Operations at JBSA-Lackland (Kelly Field)**

| Unit | Aircraft | Departures | Arrivals | Closed Patterns | Total Ops |
|---|---|---|---|---|---|
| ANG | F-16C | 3,888 | 3,888 | 12,442 | 20,218 |
| 68 AS | C-5M | 1,040 | 1,040 | 33,280 | 35,360 |
| Boeing | C-17 | 120 | 120 | 240 | 480 |
| | KC-135 | 2 | 2 | - | 4 |
| | 747-200 | 2 | 2 | - | 4 |
| | 747-8 | 16 | 16 | - | 32 |
| | F-15 | 22 | 22 | - | 44 |
| | C-40 | 3 | 3 | - | 6 |
| | C-32 | 3 | 3 | - | 6 |
| Civilian | - | 1,857 | 1,857 | - | 3,714 |
| Transient | - | 1,250 | 1,250 | - | 2,500 |
| **All Units** | **All** | **8,203** | **8,203** | **45,962** | **62,368** |

**Table 4. Net Increase in Flight Operations at JBSA-Lackland (Kelly Field) under Proposed Condition**

| Scenario | Unit | Aircraft | Departures | Arrivals | Closed Patterns | Total Ops |
|---|---|---|---|---|---|---|
| 2 F-16 FTUs | ANG | F-16C | 7,776 | 7,776 | 62,208 | 77,760 |
| 1 F-16 FTU | ANG | F-16C | | | | |

## 1.5 Runway and Flight Track Utilization

Flight tracks represent "typical" paths of flight operations around runways. An airfield operation is any take-off or landing at an airfield. The take-off and landing may be part of a training maneuver (or "pattern") in the vicinity of the runways or may simply be a departure or arrival of an aircraft. Several basic flight operations are described below:

- Departure – an aircraft taking off from a runway.
- Non-break Arrival – an aircraft straight in landing on a runway.
- Overhead Arrival – a special type of approach in that instead of a straight-in, the aircraft splits off to the left or right making a spiral-like descent to the ground, using visual flight rules.
- Patterns - A pilot can operate an aircraft by Visual Flight Rules (VFR) or Instrument Flight Rules (IFR). VFR is a standard set of rules that govern the procedures for conducting flight under visual conditions where pilots remain clear of clouds, avoid other aircraft, and usually fly unassisted by Air Traffic Control (ATC). IFR is a standard set of rules governing the procedures for conducting flights whereby ATC provides for separation between aircraft and is the standard flight rule used outside of the local traffic pattern.

Runway usage under Alternatives 1 and 2 are summarized in Table 5 and 6. The arrival, departure, and pattern runway flight tracks for each runway are shown on Figures 1 through 18 under Alternative 1- Holloman AFB, and 19 through 24 under Alternative 2 - JBSA-Lackland (Kelly Field), respectively. The flight tracks depicted represent predominant flight paths of aircraft. Noise modeling is based on the use of predominant flight paths because these paths dominate the noise environment around an airfield. Flight paths are represented as single lines on these figures, but actual flight paths may vary because of aircraft performance, pilot technique, wind, and other weather conditions. Therefore, an actual flight path (track) is better thought of as a band rather than a single line.

**Table 5. Alternative 1 – Holloman AFB Runway Usage by Operations Type Combined**

| Runway | Aircraft Using Runway | Departure | Arrival | Closed Pattern | Notes |
|---|---|---|---|---|---|
| 04 | QF-16 | - | 1.0% | 1% | QF-16 only |
| 07 | MQ-9 | 0.4% | 0.4% | 1% | MQ-9 only |
| 16 | C-12, F-16C, MQ-9, QF-16, T-38A, Transients | 8.4% | 63.1% | 27% | Fixed Wing |
| 22 | C-12, F-16C, MQ-9, QF-16, T-38A, Civilians | 7.8% | 4.9% | 17% | Fixed Wing |
| 25 | C-12, F-16C, MQ-9, QF-16, T-38A, Civilians Transients | 67.1% | 14.9% | 26% | Fixed wing |
| 34 | C-12, F-16C, MQ-9, QF-16, T-38A | 16.3% | 15.7% | 28% | Fixed Wing |
| 1HP | OH-58 and Transients | 33% | 67% | - | OH-58 only |
| 2HP | OH-58 and Transients | 67% | 33% | - | OH-58 only |

**Table 6. Alternative 2 – JBSA-Lackland (Kelly Field) Runway Usage by Operations Type Combined**

| Runway | Aircraft Using Runway | Departure | Arrival | Closed Pattern |
|---|---|---|---|---|
| 15 | C-5M, F-16C, Boeing, Civilian, Transients | 80% | 80% | 80% |
| 33 | C-5M, F-16C, Boeing, Civilian, Transients | 20% | 20% | 20% |

