Aircraft Noise Study for the Basing of MV-22 at Marine Air Station Futenma and Operations at Marine Corps Facilities in Japan

Appendix C

AIRCRAFT NOISE STUDY FOR THE BASING OF MV-22 AT MARINE CORPS AIR STATION FUTENMA AND OPERATIONS AT MARINE CORPS FACILITIES IN JAPAN

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Acronyms & Abbreviations

ID	Definition
°F	degrees Fahrenheit
AAD	Annual Average Daily
AAM	Advanced Acoustic Model
AB	Air Base
AGL	Above Ground Level
AICUZ	Air Installations Compatible Use Zones
AOA	Angle of Attack
APZ	Accident Potential Zone
ATAR	Air Traffic Activity Report
ATC	Air Traffic Control
CAL	Confined Area Landing
CALA	Combat Aircraft Loading Area
CBP	Continuous Bomber Presence
CMC	Commandant of the Marine Corps
CNEL	Community Noise Equivalent Level
$CNEL_{mr}$	Onset-Rate Adjusted Monthly Community Noise Equivalent Level
CNO	Chief of Naval Operations
CTA	Central Training Area
CY	Calendar Year
CZ	Clear Zone
dB	Decibel
DNL	Day-Night Average Sound Level
DoD	Department of Defense
DoN	Department of the Navy
EPNL	Effective Perceived Noise Level
FAA	Federal Aviation Administration
FARP	Forward Arming and Refueling Point
FCLP	Field Carrier Landing Practice
FRF	Futenma Replacement Facility
FY	Fiscal Year
GCA	Ground Controlled Approach
GOJ	Government of Japan
H&HS	Headquarters & Headquarters Squadron
HLL	High Light Level
Hz	Hertz
ID	Identification
IFR	Instrument Flight Rules
in Hg	inches of mercury
in-lbs	inch pounds (torque)
ISTF	Ie Shima Training Facility
kts	Knots
L_{dnmr}	Onset-Rate Adjusted Monthly Day-Night Average Sound Level
$L_{eq(h)}$	Hourly Average Sound Level

ID	Definition
LHA	Landing Helicopter Amphibious
LLL	Low Light Level
L_{max}	Maximum Sound Level
LZ	Landing Zone
MALS	Marine Air Logistics Squadron
MAW	Marine Air Wing
MCAS	Marine Corps Air Station
MCB	Marine Corps Base
MMA	Multi-mission Maritime Aircraft
MOA	Military Operations Area
MR_NMAP	MOA Range Noise Model
MSL	Mean Sea Level
MTR	Military Training Route
NAPRA	Naval Air Pacific Repair Activity
NAV	Navigational Route
NC or %NC	Compressor RPM
NMAP	NOISEMAP
NTA	Northern Training Area
OSA	Operational Support Airlift
Pa	Pascal
PNL	Perceived Noise Level
PNLT	Tone-Corrected Perceived Noise Level
POI	Point of Interest
RH	Relative Humidity
RNM	Rotorcraft Noise Model
RPM	Revolutions Per Minute
SEL	Sound Exposure Level
SEL_r	Onset-rate Adjusted Sound Exposure Level
SID	Standard Instrument Departure
SUA	Special Use Airspace
T&G	Touch-and-Go
T&R	Training and Readiness
TERF	Terrain Flight
U.S.	United States
USMC	United States Marine Corps
VFR	Visual Flight Rules
VIP	Very Important Person
VTOL	Vertical Take-Off / Landing
WECPNL	Weighted Effective Continuous Perceived Noise Level

Executive Summary

The primary purpose of this study is to assess noise exposure in support of the associated Environmental Review of the introduction of two squadrons of MV-22 Osprey tilt-rotor aircraft to Marine Corps Air Station (MCAS) Futenma. The facilities included in this study are MCAS Futenma, Ie Shima (Ie Jima) Training Facility (ISTF), and the use of associated airspace. The latter is comprised of the Central Training Area (CTA) and the Northern Training Area (NTA) (also referred to as Jungle Warfare Training Center) associated with the island of Okinawa and Navigation (NAV) routes primarily on mainland Japan.

The Baseline and Proposed scenarios for MCAS Futenma, ISTF and the associated airspace represent operations during Calendar Year 2010 (CY2010) and Fiscal Year 2012 (FY2012), respectively. The Proposed scenario projects the basing of 24 MV-22 Osprey aircraft at MCAS Futenma beginning in late FY2012 to replace the CH-46 Sea Knight helicopters on a one-for-one basis. Although the MV-22 would utilize other facilities such as MCAS Iwakuni, Kadena Air Base and Camp Fuji, these facilities are not included in this study because the noise exposure contribution of the MV-22 to the overall noise environment is assessed to be negligible compared to other aircraft currently operating at these facilities.

This study was conducted according to established Department of Defense (DoD) guidelines and best practices. The noise analysis leveraged the DoD NOISEMAP suite of computer-based modeling tools (including the Rotorcraft Noise Model (RNM)) to determine airfield noise exposure in terms of the U.S.-based Community Noise Equivalent Level (CNEL) metric[1] and the Government of Japan's Weighted Effective Continuous Perceived Noise Level (WECPNL) metric. Airspace noise exposure was assessed using a combination of the DoD Military Operating Area Range Noise Model (MR_NMAP) and RNM. No MV-22 aircraft were flown in Okinawa to conduct this noise study as that is the standard for DoD noise studies and is consistent with the MV-22 West Coast Homebasing EIS and the Hawaii EIS analysis.

For MCAS Futenma, the Baseline scenario consists of approximately 23,400 annual flight operations of which nearly half is generated by the CH-46 rotary-wing aircraft. For the Proposed scenario, the MV-22 is anticipated to perform approximately 7,000 annual flight operations or approximately one-third of the total airfield operations. The noise analysis shows the introduction of the MV-22 (and retirement of the CH-46) operations would generally result in a decrease of up to 1 decibel (dB) in CNEL exposure relative to Baseline levels. The legacy FA-18 Hornet aircraft dominates the CNEL/WECPNL exposure environment at MCAS Futenma despite comprising less than 10 percent of operations because it is 10 to 15 dB greater in (instantaneous) maximum sound level (L_{max}) than the other aircraft on a single event basis.

In addition, CNEL and WECPNL were computed for 17 representative Points of Interest (POI) in the vicinity of MCAS Futenma, consisting of public schools and hospitals. Four POI would experience a decrease in CNEL and/or WECPNL of 1 to 2 dB relative to Baseline levels due to the MV-22 being quieter while flying in airplane mode than the CH-46 and fewer MV-22 flight operations relative to the CH-46. The WECPNL at Futenma High School, Ginowan High School, Toyama Elementary School, and Urasoe General Hospital would increase by up to 2 dB because of (introduced) MV-22 overhead break arrivals and a tonal component of those operations affecting the WECPNL but not the A-weighted CNEL.

[1] CNEL is the standard cumulative noise metric used by the State of California and accepted by DoD to define long-term noise exposure from aircraft operations and was chosen as most comparable to WECPNL due to the same temporal periods.

For ISTF, the Baseline scenario consists of approximately 6,200 annual flight operations of which nearly half is performed by the CH-46 rotary-wing aircraft. The Proposed scenario projects that the MV-22 would conduct approximately 6,800 annual flight operations, or approximately 65 percent of the total flight operations at the outlying field. The noise analysis conducted in this study reveals that the introduction of the MV-22 (and retirement of the CH-46) operations would result in no significant change in CNEL exposure relative to Baseline levels at the ISTF. This is primarily because the noise exposure at ISTF is dominated by the AV-8 aircraft which is considerably greater in terms of L_{max} than the other aircraft operating at ISTF, including the MV-22.

There are 4,400 annual baseline Confined Area Landing (CAL) sorties for the CTA and NTA combined, 55 percent of which are generated by the CH-46 aircraft. The MV-22 is anticipated to conduct approximately 1,400 annual CAL sorties in the CTA and NTA combined. It was not practical to analyze every single Landing Zone (LZ) that MV-22 might utilize so a group of 10 LZs expected to receive the most use by the MV-22 were selected for this analysis. This means the analysis overestimates the noise exposure at the selected ten LZs. The analysis reveals noise exposure in terms of $CNEL_{mr}$ would generally increase no more than 1 dB at or near the modeled LZs relative to Baseline levels due to the introduction of the MV-22 (and retirement of the CH-46). Note that LZ Swan was not modeled for Baseline because existing usage is considered rare. The 65 dB $CNEL_{mr}$ contours would extend beyond U.S. areas and facilities at 5 of the 14 modeled CTA LZs and 1 of the 10 modeled NTA LZs which seem to be adjacent to rural (civilian) or unpopulated land. LZ 13, LZ14, and LZ Baseball are located within close proximity to each other and as a result the 65 dB $CNEL_{mr}$ contours combine to surround all three LZs. The 65 dB $CNEL_{mr}$ contour would extend beyond the bounds of LZ Swallow in the CTA but LZ Swallow is adjacent to Camp Hansen. LZs not modeled in this analysis would experience noise exposure less than the modeled LZs because fewer operations would be conducted at them.

A primarily qualitative analysis was performed for the four NAV routes proposed for use by the MV-22. The most common existing users of the NAV routes are jet fighter/attack aircraft such as the AV-8B and FA-18 and with only approximately 200 annual NAV sorties proposed by the MV-22, it was concluded that the MV-22 would cause a negligible increase in the existing noise exposure along the four considered routes.

SECTION 1

Introduction and Background

The primary purpose of this study is to determine the noise exposure due to the introduction of two squadrons of MV-22 Osprey tilt-rotor aircraft to Marine Corps Air Station (MCAS) Futenma in support of the associated Environmental Review. As shown in Figure 1-1, the island of Okinawa, Japan lies approximately 500 miles east of the coast of China and approximately 300 miles southeast from "mainland" Japan. West of Okinawa is the East China Sea. East of Okinawa is the Philippine Sea and the Pacific Ocean.

Identified in Figure 1-1, the facilities included in this study are MCAS Futenma, Ie Shima (Ie Jima) Training Facility (ISTF), the Central Training Area (CTA) and the Northern Training Area (NTA) (also referred to as Jungle Warfare Training Center). MCAS Futenma is located in the southwestern part of the island five miles south of Kadena Air Base and seven miles northwest of the Japanese civilian airport/city of Naha. ISTF supports aircraft based at MCAS Futenma and is located approximately 30 miles north of MCAS Futenma. ISTF is primarily utilized for Field Carrier Landing Practice (FCLP) operations. Aircraft based at MCAS Futenma also conduct a large portion of training exercises in the CTA and the NTA located 20 and 40 miles northeast of MCAS Futenma, respectively.

The Baseline and Proposed scenarios for MCAS Futenma, ISTF and the associated airspace represent operations during Calendar Year 2010 (CY2010) (represented by a 3 year average of CY2008 through CY2010) and FY2012, respectively.

The Proposed action consists of the basing of 24 MV-22 Osprey aircraft based at MCAS Futenma beginning in late FY2012 to replace the CH-46 Sea Knight aircraft on a one-for-one basis. During this time, the MV-22 would utilize appropriate training areas including ISTF, the CTA, and the NTA along with Navigation (NAV) routes on mainland Japan.

Although the MV-22 would utilize other facilities such as MCAS Iwakuni, Kadena Air Base and Camp Fuji, these facilities are not included in the noise study because the MV-22's contribution to the overall noise environment would be negligible compared to other aircraft currently operating at these facilities.

This report is organized into five sections, followed by two appendices. Section 2 provides an overview of the noise metrics and the technical tools used to conduct this analysis in addition to the analysis methodology and background data. Sections 3 and 4 present the results for MCAS Futenma and ISTF, respectively. Section 5 presents the results for the associated airspace. Appendix A provides detailed tabular and graphic modeling data and Appendix B presents the representative flight profiles for all modeled aircraft.

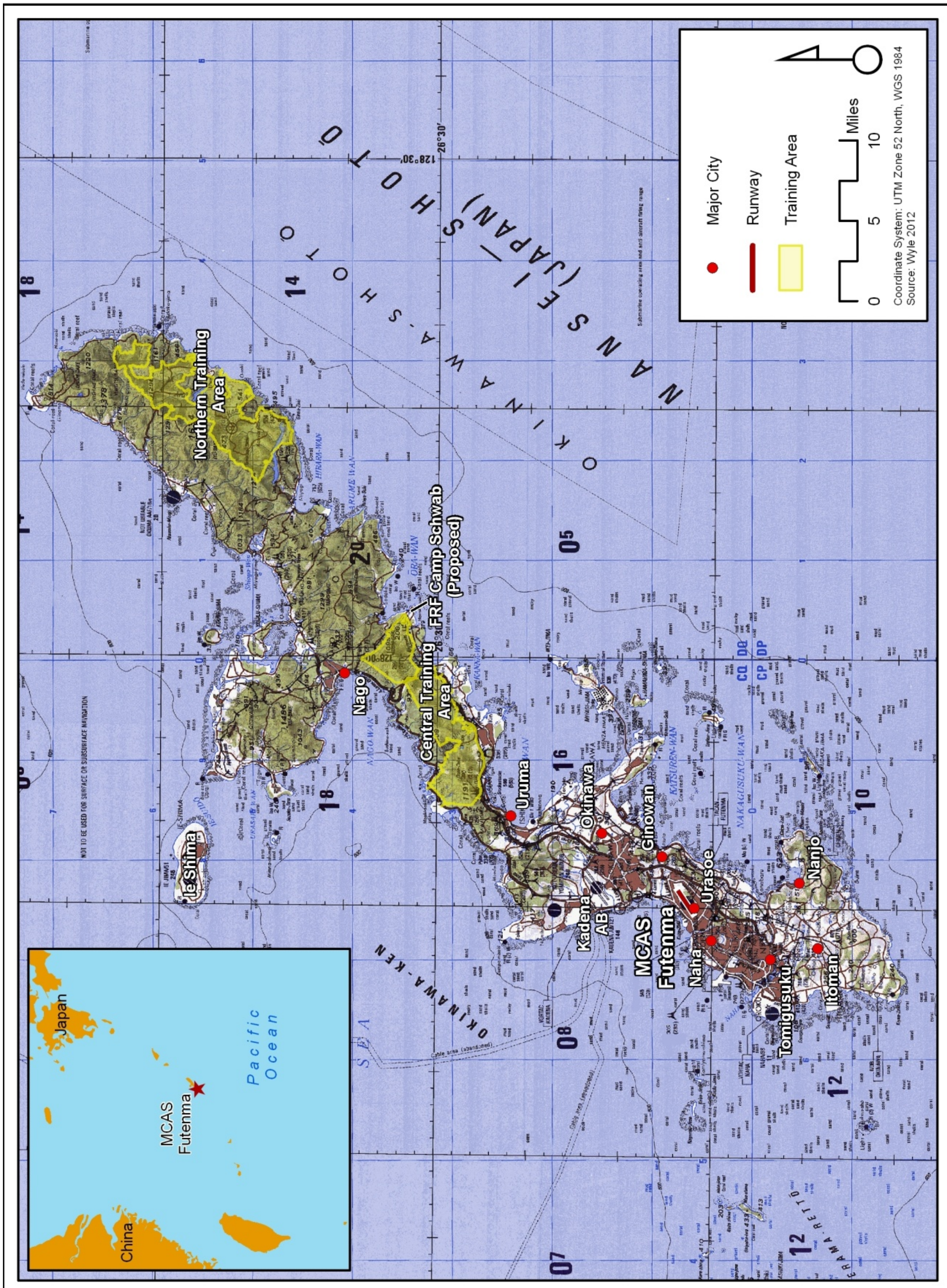

Figure 1-1 Regional Setting for MCAS Futenma

SECTION 2

Study Methodology and Data Collection

This section provides an overview of the methodology, noise metrics, analysis tools and geospatial capabilities that were used in the performance of the study.

This study utilizes tested methodologies, approved regulatory modeling tools, and a strong quality assurance process. Figure 2-1 below provides an overview of the major phases of the study and their associated quality control and program performance steps.

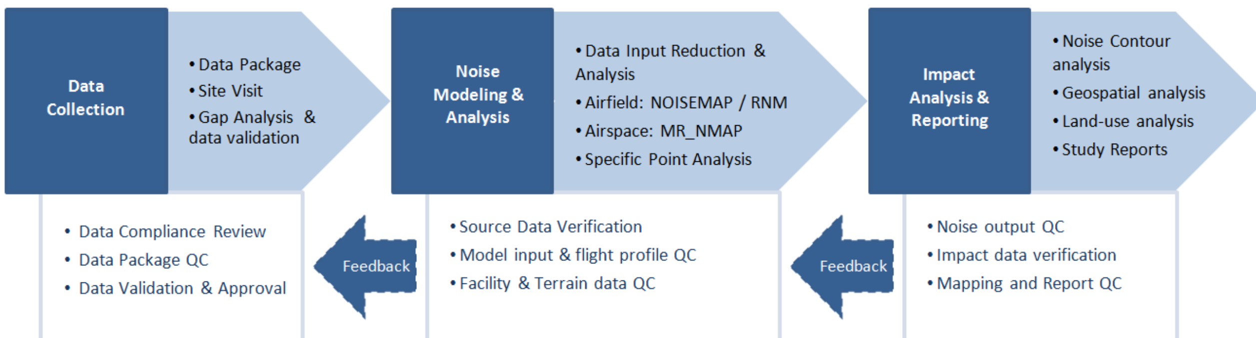

Figure 2-1 Major Phases of the Noise Study

2.1 Data Collection

In April of 2010, the data collection phase began and an initial data collection package in electronic format was supplied to MCAS Futenma personnel (Kester 2010a). The package included requested airfield information (e.g., weather data, geographic coordinates of navigational aids, runways, etc.), points of interest and noise-sensitive receptors, numbers of flight operations (including aircraft distribution), flight tracks, runway and flight track utilization, run-up operations, and flight tracks. The data package was to outline the data requirements and to aid in the data collection during the upcoming site visit.

A site visit to MCAS Futenma was conducted on the week of May 2 through May 8, 2010 to collect the information detailed above and to collect squadron-specific data such as flight profiles. NAVFAC conducted a site visit in October 2010 to Okinawa to discuss the MV-22 operations with USMC personnel. Several follow-up data validation packages were provided to MCAS Futenma and USMC personnel for review and validation (Kester 2010b). Ongoing communication through electronic mail and telephone conferences provided additional refinement of the data culminating with the final data validation occurring in February of 2012 (Hernandez 2012a).

2.2 Noise Modeling

Section 2.2.1 addresses U.S. airfield and airspace noise metrics while Section 2.2.2 describes the Government of Japan (GOJ) airfield noise metrics. Sections 2.2.3 and 2.2.4 describe U.S. Noise Zones and the noise models utilized for the analysis, respectively.

2.2.1 U.S. Noise Metrics

The Federal Interagency Committee on Aviation Noise[2] (FICAN) uses three types of metrics to describe noise exposure:

1) A measure of the highest sound level occurring during an individual aircraft overflight,
2) A combination of the maximum level of that single event with its duration; and
3) A description of the cumulative noise environment based on all noise events over a period of time.

The DoD and other FICAN members use Maximum Sound Level (L_{max}), Sound Exposure Level (SEL) and Community Noise Equivalent Level (CNEL)[3] for the aforementioned three types, respectively. Note that SEL is associated with flight events. L_{max} is associated with flight and run-up events. The U.S. metrics in this study are presented in terms of A-weighted decibels (dB), which approximates the response and sensitivity of the human ear.

2.2.1.1 Sound Exposure Level (SEL) and Maximum Sound Level (L_{max})

During an aircraft overflight, the noise level starts at the ambient or background noise level, rises to the maximum level as the aircraft flies closest to the observer, and returns to the background level as the aircraft recedes into the distance. The variation in sound level with time is shown by the solid red line in Figure 2-2. The Maximum Sound Level, L_{max}, is the instantaneous maximum sound level measured/heard during the event. The L_{max} is important in judging the interference caused by a noise event with conversation, TV or radio listening, sleep, or other common activities. Although it provides some measure of the intrusiveness of the event, it does not completely describe the total event, because it does not include the period of time that the sound is heard.

The Sound Exposure Level, SEL, is a composite metric that represents all of the sound energy of the event and includes both the intensity of a sound and its duration. The SEL metric is the best metric to compare noise levels from overflights of different aircraft types. For sound from military aircraft overflights, the SEL is usually 5 to 10 dBA greater than the L_{max}. For example, the L_{max} of the sample event in Figure 2-2 is 93.5 dBA whereas the SEL is 102.7 dBA.

[2] DoD is a member of FICAN
[3] In the State of California.

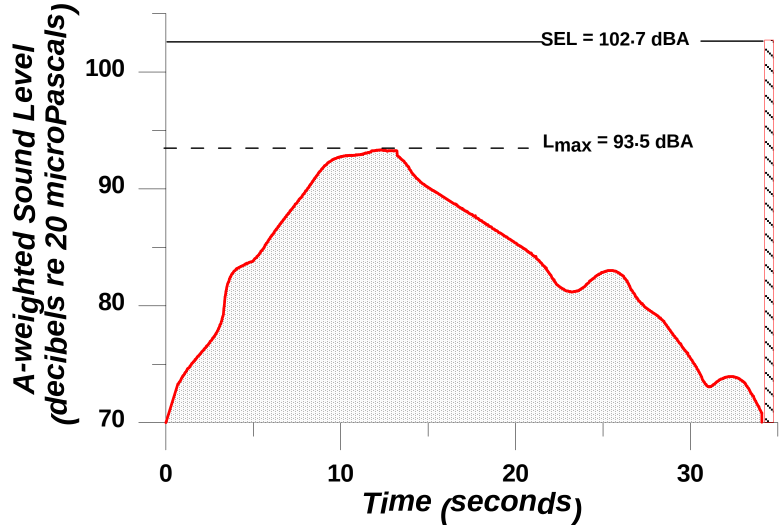

Figure 2-2 Example of Maximum Sound Level and Sound Exposure Level from an Individual Event

2.2.1.2 Community Noise Equivalent Level (CNEL)

The noise measure used for assessing aircraft noise exposures in communities in the vicinity of California airfields/airports is the CNEL, in units of the dB (State of California, 1990). It is the daily or 24-hour A-weighted Equivalent Sound Level ($L_{eq(24h)}$) with sounds occurring during the evening period penalized by 5 dB and sounds occurring the nighttime period penalized by 10 dB. Evening is defined as the hours between 7 p.m. to 10 p.m. (0700-1900). Nighttime is defined as the hours between 10 p.m. and 7 a.m. (2200-0700). Events during the evening period are penalized by approximately 5 dB while events during the nighttime period are penalized by 10 dB. $L_{eq(24h)}$ is the continuous sound level that would be present if all of the variations in sound level that occur over a 24-hour period were smoothed out so as to contain the same total sound energy.

Like SEL, CNEL does not represent the sound level heard at any particular time, but represents the total sound energy received. While it is normalized as an average, it represents all of the sound energy, and is therefore a cumulative measure. The penalties of the CNEL metric accounts for the added intrusiveness of sounds during evening and nighttime hours, when people are typically enjoying home recreation (i.e., television viewing), conversation and sleep. The penalties also account for people's increased sensitivity to noise during those periods and for ambient sound levels being between 5 and 10 dB lower than during daytime hours.

Because it is an energy-based quantity, CNEL tends to be dominated by the noisier events. As a simple example, consider a case in which only one daytime aircraft overflight occurs over a 24-hour period, creating a sound level of 100 dB for 30 seconds. During the remaining 23 hours, 59 minutes and 30 seconds of the day, the ambient sound level is 50 dB. The resultant CNEL would be 66 dB. Comparatively, consider a second example that 10 such 30-second overflights occur during daytime hours instead, with the same ambient sound level of 50 dB during the remaining 23 hours and 55 minutes. The resultant CNEL would be 75 dB. Clearly, the logarithmic averaging of noise over a 24-hour period does not ignore the louder single events and tends to emphasize both the sound levels and the number of those events.

Figure 2-3 graphically describes CNEL using notional Equivalent (energy average) Sound Levels ($L_{eq(h)}$) for each hour of the day as an example. Note the $L_{eq(h)}$ for the hours between 7 p.m. and 10 p.m. have a 5 dB penalty assigned and the hours between 10 p.m. and 7 a.m. have a 10 dB penalty assigned. The CNEL for the example noise distribution shown in Figure 2-3 is 66 dB.

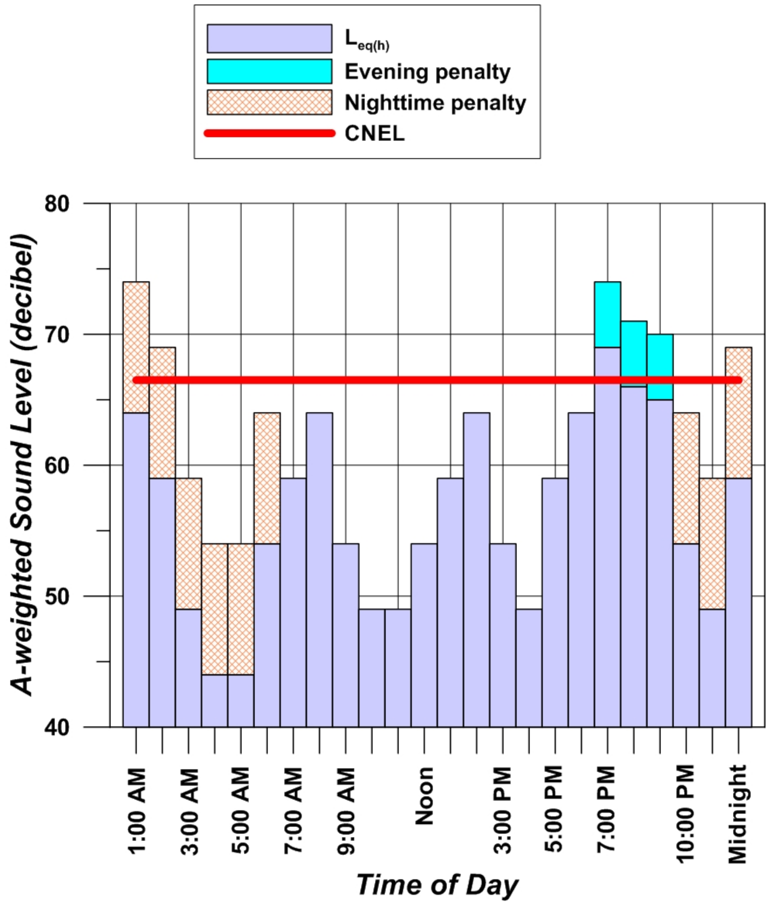

Figure 2-3 Example of Community Noise Equivalent Level Computed from Hourly Average Sound Levels

2.2.1.3 Onset-Rate Adjusted Monthly Day-Night Average Sound Level (L_{dnmr}) and Onset-Rate Adjusted Monthly Community Noise Equivalent Level ($CNEL_{mr}$)

Military aircraft utilizing Special Use Airspace (SUA) such as Military Training Routes (MTRs), Military Operations Areas (MOAs) and Restricted Areas/Ranges generate a noise environment that is somewhat different from that associated with airfield operations. As opposed to patterned or continuous noise environments associated with airfields, flight activity in SUAs is highly sporadic and often seasonal ranging from ten per hour to less than one per week. Individual military overflight events also differ from typical community noise events in that noise from a low-altitude, high-airspeed flyover can have a rather sudden onset, exhibiting a rate of increase in sound level (onset rate) of up to 150 dB per second.

To represent these differences, the conventional SEL metric is adjusted to account for the "surprise" effect of the sudden onset of aircraft noise events on humans with an adjustment ranging up to 11 dB above the normal SEL (Stusnick, et al, 1992). Onset rates between 15 to 150 dB per second require an adjustment of 0 to 11 dB, while onset rates below 15 dB per second require no adjustment. The adjusted SEL is designated as the Onset-Rate Adjusted Sound Exposure Level (SEL_r).

Because of the sporadic characteristic of SUA activity and so as not to dilute the resultant noise exposure, the month with the most operations or sorties from a yearly tabulation for the given SUA is examined -- the so-called busiest month. The cumulative exposure to noise in these areas is computed by the Day-Night Average Sound Level (DNL)[4] over the busy month, but using SEL_r instead of SEL. This monthly average is denoted L_{dnmr}. If onset rate adjusted DNL is computed over a period other than a month, it would be designated L_{dnmr} and the period must be specified. In the state of California, a variant of the L_{dnmr} includes a penalty for evening operations (7 p.m. to 10 p.m.) and is denoted $CNEL_{mr}$.

2.2.2 GOJ Noise Metrics

The GOJ uses Tone-Corrected Perceived Noise Level (PNLT), Effective Perceived Noise Level (EPNL), and Weighted Effective Continuous Perceived Noise Level (WECPNL). EPNL is associated with flight events. PNLT is associated with flight and run-up events.

2.2.2.1 Perceived Noise Level (PNL)

Prior to the advent of DNL and attempts to correlate it (or other daily metrics) with community annoyance from aircraft noise, it was common to account for annoyance within the single event noise metric. Developed by Kryter (Kryter, 1959) specifically for fixed-wing jet aircraft flyover noise, Perceived Noise Level (PNL) is such a single-event metric. PNL accounts for annoyance by examining the spectral complexity of the noise.

The two basic sound characteristics are sound intensity and sound frequency. The relationship between a sound's intensity and frequency is its spectrum – a "frequency profile". To calculate PNL from an aircraft event, the event's spectrum is sampled twice per second. Each sample's frequency profile is split into frequency bands and the sound pressure level of each band is rated on its level of annoyance. The overall annoyance rating is calculated and related back to an overall sound level for the sample – the PNL.

Next, to calculate the PNLT, each frequency band (of each sample) is examined to detect, via a complex tone-correction procedure (Edge and Cawthorn, 1976), any band whose level exceeds the levels of adjacent bands. The tone-correction can be from 0 dB to 6.7 dB. The decibel units of PNL are expressed as PNdB.

2.2.2.2 Effective Perceived Noise Level (EPNL)

The EPNL is the sum of the maximum PNLT and a duration correction. The duration correction is a function of the maximum PNLT and the effective duration of the event. The effective duration is the shortest of the time (a) during which the PNLT remains within 10 PNdB of the maximum PNLT, or (b) during which the PNLT remains greater than 90 PNdB.

2.2.2.3 Weighted Effective Continuous Perceived Noise Level (WECPNL)

Weighted Effective Continuous Perceived Noise Level (WECPNL) is a 24-hour cumulative rating scheme which is based on Effective Perceived Noise Level (EPNL) for flight events and Tone-corrected Perceived Noise Level (PNLT) for run-up events. The adjustments incorporated into this measure account for some of the variables associated with aircraft noise, such as discrete tonal frequencies, as well as time of day. Sounds occurring during the evening period are penalized by 5 dB and sounds occurring the nighttime period penalized by 10 dB. Identical to CNEL, evening is defined as the hours between 7 p.m. to 10 p.m. Nighttime is defined as the hours between 10 p.m. and 7 a.m. These 5 and 10 dB "penalties" represent the

[4] DNL is a composite metric similar to CNEL but has only 2 temporal periods: daytime (7a.m. to 10 p.m.; 0700-2200) and nighttime (10 p.m. to 7 a.m.); 2200-0700). Events during the nighttime period are penalized by 10 dB.

added intrusiveness of sounds which occur during the evening and nighttime, both because of the increased sensitivity to noise during those hours and because ambient sound levels during evening and nighttime are typically about 5 dB and 10 dB, respectively, lower than during daytime hours.

WECPNL, like CNEL, provides a single measure of overall noise impact, but does not provide specific information on the number of noise events or the individual sound levels that occur during the day. For example, a WECPNL of 90 PNdB could result from a very few noisy events, or a large number of quieter events.

65 dB CNEL is analogous to 80 PNdB WECPNL in terms of land use compatibility.

2.2.3 Noise Zones

Community response to aircraft noise has long been a concern in the vicinity of airfields. In an effort to manage airport and community growth, noise has been considered a key factor in land-use planning in the U.S. and other countries abroad. Noise exposure zones are divided into three categories, as follows:

- Noise Zone I: Defined as an area of minimal impact, refers to A-weighted CNEL values less than 65 dB. This is also an area where social surveys show less than 15 percent of the population likely to be highly annoyed.
- Noise Zone II: Defined as an area of moderate impact, refers to A-weighted CNEL values from 65 dB up to, but not including 75 dB. This is the area where social surveys show between 15 percent and 39 percent of the population is likely to be highly annoyed and an area of moderate impact where some land use controls are needed.
- Noise Zone III: Defined as an area of most severe impact, refers to A-weighted CNEL values of 75 dB and greater. This is the area where social surveys show greater than 39 percent of the population likely to be highly annoyed and requires the greatest degree of compatible use controls.

In addition to the noise zones, areas of concern may be defined where noise levels are not normally considered to be objectionable (less than 65 dB CNEL), but land use controls are recommended in that particular area (DoN 2008).

2.2.4 Noise Models

This section describes the analysis tools used to calculate the noise levels in this report: the NOISEMAP and MR_NMAP suites of computer programs.

Analyses of aircraft noise exposure and compatible land uses around DoD airfield-like facilities are normally accomplished using a group of computer-based programs, collectively called NOISEMAP (Czech and Plotkin 1998; Wasmer and Maunsell 2006a; Czech 2008; Wasmer and Maunsell 2006b; Page, et al, 2008). The core computational programs of the NOISEMAP suite are NMAP and the Rotorcraft Noise Model (RNM). In this report, NMAP Version 7.2[5] and RNM Version 7.2.4 were used to analyze fixed- and rotary-wing aircraft/operations, respectively.

The NOISEMAP suite of computer programs includes BaseOps, OMEGA10, OMEGA11, NOISEMAP, RNM and NMPlot. The suite also includes the NOISEFILE and NCFiles databases. The BaseOps program allows entry of runway coordinates, airfield information, flight tracks, flight profiles along each flight track for each aircraft, numbers of daily flight operations, run-up coordinates, run-up profiles, and run-up operations. At this stage, closed-pattern operations, which are counted by Air Traffic Control

[5] Corrected to properly compute WECPNL.

(ATC) as two operations (one departure and one arrival), are entered in the program as one noise event (one departure followed by one arrival with the aircraft remaining in the vicinity of the airfield). The OMEGA10 program then calculates the SEL 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. The OMEGA11 program calculates maximum A-weighted sound levels from the NOISEFILE database for each model of aircraft taking into consideration the engine thrust settings and environmental conditions appropriate to run-up operations. In this report, NOISEMAP Version 7.2 was used to analyze fixed-wing aircraft/operations and those of the UH-1.

RNM is a computer program developed by Wyle Laboratories, Inc. for the National Aeronautics and Space Administration (NASA)-Langley Research Center (LaRC). RNM, as part of LaRC's Tilt Rotor Aeroacoustic Code (TRAC) suite of computer programs, is aimed at the prediction of far-field sound levels from tilt rotor aircraft and helicopters. DoD has adopted RNM for the environmental impact assessment of rotorcraft noise.

RNM simulates vehicle flight in a time-based manner along a prescribed flight track and the sound is analytically propagated through the atmosphere to specified receiver locations. RNM accounts for spherical spreading, atmospheric absorption, ground reflection and attenuation, Doppler shifts, the difference in phase between direct and reflected rays, varying terrain and ground impedance between the vehicle and the receiver. Although not utilized for this study, RNM has the ability to account for horizontally stratified atmospheres with winds and curved ray paths. RNM's acoustic algorithms are more robust than NOISEMAP's algorithms, partially due to RNM's more detailed noise database (NCFiles) of one-third octave band sound hemispheres for each vehicle in its inventory. In addition to altitude and speed, RNM accounts for roll, angle of attack (similar to pitch), yaw, and nacelle angles, if applicable, along each flight track for each aircraft. In this report, RNM Version 7 was used to analyze most rotary-wing aircraft/operations.

Each of the noise computation programs can incorporate the number of day, evening, and night operations, flight paths, and profiles of the aircraft to calculate CNEL and WECPNL at many points five feet above the surface around the facility. This process results in a "grid" file containing noise levels at different points of a user specified rectangular area. The spacing of the grid points for this study was 500 feet.

The programs can also compute CNEL and WECPNL for specific points of interest, e.g., noise-sensitive receptors, and determine the primary contributors to the overall CNEL at each point. Seventeen Points of Interest (POI) were modeled in this study. See Section 3 for further discussion of the POI.

Based on NOISEMAP technology the Military Operating Area and Range Noise Model (MR_NMAP) is a model for predicting aircraft noise from aircraft operating in three types of special-use airspace: MOAs, Range/Restricted Areas, and MTRs (Lucas and Calamia 1997).

A MTR is a defined volume of airspace designed for use by military aircraft which can be generally described as having an altitude structure below 10,000 feet Mean Sea Level (MSL) and military aircraft operations in excess of 250 knots indicated airspeed. NAV routes and flight corridors are similar to MTRs in that both are volumes of airspace utilized by aircraft to transit from one location to another. This similarity makes MR_NMAP a good tool in the analysis of NAV routes and flight corridors as studied in this report. MTR use is not part of the proposed action and none are analyzed in this study.

A restricted area is defined as airspace above a range of specific dimensions where flight and/or ground activities must be confined because of their nature and which may be considered hazardous to non-participating aircraft. A range is defined as a portion of the ground under a restricted area that must be available to contain both the weapons delivered and the aircraft flight paths during delivery of those weapons. Thus, non-participating aircraft are prohibited from flying through restricted airspace when it is being used for military training. When a restricted area is not being utilized, however, access through the airspace may be requested from the controlling agency and will normally be granted.

A MOA is a defined volume of airspace which can generally be described as having an altitude structure anywhere from the surface up to a ceiling or maximum altitude. MOAs are established to contain certain military activities such as air combat maneuvers, instrument operations, intercepts, acrobatics, etc. Helicopters operating in training areas on Okinawa utilize volumes of airspace in the CTA and NTA. These flight areas or operating areas are analyzed using MR_NMAP and a modeling methodology similar to that used for MOA analysis. No MOAs are part of this proposed action and none were modeled in this noise study.

The MR_NMAP suite of computer programs includes OMEGA10R, NOISEFILE, and the core code MRNMAP, of which version 2.20 was used for this report. MR_NMAP allows for entry of airspace information, the horizontal distribution of operations, flight profiles (average power settings, altitude distributions, and speeds), and numbers of sorties. "Horizontal distribution of operations" refers to the modeling of lateral airspace utilization via three general representations: broadly distributed operations for modeling of MOA or flight area events, operations distributed among parallel tracks for modeling of NAV events, and operations on specific tracks for modeling of unique transit along routes for training purposes. OMEGA10R extrapolates/interpolates the reference SELs for each model of aircraft from the NOISEFILE database, taking into consideration the specified speeds, engine thrust settings and environmental conditions appropriate to each flight operation. The core program MRNMAP incorporates the number of monthly operations by time period, specified horizontal distributions, volume of the airspaces, and profiles of the aircraft to primarily calculate: (a) Onset-Rate Adjusted Monthly Day-Night Average Sound Level (L_{dnmr}) at many points on the ground, (b) average L_{dnmr} for entire airspaces, or (c) maximum L_{dnmr} under NAV routes or specific tracks. $CNEL_{mr}$ and L_{dnmr} are used interchangeably here.

In calculating time-average sound levels for airspaces, the reliability of the results varies at lower levels (below 55 dB). This arises from the increasing variability of individual aircraft sound levels at the longer distances due to atmospheric effects on sound propagation and to the presence of other sources of noise. Also, when flight activity is infrequent, the time-averaged sound levels are generated by only a few individual aircraft noise events, which may not be statistically representative of the given aircraft modeled. Time-averaged outdoor sound levels less than 45 dB are well below any currently accepted guidelines for aircraft noise compatibility. Most of the guidelines for the acceptability of aircraft noise are on the order of 65 dB and higher.

The programs described above are most accurate and useful for comparing "before-and-after" noise levels that would result from alternative scenarios when calculations are made in a consistent manner. The programs allow noise exposure prediction of such proposed actions without actual implementation and/or noise monitoring of those actions.

2.3 Impact and Geospatial Analysis

2.3.1 Topographical Data

The NOISEMAP suite of programs include atmospheric sound propagation effects over varying terrain, including hills and mountainous regions, as well as regions of varying acoustical impedance—for example, water around coastal regions. Elevation and impedance grid files were created to model the area surrounding MCAS Futenma with a grid spacing of 200 feet based on data obtained from the U.S. Geological Survey (USGS 2011). Acoustical impedance is measured in terms of flow resistivity in units of kilo-Pascals seconds per meter squared (kPa-s/m^2). The land of MCAS Futenma and the ground of the rest of the island were modeled acoustically "soft" with a flow resistivity of 200 kPa-s/m^2. Water area was modeled as acoustically "hard" with a flow resistivity of 1,000,000 kPa-s/m^2.

The MCAS Futenma airfield elevation is 247 feet above MSL, and the magnetic declination is 4.7 degrees East. All maps in this report depict a north arrow pointing to true north.

The topography on and around the island of Ie Shima (referred to herein as the island of Ie Jima) was modeled using the same method mentioned above. Ie Jima was modeled with acoustically "soft" ground and all water areas were modeled as acoustically "hard" impedance. The field elevation at ISTF was modeled as 85 feet above MSL (USGS 2011).

Activity in the CTA, and NTA were modeled, in part, with MR_NMAP using flat ground and acoustically "soft" ground impedance for baseline conditions. MR_NMAP does not have the capability to model non-flat ground topography as it assumes all flight profiles are relative to the elevation of the ground. The Proposed MV-22 operations at the CTA and the NTA were modeled as a combination of MR_NMAP and with NOISEMAP (RNM) with topography. This allowed for more accurate analysis of the geographically larger flight tracks and profiles flown by the MV-22 over varying terrain with RNM.

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SECTION 3 MCAS Futenma

The following five subsections present the installation's geographic setting, weather conditions, its basic operational profile and results for the Baseline and Proposed scenarios.

3.1 Local Setting

Figure 3-1 shows the vicinity of MCAS Futenma including the cities of Urasoe to the west and villages of Nakagusuku and Kitanakagusuku to the east of MCAS Futenma. The figure also shows representative Points of Interest (POI) chosen to provide additional information about noise exposure in the vicinity of the air station.

The communities in the vicinity of MCAS Futenma are built to the station fence line which puts residential buildings as close as 500 feet from the MCAS Futenma runway. Seventeen POIs in the vicinity of MCAS Futenma were identified for the purposes of analyzing annual average day noise exposure resulting from aircraft operations at MCAS Futenma. These POIs represent noise sensitive locations in the communities surrounding the MCAS Futenma. The 17 POIs consist of 5 hospitals, 1 university, and 11 schools (elementary or high schools).

3.2 Climatic/Weather Conditions

Okinawa is situated in a tropical zone of the Pacific. To account for weather effects in the propagation of noise, the computer models require input of the average daily temperatures in degrees Fahrenheit (°F), percent Relative Humidity (% RH) and station pressure in inches of mercury (in Hg) for each month of a year. Climatic data for CY2009 was obtained from MCAS Futenma. Temperature and relative humidity are charted in Figure 3-2. Temperatures for summer months (May to September) and winter months (October to April) averaged 85 and 71°F, respectively. RH for the same periods averaged 82 percent during summer months and 72 percent during winter months. The station pressure averaged 29.678 inHg (Drake 2010). NOISEMAP's BaseOps program computes absorption coefficients for each month and selects the sixth highest coefficient for the purposes of noise exposure modeling (U.S. Air Force 1992). The modeled conditions computed by the BaseOps program correspond to April of 2009 with 75°F and a relative humidity of 77 percent. These conditions were used for all modeled facilities in this study.