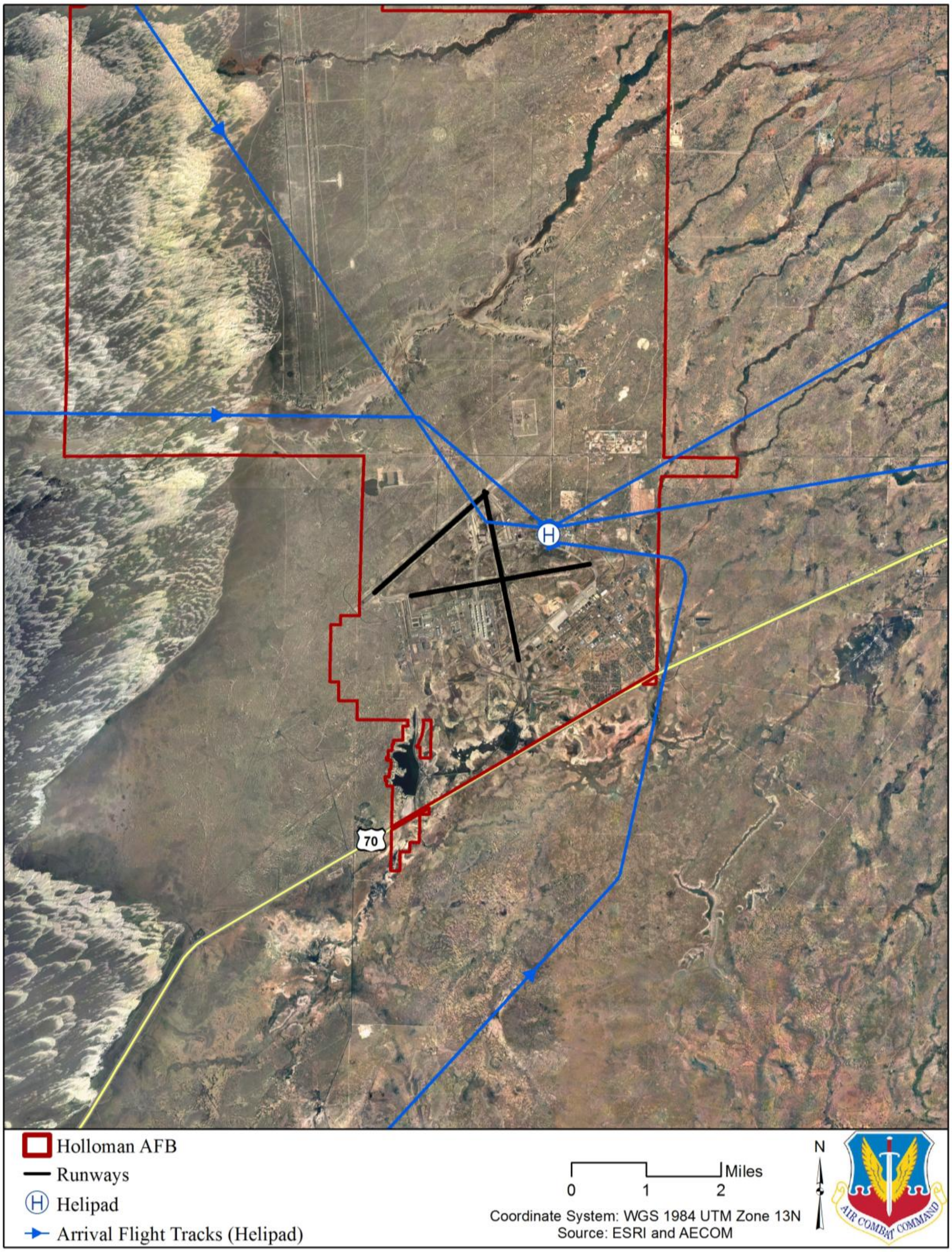


**Figure 1. Helipad Arrival Flight Tracks - Alternative 1**

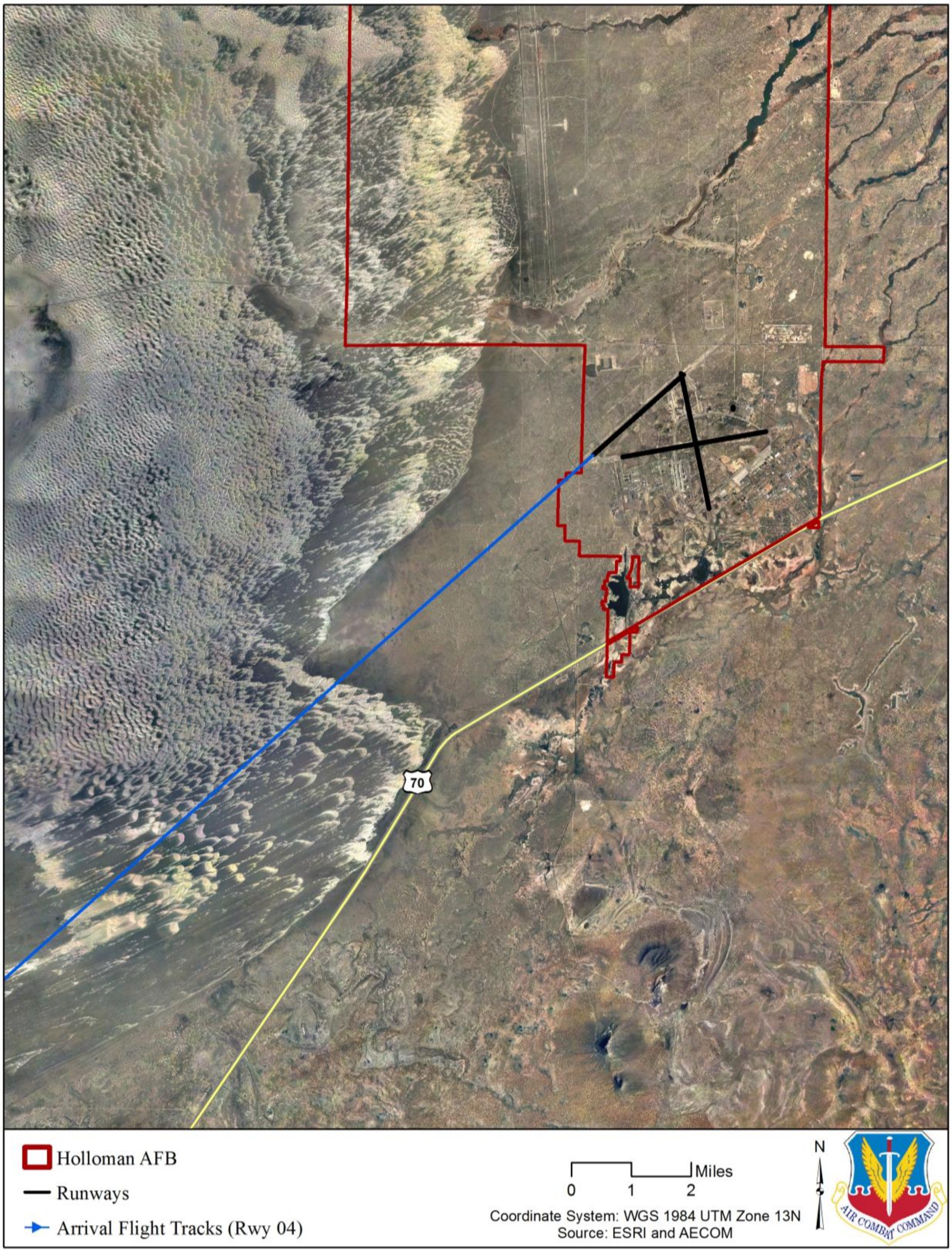


**Figure 2. Runway 04 Arrival Flight Tracks - Alternative 1**

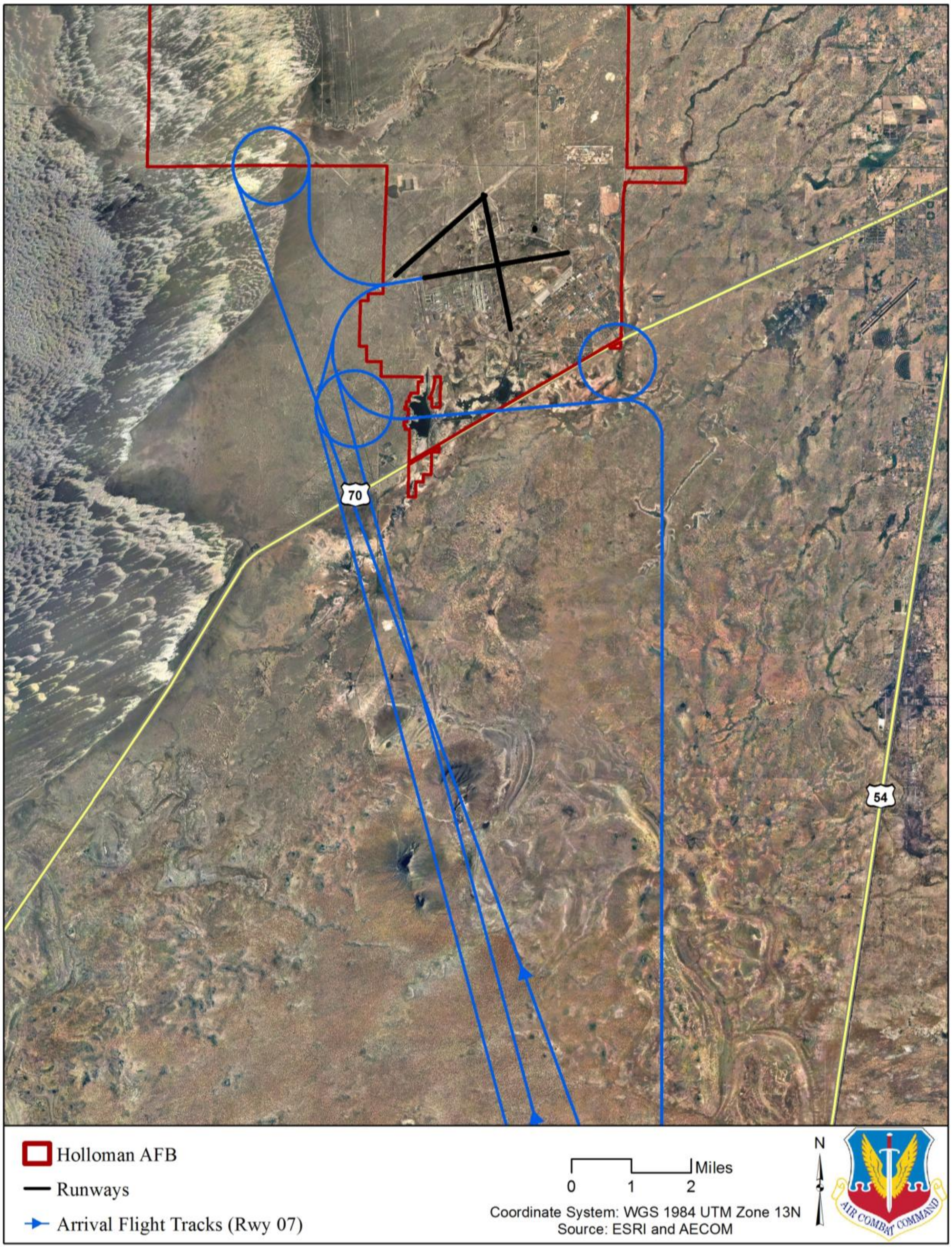


**Figure 3. Runway 07 Arrival Flight Tracks - Alternative 1**

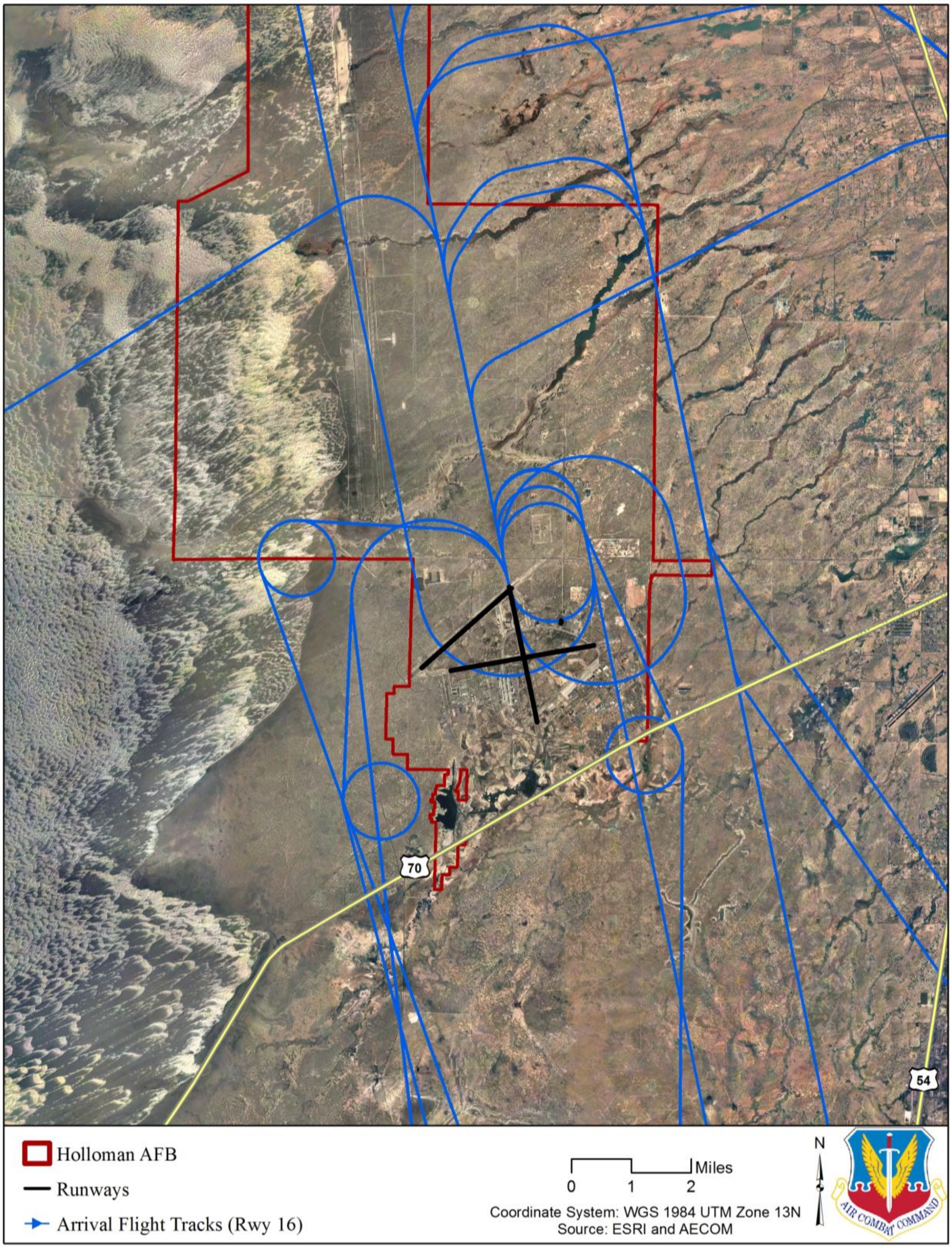


**Figure 4. Runway 16 Arrival Flight Tracks - Alternative 1**

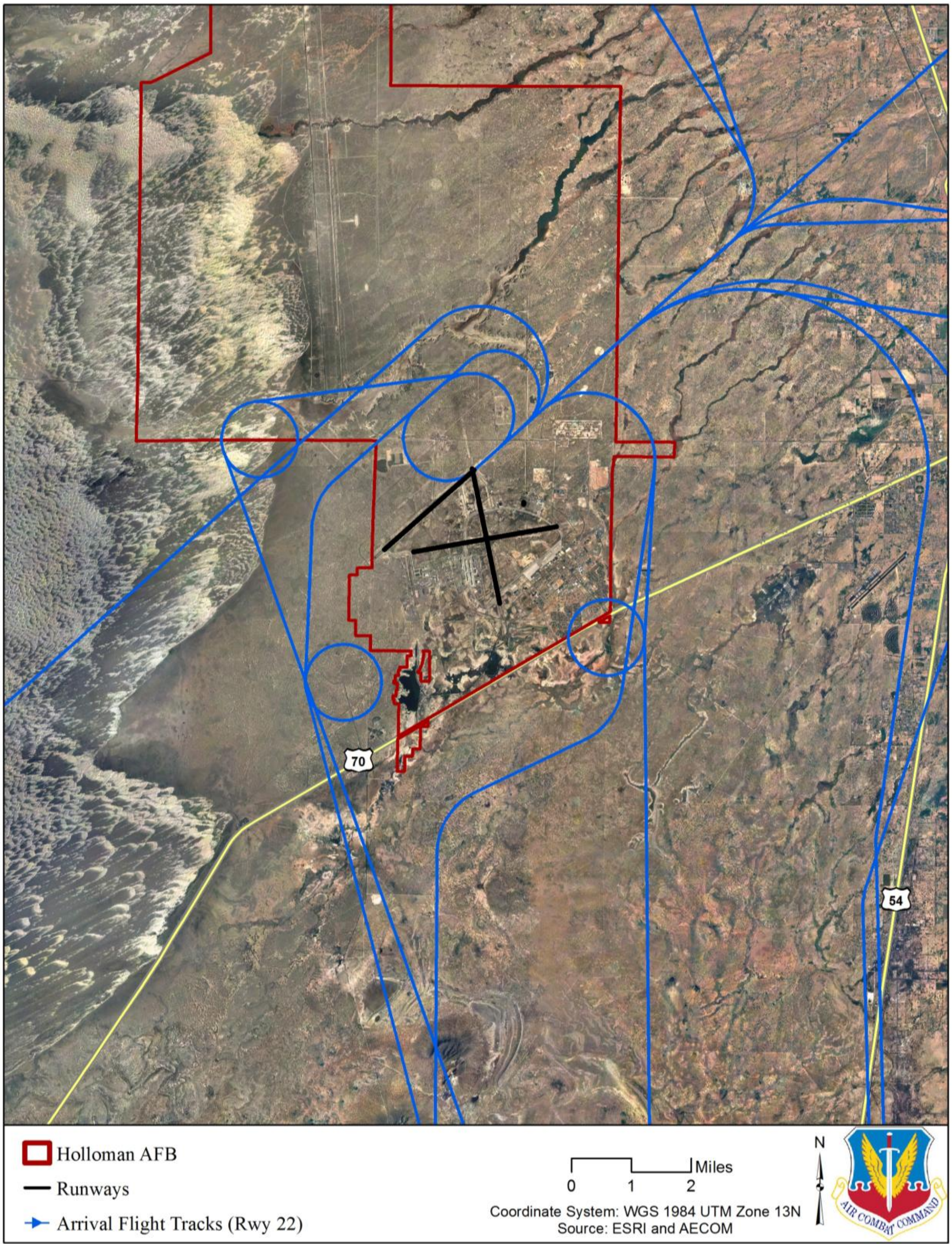


**Figure 5. Runway 22 Arrival Flight Tracks - Alternative 1**

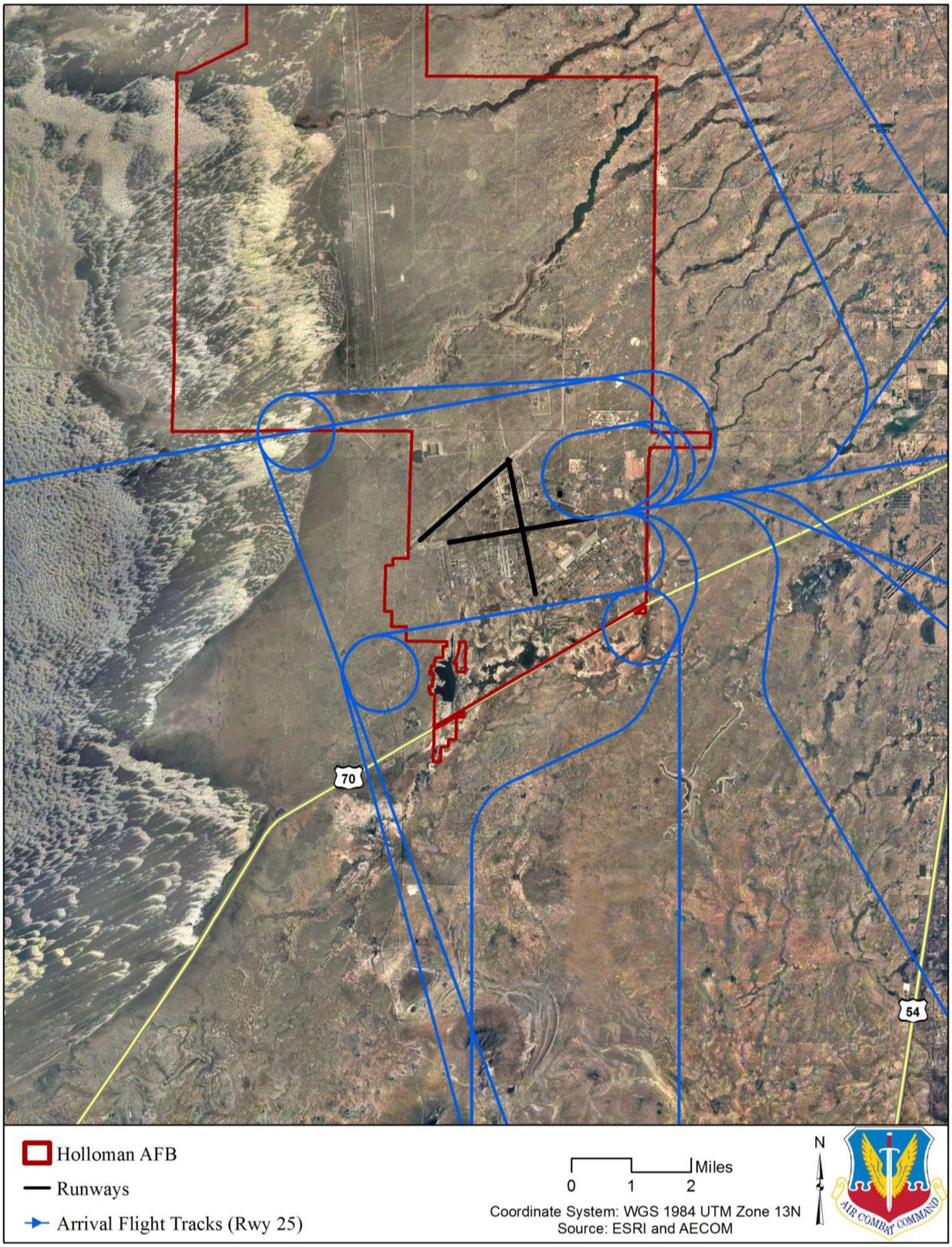


**Figure 6. Runway 25 Arrival Flight Tracks - Alternative 1**

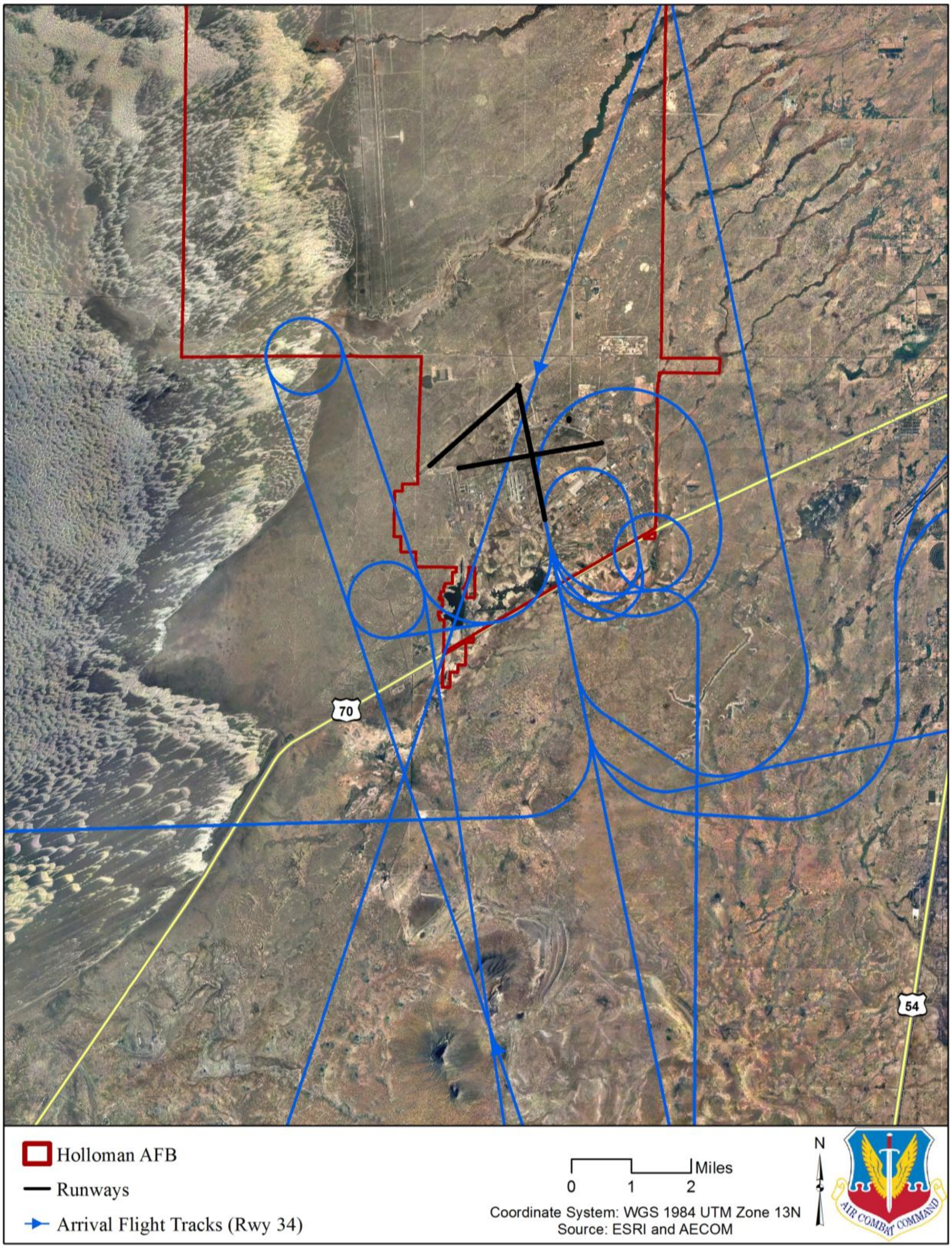


**Figure 7. Runway 34 Arrival Flight Tracks - Alternative 1**

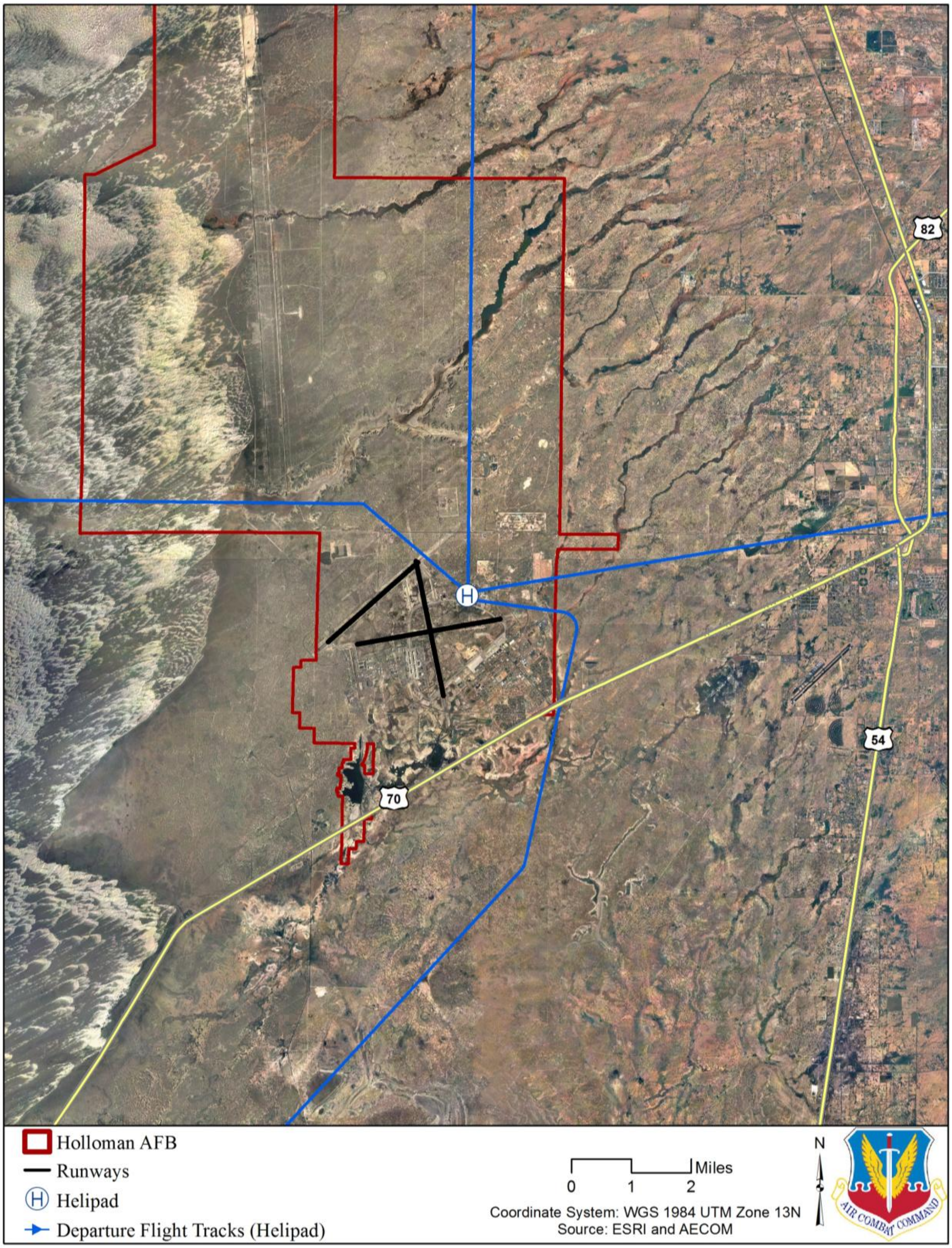


**Figure 8. Helipad Departure Flight Tracks - Alternative 1**

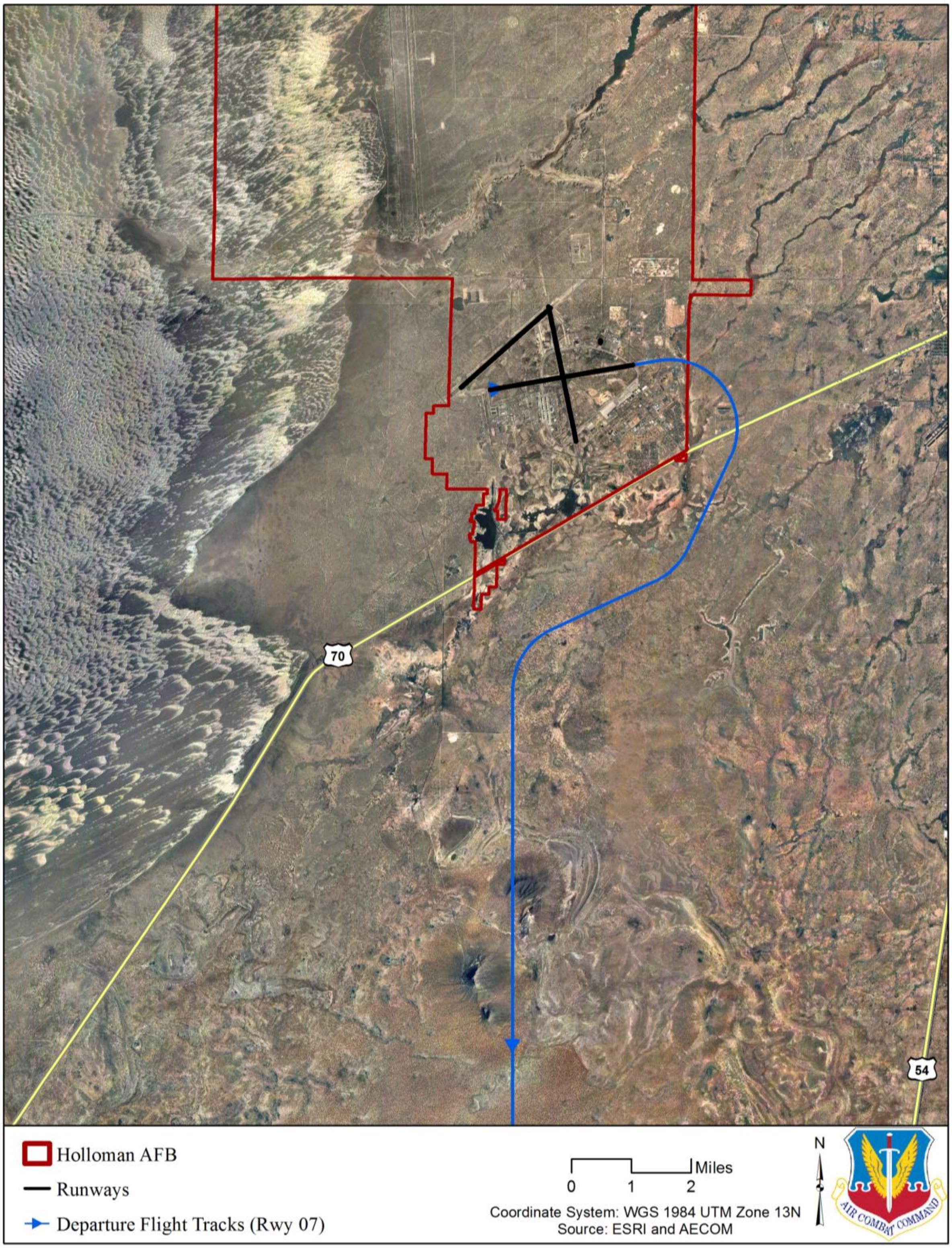


**Figure 9. Runway 07 Departure Flight Tracks - Alternative 1**

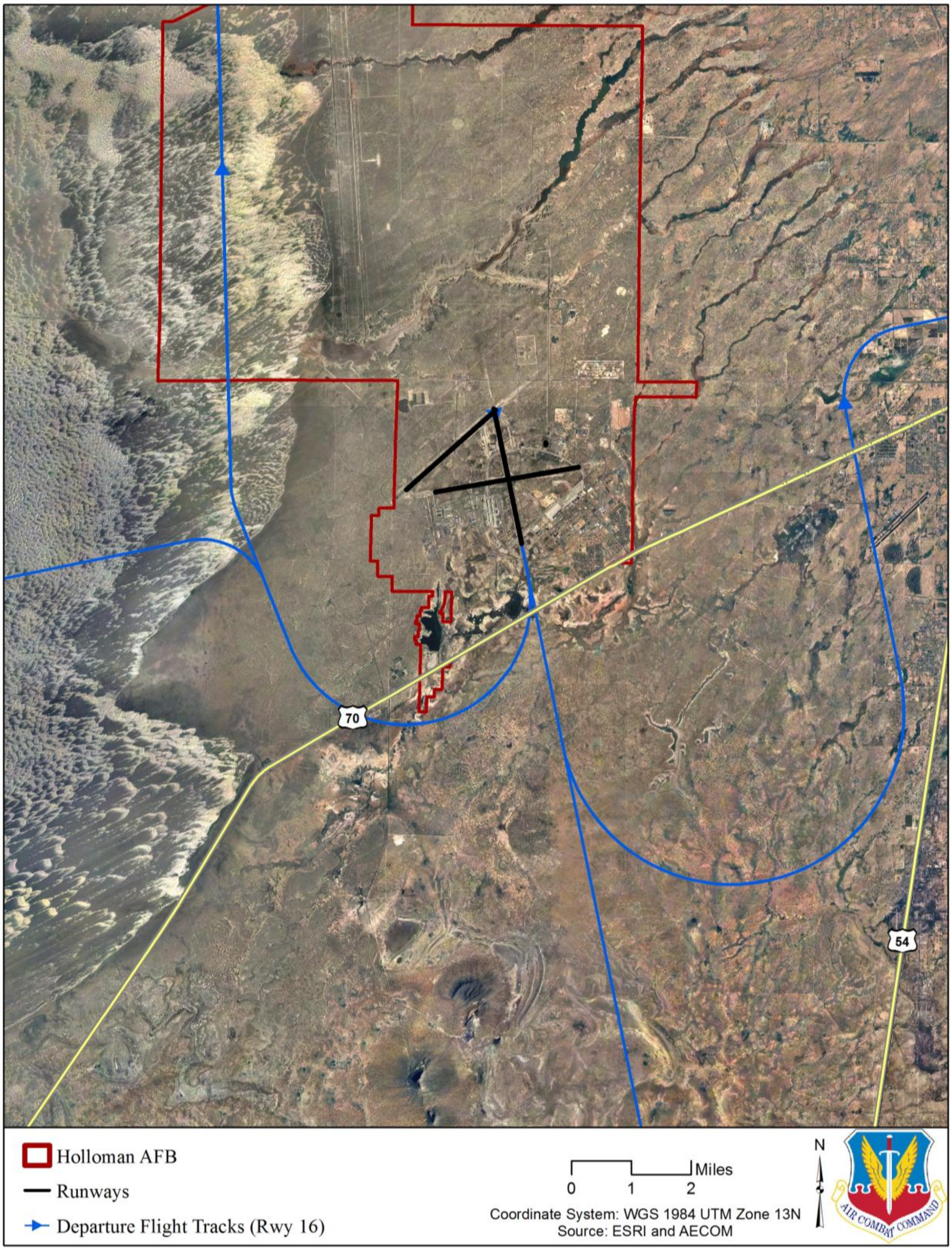


**Figure 10. Runway 16 Departure Flight Tracks - Alternative 1**

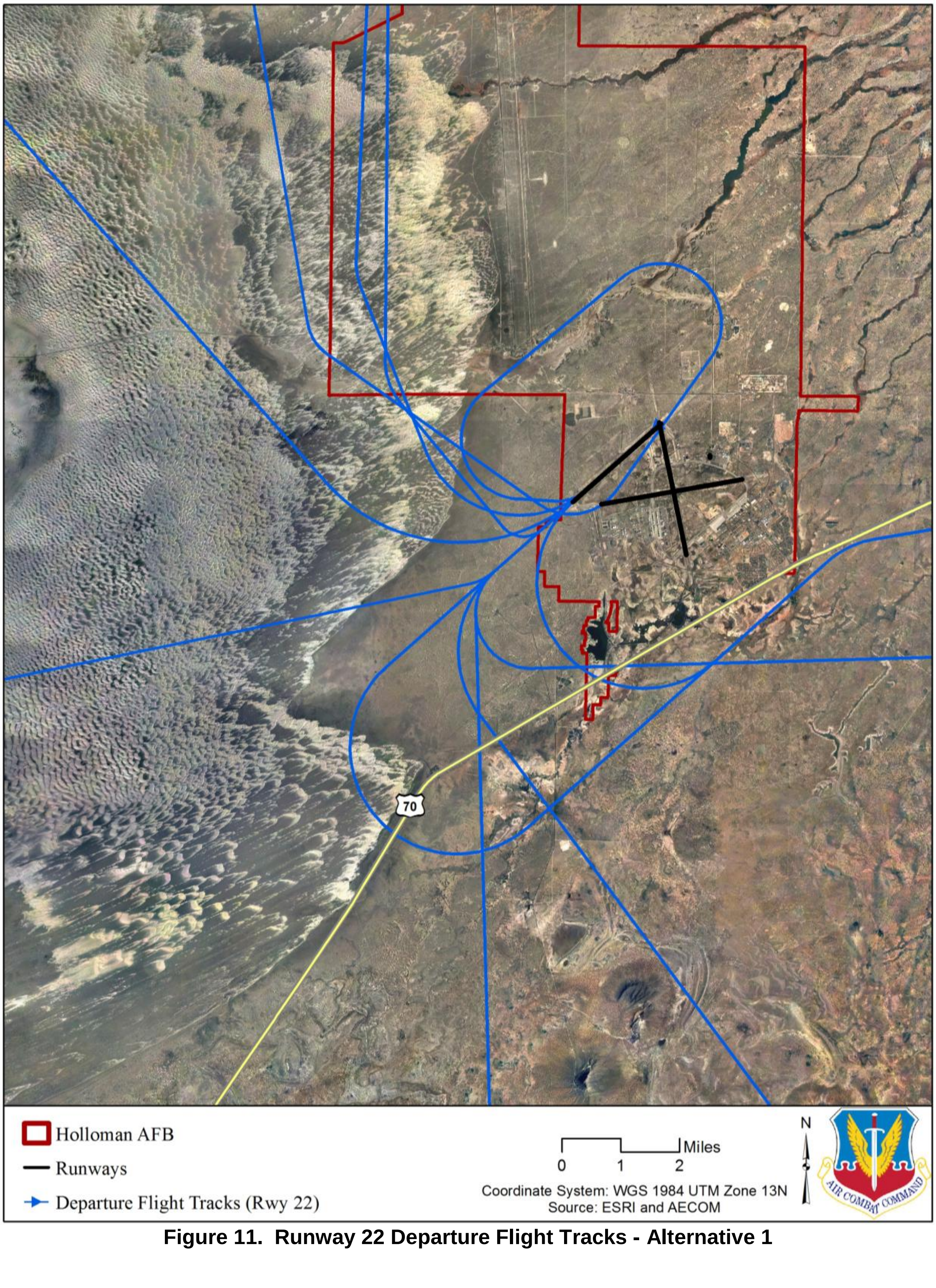


**Figure 11. Runway 22 Departure Flight Tracks - Alternative 1**

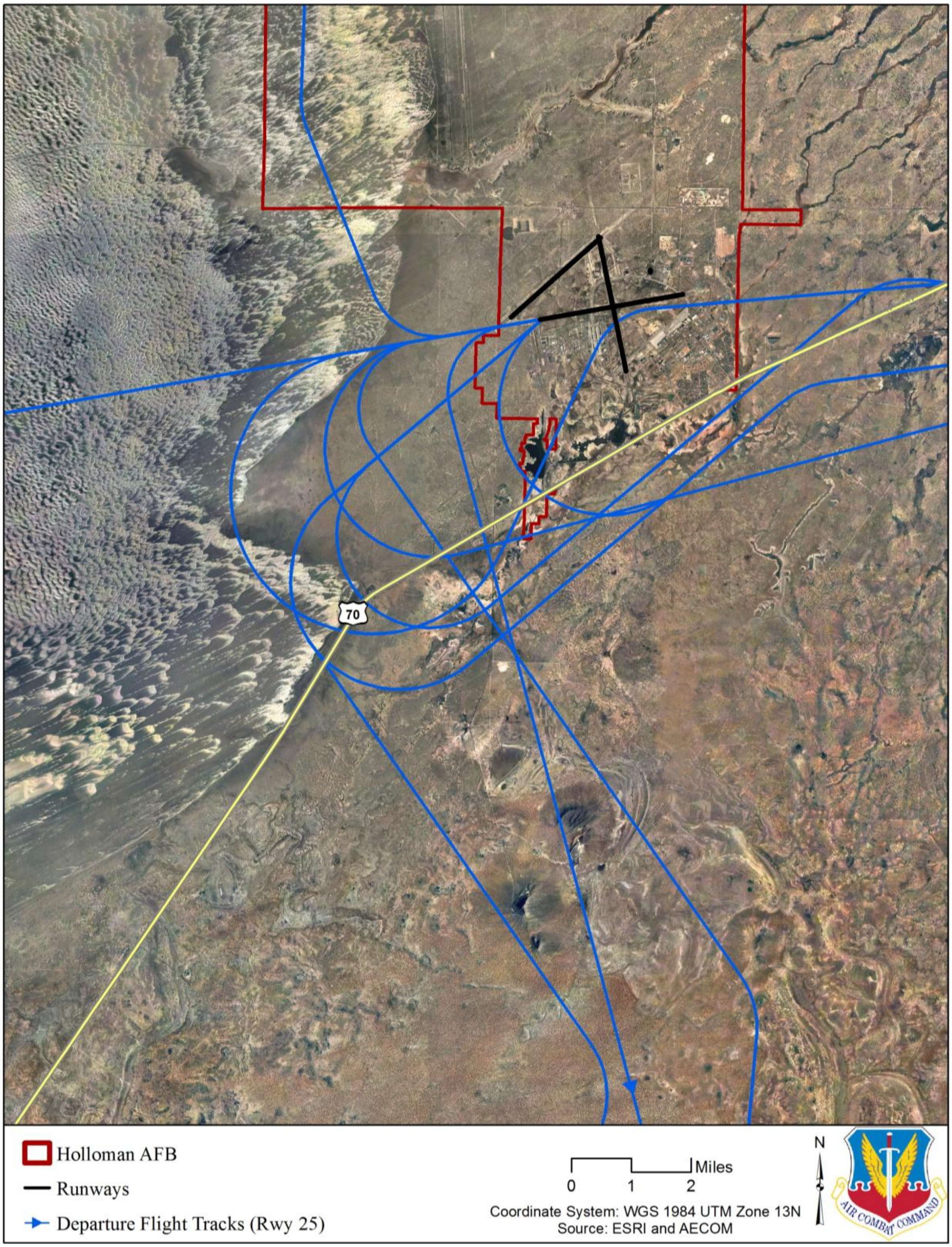


**Figure 12. Runway 25 Departure Flight Tracks - Alternative 1**

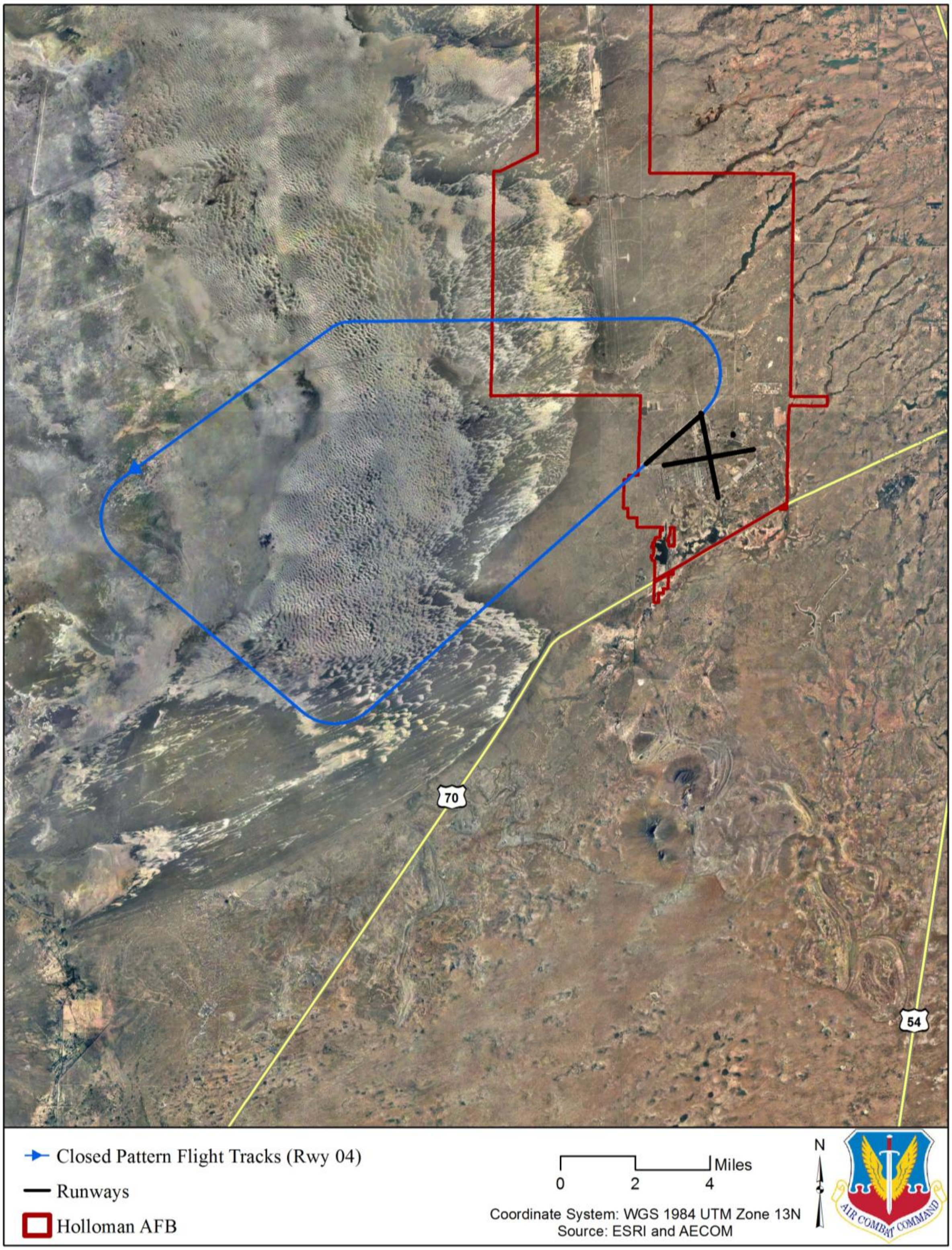


**Figure 13. Runway 04 Closed Pattern Flight Tracks - Alternative 1**

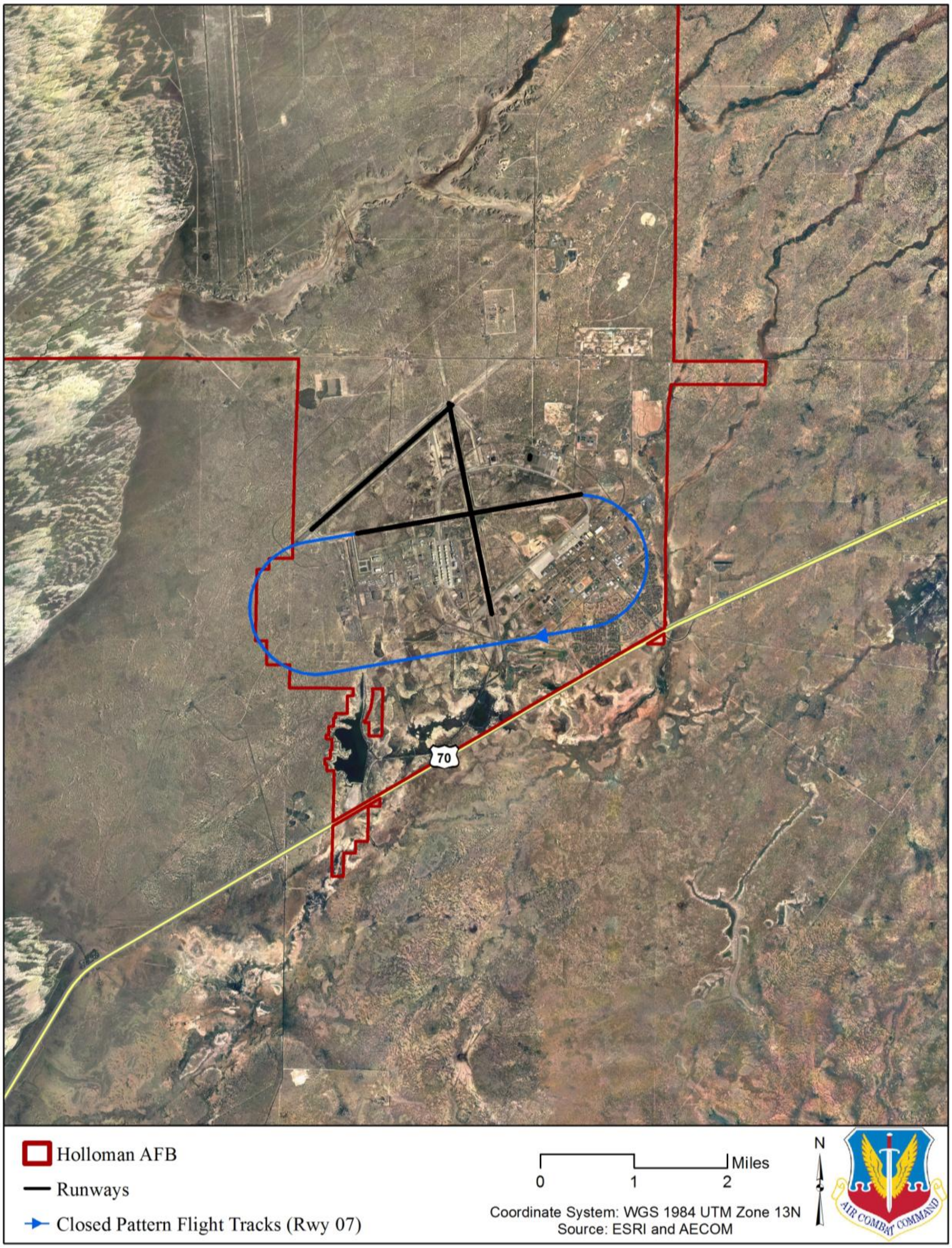


**Figure 14. Runway 07 Closed Pattern Flight Tracks - Alternative 1**

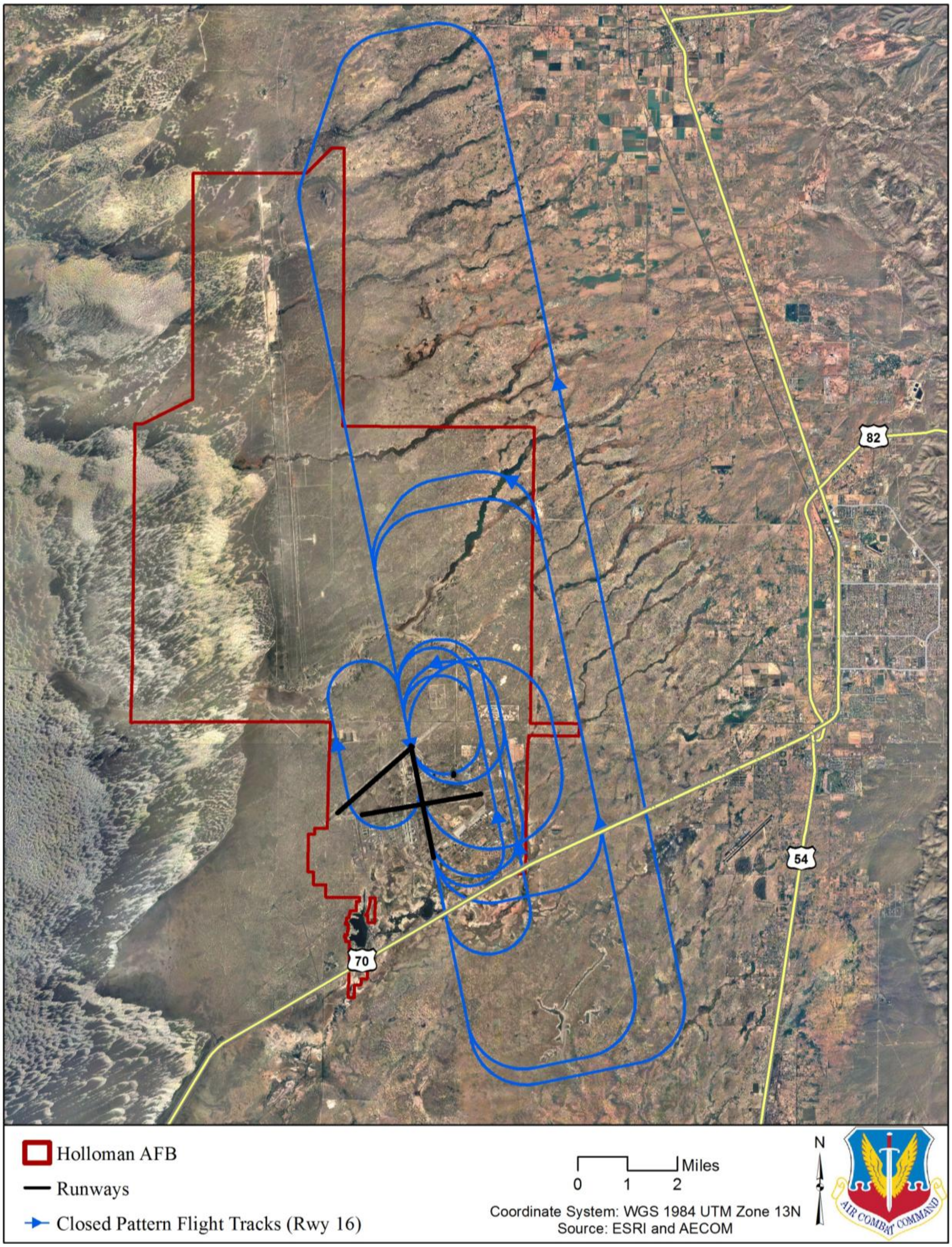


**Figure 15. Runway 16 Closed Pattern Flight Tracks - Alternative 1**

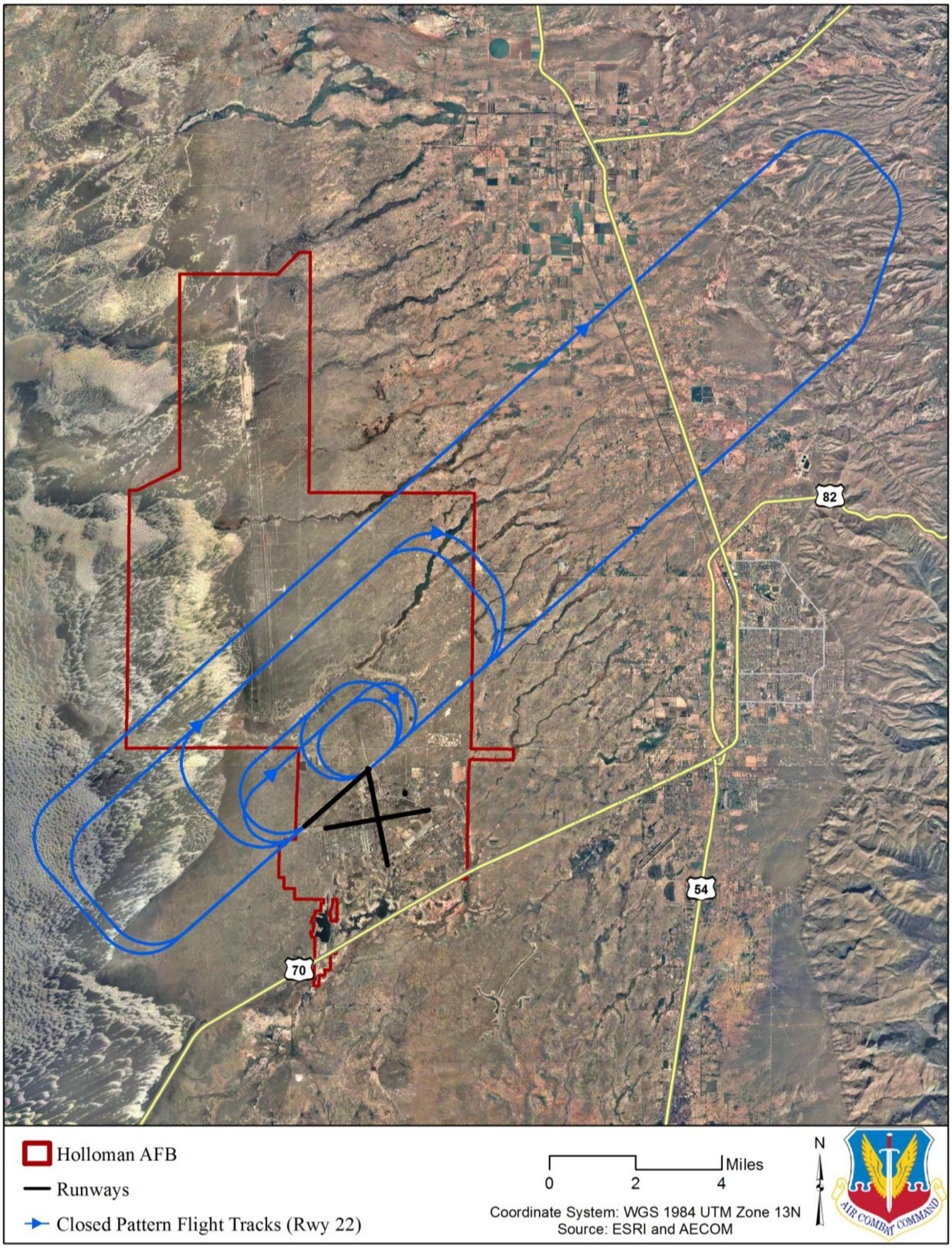


**Figure 16. Runway 22 Closed Pattern Flight Tracks - Alternative 1**

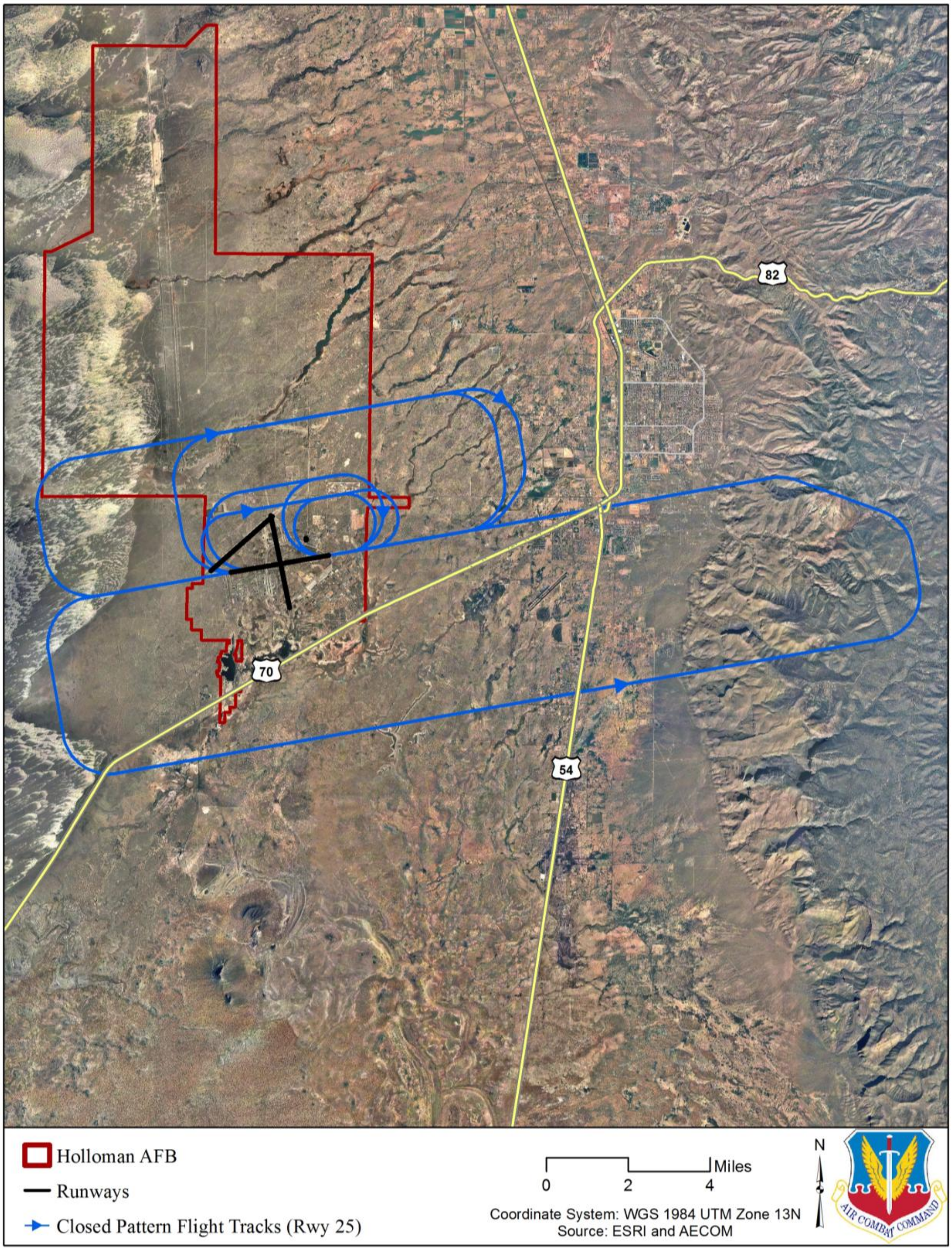


**Figure 17. Runway 25 Closed Pattern Flight Tracks - Alternative 1**

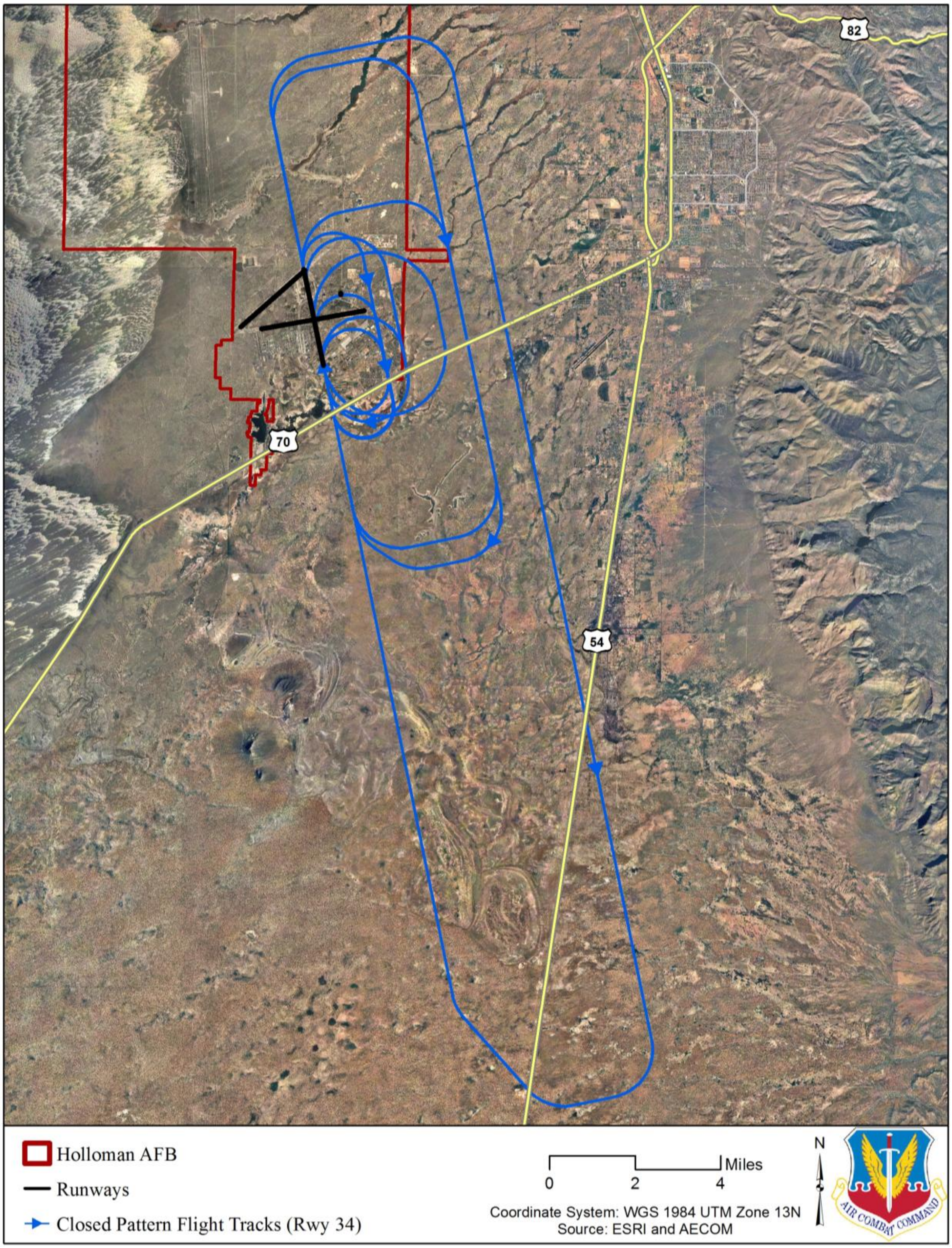


**Figure 18. Runway 34 Closed Pattern Flight Tracks - Alternative 1**

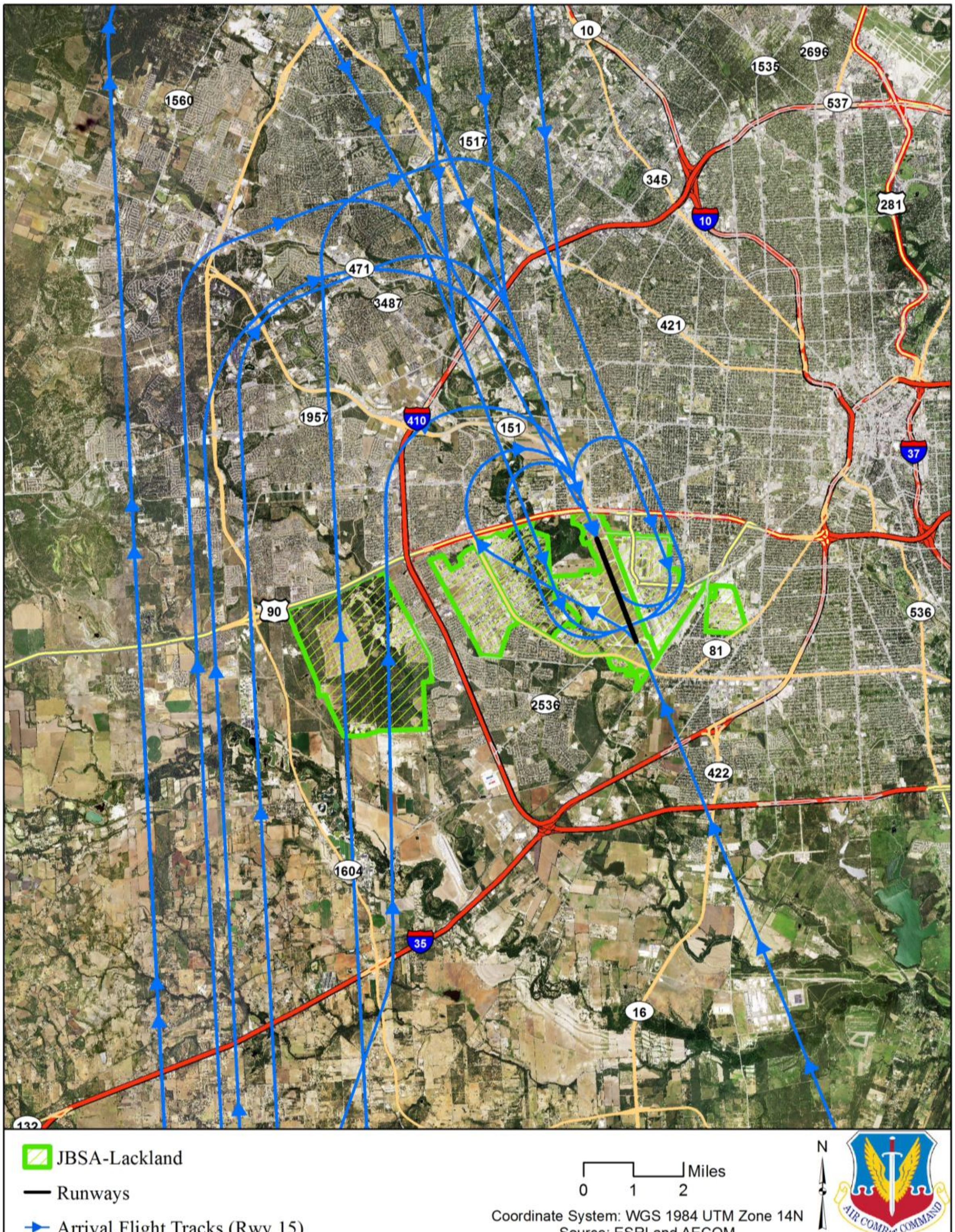


**Figure 19. Runway 15 Arrival Flight Tracks - Alternative 2**

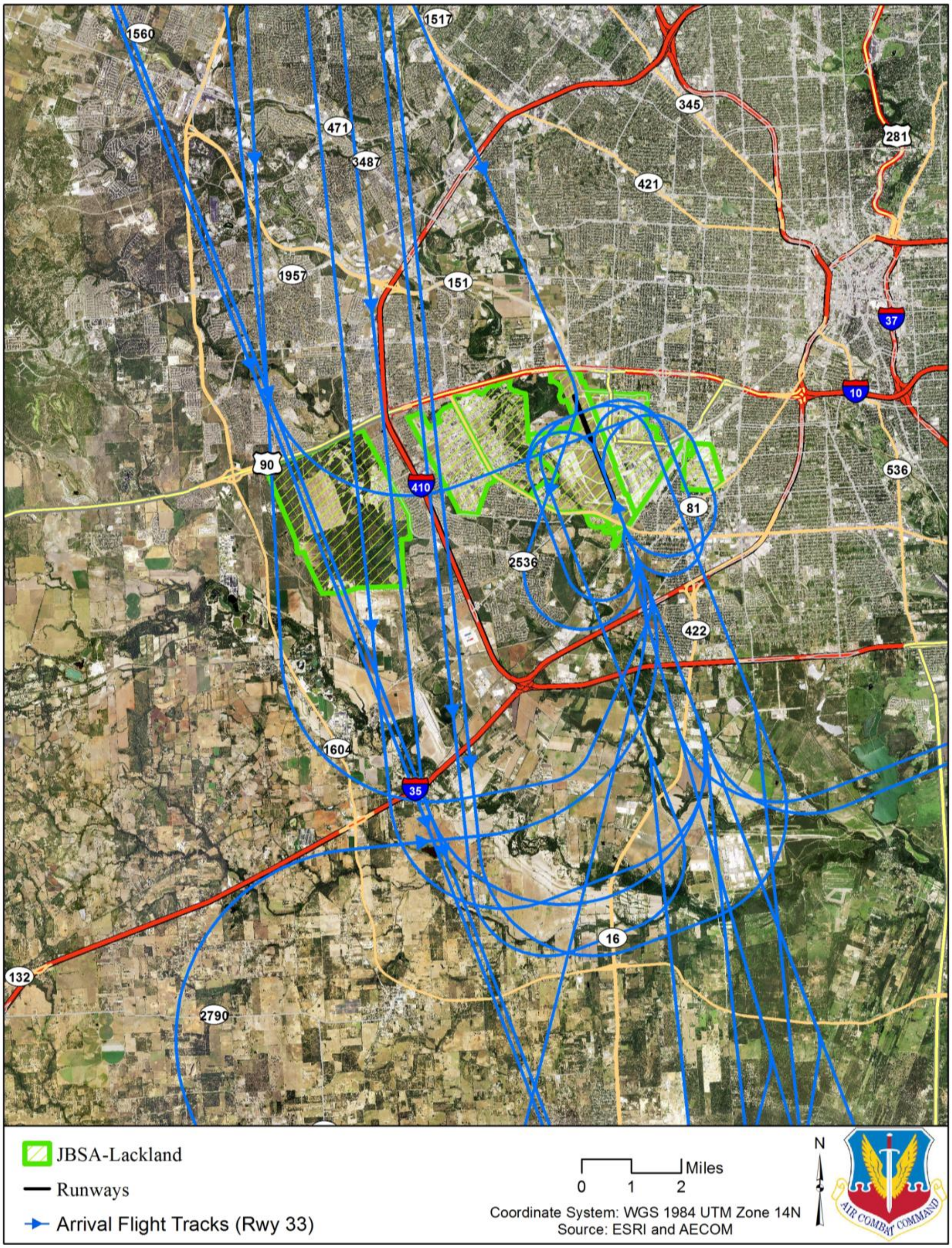


**Figure 20. Runway 33 Arrival Flight Tracks - Alternative 2**

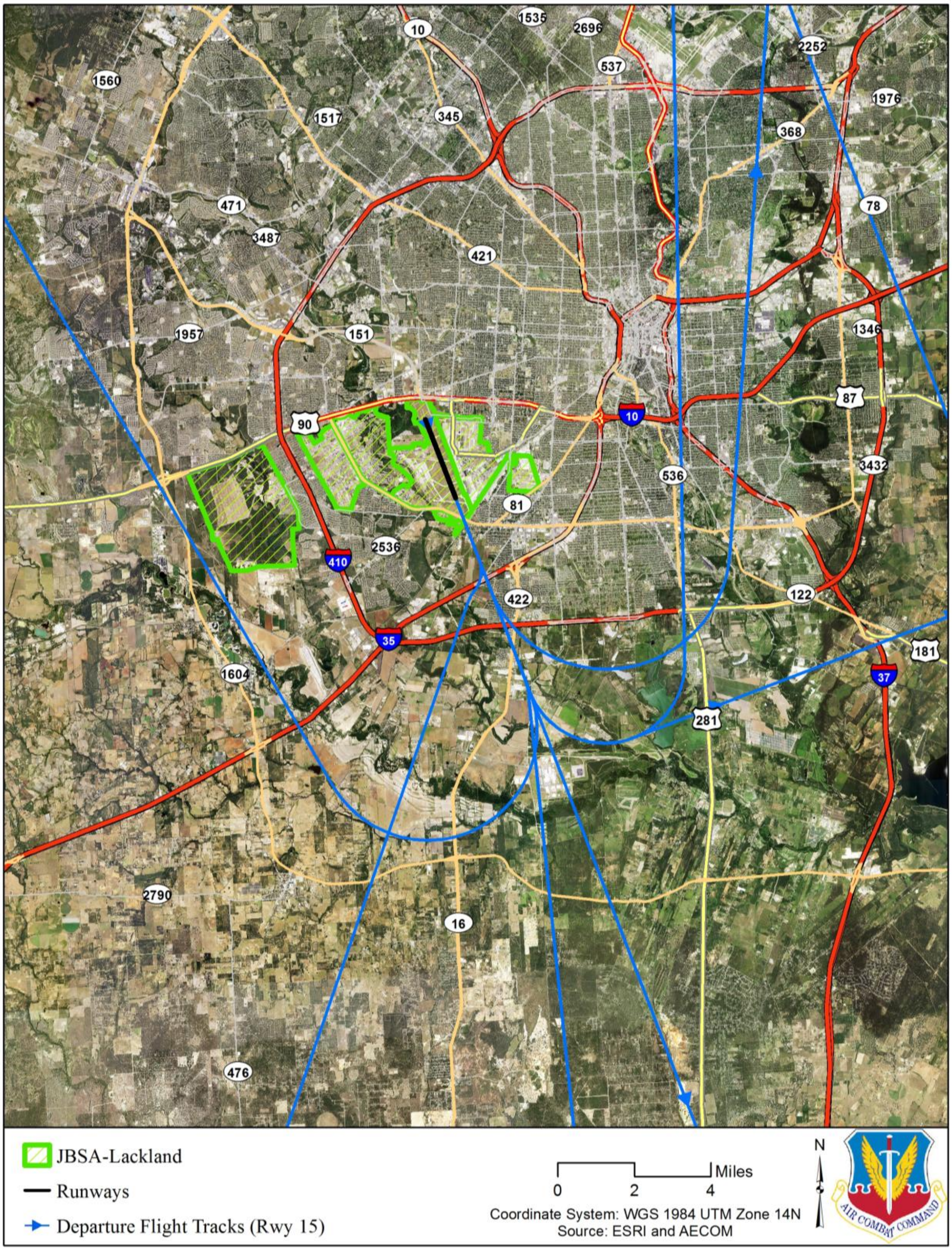

**Figure 21. Runway 15 Departure Flight Tracks - Alternative 2**

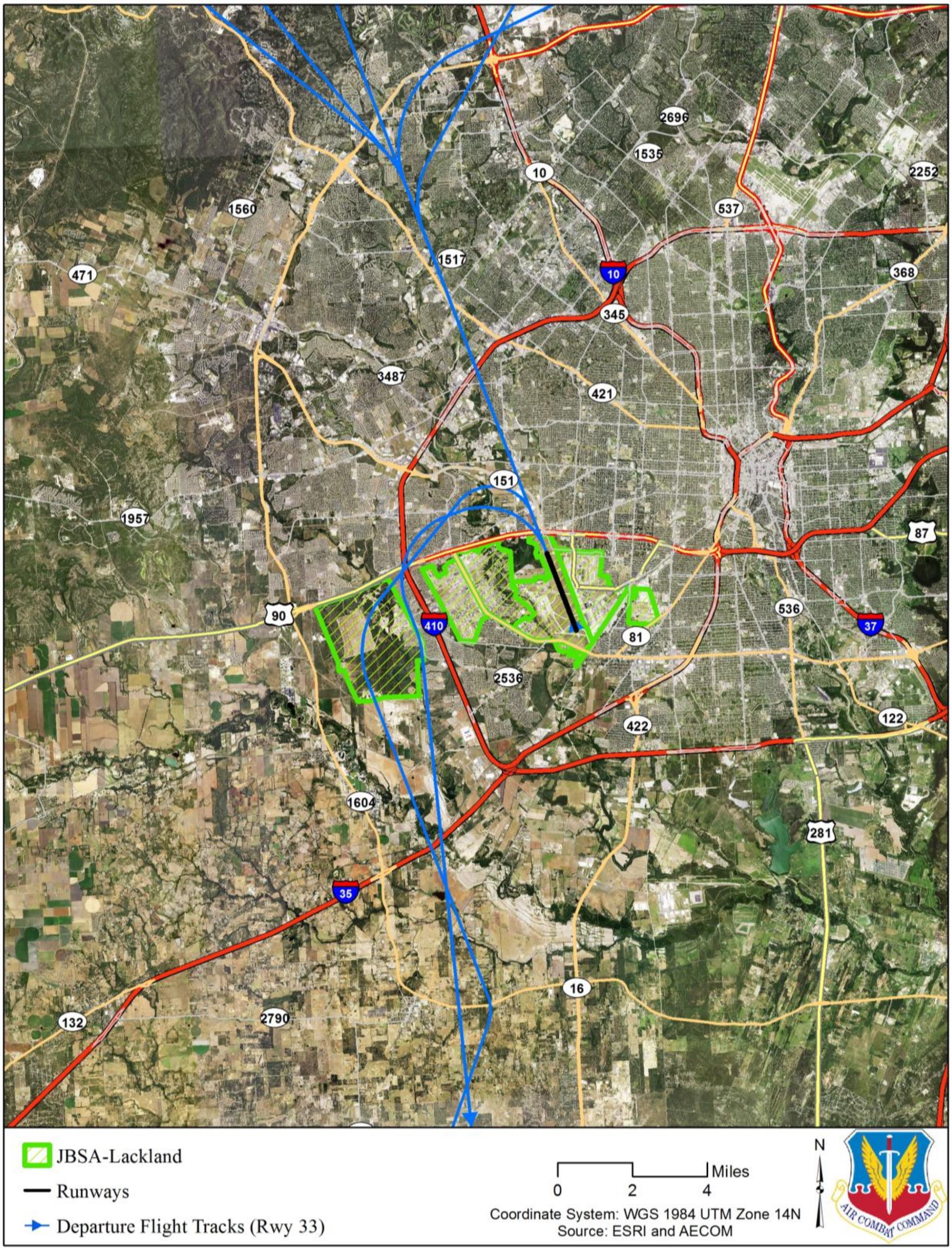