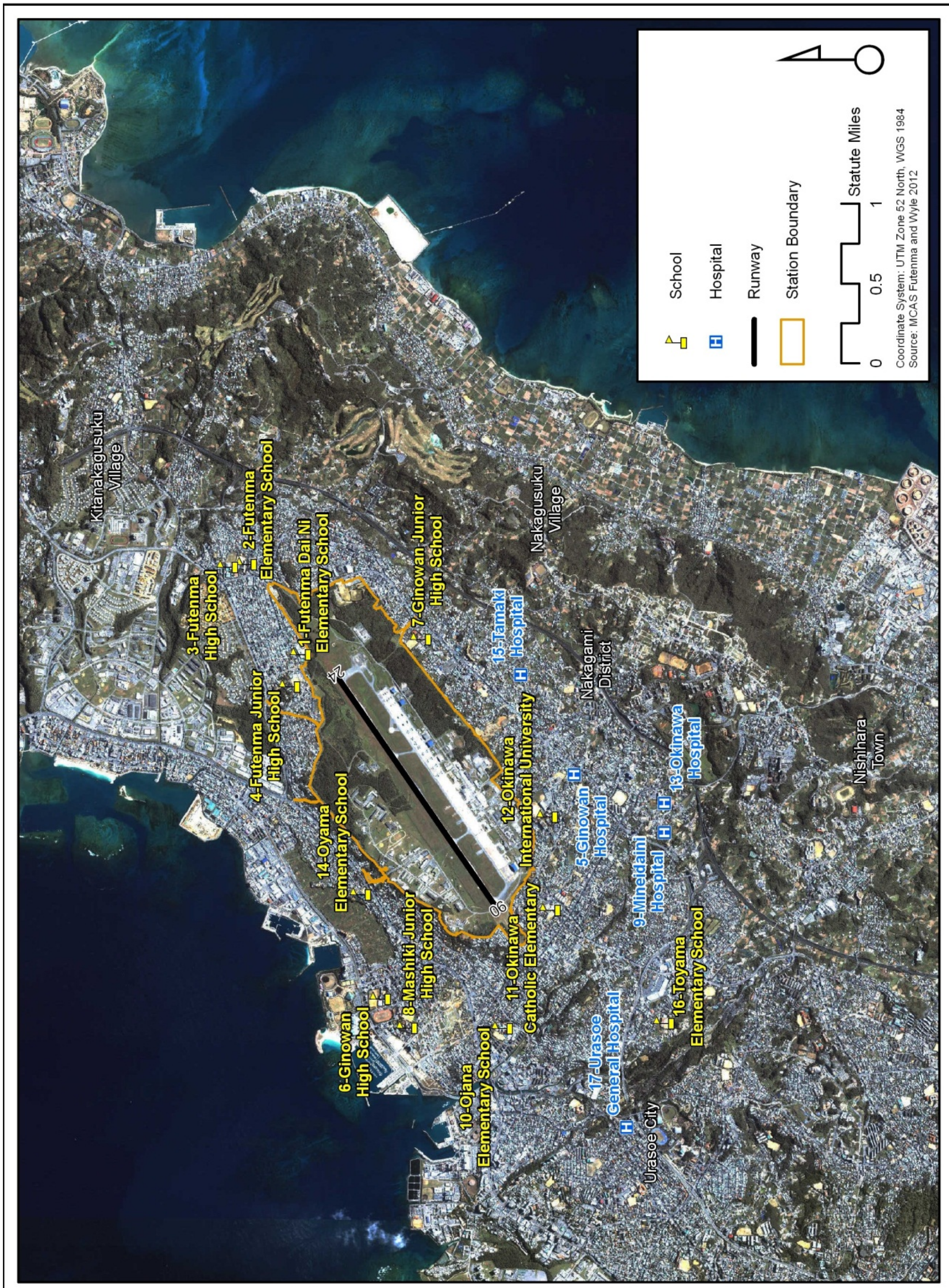

Figure 3-1 Vicinity of MCAS Futenma

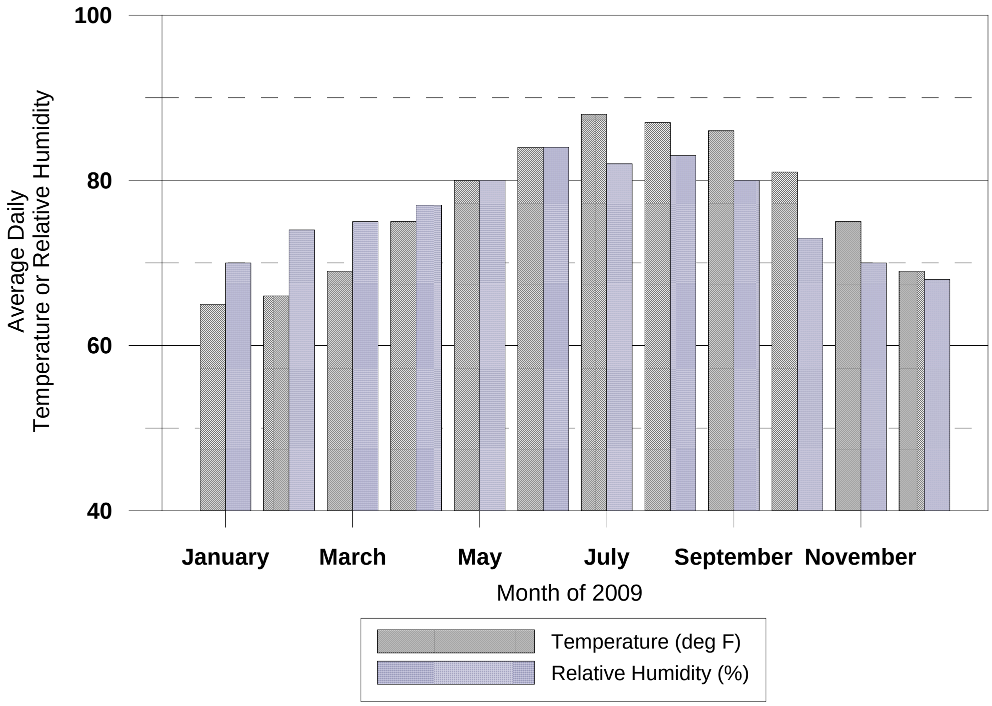

Figure 3-2 Average Daily Temperature and Relative Humidity for MCAS Futenma

3.3 Operational/Mission Profile

The First Marine Aircraft Wing (1st MAW) currently operates 38 based rotary-wing aircraft at MCAS Futenma consisting of the following:

- 5 CH-53E Super Stallion heavy-lift helicopters,
- 5 AH-1W Super Cobra attack helicopters,
- 4 UH-1N Iroquois (Huey) light-lift utility helicopters, and
- 24 CH-46E Sea Knight medium-lift transport helicopters.

1st MAW also operates fixed-wing aircraft from MCAS Futenma:

- 15 KC-130J Hercules cargo transport and
- 4 Operational Support Airlift (OSA) aircraft consisting of:
  - 1 UC-12B/F Huron cargo transport, and
  - 3 UC-35D Encore transports.

The KC-130J Hercules is a four-engine turboprop cargo transport aircraft. The UC-12 Huron is a relatively small twin turboprop. The UC-35 Encore is a relatively small twin-engine jet based on the civilian Cessna Citation Encore CE-560.

3.4 Baseline Scenario

The following six subsections present the baseline (CY2010) annual flight operations, runway utilization and flight track utilization, flight profiles, average daily flight events, run-up operations and resultant noise exposure.

3.4.1 Annual Flight Operations

The first step in the noise analysis process is to determine the number of annual flight operations for the modeled Calendar Year. The counts under this and subsequent sections of this report do not include transitions through the airspace above MCAS Futenma. The annual flight operations at MCAS Futenma can vary greatly year to year. To best represent the baseline annual airfield flight operations for the study a three year average of airfield operations from CY2008 through CY2010 Air Traffic Activity Reports (ATAR) was used.

Table 3-1 and Figure 3-3 depict the ATAR data. The 3-year data shows the year with the highest numbers of operations is CY2008 with 26,795 operations. Navy/Marine operations account for approximately 85 percent of the station's traffic, year to year. The average of total annual operations based on the 5-year period is 23,361.

The USMC provided the baseline flight operations by aircraft type presented in Table 3-2 totaling 23,366 operations annually which differs slightly from the 3-year average due to rounding. Aircraft based at MCAS Futenma account for 18,555 of the total operations, nearly 80 percent. The top three users of the airfield include the CH-46E (40 percent), KC-130J (111 percent), and UC-35 (7 percent) comprising 58 percent of the total operations as shown in Figure 3-4. Approximately half of the CH-46 operations are pattern operations. From Table 3-2, the 3-hour evening and 9-hour nighttime periods account for nearly 23 percent and 1 percent of total operations, respectively. No MV-22 operations were included in Baseline because the MV-22 does not currently operate at MCAS Futenma.

The remaining 4,811 transient operations consist primarily of transient aircraft landings and takeoffs and the most significant of these, from a noise perspective, are those conducted by the FA-18C/D aircraft. The FA-18C/D aircraft are typically from MCAS Iwakuni-based Marine Air Group 12 (MAG-12). MAG-12 does not detach to MCAS Futenma but does occasionally land to refuel. The remaining transient aircraft are comprised primarily of C-12, KC-135, P-3, C-5, H-60, F-15, An-124 and light helicopters listed here in order of decreasing frequency.

Table 3-1 MCAS Futenma Air Traffic Activity Reports of Annual Flight Operations

Calendar Year	TOTAL
2008	26,795
2009	23,489
2010	19,798
3 yr average	**23,361**

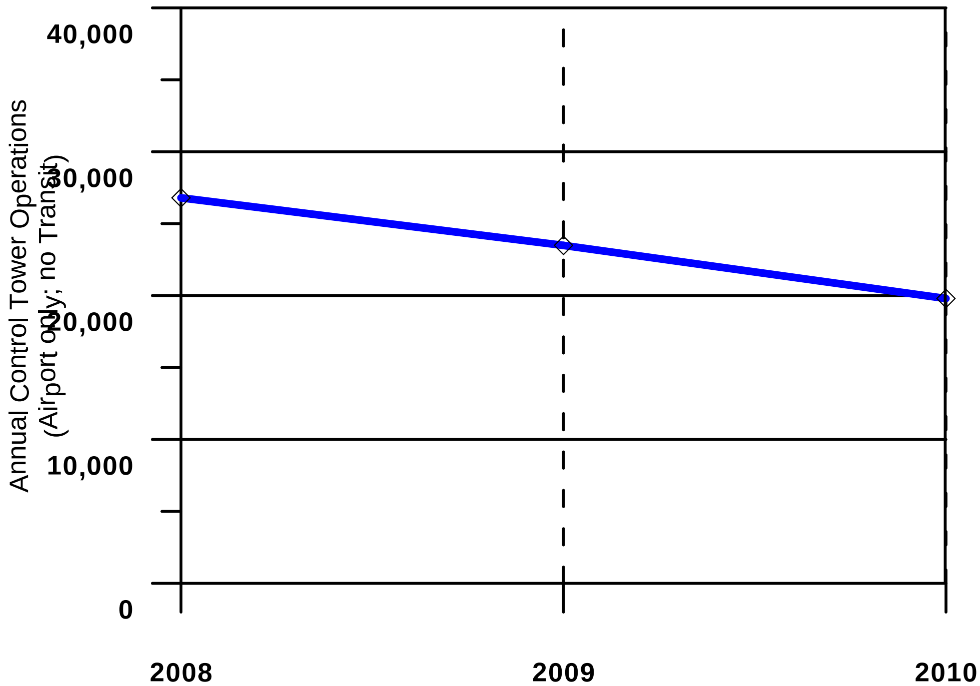

Figure 3-3 Annual ATC Tower Operations (Airport only, No Transit)

Table 3-2 Baseline Annual Flight Operations for MCAS Futenma

Based or Transient	Aircraft Category	Aircraft Type	Departure				Non Break Visual Arrival				Instrument Arrival			
			Day (0700-1900)	Eve (1900-2200)	Night (2200-0700)	Total	Day (0700-1900)	Eve (1900-2200)	Night (2200-0700)	Total	Day (0700-1900)	Eve (1900-2200)	Night (2200-0700)	Total
Based	Navy / Marine	UC-35	510	23	-	533	30	6	1	37	250	232	14	496
Based	Navy / Marine	UC-12W	273	14	-	287	3	1	1	5	173	104	5	282
Based	Navy / Marine	KC-130J(6)	608	102	-	710	25	13	5	43	503	149	13	665
Based	Navy / Marine	CH-53E	152	111	-	263	140	96	9	245	9	6	-	15
Based	Navy / Marine	AH-1W	211	154	-	365	195	134	13	342	12	8	-	20
Based	Navy / Marine	UH-1N	154	112	-	266	142	98	10	250	9	6	-	15
Based	Navy / Marine	CH-46E	1,217	890	-	2,107	1,128	773	76	1,977	71	44	-	115
Transient	Navy / Marine	FA-18C/D(2)	341	69	-	410	175	19	-	194	21	-	-	21
Transient	Navy / Marine	P-3	36	-	-	36	18	-	-	18	17	-	-	17
Transient	Other Military(3)		252	83	2	337	52	-	-	52	209	55	6	270
Transient	Air Carrier(4)		-	-	-	-	-	-	-	-	-	-	-	-
Transient	General Aviation(5)		511	57	-	568	511	57	-	568	15	4	-	19
Totals	**Based**		3,125	1,406	-	4,531	1,663	1,121	115	2,899	1,027	549	32	1,608
Totals	**Transient**		1,140	209	2	1,351	756	76	-	832	262	59	6	327
Grand Total			4,265	1,615	2	5,882	2,419	1,197	115	3,731	1,289	608	38	1,935

Based or Transient	Aircraft Category	Aircraft Type	Break Arrival				Touch and Go(1)				GCA Box(1)				**Total**			
			Day (0700-1900)	Eve (1900-2200)	Night (2200-0700)	Total	Day (0700-1900)	Eve (1900-2200)	Night (2200-0700)	Total	Day (0700-1900)	Eve (1900-2200)	Night (2200-0700)	Total	**Day (0700-1900)**	**Eve (1900-2200)**	**Night (2200-0700)**	**Total**
Based	Navy / Marine	UC-35	-	-	-	-	319	60	-	379	248	5	-	253	1,357	326	15	1,698
Based	Navy / Marine	UC-12W	1	-	-	1	266	18	-	284	127	9	-	136	843	146	6	995
Based	Navy / Marine	KC-130J(6)	4	-	-	4	1,045	95	-	1,140	64	7	-	71	2,249	366	18	2,633
Based	Navy / Marine	CH-53E	2	-	-	2	247	89	-	336	231	64	-	295	781	366	9	1,156
Based	Navy / Marine	AH-1W	3	-	-	3	343	124	-	467	322	89	-	411	1,086	509	13	1,608
Based	Navy / Marine	UH-1N	2	-	-	2	250	91	-	341	234	65	-	299	791	372	10	1,173
Based	Navy / Marine	CH-46E	17	-	-	17	1,983	718	-	2,701	1,857	518	-	2,375	6,273	2,943	76	9,292
Transient	Navy / Marine	FA-18C/D(2)	195	-	-	195	73	15	-	88	7	-	-	7	812	103	-	915
Transient	Navy / Marine	P-3	-	-	-	-	911	-	-	911	182	-	-	182	1,164	-	-	1,164
Transient	Other Military(3)		13	2	-	15	107	9	-	116	13	2	-	15	646	151	8	805
Transient	Air Carrier(4)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient	General Aviation(5)		-	-	-	-	685	78	-	763	9	-	-	9	1,731	196	-	1,927
Totals	**Based**		29	-	-	29	4,453	1,195	-	5,648	3,083	757	-	3,840	13,380	5,028	147	18,555
Totals	**Transient**		208	2	-	210	1,776	102	-	1,878	211	2	-	213	4,353	450	8	4,811
Grand Total			237	2	-	239	6,229	1,297	-	7,526	3,294	759	-	4,053	17,733	5,478	155	23,366

Notes:

(1) Counted as two operations; 1 circuit = 1 departure + 1 arrival = 2 operations
(2) FA-18C/D ops totals provided by MCAS Futenma (13 Oct 2011)
(3) Includes primarily C-12, as well as KC-135, C-5, H-60, F-15, C-20, C-40, KC-10, and C-17 (modeled as UC-12B/F)
(4) Previously supported UDP and OIF
(5) Includes Dauphin, Eurocopter, Jet Ranger, Bell 500, Islander, C-172, and XL-2, (Not Modeled)
(6) Minimal break Arrival for UC-35, UC-12W, KC-130J, CH-53, AH-1W, UH-1N, CH-46E, and Other Military considered insignificant and not modeled

***MCAS Futenma ops scaled to ATARs 2008-2010 3 yr average**

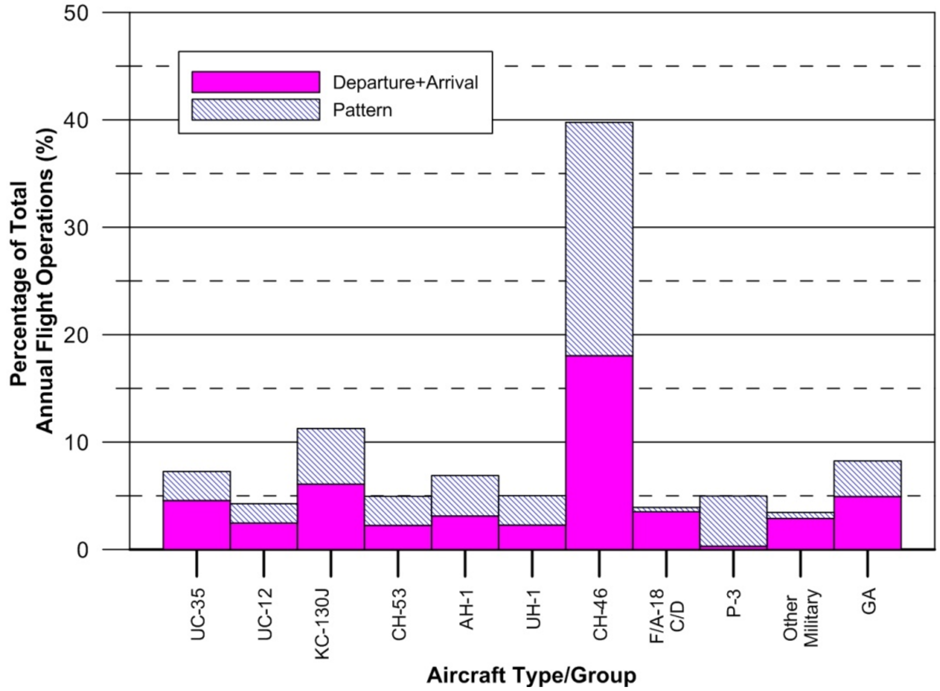

Figure 3-4 Mix of Baseline Flight Operations at MCAS Futenma

3.4.2 Runway and Local Airspace/Flight Track Utilization

Figure 3-5 depicts the runway utilization percentages for fixed- and rotary-wing aircraft. For all types of operations except the rotary-wing arrivals, 80 percent of the departures, arrivals and patterns are on Runway 06 with the remaining 20 percent on Runway 24. Helicopters do land and depart from the pads on the runway but do so in a way very similar to runway departures and arrivals. For this analysis helicopter departures and arrivals from pads were considered as originating and terminating at the runway. An exception to this is the helicopter arrivals to Pad 2 which occur from the southeast approximately perpendicular to the runway direction. Seventy percent of rotary-wing arrivals occur on Runway 06 while 18 percent occur on Runway 24 and the remaining 12 percent occur on Pad 2. All of the closed patterns are conducted on the southeast side of the airfield except rotary-wing closed patterns, which are conducted on the northwest side of the airfield.

The next step in the noise modeling process is assignment of runway operations to flight tracks for each aircraft type, operation type, and CNEL/WECPNL time period. The modeled flight tracks for MCAS Futenma are listed in Table 3-3 whereas Tables A-1 and A-2 of Appendix A show the modeled flight track utilization percentages approved by squadron personnel. The track IDs generally follow a naming convention of runway/pad ID, operation type (D for departure, A for "straight-in" arrival, O for overhead/carrier break, T for touch-and-go and G for GCA Box patterns) and sequence number.

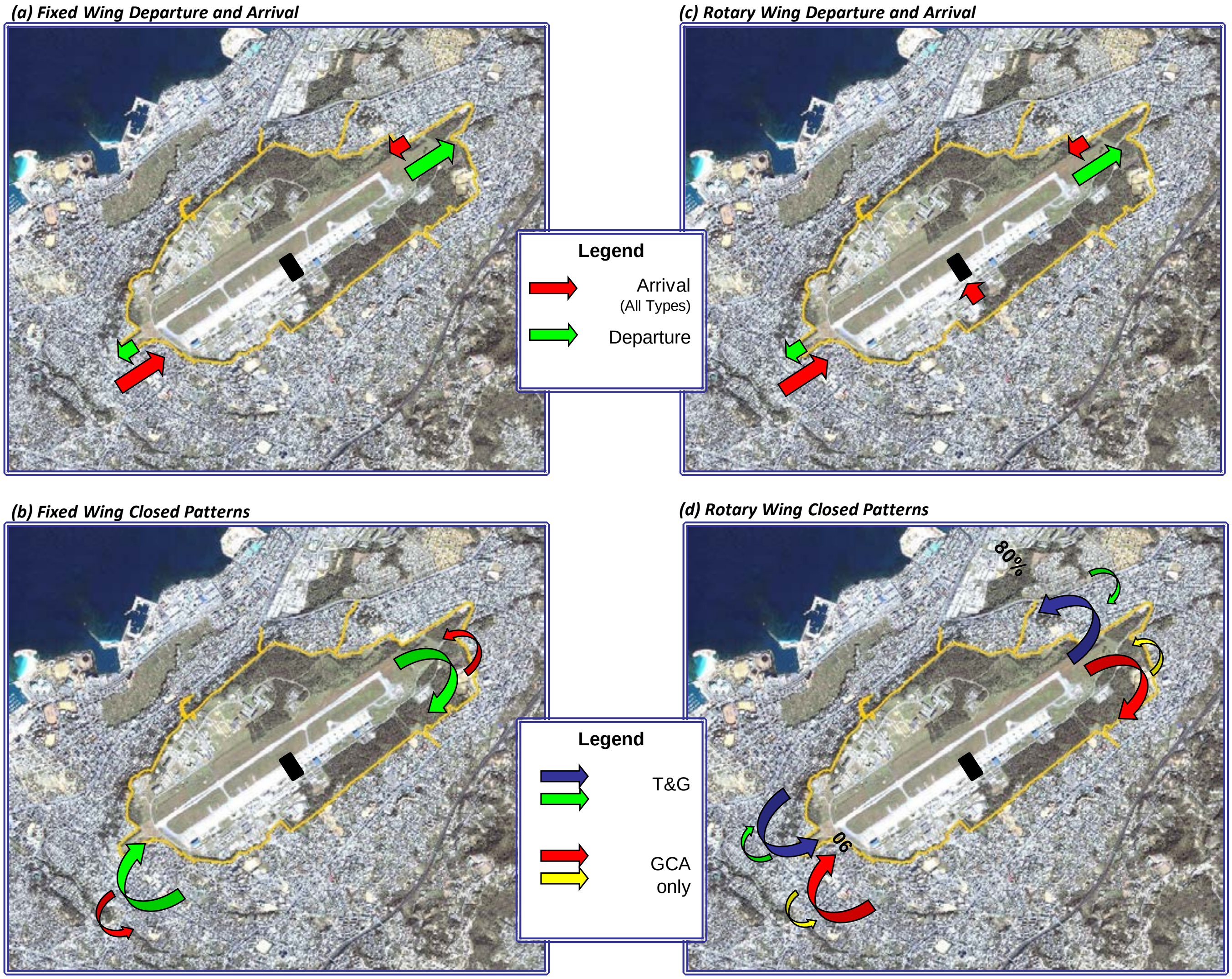

Figure 3-5 Fixed and Rotary Wing Runway Utilization for MCAS Futenma

Table 3-3 List of Modeled Flight Tracks for Baseline Scenario

Op Type	Runway ID	Flight Track ID	Flight Track Description
Departure	06	06D1	Helo departure to Point Kilo
		06D2	Helo departure to Point Sierra
		06D3	ADDAN ONE
		06D4	CHINEN ONE
		06D5	Standard Instrument Departure SE
		06D6	Standard Instrument Departure NE
	24	24D1	Helo departure to Point Tango
		24D2	Helo departure to Point Sierra
		24D3	ADDAN ONE
		24D4	CHINEN ONE
		24D5	Standard Instrument Departure South
Nonbreak Arrival	06	06A1	Helo arrival from Point Kilo
		06A2	Helo arrival from Point Sierra
		06A3	Copter TACAN 040
		06A4	Straight-in Visual
	24	24A1	Helo arrival from Point Tango
		24A2	Helo arrival from Point Sierra
		24A3	Copter TACAN 24
		24A4	Straight-in Visual
	Pad 2	PAD2A1	Helo straight in from southeast
Instrument Arrival	06	06A5	TACAN Y
		06A6	TACAN Z
	24	24A5	TACAN
Overhead Break Arrival	06	06O1A	break at downwind numbers
		06O1B	break at midfield
		06O1C	break at upwind numbers
	24	24O1A	break at downwind numbers
		24O1B	break at midfield
		24O1C	break at upwind numbers
Touch and Go	06	06T1	Helo, 0.4nm abeam, 0.6 nm downwind to runway
		06T2	Helo, 0.4nm abeam, 0.6 nm downwind to CAL
		06T3	Fixed Wing, circle southeast of runway
	24	24T1	Helo, 0.4nm abeam, 0.6 nm downwind to runway
		24T2	Fixed Wing, circle southeast of runway
GCA Box	06	06G1	Helo Radar Pattern, 3 nm abeam, 7.4 nm downwind
		06G2	Fixed Wing pattern
	24	24G1	Helo Radar Pattern, 3 nm abeam, 7.4 nm downwind
		24G2	Fixed Wing pattern

Figures A-1 through A-8 of Appendix A depict the modeled average daily flight tracks for MCAS developed by ATC and squadron personnel at MCAS Futenma. Helicopters have three visual points (Point Kilo, Point Tango, and Point Sierra; not shown) which are used for all departures and 90 percent of all arrivals. When helicopters depart from Runway 06 they either make a 20 degree turn to the right to reach Point Tango on the east coast of Okinawa or a sharper 80 degree left turn to reach Point Sierra at the water treatment plant on the northern coast. When helicopters depart Runway 24 they reach the east coast by turning 140 degrees to the left to fly to Point Kilo or turn 180 degrees to the right to catch the helicopter pattern downwind before turning back left to reach Point Sierra. Helicopters would then continue up the coast of Okinawa to the training ranges. Helicopter arrivals are essentially the same but in reverse and include a Copter TACAN arrival (modeled flight tracks 24A3 and 06A3) which are straight in to Runway 24 and slightly offset to Runway 06 due to restrictions when flying near Naha Airport to the southwest. The fixed-wing aircraft primarily fly Standard Instrument Departures (SID) when departing MCAS Futenma. Fixed-wing arrivals are almost all straight-in whether instrument or visual and the tracks are either at runway heading or slightly offset. Overhead break arrivals are rare for based aircraft.

Nearly all helicopter patterns are conducted to the north of the runway and stay almost 100 percent within the station boundary. All fixed-wing patterns are conducted to the south of the runway. All GCA box patterns occur to the south of the runway. The rotary-wing GCA box patterns characterized by an abeam distance of approximately 4.5 nm and a downwind leg of approximately 7 nm. The fixed-wing GCA box patterns are characterized by an abeam distance of approximately 8 nm and a downwind leg of approximately 12 nm.

3.4.3 Flight Performance Profiles

The following overhead break and pattern altitudes were modeled for MCAS Futenma as provided by MCAS Futenma ATC:

- Overhead break altitude = 1,500 feet MSL,
- Fixed-wing T&G pattern altitude = 1,500 feet MSL,
- Rotary-wing T&G pattern altitude = 1,000 feet MSL,
- Fixed-wing GCA pattern altitude = 3,000 feet MSL, and
- Rotary-wing GCA pattern altitude = 2,000 feet MSL.

Representative flight profiles for the modeled tracks were provided by squadron personnel for all modeled aircraft types and types of operations except the transient FA-18C/D which were obtained from the MCAS Iwakuni noise study (Wyle Report (WR) 09-21; Czech and Kester 2010). The FA-18C/D flight profiles in WR 09-21 were originally developed with the input of MAG-12 pilots and have been adjusted for local course rules for this study. The squadron POCs listed in Section 2 verified and validated the flight profiles modeled in the study. Representative flight profiles of all modeled aircraft types are graphically depicted in Appendix B.

Fixed-wing departure profiles can also be automatically modeled with a pre-flight run-up, conducted at the runway threshold prior to brake release. The KC-130J was modeled with a 10 second pre-flight run-up with a power setting of 8000 in-lbs. No static noise data was available for the KC-130J so the C-130H&N&P was used as a surrogate for departure profiles. The C-12 was modeled with a 15 second pre-flight run-up at 90 percent RPM and no pre-flight run-up was modeled for the C-35 aircraft. The transient FA-18C/D was modeled with the same 5 second pre-flight run-up with the power setting at 80 percent RPM as was modeled for WR 09-21 at MCAS Iwakuni.

3.4.4 Modeled Flight Events

The next step in the noise modeling process is the computation of the modeled Annual Average Daily (AAD) day, evening and night events for each profile. This is accomplished by dividing the track operations by 365 and further dividing closed-pattern operations (e.g., T&G, FCLP and GCA Box) by 2[6]. The resultant numbers of events are presented in Tables A-3 and A-4. Helicopter and fixed-wing AAD events at MCAS Futenma total approximately 26 and 16, respectively.

[6] The closed-pattern operations are divided by two for noise modeling purposes only. ATC counts closed patterns as two distinct operations: one departure and one arrival. In NOISEMAP and RNM, the departure and arrival are represented by one event because both operations are connected (i.e., on a single flight track).

3.4.5 Maintenance Run-up Operations

Marine Air Logistics Squadron 36 (MALS-36), Naval Air Pacific Repair Activity (NAPRA) and other flight squadrons currently conduct run-ups at MCAS Futenma. Table 3-4 lists the run-up operations currently performed at MCAS Futenma. Run-up locations are shown in Figure 3-6. The helicopter run-ups are performed on the flightline.

Because NOISEMAP's database does not contain reference noise data for every run-up operations performed at MCAS Futenma, some run-ups were modeled with a surrogate engine/airframe. Similarly, reported power settings were approximated with the closest representative power settings in the database. Table 3-4 shows the modeled aircraft/engine and power settings alongside the ones reported by the data providers. The UC-35 was modeled as a T-1.

Table 3-4 Modeled Maintenance Run-up Operations at MCAS Futenma for Baseline Scenario

Aircraft	Engine Type	Modeled Aircraft / Engine (if different)	Location ID	Magnetic Heading (deg)	Annual Events				Reported Power Setting	Duration at Power Setting (Minutes)	Number of Engines Running Simul-taneously	Modeled Power Setting (If Different Than Reported)
					Events	% Day (0700-1900)	% Evening (1900-2200)	% Night (2200-0700)				
CH-53E	T-64-GE - 461A	--	Flightline	60	96	90%	10%	-	Idle	30	1	GND Idle
									Rated Pwr (3700-4750 shp)	30	1	GND Max
									Military	15	1	GND Max
CH-46E	T58-GE-16	--	Flightline	60	365	85%	10%	5%	Idle	30	1	GND Idle
									Military	30	1	GND Max
									Military	15	1	GND Max
UH-1N	T-400	UH-1M (T53-L-13)	Flightline	60	72	90%	10%	-	Idle	30	1	ige lite
									Rated Pwr (850-950 shp)	60	1	oge lite
AH-1W	T-700-GE-701	--	Flightline	60	144	90%	10%	-	Idle	30	1	idl
									Rated Pwr (1600-1800 shp)	60	1	oge load
UC-12F	PT6A-42	--	C-12	60 (80%); 230 (20%)	340	80%	20%	-	Idle	10	2	
									85%	5	2	90% Torque
UC-35	PW535	T-1 (JT15D-5D)	Flightline	60 (80%); 230 (20%)	72	80%	20%	-	Idle	10	2	
									Takeoff Power	5	2	Max Cont
KC-130J	AE2100D3	C-130H&N&P (T56-A-15)	Spot 3	60	52	80%	20%	-	Hi-power (9600 IN-LBS)	1.5	2	--

Figure 3-6 Modeled Maintenance Run-up Locations

3.4.6 Baseline Scenario Noise Exposure

Using the data described in Sections 3.3.1 through 3.3.5, the NOISEMAP suite was used to calculate and plot the 65 dB through 85 dB CNEL contours and the 75 dB to 100 dB WECPNL contours for AAD operations at MCAS Futenma. Figures 3-7 and 3-8 show the CNEL and WECPNL contours, respectively.

The 65 dB CNEL would extend approximately 3,400 feet southwest beyond the MCAS Futenma boundary. This lobe is primarily due to the FA-18C/D approaches to Runway 06 which includes both the straight-in and the overhead break arrivals. The 65 dB CNEL would extend approximately 1,300 feet northeast of the MCAS Futenma boundary due to departures on Runway 06. Despite the FA-18C/D arrivals or departures accounting for less than seven percent of all MCAS Futenma arrivals or departures the FA-18C/D is the primary noise contributor because it is considerably greater in terms of SEL/EPNL than the other modeled aircraft when compared on a single-event basis.

The 80 dB WECPNL would extend approximately 1,700 feet southwest beyond the MCAS Futenma boundary due to the FA-18C/D arrivals. That 80 dB WECPNL contour contains an additional lobe extending to the southeast caused by the FA-18C/D accelerating on the runway during departures on Runway 06. The terrain to the west of MCAS Futenma slopes down away from the airfield towards the ocean with a small ridge running approximately southeast to northwest in the vicinity of the detached 80 dB WECPNL contour. Most of the sound received along the ridge from noise at ground level travels approximately laterally and is attenuated less due to less interference with the ground. The 80 dB WECPNL also extends approximately 600 feet north of MCAS Futenma caused by FA-18C/D departures from Runway 06.

The primary contributor to the overall noise exposure is the transient Navy/Marine aircraft modeled by the FA-18C/D Hornet even though it only accounts for approximately 5 percent of annual airfield operations. This is due to the Hornet being 10 to 15 dB greater in terms of SEL on a single event basis than the other aircraft operating at MCAS Futenma.

CNEL and WECPNL exposure was calculated for each of the 17 POIs and tabulated in Table 3-5. Of the 17 POI, Futenma Dai Ni Elementary School is exposed to the highest CNEL and WECPNL of 68 dB and 81 PNdB, respectively because of its proximity to the end of Runway 06. Futenma Dai Ni Elementary School is approximately 500 feet abeam of the departures on Runway 06. The primary contributor to the CNEL and WECPNL at this location is the transient FA-18C/D departures because of the aircraft's proximity to the POI. The remaining 16 POI are exposed to less than 65 dB CNEL and less than 80 dB WECPNL.

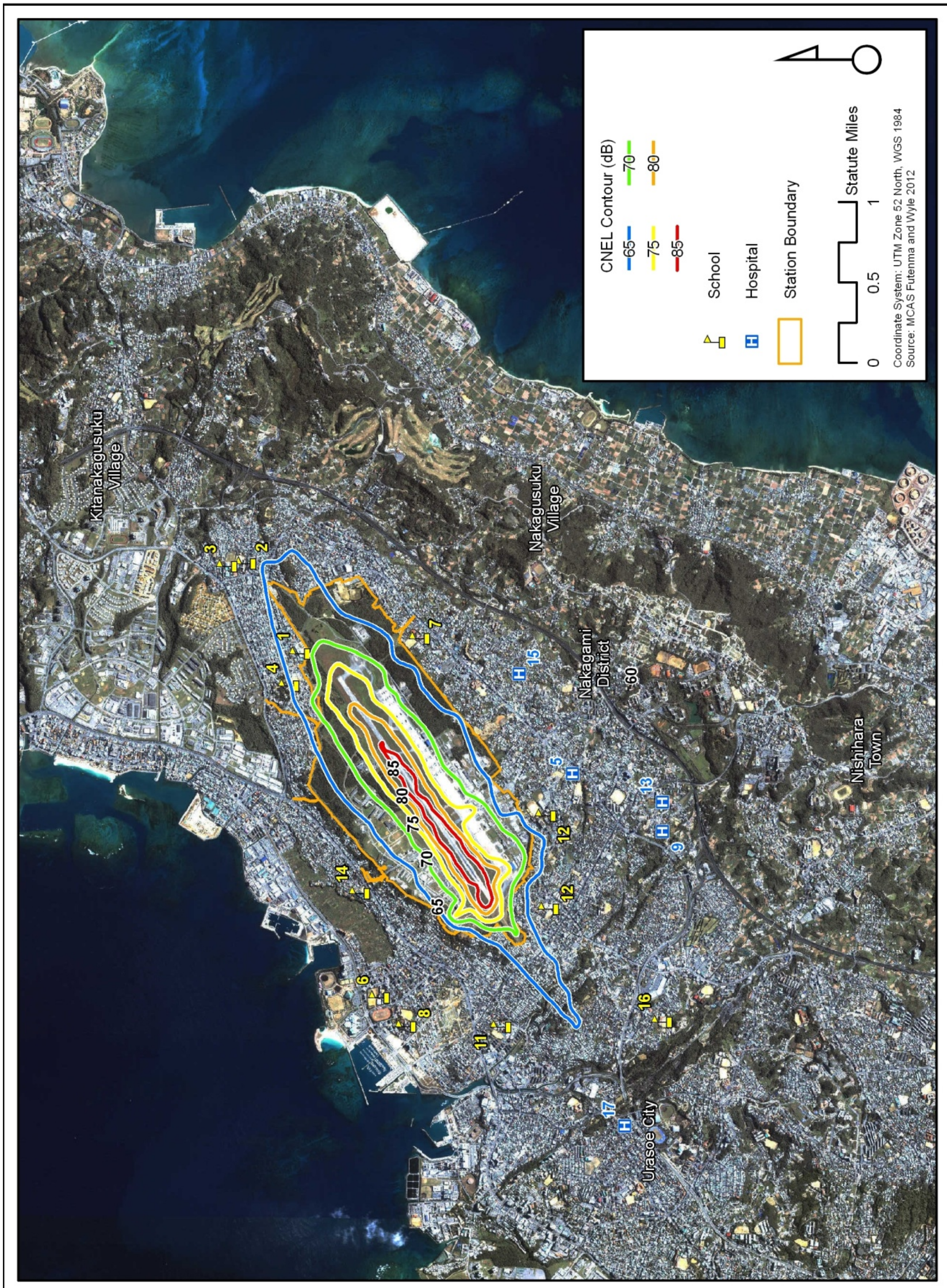

Figure 3-7 Aircraft CNEL Contours for Baseline Average Daily Operations at MCAS Futenma

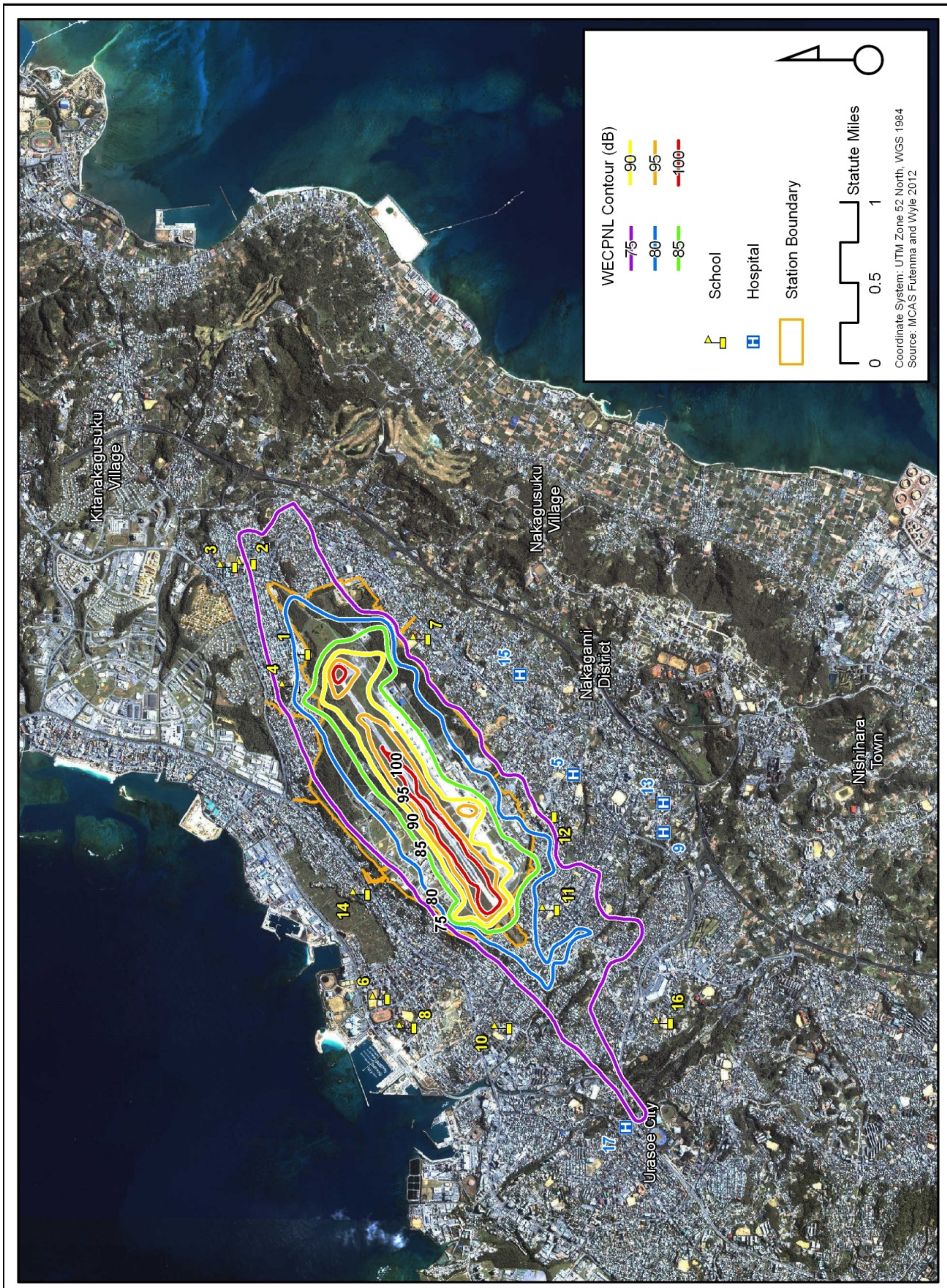

Figure 3-8 Aircraft WECPNL Contours for Baseline Average Daily Operations at MCAS Futenma

Table 3-5 Estimated Noise Exposure at POI for MCAS Futenma for Baseline Scenario

Point of Interest		CNEL (dBA)	WECPNL (PNdB)
ID	Description		
1	Futenma Dai Ni Elementary School	68	81
2	Futenma Elementary School	63	75
3	Futenma High School	60	72
4	Futenma Junior High School	65	78
5	Ginowan Hospital School	54	65
6	Ginowan High School	51	63
7	Ginowan Junior High School	60	72
8	Mashiki Junior High School	51	62
9	Mineidaini Hospital	55	66
10	Ojana Elementary School	56	68
11	Okinawa Catholic Elementary	61	77
12	Okinawa International University	58	70
13	Okinawa Hospital	55	66
14	Oyama Elementary School	58	69
15	Tayaki Hospital	55	66
16	Toyama Elementary School	57	69
17	Urasoe General Hospital	59	71

3.5 Proposed Scenario

The Proposed scenario involves the full replacement of the MCAS Futenma-based CH-46 with 24 MV-22 aircraft on a one-for-one basis beginning in late FY2012. The following six subsections present the Proposed scenario annual flight operations, runway utilization and flight track utilization, flight profiles, average daily flight events, run-ups and resultant noise exposure, respectively.

3.5.1 Annual Flight Operations

Annual flight operations totaling nearly 20,800 for the Proposed scenario are shown in Table 3-7. Operations would be identical to the Baseline scenario except for the replacement of the CH-46 with operations with MV-22 operations. The Proposed MV-22 operations are based on USMC Core Competency Resource Model and Training and Readiness (T&R) Manual requirements for 24 aircraft (Holden 2010a). Of the approximate 6,700 annual MV-22 operations, 68, 28, and 4 percent would occur during CNEL/WECPNL day, evening, and nighttime periods, respectively. The temporal distribution of MV-22 differs slightly from the baseline CH-46 because it is based on the training requirements for daylight and darkness exercises for the MV-22.

Table 3-7 reveals approximately 21 and 2 percent of the total flight operations for the Proposed scenario at MCAS Futenma would occur during CNEL/WECPNL evening and nighttime periods, respectively. Compared to the Baseline scenario, the total flight operations would decrease by 11 percent. The decrease is due to the replacement of approximate 9,300 CH-46 operations with only approximately 6,700 MV-22 operations.

Figure 3-10 charts the annual flight operations by aircraft type and grouping of operation. The MV-22 aircraft would have the highest percentage of flight operations (40 percent) with the largest portion from departure and arrival operations. The KC-130J would have the next highest percentage of flight operations at approximately 11 percent.