**Figure 22. Runway 33 Departure Flight Tracks - Alternative 2**

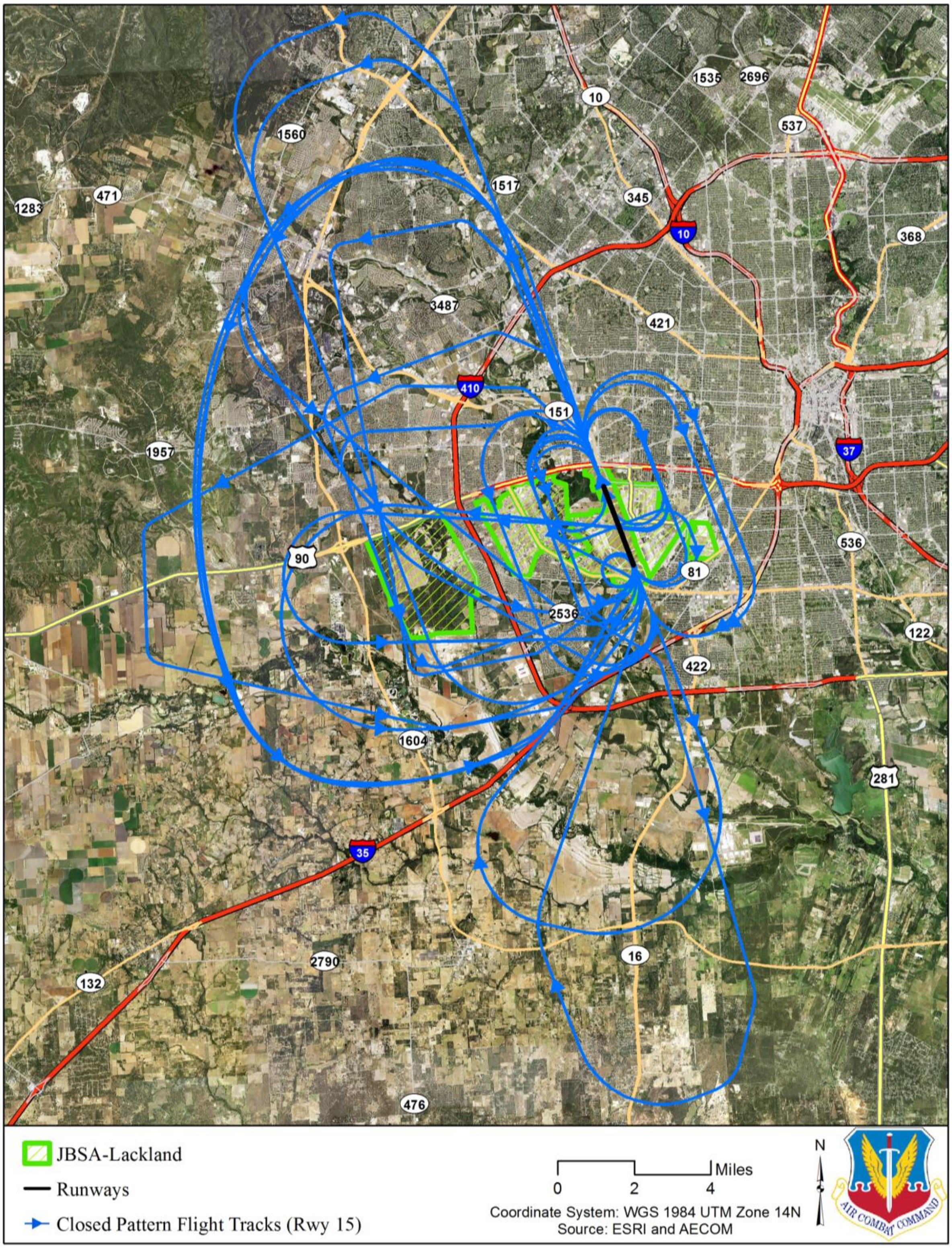


**Figure 23. Runway 15 Closed Pattern Flight Tracks - Alternative 2**

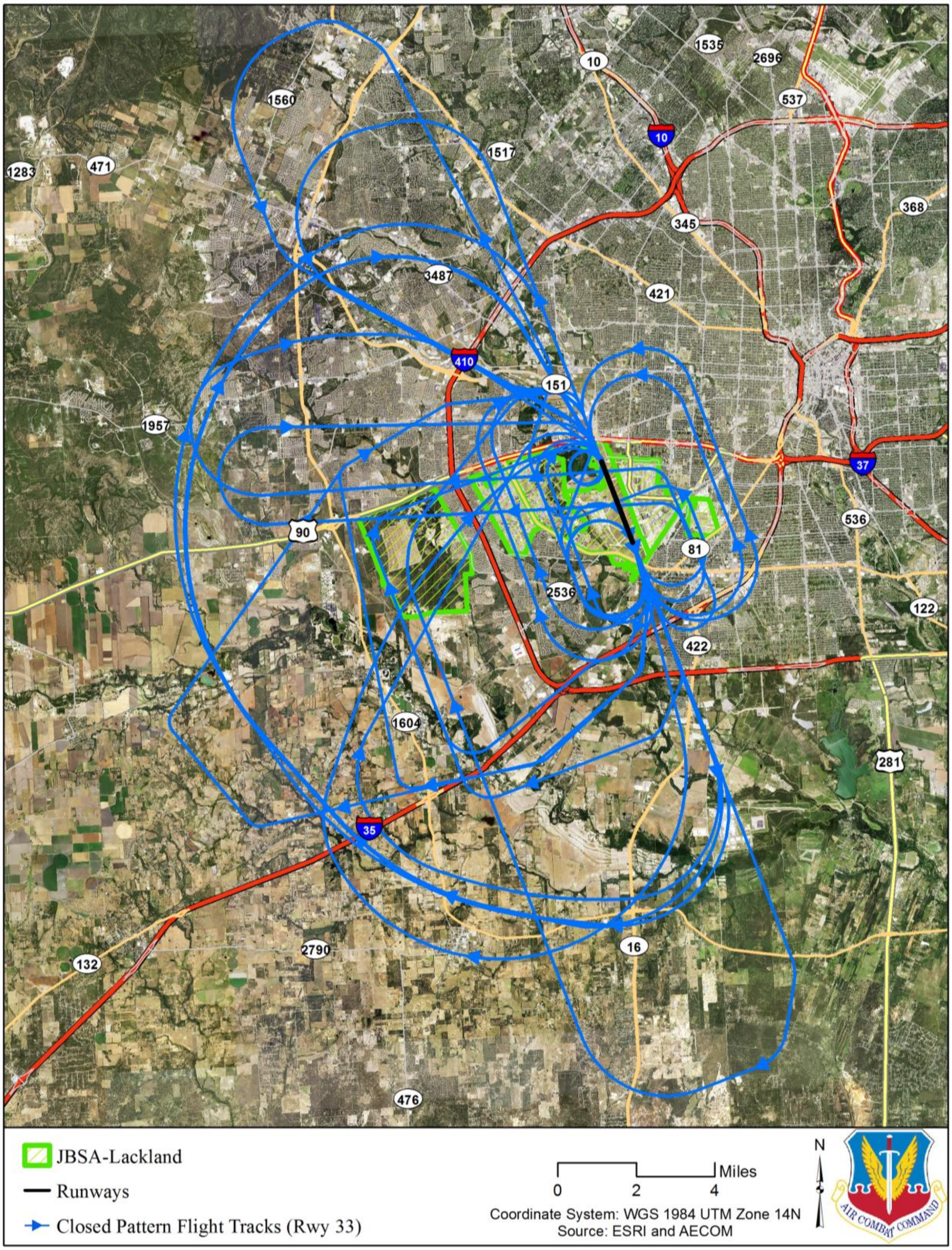


**Figure 24. Runway 33 Closed Pattern Flight Tracks - Alternative 2**

### 1.6 Flight Profiles and Noise Source Data

Most flight profiles remained the same as established in the 2014 model used for this update. However several major updates including specific profiles for those added flight tracks such as MQ-9 under Alternative 1 and C-5M to and from the south under Alternative 2 were developed based on interviews with pilots. These interviews require an iterative process as the pilots and modelers translate the flying parameters into the parameters utilized by the noise model (aircraft power settings, altitudes above runway level, and airspeeds along each flight track). This iterative process ensures that the modeled flight profiles provide an accurate description of the pilots' nominal flight procedures throughout the year.

Under Alternative 2, C-5M aircraft has recently replaced older C-5A model aircraft and its engine is much quieter than the C-5A. Therefore the C-5M specific engine noise source data were utilized in the modeling.

### 1.7 Maintenance Run-up Operations

Pilots and maintenance personnel conduct static engine run-ups as part of maintenance procedures or as part of standard pre-flight/post-flight procedures. The modeled maintenance run-up activities for the baseline and proposed conditions include the aircraft type, the engine type, location, magnetic heading, the number of annual operations by acoustical day and night, the power setting, and duration in minutes at each power setting. A brief summary of the number of engine run-ups performed on an annual basis are shown in Tables 7 and 8 under Alternative 1-Holloman AFB and Tables 9 and 10 under Alternative 2 – JBSA-Lackland (Kelly Field), respectively. The run-up locations are depicted in Figures 25 at Holloman AFB and 26 at JBSA-Lackland (Kelly Field), respectively.

**Table 7. Existing Engine Maintenance Runups at Holloman AFB**

| Unit | Aircraft | Runup Type | Runup Location | Annual Frequency |
|---|---|---|---|---|