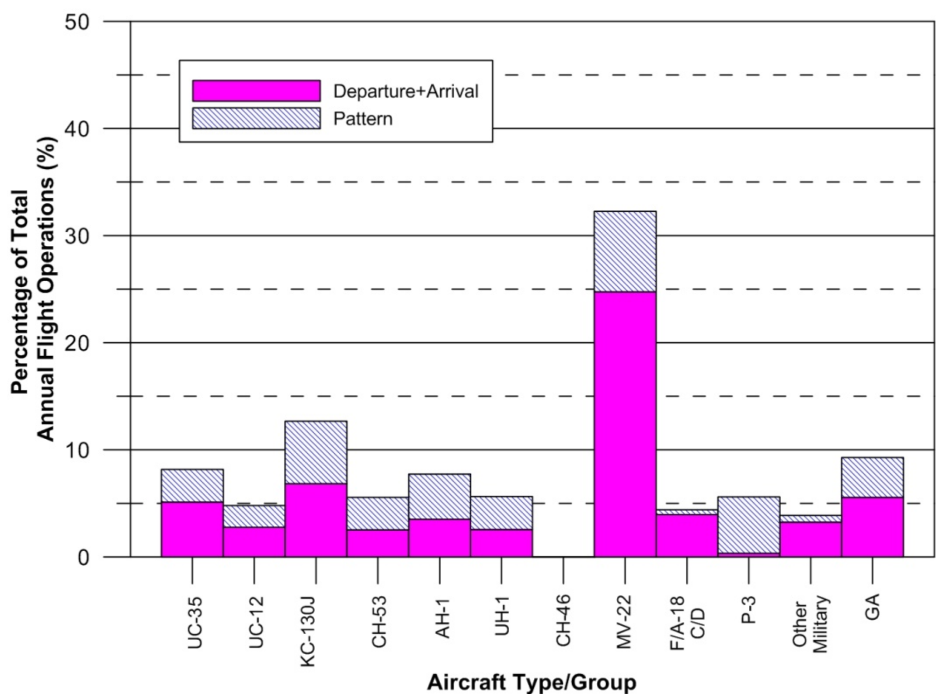

Figure 3-10 Mix of Proposed Flight Operations at MCAS Futenma

Table 3-7 Proposed Annual Flight Operations for MCAS Futenma

Based or Transient	Aircraft Category	Aircraft Type	Departure Day (0700-1900)	Departure Eve (1900-2200)	Departure Night (2200-0700)	Departure Total	Non Break Visual Arrival Day (0700-1900)	Non Break Visual Arrival Eve (1900-2200)	Non Break Visual Arrival Night (2200-0700)	Non Break Visual Arrival Total	Instrument Arrival Day (0700-1900)	Instrument Arrival Eve (1900-2200)	Instrument Arrival Night (2200-0700)	Instrument Arrival Total
Based	Navy / Marine	UC-35W	510	23	-	533	30	6	1	37	250	232	14	496
Based	Navy / Marine	UC-12B/F	273	14	-	287	3	1	1	5	173	104	5	282
Based	Navy / Marine	KC-130J(6)	608	102	-	710	25	13	5	43	503	149	13	665
Based	Navy / Marine	CH-53E	152	111	-	263	140	96	9	245	9	6	-	15
Based	Navy / Marine	AH-1W	211	154	-	365	195	134	13	342	12	8	-	20
Based	Navy / Marine	UH-1N	154	112	-	266	142	98	10	250	9	6	-	15
Based	Navy / Marine	CH-46E	-	-	-	-	-	-	-	-	-	-	-	-
Based	Navy / Marine	MV-22B (7)	1,741	745	86	2,572	296	119	22	437	383	154	28	565
Transient	Navy / Marine	FA-18C/D(2)	341	69	-	410	175	19	-	194	21	-	-	21
Transient	Navy / Marine	P-3	36	-	-	36	18	-	-	18	17	-	-	17
Transient	Other Military(3)		252	83	2	337	52	-	-	52	209	55	6	270
Transient	Air Carrier(4)		-	-	-	-	-	-	-	-	-	-	-	-
Transient	General Aviation(5)		511	57	-	568	511	57	-	568	15	4	-	19
Totals	**Based**		3,649	1,261	86	4,996	831	467	61	1,359	1,339	659	60	2,058
Totals	**Transient**		1,140	209	2	1,351	756	76	-	832	262	59	6	327
Grand Total			4,789	1,470	88	6,347	1,587	543	61	2,191	1,601	718	66	2,385

Based or Transient	Aircraft Category	Aircraft Type	Break Arrival Day (0700-1900)	Break Arrival Eve (1900-2200)	Break Arrival Night (2200-0700)	Break Arrival Total	Touch and Go(1) Day (0700-1900)	Touch and Go(1) Eve (1900-2200)	Touch and Go(1) Night (2200-0700)	Touch and Go(1) Total	GCA Box(1) Day (0700-1900)	GCA Box(1) Eve (1900-2200)	GCA Box(1) Night (2200-0700)	GCA Box(1) Total	**Total Day (0700-1900)**	**Total Eve (1900-2200)**	**Total Night (2200-0700)**	**Total**
Based	Navy / Marine	UC-35W	-	-	-	-	319	60	-	379	248	5	-	253	1,357	326	15	1,698
Based	Navy / Marine	UC-12B/F	1	-	-	1	266	18	-	284	127	9	-	136	843	146	6	995
Based	Navy / Marine	KC-130J(6)	4	-	-	4	1,045	95	-	1,140	64	7	-	71	2,249	366	18	2,633
Based	Navy / Marine	CH-53E	2	-	-	2	247	89	-	336	231	64	-	295	781	366	9	1,156
Based	Navy / Marine	AH-1W	3	-	-	3	343	124	-	467	322	89	-	411	1,086	509	13	1,608
Based	Navy / Marine	UH-1N	2	-	-	2	250	91	-	341	234	65	-	299	791	372	10	1,173
Based	Navy / Marine	CH-46E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Based	Navy / Marine	MV-22B (7)	1,069	428	73	1,570	192	79	11	282	869	351	60	1,280	4,550	1,876	280	6,706
Transient	Navy / Marine	FA-18C/D(2)	195	-	-	195	73	15	-	88	7	-	-	7	812	103	-	915
Transient	Navy / Marine	P-3	-	-	-	-	911	-	-	911	182	-	-	182	1,164	-	-	1,164
Transient	Other Military(3)		13	2	-	15	107	9	-	116	13	2	-	15	646	151	8	805
Transient	Air Carrier(4)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient	General Aviation(5)		-	-	-	-	685	78	-	763	9	-	-	9	1,731	196	-	1,927
Totals	**Based**		1,081	428	73	1,582	2,662	556	11	3,229	2,095	590	60	2,745	11,657	3,961	351	15,969
Totals	**Transient**		208	2	-	210	1,776	102	-	1,878	211	2	-	213	4,353	450	8	4,811
Grand Total			1,289	430	73	1,792	4,438	658	11	5,107	2,306	592	60	2,958	16,010	4,411	359	20,780

Note:

(1) Counted as two operations; 1 circuit = 1 departure + 1 arrival = 2 operations
(2) FA-18C/D ops totals provided by MCAS Futenma (13 Oct 2011)
(3) Includes primarily C-12, as well as KC-135, C-5, H-60, F-15, C-20, C-40, KC-10, and C-17 (modeled as UC-12B/F)
(4) Previously supported UDP and OIF
(5) Includes Dauphin, Eurocopter, Jet Ranger, Bell 500, Islander, C-172, and XL-2, (Not Modeled)
(6) Minimal break Arrival for UC-35, UC-12W, KC-130J, CH-53, AH-1W, UH-1N, CH-46E, and Other Military considered insignificant and not modeled
(7) Operations based on USMC Core Competency Resource Model and Training and Readiness Manual requirements; LtCol Holden, October 2010
(8) All break arrivals listed above modeled at MCAS Futenma; Up to 2 percent of MV-22 Break arrivals shown above would be conducted at MCAS Iwakuni
All FCLP operations will be conducted at ISTF; departures and arrival operations account for off-site FCLP missions

3.5.2 Runway and Local Airspace/Flight Track Utilization

Runway utilization percentages would not change relative to Baseline scenario for the Proposed scenario. The MV-22 is able to operate as both a VTOL (Vertical Take-off and Landing) mode, similar to a helicopter, and an airplane mode so it would utilize both fixed- and rotary-wing flight tracks from the runway along with the shaded flight tracks listed in Table 3-8. The MV-22 flight track usage percentages were provided by the USMC (Reiffer 2011) and are contained in Table A-5 of Appendix A. The MV-22 would operate on both helicopter and fixed-wing flight tracks. The MV-22 would conduct 80 and 77 percent of departures and non-break arrivals, respectively, along fixed-wing flight tracks very similar to the KC-130J with the remaining events occurring on helicopter tracks used by the CH-46E. The MV-22 T&G pattern operations would favor the fixed-wing tracks with 58 and 42 percent on the fixed-wing and helicopter flight tracks, respectively. The MV-22 would exclusively conduct GCA Box patterns on fixed-wing flight tracks.

Table 3-8 List of Modeled Flight Tracks for Proposed Scenario

Op Type	Runway ID	Flight Track ID	Flight Track Description
Departure	06	06D1	Helo departure to Point Kilo
		06D2B	Helo departure to Point Sierra
		06D3	ADDAN ONE
		06D4B	South
		06D5	Standard Instrument Departure SE
		06D6	Standard Instrument Departure NE
	24	24D1	Helo departure to Point Tango
		24D2B	Helo departure to Point Sierra
		24D3	ADDAN ONE
		24D4	CHINEN ONE
		24D5	Standard Instrument Departure South
Nonbreak Arrival	06	06A1	Helo arrival from Point Kilo
		06A2B	Helo arrival from Point Sierra
		06A3	Copter TACAN 040
		06A4	Straight-in Visual
	24	24A1	Helo arrival from Point Tango
		24A2B	Helo arrival from Point Sierra
		24A3	Copter TACAN 24
		24A4	Straight-in Visual
Instrument Arrival	06	06A5	TACAN Y
		06A6	TACAN Z
	24	24A5	TACAN
Overhead Break Arrival	06	06O1A	from SW; break at downwind numbers
		06O2A	from SW; break at midfield
		06O1A	from SW; break at upwind numbers
		06O1B	from SE; break at downwind numbers
		06O2B	from SE; break at midfield
		06O3B	from SE; break at upwind numbers
	24	24O1	break at downwind numbers
		24O2	break at midfield
		24O3	break at upwind numbers
Touch and Go	06	06T1	Helo, 0.4nm abeam, 0.6 nm downwind to runway
		06T2	Helo, 0.4nm abeam, 0.6 nm downwind to CAL
		06T3	Fixed Wing, circle southeast of runway
	24	24T1	Helo, 0.4nm abeam, 0.6 nm downwind to runway
		24T2	Fixed Wing, circle southeast of runway
GCA Box	06	06G1	Helo Radar Pattern, 3 nm abeam, 7.4 nm downwind
		06G2	Fixed Wing pattern over Naha
		06G3	Tiltrotor pattern around Naha
	24	24G1	Helo Radar Pattern, 3 nm abeam, 7.4 nm downwind
		24G2	Fixed Wing pattern

3.5.3 Flight Performance Profiles

The MV-22 flight profiles were developed for the applicable flight tracks with guidance from the USMC and the representative flight profiles are presented in Appendix B (Holden 2011a).

3.5.4 Modeled Flight Events

The computation of the modeled AAD day, evening and night events for each profile is accomplished by multiplying the annual operations in Table 3-6 by the corresponding runway and track utilization percentages (in Tables A-1 through A-5 of Appendix A), dividing the annual track/profile operations by 365 and further dividing closed-pattern (e.g., touch-and-go) operations by 2. The resultant modeled average daily numbers of events are shown in Tables A-6 through A-8 of Appendix A. There would be approximately 16 annual average daily flight events for the MV-22 for a total of approximately 40 annual average daily flight events modeled for the proposed conditions.

3.5.5 Maintenance Run-up Operations

Table 3-9 lists the modeled maintenance run-up activities for the Proposed Action scenario. The table includes the aircraft type, the engine type, location, magnetic heading, the number of annual operations by CNEL/WECPNL day, evening and night, the power setting, and duration in minutes at each power setting. Table 3-9 is identical to the run-up operations modeled for the Baseline scenario but with CH-46 run-up events removed and the addition of MV-22 "low work" run-up events (Holden 2011a). Figure 3-5 shows the run-up locations listed in the table which would be identical to the locations modeled for the Baseline scenario.

Table 3-9 Modeled Maintenance Run-up Operations at MCAS Futenma for Proposed Scenario

Aircraft	Engine Type	Modeled Aircraft / Engine (if different)	Location ID	Magnetic Heading (deg)	Annual Events				Reported Power Setting	Duration at Power Setting (Minutes)	Number of Engines Running Simul-taneously	Modeled Power Setting (If Different Than Reported)
					Events	% Day (0700-1900)	% Evening (1900-2200)	% Night (2200-0700)				
CH-53E	T-64-GE - 461A	--	Flightline	60	96	90%	10%	-	Idle	30	1	GND Idle
									Rated Pwr (3700-4750 shp)	30	1	GND Max
									Military	15	1	GND Max
UH-1N	T-400	UH-1M (T53-L-13)	Flightline	60	72	90%	10%	-	Idle	30	1	ige lite
									Rated Pwr (850-950 shp)	60	1	oge lite
AH-1W	T-700-GE-701	--	Flightline	60	144	90%	10%	-	Idle	30	1	idl
									Rated Pwr	60	1	oge load
UC-12F	PT6A-42	--	C-12	60 (80%); 230 (20%)	340	80%	20%	-	Idle	10	2	--
									85%	5	2	90% Torque
UC-35	PW535	T-1 (JT15D-5D)	Flightline	60 (80%); 230 (20%)	72	80%	20%	-	Idle	10	2	
									Takeoff Power	5	2	Max Cont
KC-130J	AE2100D3	C-130H&N&P (T56-A-15)	Spot 3	60	52	80%	20%	-	Hi-power (9600 IN-LBS)	1.5	2	--
MV-22B (1)	T406/ AE1107C	CH-53E	Spot 3	60	154	100%	0%	-	Low work	7	2	--
			CALA Site	60	77				Low work	7	2	--
			Slide on Area	60	26				Low work	7	2	--

Note: (1) No Static noise data available for MV-22; modeled as CH-53E in-frame

3.5.6 Proposed Scenario Noise Exposure

Using the data described in Sections 3.5.1 through 3.5.5, the NOISEMAP suite was used to calculate and plot the 65 dB through 85 dB CNEL contours and the 75 dB to 100 dB WECPNL contours for the AAD operations for MCAS Futenma. Figures 3-11 and 3-12 show the CNEL and WECPNL contours, respectively.

Similar to Baseline, Figure 3-11 shows that 65 dB CNEL would extend slightly further to approximately 3,500 feet to the southwest of the MCAS Futenma boundary. The small increase in size of the 65 dB contour would be due to the addition of the MV-22 overhead break arrivals. The 65 dB contour to the north of MCAS Futenma would change slightly in shape but remain approximately the same size due to the addition of the MV-22 which has different flight track utilization than the baseline CH-46 it is replacing. Overall, the Proposed CNEL noise exposure would not greatly change relative to the Baseline CNEL noise exposure because the FA-18C/D would remain the dominant noise source.

The 80 dB WECPNL would extend approximately 3,400 feet southwest beyond the MCAS Futenma boundary due to a combination of the FA-18C/D arrivals and the arrival portion of MV-22 GCA box patterns to Runway 06. At the southwestern extent of the 80 dB WECPNL contour, the MV-22 is converting from airplane mode as it slows to prepare for landing. In this configuration the MV-22 is slightly greater in terms of L_{max} than the CH46 it is replacing and would cause a slight increase of 1 to 2 PNdB WECPNL in this area. The FA-18C/D would continue to dominate the rest of the noise environment with no significant increases in WECPNL noise exposure for the Proposed scenario.

CNEL and WECPNL exposure was calculated for each of the 17 POIs and tabulated in Table 3-5. Of the 17 POI, Futenma Dai Ni Elementary School would remain the site exposed to the highest CNEL and WECPNL of 68 dB and 81 PNdB, respectively because of its proximity to the end of Runway 06. The primary contributor to the CNEL and WECPNL at this location remains the transient FA-18C/D departures because of the aircraft's proximity to the POI during takeoffs. The remaining 16 POI would be exposed to less than 65 dB CNEL and less than 80 dB WECPNL. No locations would experience any increases in CNEL but five locations would experience an increase of 1 to 2 PNdB WECPNL. The increases in WECPNL would be due to the (introduced) MV-22 overhead break arrivals and a tonal component of those operations affecting the WECPNL but not the A-weighted CNEL. Four locations (Mineidaini Hospital, Okinawa Hospital, Oyama Elementary School and Tayaki Hospital) would experience a decrease in CNEL of 1 to 3 dB and 0 to 2 PNdB WECPNL relative to the Baseline scenario.

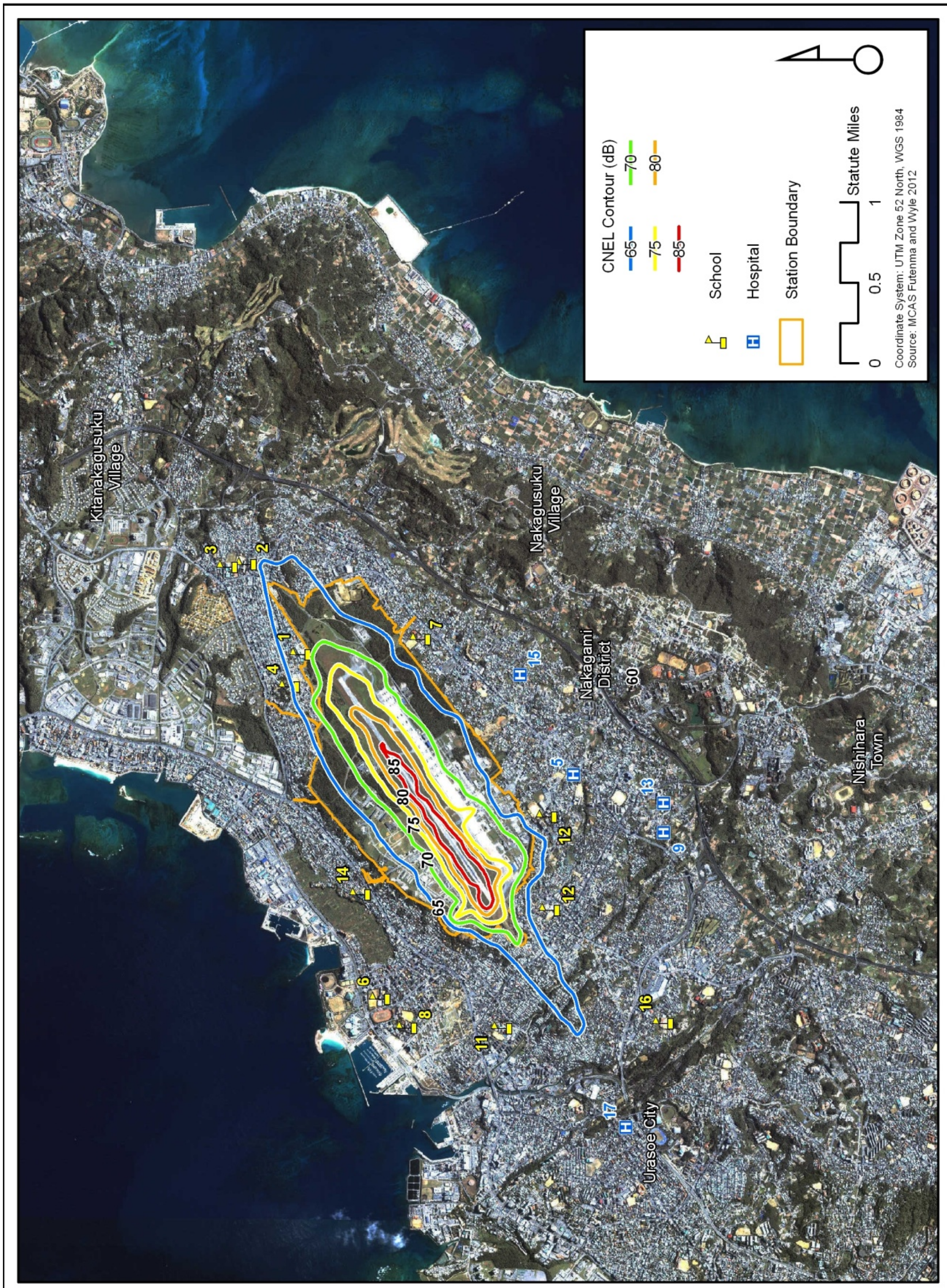

Figure 3-11 Aircraft CNEL Contours for Proposed Average Daily Operations at MCAS Futenma

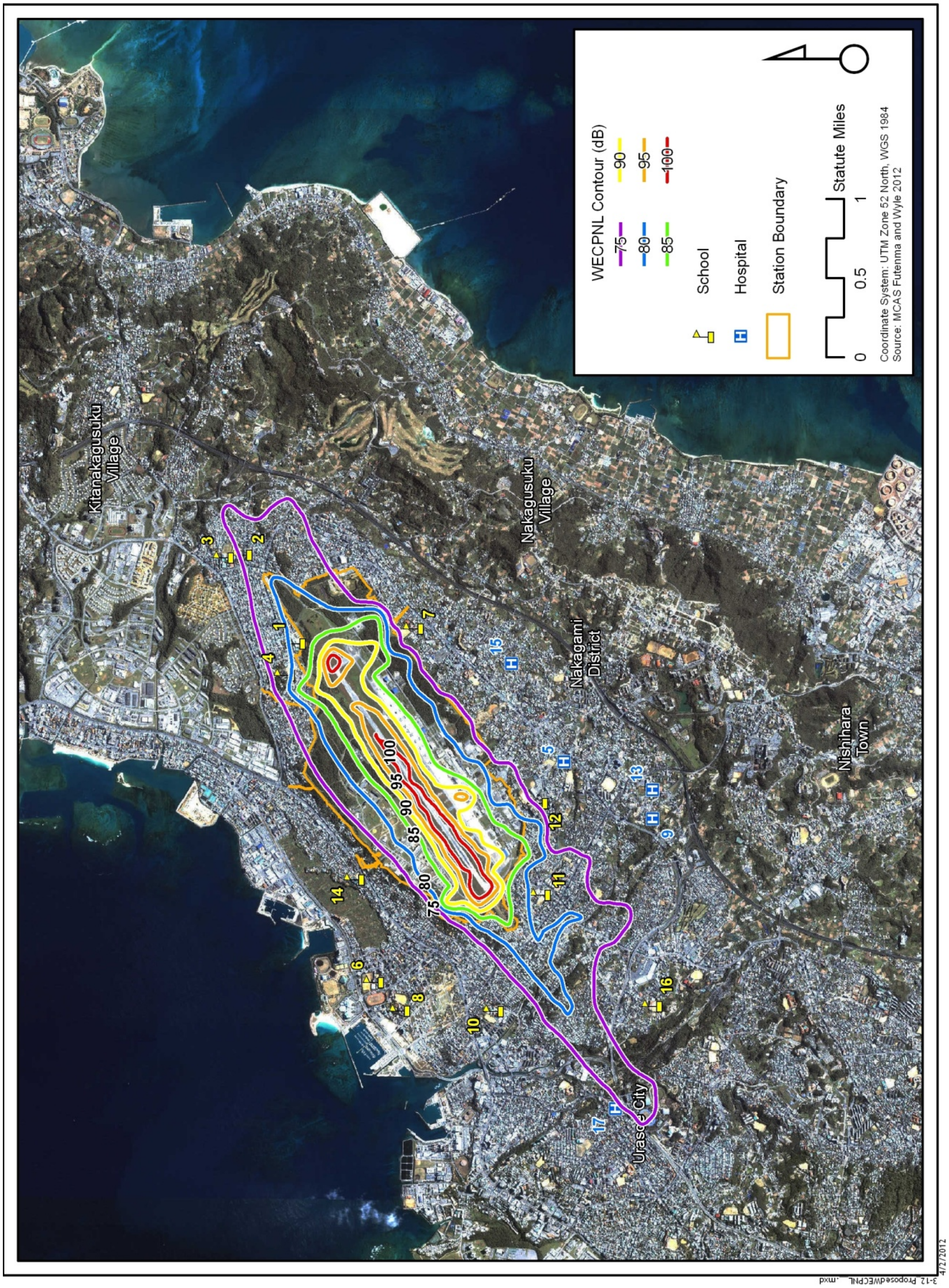

Figure 3-12 Aircraft WECPNL Contours for Proposed Average Daily Operations at MCAS Futenma

Table 3-10 Estimated Noise Exposure at POI for MCAS Futenma for Proposed Scenario

Point of Interest		CNEL (dBA)		WECPNL (PNdB)	
ID	Description	Proposed	Change re Baseline	Proposed	Change re Baseline
1	Futenma Dai Ni Elementary School	68	0	81	0
2	Futenma Elementary School	63	0	76	1
3	Futenma High School	60	0	72	0
4	Futenma Junior High School	65	0	78	0
5	Ginowan Hospital School	54	0	65	0
6	Ginowan High School	51	0	64	1
7	Ginowan Junior High School	60	0	72	0
8	Mashiki Junior High School	51	0	64	2
9	Mineidaini Hospital	52	-3	65	-1
10	Ojana Elementary School	56	0	70	2
11	Okinawa Catholic Elementary	61	0	77	0
12	Okinawa International University	58	0	70	0
13	Okinawa Hospital	52	-3	64	-2
14	Oyama Elementary School	57	-1	69	0
15	Tayaki Hospital	54	-1	65	-1
16	Toyama Elementary School	57	0	70	1
17	Urasoe General Hospital	59	0	73	2

SECTION 4

Ie Shima Training Facility

The following four subsections present ISTF geographic setting, its basic operational profile, the results for the Baseline scenario and results for the Proposed scenario.