| 54 FG | F-16C | Arming | End of Rwy 16 | 864 |
| 54 FG | F-16C | Arming | End of Rwy 22 | 864 |
| 54 FG | F-16C | Arming | End of Rwy 25 | 6,480 |
| 54 FG | F-16C | Arming | End of Rwy 34 | 432 |
| 54 FG | F-16C | Dearming | End of Rwy 16 | 4,320 |
| 54 FG | F-16C | Dearming | End of Rwy 22 | 2,592 |
| 54 FG | F-16C | Dearming | End of Rwy 25 | 864 |
| 54 FG | F-16C | Dearming | End of Rwy 34 | 864 |
| 54 FG | F-16C | Oil consumption, APU check | Flight Line | 52 |
| 54 FG | F-16C | Flight controls and Engine change | Flight Line | 208 |
| 54 FG | F-16C | Takeoff Roll Runup | End of Rwy 16 | 143 |
| 54 FG | F-16C | Takeoff Roll Runup | End of Rwy 25 | 1,153 |
| 54 FG | F-16C | Hush House Engine Runs | Hush House | 146 |
| 82 ATRS | QF-16C | Oil consumption, APU check | QF-16 Parking spot | 37 |
| 82 ATRS | QF-16C | Flight controls and Engine change | QF-16 Parking spot | 146 |
| 82 ATRS | QF-16C | Takeoff Roll Runup | End of Rwy 16 | 28 |
| 82 ATRS | QF-16C | Takeoff Roll Runup | End of Rwy 22 | 132 |
| 82 ATRS | QF-16C | Takeoff Roll Runup | End of Rwy 25 | 228 |
| 82 ATRS | QF-16C | Takeoff Roll Runup | End of Rwy 34 | 12 |
| 82 ATRS | QF-16C | Hush House Engine Runs | Hush House | 73 |
| 54 FG | F-16C | Hush House Suppressor Engine Runs | Hush House | 292 |
| 82 ATRS | QF-16C | Hush House suppressor Engine Runs | Hush House | 146 |
| 586 FTS | T-38C | Preflight | End of Rwy 16 | 204 |
| 586 FTS | T-38C | Preflight | End of Rwy 25 | 3,687 |
| 586 FTS | T-38C | Preflight | End of Rwy 34 | 204 |
| 586 FTS | T-38C | Warmup & Cooldown | T-38 Pad | 8,198 |
| 586 FTS | T-38C | All other operations combined | T-38 Pad | 365 |
| 586 FTS | T-38C | Hush House runs | Hush House | 32 |

**Table 8. Proposed Net Increase in Engine Maintenance Runups at Holloman AFB**

| Unit | Aircraft | Runup Type | Runup Location | Annual Frequency |
|---|---|---|---|---|
| 54 FG | F-16C | Arming | End of Rwy 16 | 960 |
| 54 FG | F-16C | Arming | End of Rwy 22 | 960 |
| 54 FG | F-16C | Arming | End of Rwy 25 | 7,200 |
| 54 FG | F-16C | Arming | End of Rwy 34 | 480 |
| 54 FG | F-16C | Dearming | End of Rwy 16 | 4,800 |
| 54 FG | F-16C | Dearming | End of Rwy 22 | 2,880 |
| 54 FG | F-16C | Dearming | End of Rwy 25 | 960 |
| 54 FG | F-16C | Dearming | End of Rwy 34 | 960 |
| 54 FG | F-16C | Takeoff Roll Runup | End of Rwy 16 | 158 |
| 54 FG | F-16C | Takeoff Roll Runup | End of Rwy 25 | 1,282 |

**Table 9. Existing Condition Total Engine Maintenance Runups at JBSA-Lackland (Kelly Field)**

| Unit | Aircraft | Runup Type | Runup Location | Annual Frequency |
|---|---|---|---|---|
| 149 FW TX ANG | F-16C | Arming | End of Rwy 15 | 1,944 |
| 149 FW TX ANG | F-16C | Dearming | End of Rwy 15 | 1,944 |
| 149 FW TX ANG | F-16C | Arming | End of Rwy 33 | 1,944 |
| 149 FW TX ANG | F-16C | Dearming | End of Rwy 33 | 1,944 |
| 149 FW TX ANG | F-16C | Hush House Out of Frame Runs | Hush House | 24 |
| 149 FW TX ANG | F-16C | Preflight | Flight Line | 3,888 |
| 68 AS FTU | C-5M | 1 Engine Idle Run | C-5M Pad | 24 |
| 68 AS FTU | C-5M | 2 Engines Idle Run | C-5M Pad | 36 |
| 68 AS FTU | C-5M | 4 Engines Power Run | C-5M Pad | 107 |
| 68 AS FTU | C-5M | 2 Engines Power Run | C-5M Pad | 107 |
| 68 AS FTU | C-5M | Preflight | C-5M Pad | 1,030 |
| Boeing | 747-8 | Preflight | Boeing Runup Pad | 16 |
| Boeing | 747-8 | General Maintenance | Boeing Runup Pad | 12 |
| Boeing | C-17 | General Maintenance | Boeing Runup Pad | 52 |
| Boeing | C-17 | Preflight | Boeing Runup Pad | 120 |
| Boeing | C-32 | Preflight | Boeing Runup Pad | 1 |
| Boeing | C-32 | General Maintenance | Boeing Runup Pad | 1 |
| Boeing | C-40 | Preflight | Boeing Runup Pad | 1 |
| Boeing | C-40 | General Maintenance | Boeing Runup Pad | 1 |
| Boeing | KC-135 | Preflight | Boeing Runup Pad | 4 |
| Boeing | KC-135 | Engine Trim | Boeing Runup Pad | 2 |
| 149 FW TX ANG | F-16C | Engine Operational checkout | Trim Pad | 3 |
| 149 FW TX ANG | F-16C | Interface checkout | Trim Pad | 10 |
| 149 FW TX ANG | F-16C | Primary/Secondary checkout | Trim Pad | 1 |
| 149 FW TX ANG | F-16C | Augmentor Operational checkout | Trim Pad | 15 |
| 149 FW TX ANG | F-16C | Intermediate checkout | Trim Pad | 3 |
| 149 FW TX ANG | F-16C | Minimum augmentor checkout | Trim Pad | 13 |
| 149 FW TX ANG | F-16C | Oil consumption checkout | Trim Pad | 3 |
| 149 FW TX ANG | F-16C | Oil contamination checkout | Trim Pad | 2 |
| 149 FW TX ANG | F-16C | Isolation checkout | Trim Pad | 2 |

**Table 10. Proposed Net Increase in Engine Maintenance Runups at JBSA-Lackland (Kelly Field) For Two New F-16C FTUs**

| Unit | Aircraft | Runup Type | Runup Location | Annual Frequency |