4.1 Local Setting

As shown in Figure 1-1, ISTF is on the island of Ie Jima approximately 30 miles north of MCAS Futenma. The island is sparsely populated with most residences located 2 miles east of the ISTF.

4.2 Operational/Mission Profile

ISTF is currently utilized for FCLP, Forward Arming and Refueling Point (FARP) training operations and CAL training for aircraft based at MCAS Futenma and other DoD installations. Each sortie to ISTF typically conducts an average of seven FCLP patterns to the simulated Landing Helicopter Amphibious (LHA) deck at ISTF (i.e., 14 operations in addition to the initial approach and final departure).

4.3 Baseline Scenario

The following six subsections present the baseline (CY2010) annual flight operations, runway utilization and flight track utilization, flight profiles, average daily flight events, run-ups and resultant noise exposure, respectively.

4.3.1 Annual Flight Operations

Table 4-1 shows the annual flight operations by category, aircraft type and period of day. Total annual flight operations comprise 6,204 including arrivals to ISTF, LHA T&G patterns, and departures from ISTF provided by the USMC (Hernandez 2012b). The temporal distribution of ISTF operations are consistent with the helicopter training requirements with 49, 44, and 7 percent occurring during CNEL/WECPNL day, evening, and nighttime periods, respectively.

Figure 4-1 depicts the percentages of total operations by each modeled aircraft type. The CH-46E and the CH-53E account for approximately 47 and 16 percent of the annual operations at ISTF, respectively. Approximately 87 percent of the operations at ISTF are patterns with the remaining 13 percent split equally between arrivals and departures.

Table 4-1 Annual Flight Operations at ISTF for Baseline Scenario

Category	Aircraft type	Location	Arrivals				Touch and Go [1]				Departures				Total			
			Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total
MCAS Futenma	CH-53E	LZ/RWY	21	18	3	42	294	252	42	588	21	18	3	42	336	288	48	672
		LHA	10	9	1	20	140	126	14	280	10	9	1	20	160	144	16	320
	AH-1W	LZ/RWY	11	9	2	22	154	126	28	308	11	9	2	22	176	144	32	352
		LHA	5	4	1	10	70	56	14	140	5	4	1	10	80	64	16	160
	UH-1N	LZ/RWY	6	5	1	12	84	70	14	168	6	5	1	12	96	80	16	192
		LHA	2	2	-	4	28	28	-	56	2	2	-	4	32	32	-	64
	CH-46E	LZ/RWY	65	56	9	130	910	784	126	1,820	65	56	9	130	1,040	896	144	2,080
		LHA	25	22	3	50	350	308	42	700	25	22	3	50	400	352	48	800
Transient	KC-130J	RWY	25	21	3	49	350	294	42	686	25	21	3	49	400	336	48	784
	AV-8B	LHA	30	26	4	60	240	364	56	660	30	26	4	60	300	416	64	780
Totals			200	172	27	399	2,620	2,408	378	5,406	200	172	27	399	3,020	2,752	432	6,204

Note:

(1) 7 pattern passes per sortie except AV-8 with 4; 1 departure and 1 arrival per sortie

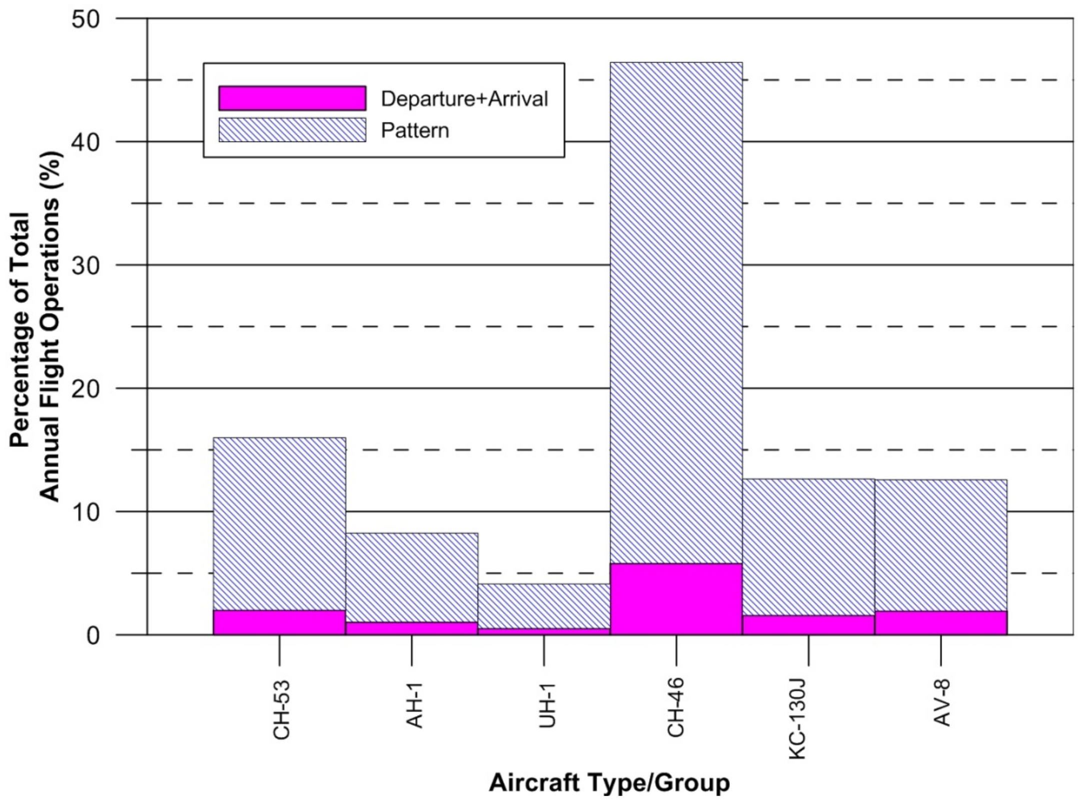

Figure 4-1 Mix of Baseline Flight Operations at ISTF

4.3.2 Runway and Local Airspace/Flight Track Utilization

The ISTF has one runway 5,000 feet in length designated 05/23 (Coral Runway) and a simulated LHA deck with a pad of 800 feet in length designated for this study as 05LHA (for the 50 degree heading). Table 4-2 lists the modeled flight tracks for the ISTF depicted in Appendix A. Flight tracks for the Coral Runway along the 230 degree heading were not modeled because their use is minimal.

Flight track utilization is listed in Table A-9 of Appendix A. The FCLP operations conducted at the ISTF utilize the simulated LHA deck. Helicopters typically approach the simulated LHA deck or LZs on Ie Jima from the southwest. Helicopters commonly perform seven FCLP patterns per visit to ISTF and may also conduct several approaches/landings at the ISTF LZs. The AV-8B conducts FCLP patterns to the simulated LHA deck. The KC-130J conducts Touch and Go patterns at the Coral Runway with the pattern flown over the ocean to the west of ISTF.

Table 4-2 List of Modeled Flight Tracks at ISTF

Aircraft Type	Op Type	Runway	Flight Track	
			ID	Description
Rotary-Wing	Arrival	Coral Runway	05A1	Arrival to Ie Shima runway
	FCLP	LHA Deck	05LF	Left-hand FCLP Pattern
	Departure	Coral Runway	05D1	Departure from Ie Shima runway
AV-8B	Arrival	LHA Deck	05LHA1	Break arrival to LHA Deck
	T&G	LHA Deck	05LHF	Left-hand FCLP Pattern
	Departure	LHA Deck	05D1	Short Takeoff Departure from LHA Deck
KC-130J	Arrival	Coral Runway	05A2	Straight-in arrival to Ie Shima runway
	T&G	Coral Runway	05T1	Touch and go pattern on runway
	Departure	Coral Runway	05D2	Departure from Ie Shima runway

4.3.3 Flight Performance Profiles

The FCLP pattern was modeled with a pattern altitude of 300 feet AGL for helicopters and 600 feet AGL for the AV-8B. The KC-130J Touch and Go pattern is modeled at 1,000 feet AGL. All flight profiles are shown in Appendix B.

4.3.4 Modeled Flight Events

The computation of the modeled AAD day, evening and night events for each profile is accomplished by dividing the track operations by 365 and further dividing closed-pattern operations (e.g., T&G, FCLP and GCA Box) by 2[7]. The resultant numbers of events are presented in Table A-10 of Appendix A. ISTF AAD events total approximately 7 and 2 for helicopters and fixed-wing aircraft, respectively.

[7] The closed-pattern operations are divided by two for noise modeling purposes only. ATC counts closed patterns as two distinct operations: one departure and one arrival. In NOISEMAP and RNM, the departure and arrival are represented by one event because both operations are connected (i.e., on a single flight track).

4.3.5 Maintenance Run-up Operations

No run-up operations occur at the ISTF thus none were modeled.

4.3.6 Baseline Scenario Noise Exposure

Using the data described in Sections 4.3.1 through 4.3.5, the NOISEMAP suite was used to calculate and plot the 65 dB through 85 dB CNEL contours for the AAD operations for the ISTF. Figure 4-2 shows the CNEL contours.

The 65 dB CNEL contours extend beyond the boundary over the ocean to the north and west following the FCLP track flown by the AV-8B. A small portion of the 65 dB CNEL extends over land approximately 500 beyond the southern boundary. The AV-8B is considerably greater in terms of SELthan the other model aircraft at ISTF and dominates the noise exposure environment.

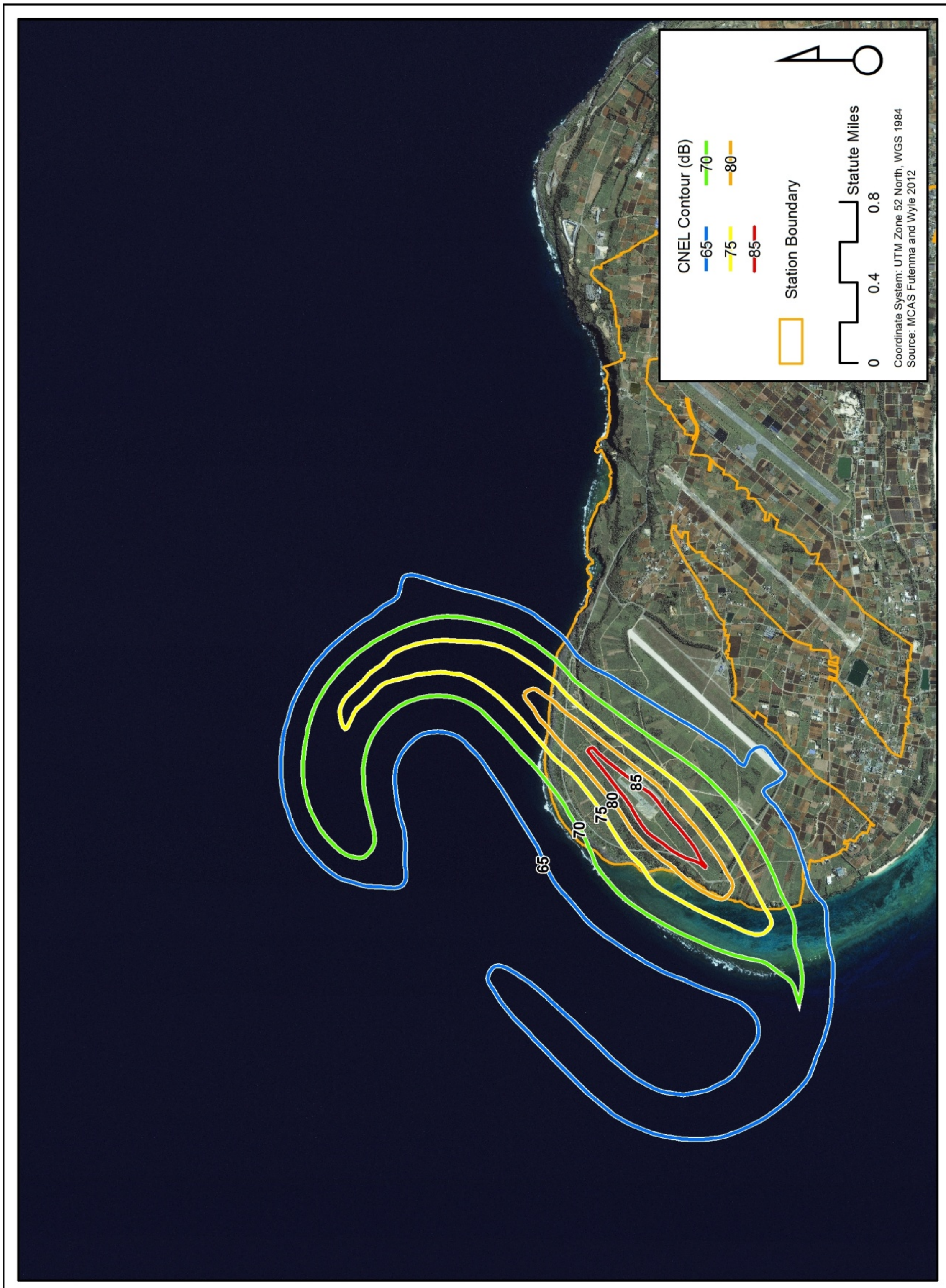

Figure 4-2 Aircraft CNEL Contours for Baseline Average Daily Operations at ISTF

4.4 Proposed Scenario

The following six subsections present the Proposed (FY2012) annual flight operations, runway utilization and flight track utilization, flight profiles, average daily flight events, run-ups and resultant noise exposure, respectively, for ISTF. The squadrons are planned to begin to arrive in late FY2012. Both squadrons will not be operating for the whole of FY2012, but FY2012 was assumed for modeling purposes.

4.4.1 Annual Flight Operations

Table 4-3 shows the annual flight operations by category, aircraft type and period of day. The annual flight operations are identical to those for the Baseline scenario except all 2,880 CH-46 operations would be replaced by 6,760 MV-22 operations. Temporal distribution of the MV-22 FCLP operations is consistent with the baseline helicopter operations of 50, 43, and 7 percent occurring during CNEL/WECPNL day, evening, and nighttime, respectively.

Figure 4-3 depicts the percentages of total operations by each modeled aircraft type. The MV-22 would account for approximately 67 percent of the annual operations at ISTF. Similar to baseline, approximately 87 percent of the operations at ISTF are patterns with the remaining 13 percent split equally between arrivals and departures.

4.4.2 Runway and Local Airspace/Flight Track Utilization

Runway utilization for the MV-22 would match the baseline helicopters and function in the same manner as listed in Table A-9 of Appendix A. The MV-22 would utilize the same runway/LHA deck as the helicopters and the same flight tracks with identical utilization percentages.

4.4.3 Flight Performance Profiles

The MV-22 flight profiles were developed for the applicable flight tracks with guidance from USMC and representative flight profiles are presented in Appendix B. The MV-22 would fly at the same 300 ft pattern altitude as the baseline helicopters and at similar speeds.

Table 4-3 Annual Flight Operations at ISTF for Proposed Scenario

Category	Aircraft Type	Location	Arrivals Day (0700 - 1900)	Arrivals Eve (1900 - 2200)	Arrivals Night (2200 - 0700)	Arrivals Total	Touch and Go (1) Day (0700 - 1900)	Touch and Go (1) Eve (1900 - 2200)	Touch and Go (1) Night (2200 - 0700)	Touch and Go (1) Total	Departures Day (0700 - 1900)	Departures Eve (1900 - 2200)	Departures Night (2200 - 0700)	Departures Total	Total Day (0700 - 1900)	Total Eve (1900 - 2200)	Total Night (2200 - 0700)	Total Total
MCAS Futenma	CH-53E	LZ/RWY	21	18	3	42	294	252	42	588	21	18	3	42	336	288	48	672
		LHA	10	9	1	20	140	126	14	280	10	9	1	20	160	144	16	320
	AH-1W	LZ/RWY	11	9	2	22	154	126	28	308	11	9	2	22	176	144	32	352
		LHA	5	4	1	10	70	56	14	140	5	4	1	10	80	64	16	160
	UH-1N	LZ/RWY	6	5	1	12	84	70	14	168	6	5	1	12	96	80	16	192
		LHA	2	2	-	4	28	28	-	56	2	2	-	4	32	32	-	64
	CH-46E	LZ/RWY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		LHA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	MV-22B	LZ/RWY	132	114	18	264	1,850	1,594	256	3,700	132	114	18	264	2,114	1,822	292	4,228
		LHA	79	70	9	158	1,108	975	133	2,216	79	70	9	158	1,266	1,115	151	2,532
Transient	KC-130J	RWY	25	21	3	49	350	294	42	686	25	21	3	49	400	336	48	784
	AV-8B	LHA	30	26	4	60	240	364	56	660	30	26	4	60	300	416	64	780
Totals			321	278	42	641	4,318	3,885	599	8,802	321	278	42	641	4,960	4,441	683	10,084

Note:

(1) 7 pattern passes per sortie except AV-8 with 4; 1 departure and 1 arrival per sortie

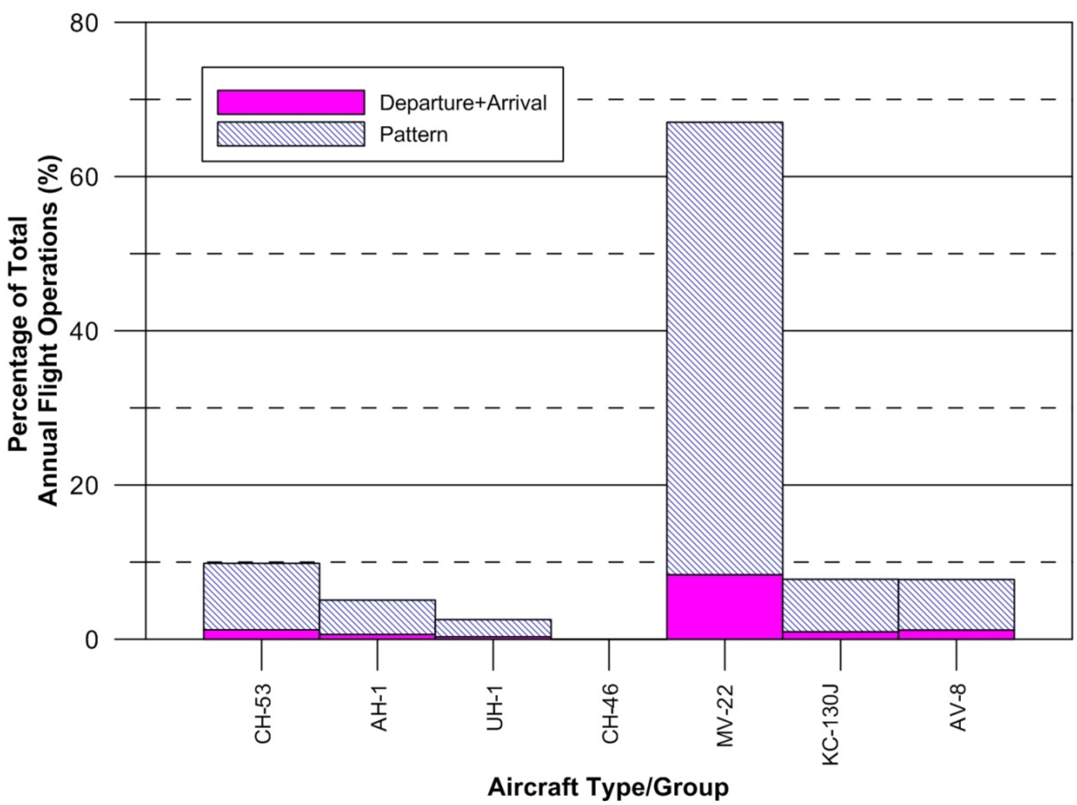

Figure 4-3 Mix of Proposed Flight Operations at ISTF

4.4.4 Modeled Flight Events

The modeled AAD at the ISTF were computed with the same method used for Baseline scenario event development and results in approximately 10 AAD events for the MV-22 for a total of nearly 16 ISTF AAD events, shown in Table A-11 of Appendix A.