|---|---|---|---|---|
| 149 FW TX ANG | F-16C | Arming | End of Rwy 15 | 3,888 |
| 149 FW TX ANG | F-16C | Dearming | End of Rwy 15 | 3,888 |
| 149 FW TX ANG | F-16C | Arming | End of Rwy 33 | 3,888 |
| 149 FW TX ANG | F-16C | Dearming | End of Rwy 33 | 3,888 |
| 149 FW TX ANG | F-16C | Hush House Out of Frame Runs | Hush House | 48 |
| 149 FW TX ANG | F-16C | Preflight | Flight Line | 7,776 |
| 149 FW TX ANG | F-16C | Engine Operational checkout | Trim Pad | 6 |
| 149 FW TX ANG | F-16C | Interface checkout | Trim Pad | 20 |
| 149 FW TX ANG | F-16C | Primary/Secondary checkout | Trim Pad | 2 |
| 149 FW TX ANG | F-16C | Augmentor Operational checkout | Trim Pad | 30 |
| 149 FW TX ANG | F-16C | Intermediate checkout | Trim Pad | 6 |
| 149 FW TX ANG | F-16C | Minimum augmentor checkout | Trim Pad | 26 |
| 149 FW TX ANG | F-16C | Oil consumption checkout | Trim Pad | 6 |
| 149 FW TX ANG | F-16C | Oil contamination checkout | Trim Pad | 4 |
| 149 FW TX ANG | F-16C | Isolation checkout | Trim Pad | 4 |

**Table 11. Proposed Net Increase in Engine Maintenance Runups at JBSA-Lackland (Kelly Field) For One New F-16C FTU**

| Unit | Aircraft | Runup Type | Runup Location | Annual Frequency |
|---|---|---|---|---|
| 149 FW TX ANG | F-16C | Arming | End of Rwy 15 | 1,944 |
| 149 FW TX ANG | F-16C | Dearming | End of Rwy 15 | 1,944 |
| 149 FW TX ANG | F-16C | Arming | End of Rwy 33 | 1,944 |
| 149 FW TX ANG | F-16C | Dearming | End of Rwy 33 | 1,944 |
| 149 FW TX ANG | F-16C | Hush House Out of Frame Runs | Hush House | 24 |
| 149 FW TX ANG | F-16C | Preflight | Flight Line | 3,888 |
| 149 FW TX ANG | F-16C | Engine Operational checkout | Trim Pad | 3 |
| 149 FW TX ANG | F-16C | Interface checkout | Trim Pad | 10 |
| 149 FW TX ANG | F-16C | Primary/Secondary checkout | Trim Pad | 1 |
| 149 FW TX ANG | F-16C | Augmentor Operational checkout | Trim Pad | 15 |
| 149 FW TX ANG | F-16C | Intermediate checkout | Trim Pad | 3 |
| 149 FW TX ANG | F-16C | Minimum augmentor checkout | Trim Pad | 13 |
| 149 FW TX ANG | F-16C | Oil consumption checkout | Trim Pad | 3 |
| 149 FW TX ANG | F-16C | Oil contamination checkout | Trim Pad | 2 |
| 149 FW TX ANG | F-16C | Isolation checkout | Trim Pad | 2 |

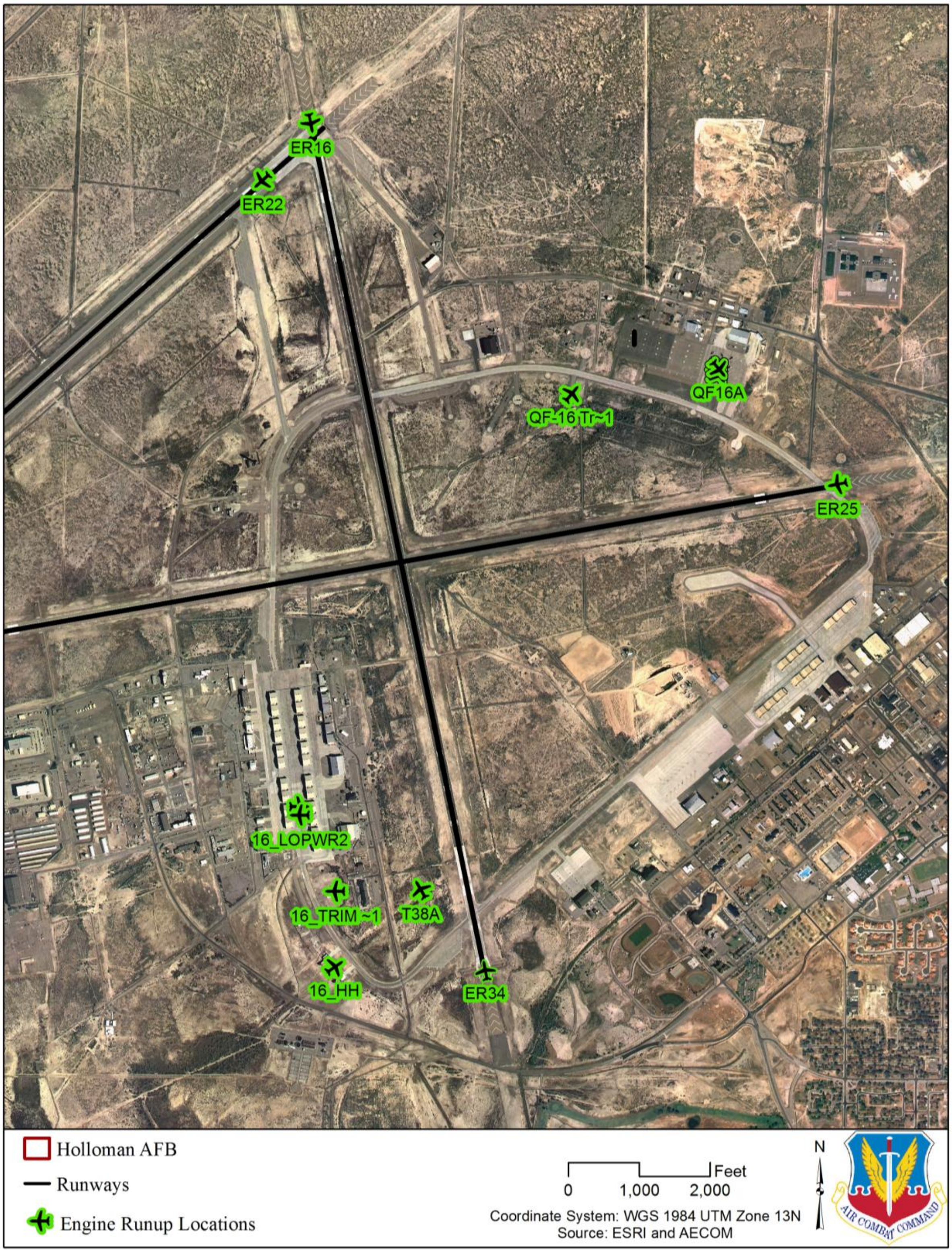


**Figure 25. Engine Runup Locations - Alternative 1**

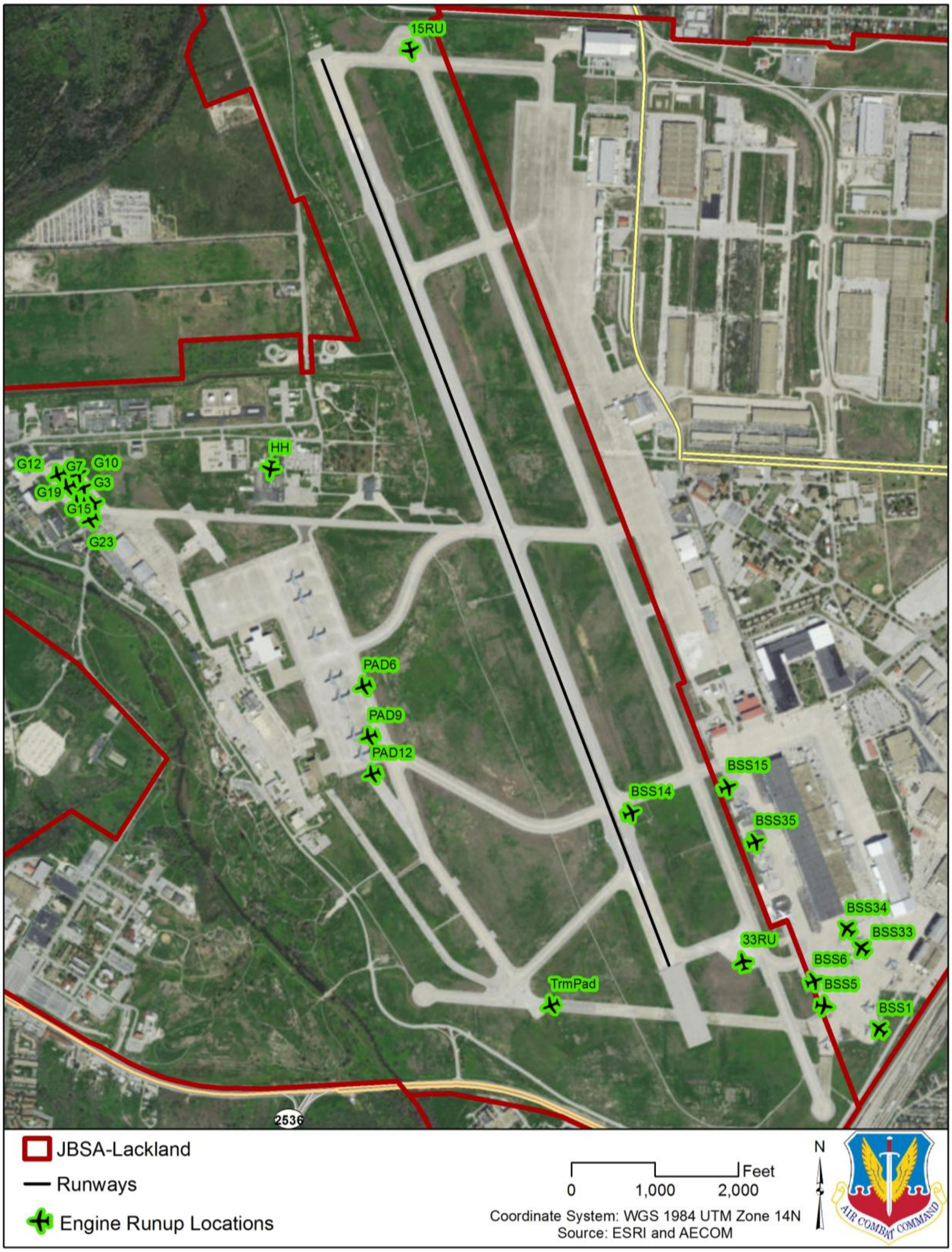


**Figure 26. Engine Runup Locations - Alternative 2**

## 1.8 Existing Baseline Condition Noise Contours

DoD NOISEMAP BASEOPS Model (Version 7.358) was used to calculate DNL noise zones based on the validated data. The effects of terrain on noise propagation were also included in noise modeling. NMPlot (Version 4.967) was used to plot the DNL levels in 5-dB increments, ranging from 65 dB DNL to 80 dB DNL. Figures 27 and 28 show the existing condition DNL noise zone contours for Holloman AFB and JBSA-Lackland (Kelly Field), respectively.

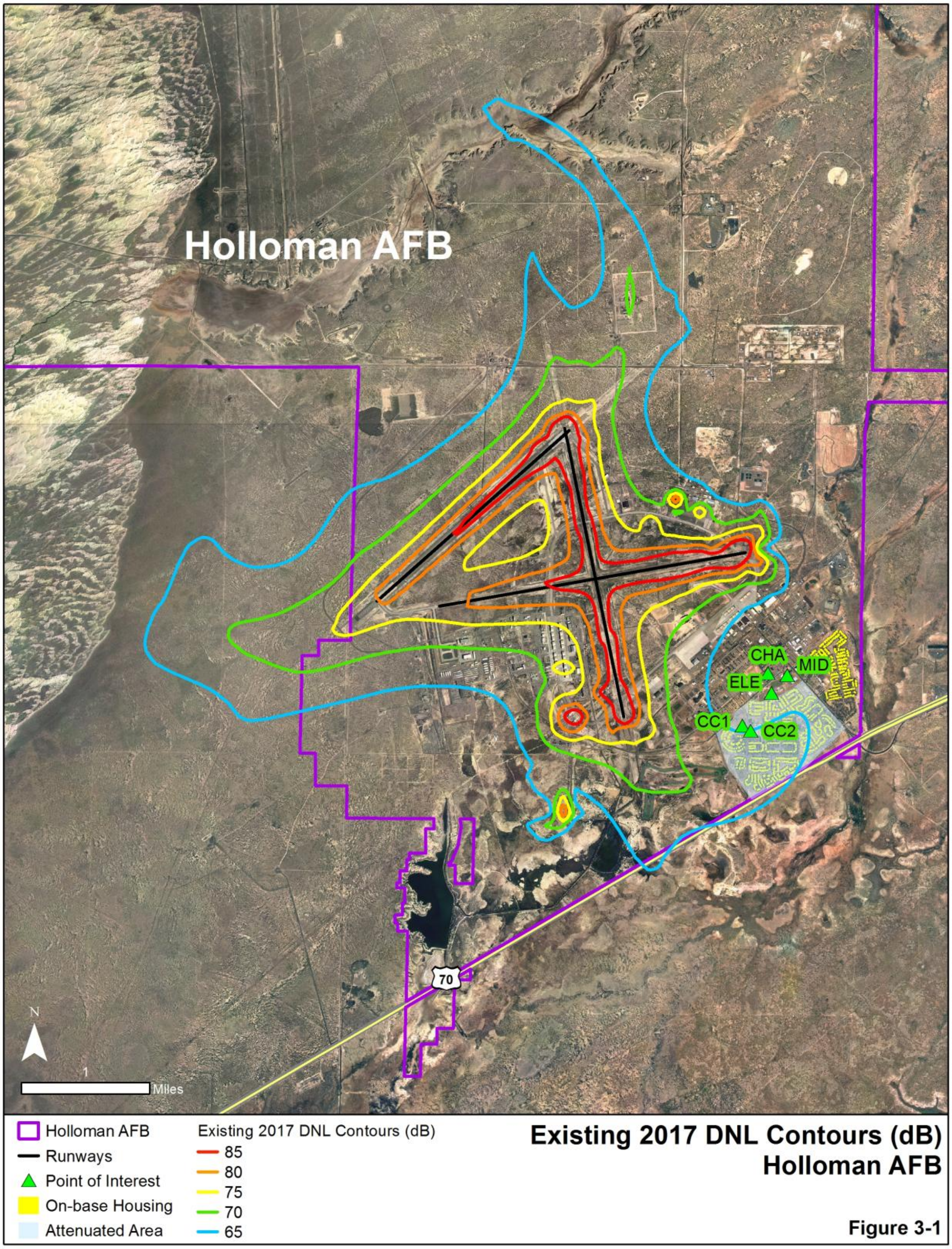


**Figure 27. Existing Condition (baseline) DNL Contours (dB) - Alternative 1**

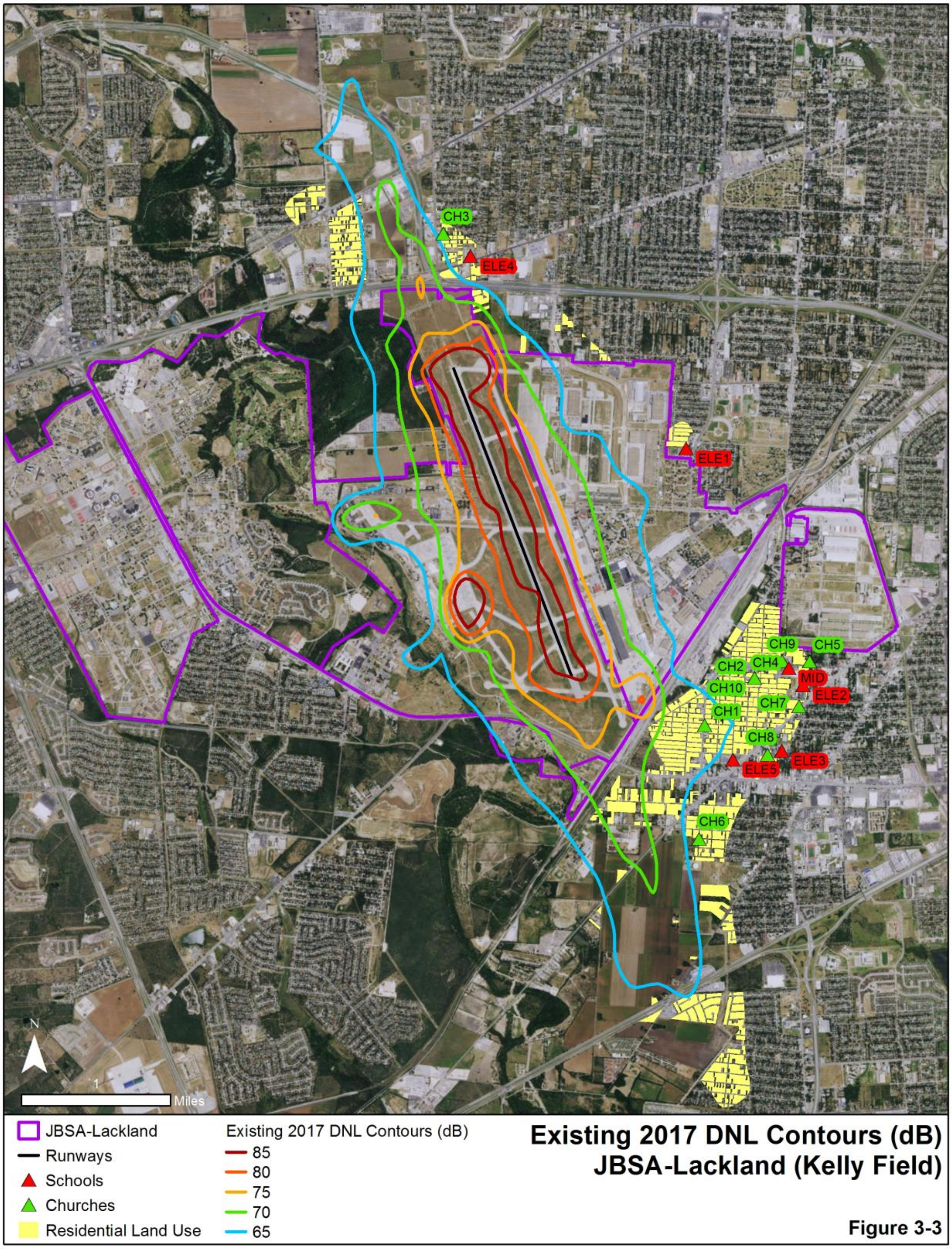


**Figure 28. Existing Condition (baseline) DNL Contours (dB) - Alternative 2**

## 1.9 Proposed Condition Noise Contours

DNL contours were also developed using the same modeling procedures described previously based on adding flight operations and engine maintenance runups from the additional two F-16 squadrons. Figures 29 and 30 show the Proposed Action condition DNL noise zone contours for Holloman AFB and JBSA-Lackland (Kelly Field), respectively. Figures 31 and 32 show a comparison of the Proposed Action condition DNL noise zone contours with the existing condition noise zone contours under Alternatives 1 and 2, respectively. Figure 33 shows the mitigated Alternative 2 with limited operations proposed at JBSA-Lackland (Kelly Field) and Figure 34 presents a comparison of the Limited Operations condition DNL noise zone contours with the existing condition noise zone contours.