4.4.5 Maintenance Run-up Operations

Consistent with the Baseline scenario, no run-up operations are anticipated at the ISTF thus none were modeled.

4.4.6 Proposed Scenario Noise Exposure

Using the data described in Sections 4.4.1 through 4.4.5, the NOISEMAP suite was used to calculate and plot the 65 dB through 85 dB CNEL contours for the AAD operations for the ISTF. Figure 4-4 shows the CNEL contours, respectively.

Similar to Baseline, the 65 dB CNEL contours extend beyond the boundary over the ocean to the north and west following the FCLP track flown by the AV-8B. A small portion of the 65 dB CNEL would extend over land less than 1,000 ft beyond the southern boundary. There would be no significant changes in the noise exposure because the AV-8B would continue to dominate the noise exposure environment at ISTF.

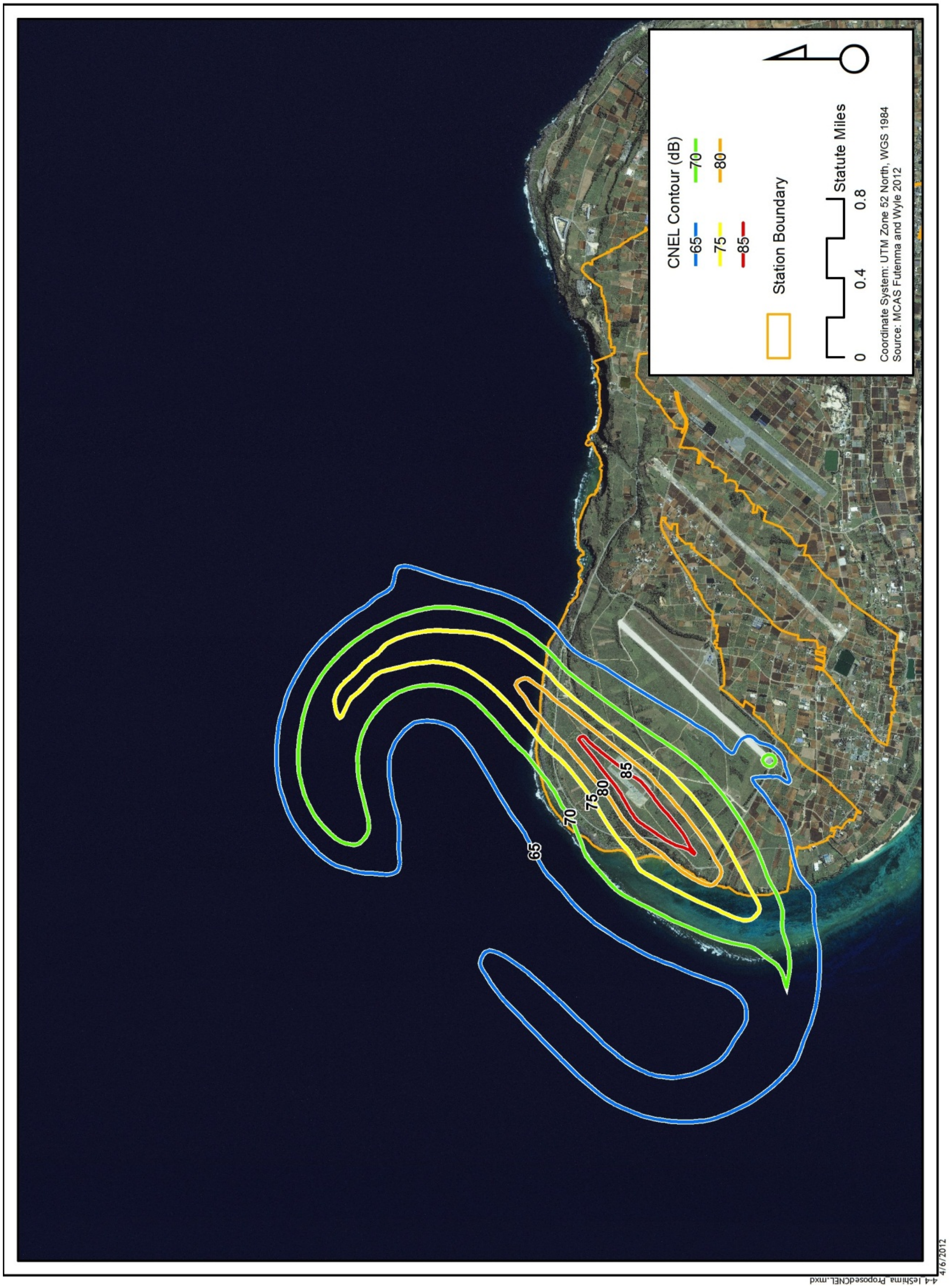

Figure 4-4 Aircraft CNEL Contours for Proposed Average Daily Operations at ISTF

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SECTION 5

Associated Airspace

The aircraft based on the island of Okinawa utilize airspace in the Central and Northern Training Areas planned for use by the MV-22. Section 5.1 through 5.4 describes the use of the airspace and the associated aircraft noise exposure.

5.1 Regional and Local Settings

The CTA and the NTA[8] are located on Okinawa approximately 20 and 40 miles northeast of MCAS Futenma, respectively. The geographic areas encompassed by the CTA and the NTA are hilly mountainous terrain covered with dense forests or jungle. Much of the land is undeveloped (i.e., it is sparsely populated) with agricultural areas along the southeast portions of the CTA. Each area contains LZs. Of the 24 modeled LZs, 14 are located in the CTA and 10 in the NTA.

5.2 Baseline Scenario and Noise Exposure

The following two subsections describe the Baseline flight activity and resultant noise exposure.

5.2.1 Annual Flight Operations, Flight Areas and Tracks

Both the CTA and the NTA are currently utilized for helicopter CAL practice by aircraft based at MCAS Futenma. According to information provided by MCAS Futenma-based helicopter pilots during the May 2010 site visit, use of CTA and the NTA is approximately equal with a total of 4,400 CAL sorties as shown in Table 5-1. The largest user of the CTA and the NTA is the CH-46 with approximately 55 percent of total sorties. The AH-1W has different training requirements and generally does not land at LZs but does operate in the CTA and NTA. The AH-1W sorties are included in the table but only 10 percent of sorties were modeled with landing components.

Based on the T&R manuals, helicopter pilots must conduct approximately half of their CAL training during darkness as a training requirement. Darkness does not directly correspond to any of the CNEL periods but most of evening and all of night was considered darkness. Based upon this requirement, MCAS Futenma personnel estimated that 47, 50 and 3 percent of training at the CTA and NTA occur during CNEL day, evening, and nighttime periods, respectively. This temporal distribution is consistent with MCAS Futenma operations.

Table 5-1 Annual CAL Sorties in Associated Airspace for Baseline Scenario

Aircraft Type	Central Training Area				Northern Training Area				Total			
	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total
CH-53E	200	190	10	400	200	190	10	400	400	380	20	800
AH-1W (1)	200	190	10	400	200	190	10	400	400	380	20	800
UH-1N	100	90	10	200	100	90	10	200	200	180	20	400
CH-46E	600	540	60	1,200	600	540	60	1,200	1,200	1,080	120	2,400
Totals	**1,100**	**1,010**	**90**	**2,200**	**1,100**	**1,010**	**90**	**2,200**	**2,200**	**2,020**	**180**	**4,400**

Notes:

(1) AH-1W sorties operating within the airspace do not generally land at LZs; 10% modeled with a landing

[8] also known as the Jungle Warfare Training Center

Including ingress/egress to/from MCAS Futenma, a typical sortie may last approximately one hour with 30 minutes modeled at each LZ and 30 minutes transiting through the intervening airspace. Modeled ingress/egress routes to the CTA are shown in Figure 5-1 as provided by MCAS Futenma helicopter pilots. Each aircraft sortie performs one ingress flight and one egress flight for a total of 2 operations. The NTA does not have a commonly flown route for ingress/egress thus none was modeled. While pilots are training within the CTA or the NTA, pilots will transit through the airspace and typically perform five to seven approaches and/or landings to several LZs. To account for this, aircraft were modeled transiting the airspace at 300 to 1,000 feet AGL within the large modeled areas shown in Figures 5-1 and 5-2 labeled as "transit area" for duration of 30 minutes per sortie. The transit area for the CTA is their primary area covering most of the LZs. The approaches to each LZ were modeled within a square area 800 feet by 800 feet centered on each LZ with the aircraft between 50 feet AGL and the ground for a duration of 30 minutes per sortie.

It was not practical from a modeling standpoint to analyze the more than 60 potential LZs. Instead, a more conservative approach was taken to model all of the operations occurring at the most commonly used LZs. Table 5-2 lists the LZs considered for the study which were categorized as frequent or average use. Approximately 90 percent of operations were modeled at frequent use LZ sites and the remaining 10 percent the average use LZ sites. Operations were distributed equally among the LZs within each of the two categories. Additional LZ sites that are not listed in table 5-2 are utilized by the USMC but were considered rare use and are not modeled for this analysis. Each sortie includes five to seven operations which may be conducted at the same LZ or performed at several different sites. The modeling details for CAL operations in the CTA and NTA are shown on Tables A-13 and A-14 of Appendix A for the CTA and NTA, respectively. The airspace flight profile altitudes and speeds were provided by MCAS Futenma helicopter pilots during the May 2010 site visit.

In addition to the CAL exercises, helicopters also conduct Terrain Flight (TERF) exercises in the NTA. TERF utilizes terrain and vegetation to enhance survival by reducing the enemy's ability to visually and electronically acquire and target the aircraft. TERF requires low level, contour, and nap-of-the-earth flights flown at decreasing airspeeds commensurate with the lower altitudes flown. Altitudes are relatively low and vary from 200 feet AGL to 10 feet above the highest obstacle. Helicopter pilots currently fly a TERF route, shown in Figure 5-2, approximately 15 miles long that begins near LZ 17 and winds its way to the northeast to end at LZ Firebase Jones. This TERF route can be flown in either direction. A typical sortie to the NTA includes a round trip flight along the TERF route. For the purposes of this analysis, one operation is considered a one-way trip along the TERF route. Table 5-3 shows the total number of TERF route operations (840) distributed by aircraft type and CNEL period. Consistent with CAL operations in the NTA, 47, 50 and 3 percent occur during CNEL day, evening, and nighttime periods, respectively. The TERF route and helicopter flight profiles were provided by MCAS Futenma pilots.

For purposes of modeling the average day during the busiest month at the CTA and NTA, the busiest month would have 10 percent more operations than the average month.

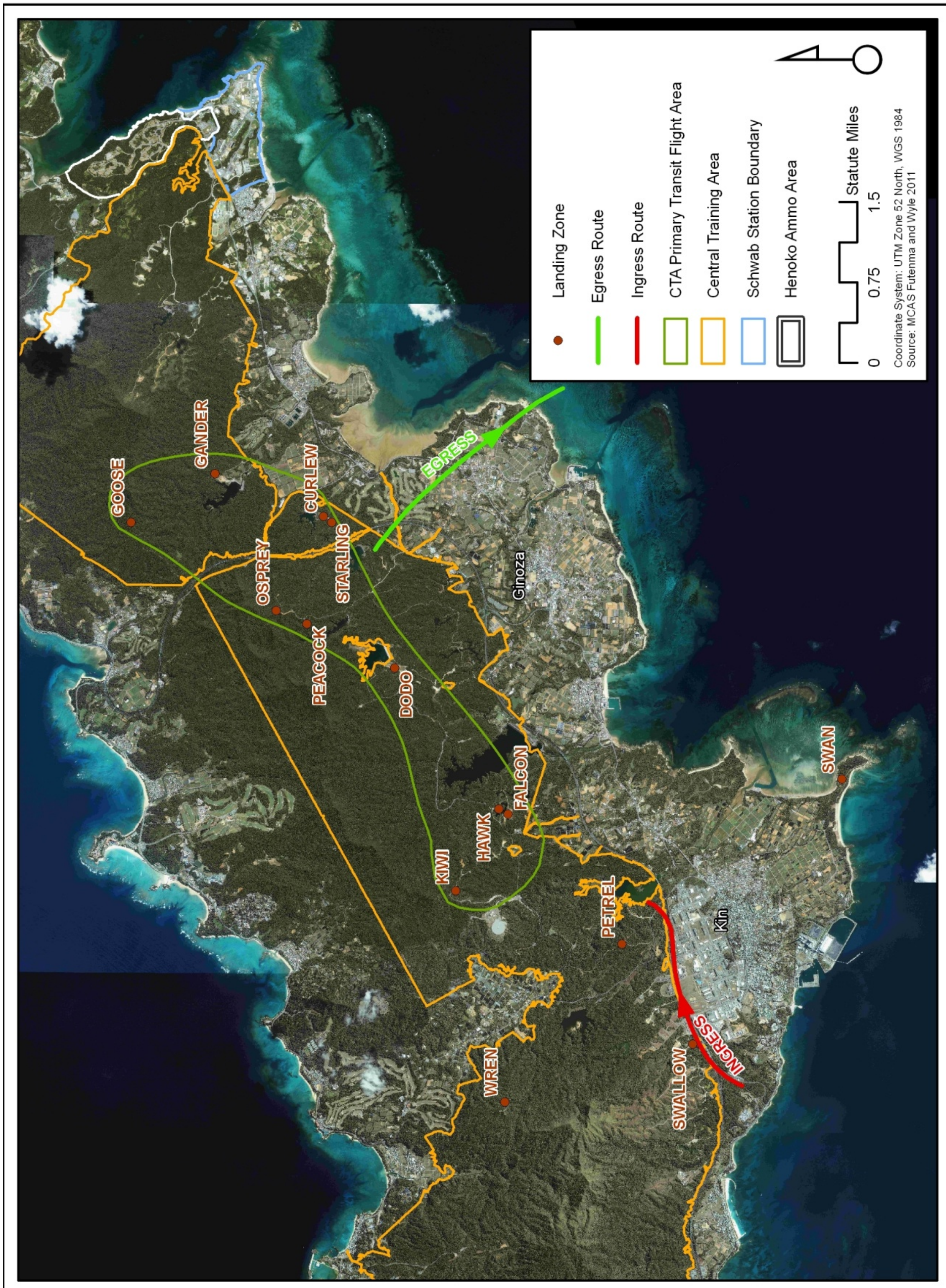

Figure 5-1 Modeled Routes and Flight Areas for the CTA

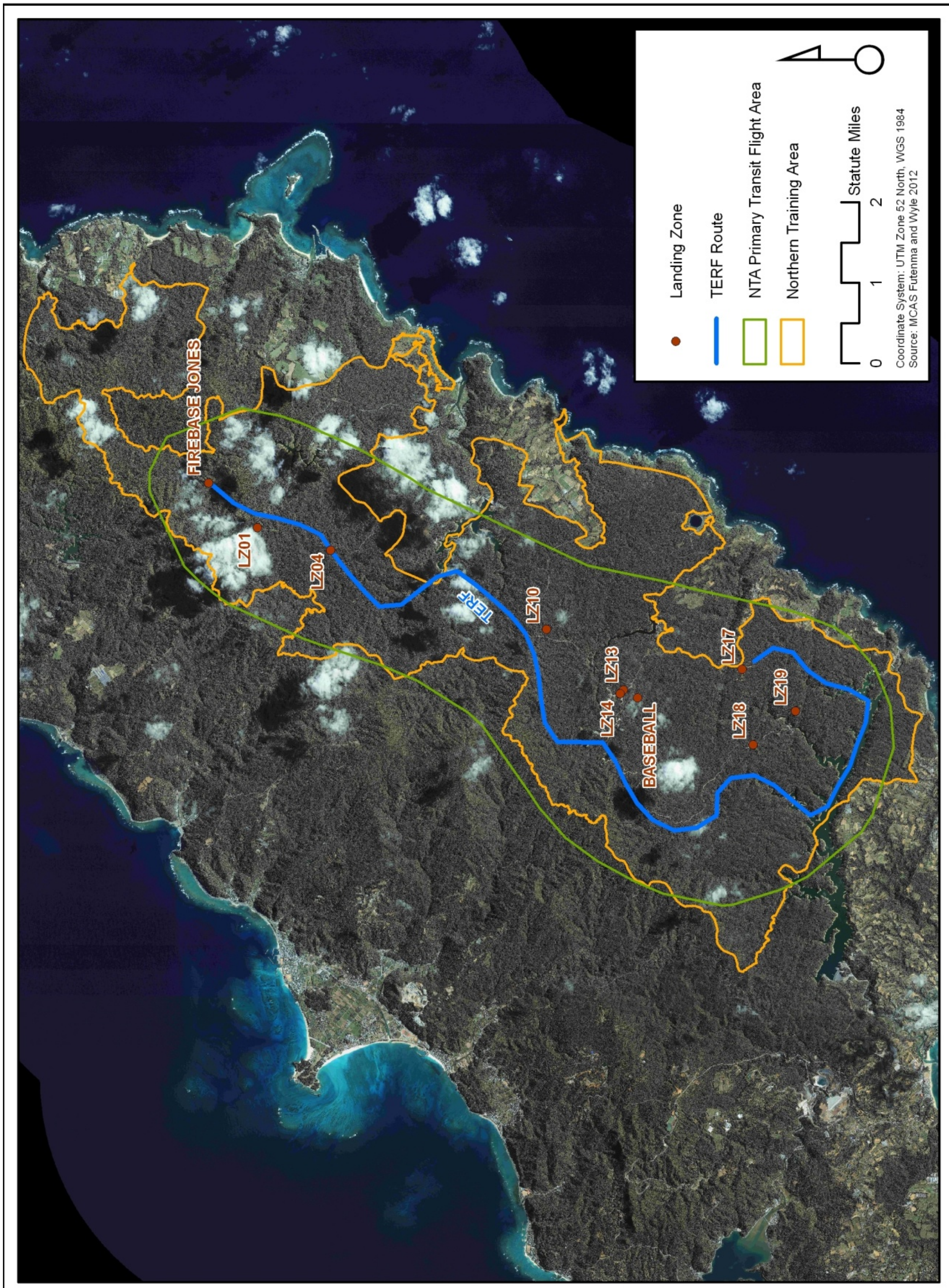

Figure 5-2 Modeled Routes and Flight Areas for the NTA

Table 5-2 List of Modeled LZ Sites

Type	LZ	Helicopter Frequent	Helicopter Average	MV-22 Frequent (1)
CTA	Curlew	✓		
	Dodo	✓		✓
	Falcon	✓		✓
	Gander	✓		
	Goose	✓		
	Hawk	✓		✓
	Kiwi	✓		
	Osprey	✓		
	Peacock	✓		
	Petrel	✓		
	Starling		✓	
	Swallow		✓	✓
	Swan			✓
	Wren		✓	
NTA	LZ 01		✓	
	LZ 04		✓	✓
	LZ 10		✓	
	LZ 13		✓	
	LZ 14		✓	
	LZ 17	✓		✓
	LZ 18	✓		✓
	LZ 19		✓	
	LZ Baseball	✓		✓
	LZ Firebase Jones	✓		✓

Note:

(1) All MV-22 LZ events are distributed equally to Frequent use LZs
(2) The AH-1W generally doesn't land at LZs while operating in the airspace; Only 10% of AH-1W sorties modeling with LZ landing events
(3) Landing events at ISTF occur on occasion but were not included in modeling

This is not a complete list of LZs that may be used. A representative group was selected for modeling purposes which presents the worst case condition at these selected LZs. Any other LZs which may be utilized but were not modeled would experience noise exposure less than that computed for LZs in this table.

Table 5-3 Annual TERF Route Operations in the NTA for Baseline Scenario

Aircraft Type	Begin at LZ 17 heading to the North				Begin at LZ Firebase Jones heading to the South				Total			
	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total
CH-53E	19	15	10	44	19	15	10	44	38	30	20	88
AH-1W	27	20	10	57	27	20	10	57	54	40	20	114
UH-1N	20	15	10	45	20	15	10	45	40	30	20	90
CH-46E	156	118	60	334	156	118	60	334	312	236	120	668
Totals	**222**	**168**	**90**	**480**	**222**	**168**	**90**	**480**	**444**	**336**	**180**	**960**

5.2.2 Baseline Noise Exposure

Using the data described in Section 5.2.1, MR_NMAP was used to calculate and plot the 65 dB through 85 dB $CNEL_{mr}$ contours, in 5 dB increments, for the average flying day during the busiest month of operations for the Baseline scenario for the CTA and NTA. Figures 5-3 and 5-4 show the $CNEL_{mr}$ contours for the CTA and NTA, respectively.