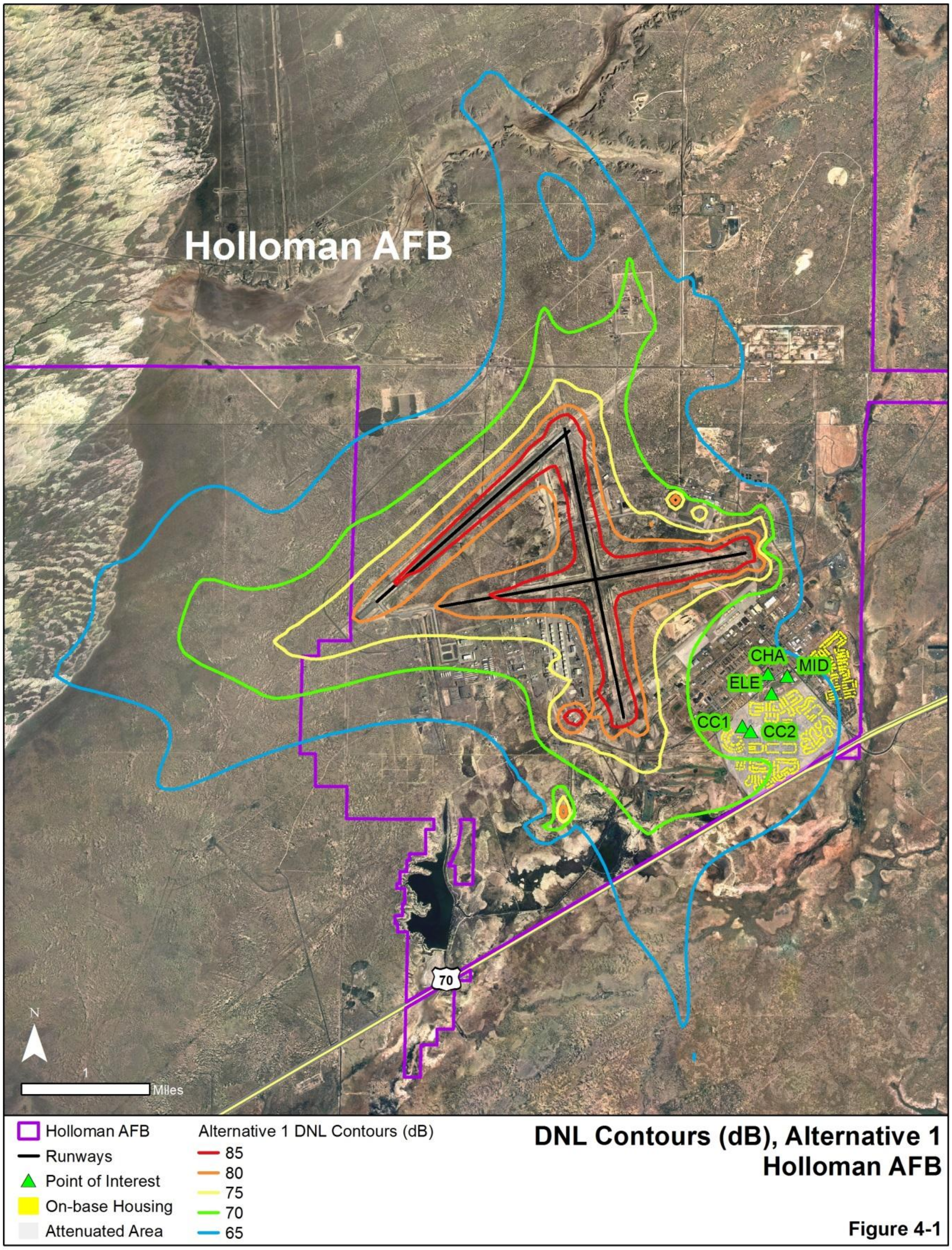


**Figure 29. Proposed DNL Contour (dB) - Alternative 1**

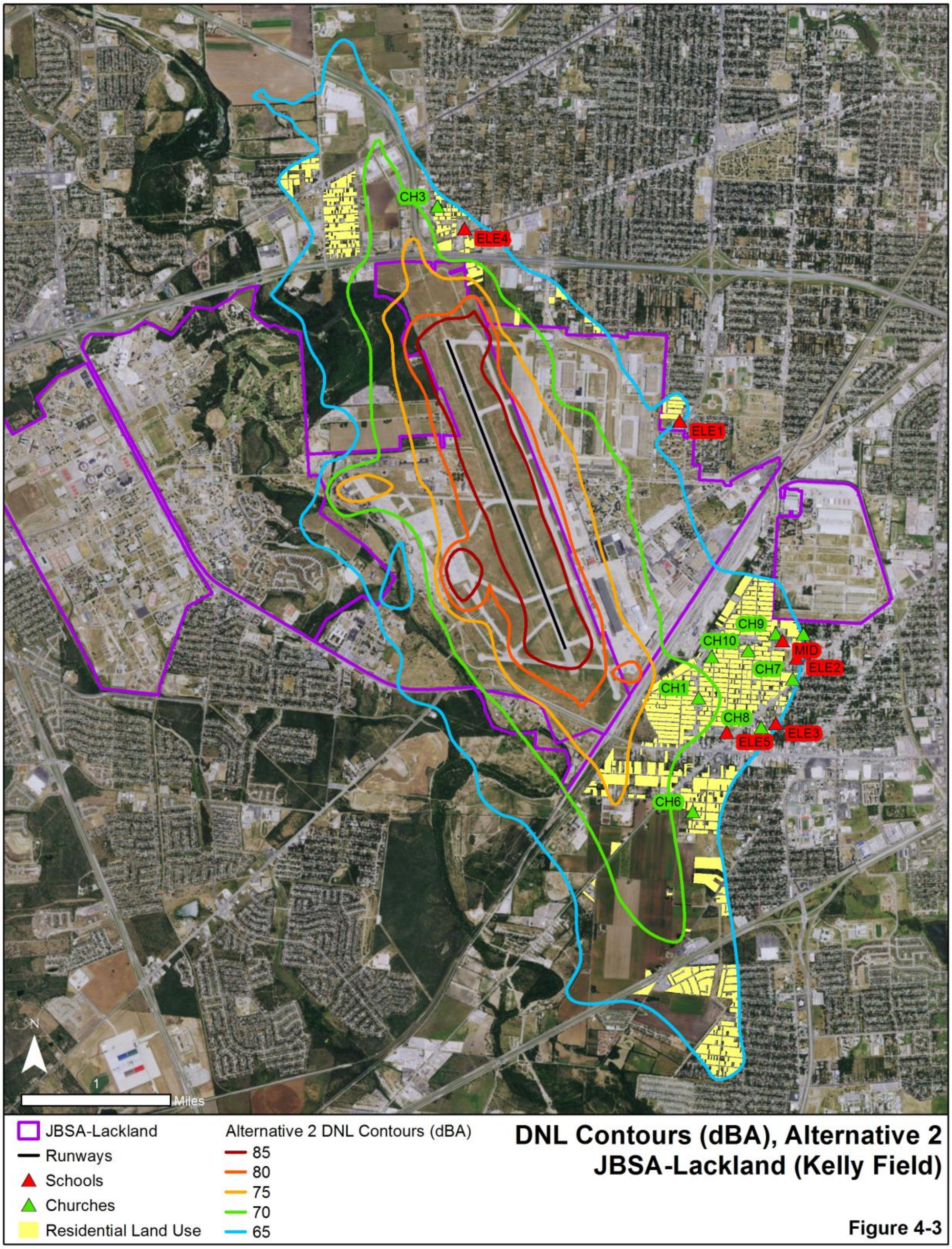


**Figure 30. Proposed DNL Contour (dB) - Alternative 2**

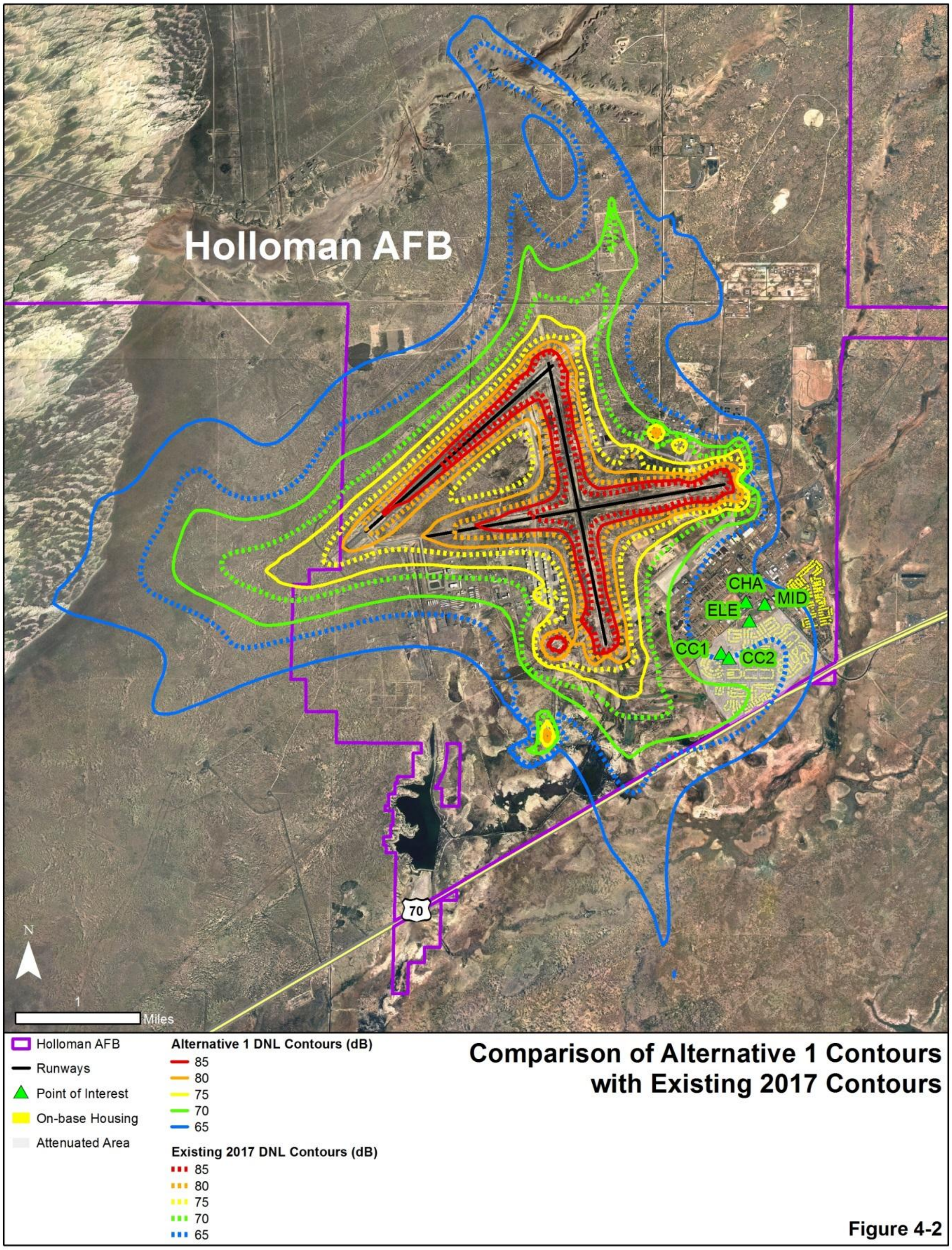


**Figure 31. Comparison of DNL Contours (dB) - Alternative 1**

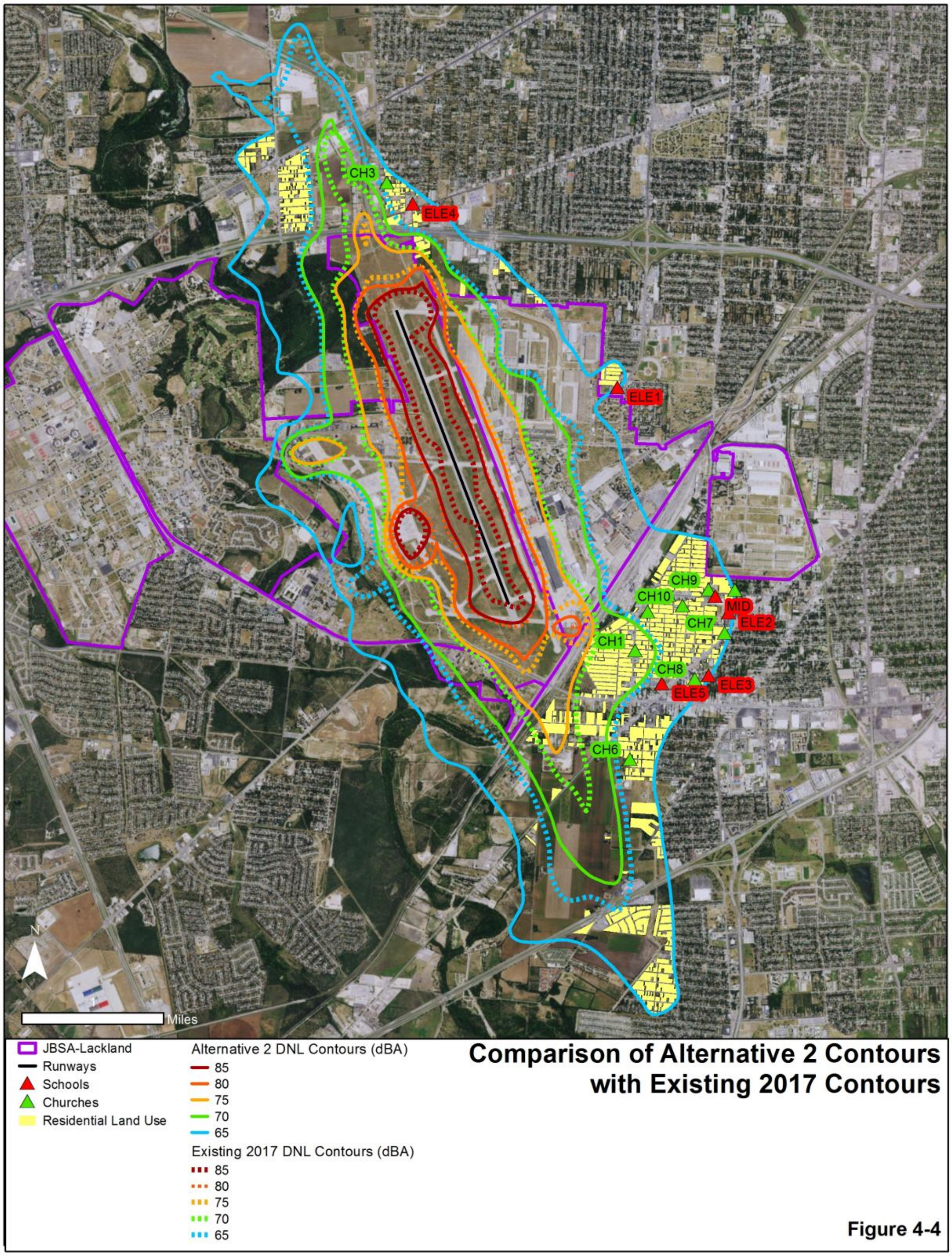


**Figure 32. Comparison of DNL Contours (dB) - Alternative 2**

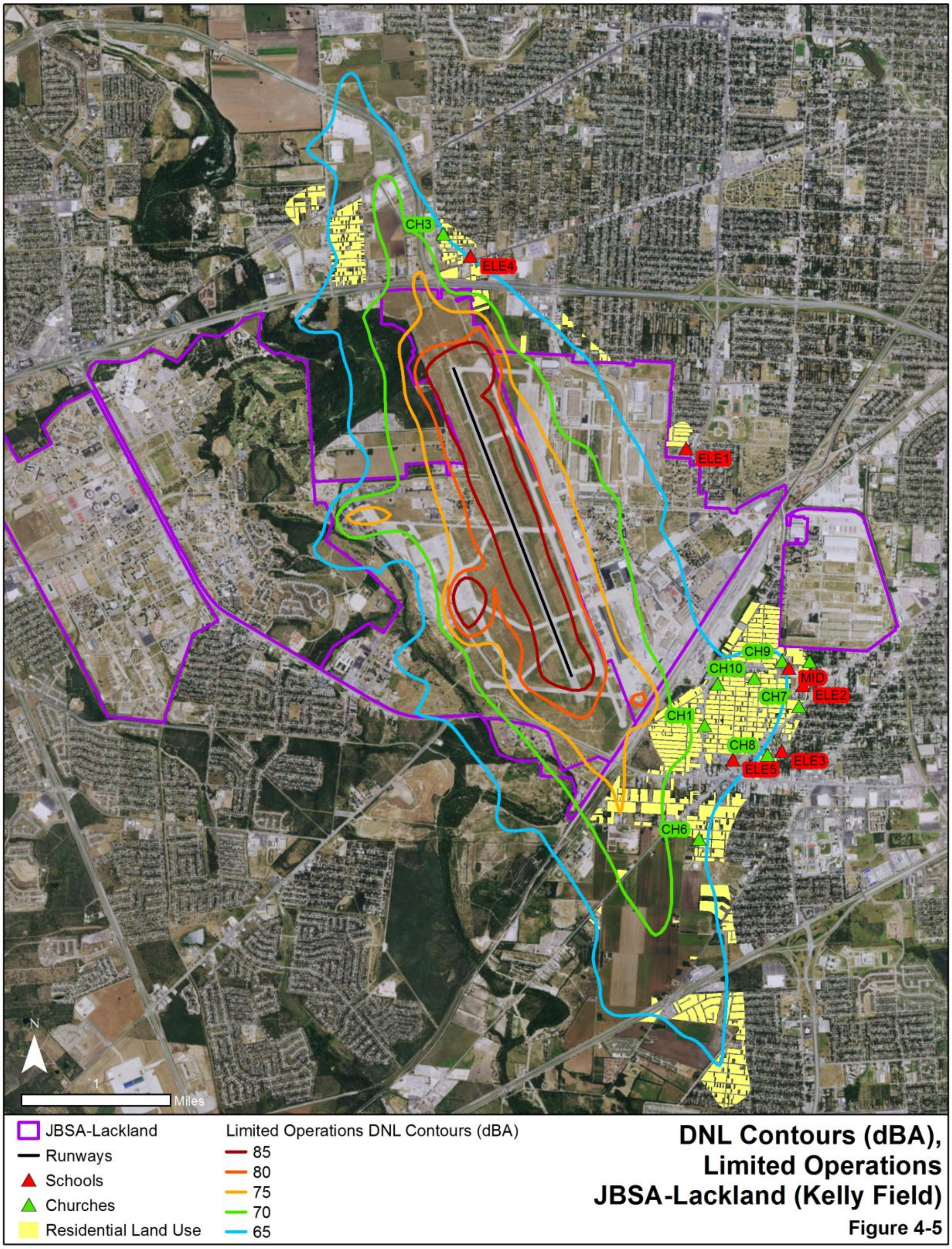


**Figure 33. Limited Operations DNL Contours (dB) – Mitigated Alternative 2**

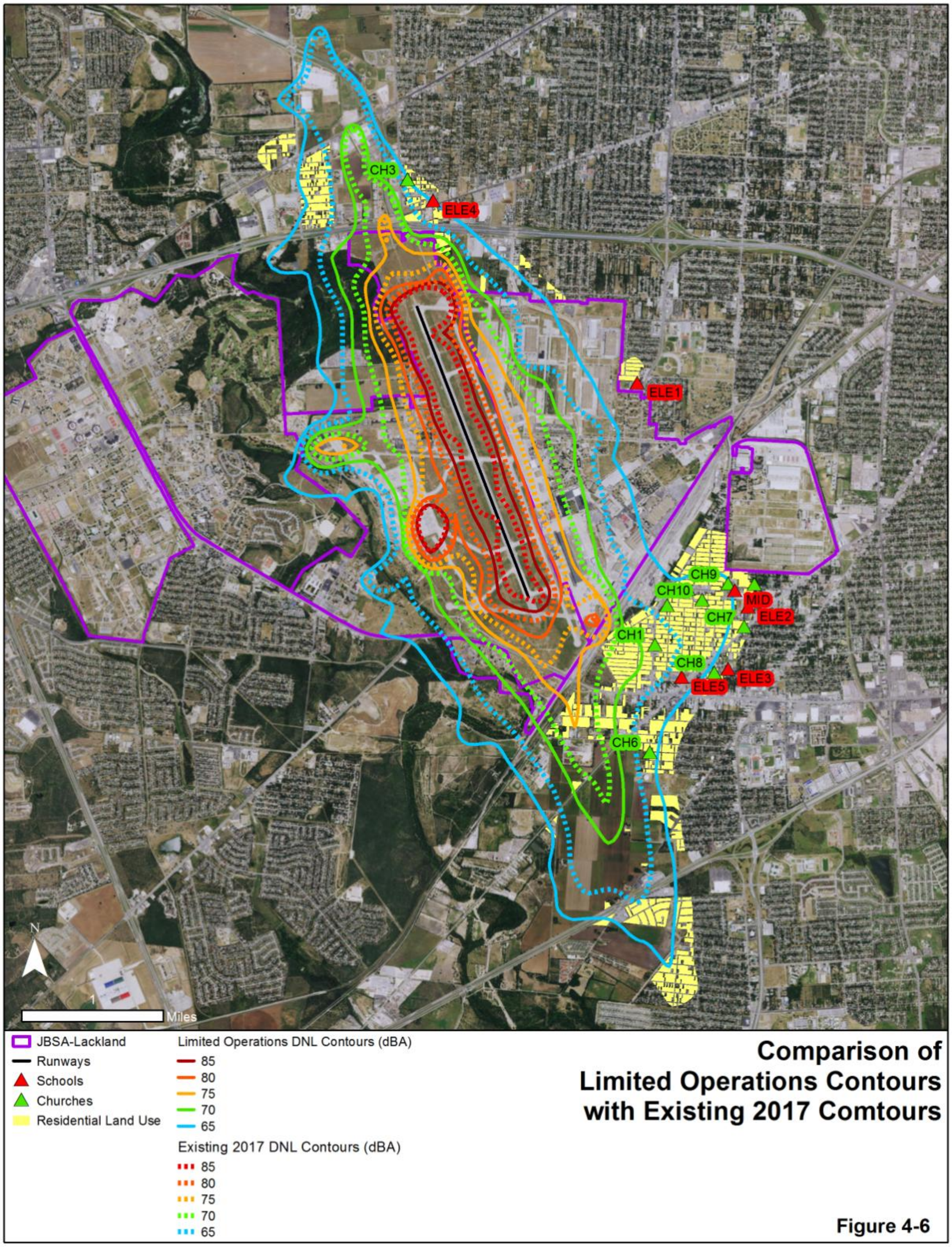


**Figure 34. Comparison of DNL Contours (dB) – Mitigated Alternative 2**