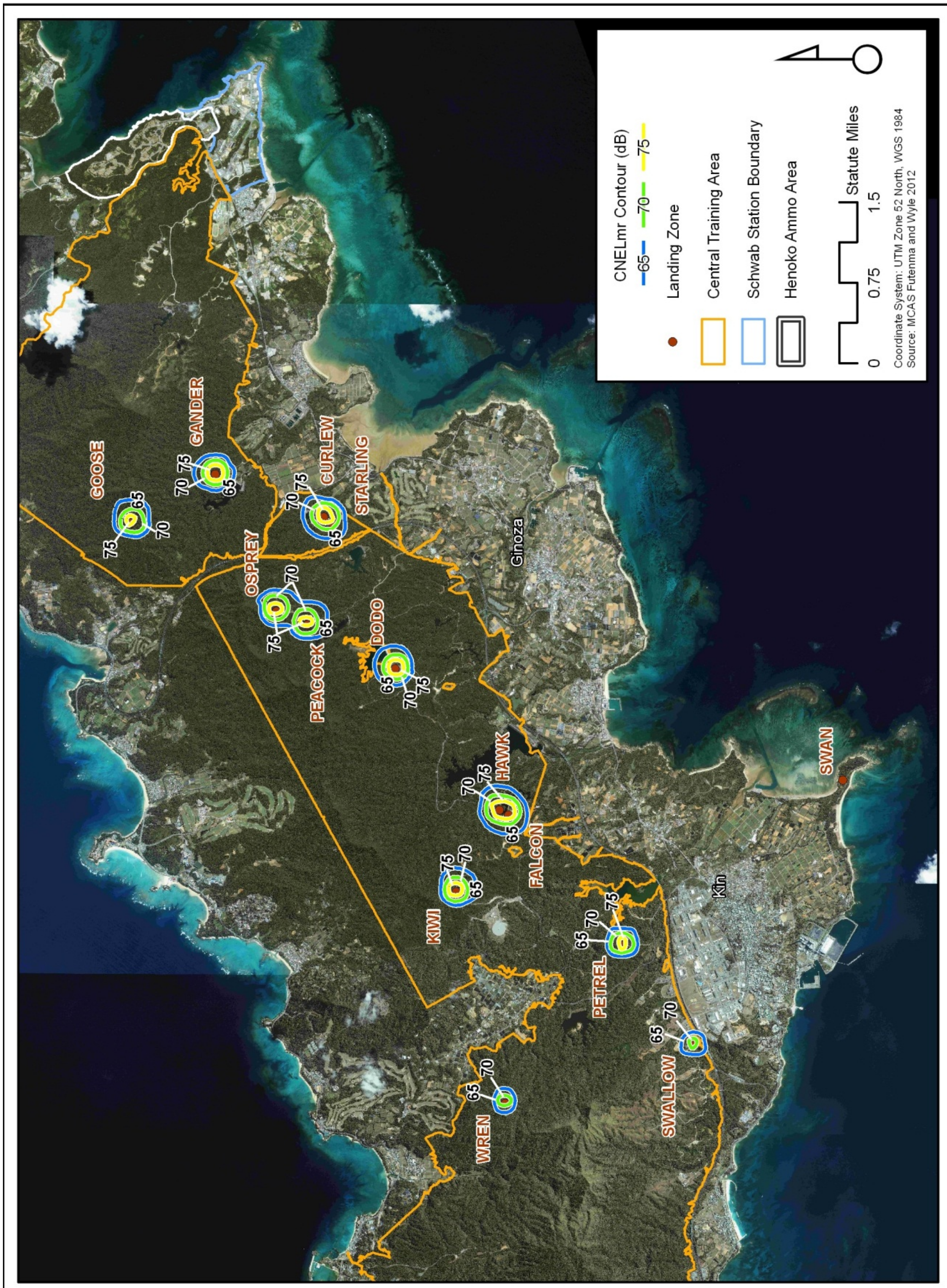

Figure 5-3 Aircraft CNEL$_{mr}$ Contours for Baseline Operations in the CTA

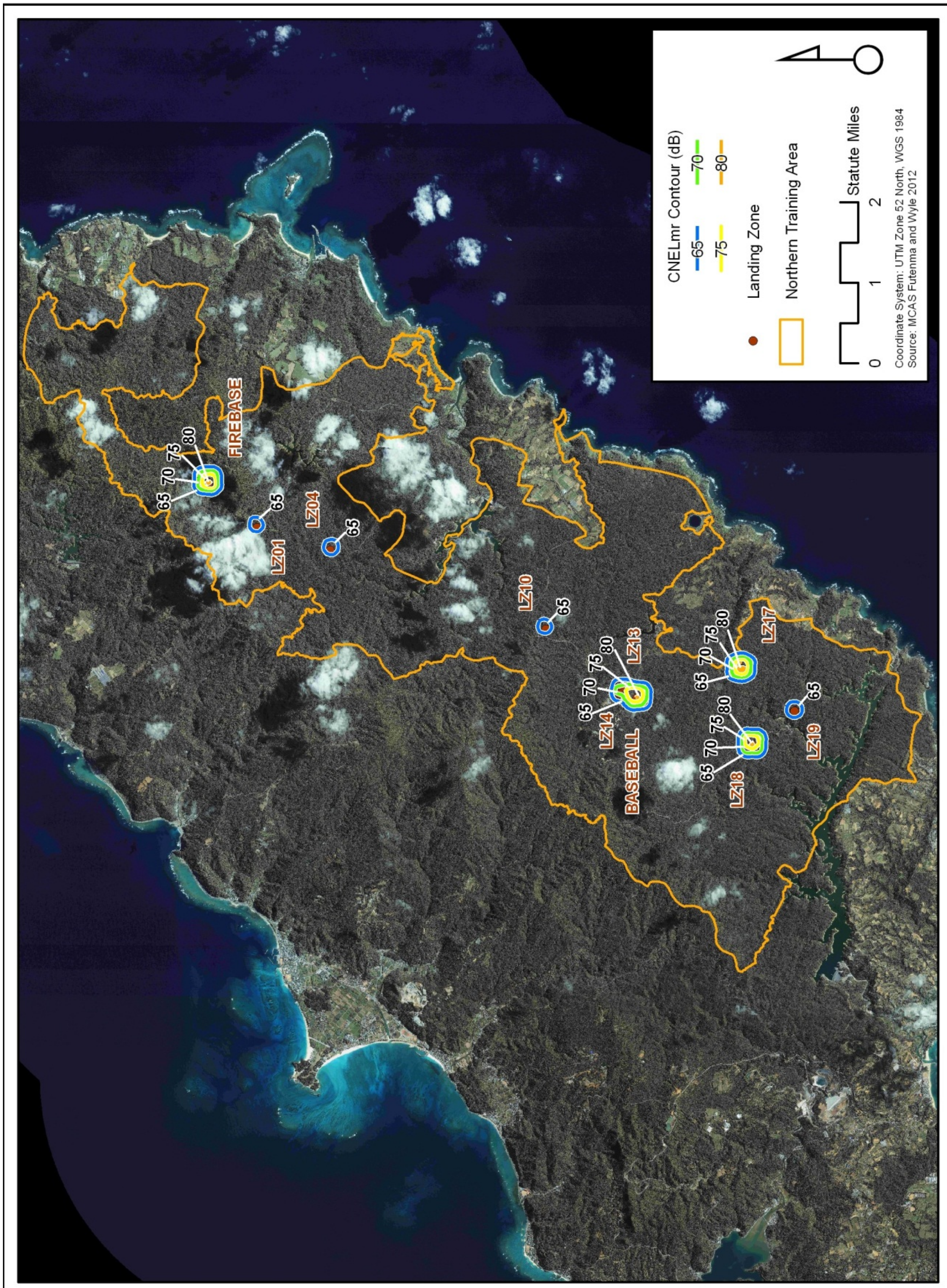

Figure 5-4 Aircraft CNEL$_{mr}$ Contours for Baseline Operations in the NTA

For the CTA, LZ Hawk experiences the maximum $CNEL_{mr}$ of nearly 79 dB. Ten of the modeled LZ sites have a maximum $CNEL_{mr}$ between 75 and 80 dB. However, most of the noise caused by CAL operations is contained to the vicinity directly surrounding each LZ, and the 65 dB $CNEL_{mr}$ contour around each LZ approximates a circle in shape and does not exceed approximately 2,500 feet in diameter. None of the 65 $CNEL_{mr}$ contours extend beyond U.S. areas and facilities except for the contours for LZs Swallow, Starling, and Curlew[9] which extend less than 500 feet. From inspection of the aerial photo of Figure 6-3, LZs Starling and Curlew are adjacent to rural (civilian) land use. The noise exposure from the associated transit area operations was added to the exposure from the LZ operations but the total exposure was less than 65 dB $CNEL_{mr}$, thus there is no contour shown to follow the shape of the transit area.

For the NTA, LZ17 experiences the maximum $CNEL_{mr}$ of nearly 81 dB. Four of the modeled sites, LZ17, LZ18, LZ Baseball, and LZ Firebase Jones, have a maximum $CNEL_{mr}$ above 75 dB. However, most of the noise caused by CAL operations is contained to the vicinity directly surrounding each LZ, and the 65 dB $CNEL_{mr}$ contour around each LZ approximates a circle in shape and does not exceed approximately 2,100 feet in diameter. The 65 dB $CNEL_{mr}$ contours are wholly contained within the NTA boundary except the one for LZ17. The noise exposure from the associated transit area operations was added to the exposure from the LZ operations but the total exposure was less than 65 dB $CNEL_{mr}$ contour, thus there is no contour shown following the shape of the transit area. Similarly, the TERF operations do not generate 65 dB $CNEL_{mr}$ (i.e., their $CNEL_{mr}$ is less than 65 dB) thus there is no contour shown for the TERF route.

Based upon this analysis, any other LZs which may be utilized but were not modeled for this study would experience noise exposure less than that of LZ17. Other LZs would not have 65 dB $CNEL_{mr}$ extending beyond 1,000 from the center of the LZ because usage would be lower than the operations modeled at LZ17.

5.3 Proposed Scenario and Noise Exposure

The following two subsections describe the proposed flight activity and resultant noise exposure.

5.3.1 Annual Flight Operations, Flight Areas and Tracks

The Proposed scenario would be identical to the Baseline scenario except all CH-46 operations would be removed and the MV-22 would be introduced.

Similar to helicopter CAL requirements, MV-22 pilots would need to perform specific tactical approaches to LZs. The objective is to efficiently transition an aircraft from the en route ingress phase to the landing phase of the mission. For the Proposed action, the MV-22 would carry out the tactical approach training at LZs in the CTA and the NTA. In addition to the approximate 2,000 sorties from Baseline scenario aircraft, Table 5-4 lists a total of 1,418 CAL sorties for the MV-22 for a total of 3,418 sorties. The MV-22 would typically perform an average of six LZ approaches (i.e., operations) per sortie. Table 5-5 lists the specific MV-22 tactical approaches and the resultant number of annual operations for each during each CNEL period. Each of the approach types would be flown in both a left-hand and right-hand pattern and during daylight and darkness. Approximately 50, 45, and 5 percent would occur during the CNEL day, evening, and nighttime periods, respectively (Holden 2011a).

[9] The $CNEL_{mr}$ contours for LZ Swallow extend onto Camp Hansen (boundary not shown).

Table 5-4 Annual CAL Sorties in Associated Airspace for Proposed Scenario

Aircraft Type	Central Training Area				Northern Training Area				Total			
	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total
CH-53E	200	190	10	400	200	190	10	400	400	380	20	800
AH-1W (1)	200	190	10	400	200	190	10	400	400	380	20	800
UH-1N	100	90	10	200	100	90	10	200	200	180	20	400
CH-46E	-	-	-	-	-	-	-	-	-	-	-	-
MV-22 (2)	354	319	36	709	354	319	36	709	708	638	72	1,418
Totals	**854**	**789**	**66**	**1,709**	**854**	**789**	**66**	**1,709**	**1,708**	**1,578**	**132**	**3,418**

Notes:
(1) AH-1W sorties operating within the airspace do not generally land at LZs
(2) All sorties for MV-22 are projected

Table 5-5 MV-22 CAL Site Operations by Approach Type for Proposed Scenario

Approach Types	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total
Straight-in tactical	2,427	2,187	247	4,861
90 degree offset	2,427	2,187	247	4,861
180 degree offset	1,214	1,094	123	2,431
Hasty	1,214	1,094	123	2,431
Conversion	1,214	1,094	123	2,431
Total	8,496	7,656	863	17,015

Notes:
(1) 6 approach patterns per sortie
(2) 1 approach pattern = 1 departure + 1 arrival = 2 operations

Generally, MV-22 tactical approaches are flown in the direction into the wind. The prevailing winds over Okinawa are to the southwest and are assumed to be oriented in relatively the same direction at the CTA, NTA and MCAS Futenma. For this reason the primary MV-22 tactical approach headings are modeled at the same heading as MCAS Futenma Runway 06, approximately 60 degrees east of magnetic north. The secondary tactical approach heading, used 20 percent of the time, is modeled at approximately 240 degrees east of magnetic north. The MV-22 tactical approach headings would likely deviate, albeit rarely, from the modeled primary/secondary headings due to wind and local terrain conditions. The modeled primary and secondary headings are to serve as a representative example of dominant flight paths of MV-22 aircraft to and around each LZ.

Each of the following five approach types were modeled with the RNM, based on the specific tactical approach guidelines set out in the MV-22 USMC Core Competency Resource Model and Training and Readiness Manual:

- Straight-in tactical,
- 90 degree offset,
- 180 degree offset,
- Hasty, and
- Conversion.

This method of modeling allows a more precise simulation of the MV-22 flight path in the vicinity of each LZ while traveling over varying terrain compared to the MR_NMAP modeling utilized for the Baseline scenario. An example of the flight tracks modeled for each LZ is shown in Figures 5-5 and 5-6. The two aforementioned approach headings were modeled for each set of approaches. The five approach types consist of an initial point approximately 3 nm from the LZ ending with a final approach to landing. All five approach types would occur within approximately 6 nm from the LZ.

The representative MV-22 tactical approach flight profiles provided by the USMC (Holden 2011b) are depicted in Appendix B.

The MV-22 would transit the airspace within the CTA and NTA similar to the helicopters but at a much higher speed as the MV-22 would be in 'airplane mode'. The MV-22 is modeled utilizing the same transit flight areas and ingress/egress routes shown in Figure 5-1 and Figure 5-2.

Table 5-6 contains the annual TERF operations for the Proposed scenario totaling 317. The helicopter operations would be identical to the Baseline scenario (Table 5-3) but with the CH-46 operations deleted. All TERF modeling for the Baseline would be identical for the Proposed scenario for applicable aircraft. The MV-22 would rarely conduct TERF along the TERF route in the NTA with up to 25 operations per year. The MV-22 pilots will primarily use simulators for this training and only utilize the TERF route if the simulators are unavailable. This minimal amount of TERF operations would have negligible impact on the noise relative to the other operations and is not included in the modeling. The MV-22 also requires Navigation training along NAV routes which are discussed in Section 5.4.

Table 5-6 TERF Route Operations in the NTA for Proposed Scenario

Aircraft Type	Begin at LZ 17 heading to the North				Begin at LZ Firebase Jones heading to the South				Total			
	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total
CH-53E	19	15	10	44	19	15	10	44	38	30	20	88
AH-1W	27	20	10	57	27	20	10	57	54	40	20	114
UH-1N	20	15	10	45	20	15	10	45	40	30	20	90
CH-46E	-	-	-	-	-	-	-	-	-	-	-	-
MV-22	6	5	1	12	7	5	1	13	13	10	2	25
Totals	**72**	**55**	**31**	**158**	**73**	**55**	**31**	**159**	**145**	**110**	**62**	**317**

5.3.2 Proposed Noise Exposure

Using the data described in Section 5.3.1, MR_NMAP and RNM were used to calculate and plot the 65 dB through 85 dB $CNEL_{mr}$[10] contours, in 5 dB increments, for the average flying day during the busiest month of operations for the Proposed scenario for the CTA and NTA. Figures 5-7 and 5-8 show the $CNEL_{mr}$ contours for the CTA and NTA, respectively.

[10] Although RNM does not compute $CNEL_{mr}$, it was used to compute CNEL for the MV-22 at the LZs and was logarithmically added to the $CNEL_{mr}$ from helicopters at the LZs, all aircraft (including the MV-22) on the transit and ingress/egress routes.

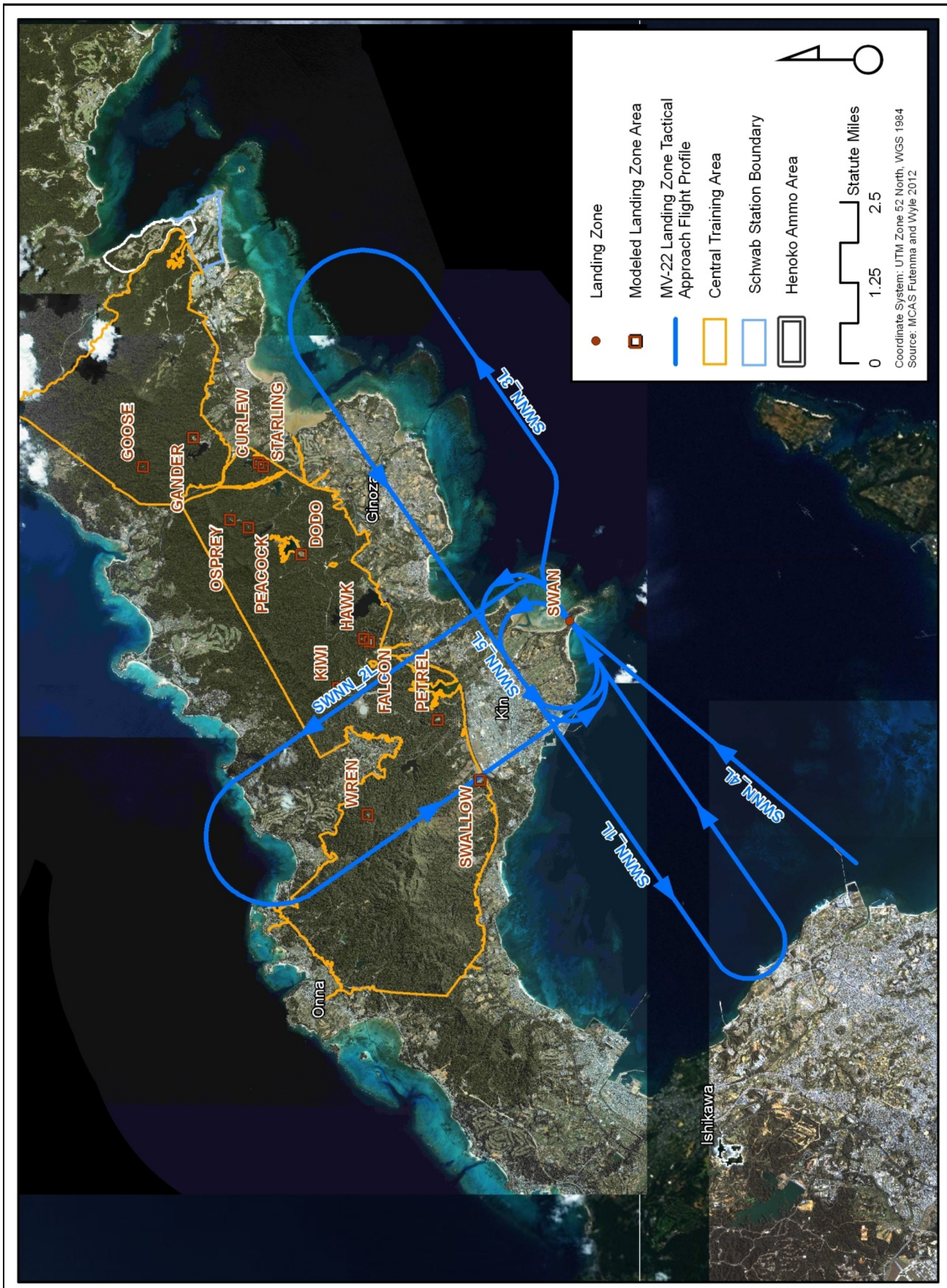

Figure 5-5a Modeled MV-22 Tactical Approach Flight Tracks at LZ Hansen 2 for Primary Approach Heading with Left-hand Pattern

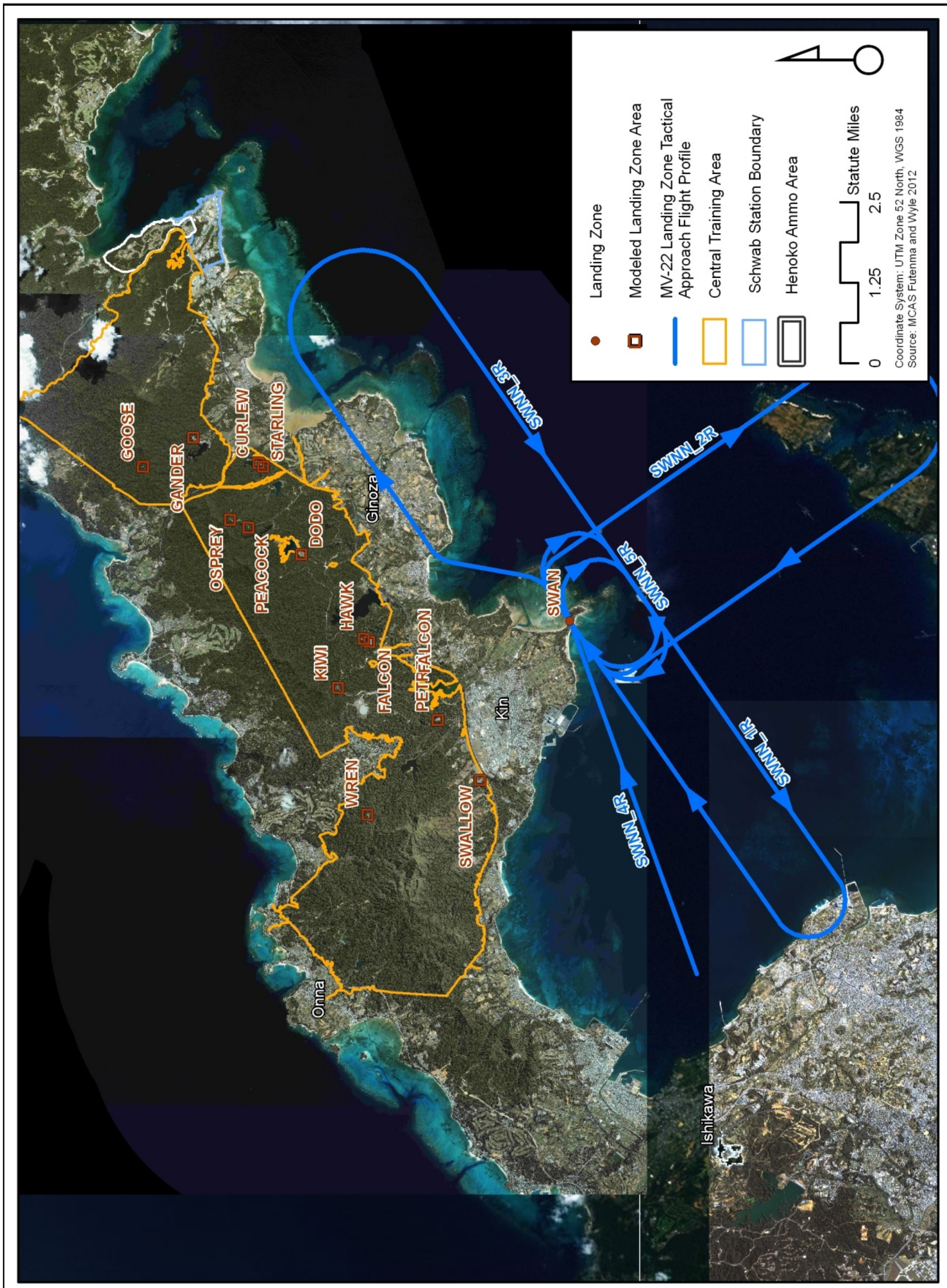

Figure 5-5b Modeled MV-22 Tactical Approach Flight Tracks at LZ Hansen 2 for Primary Approach Heading with Right-hand Pattern

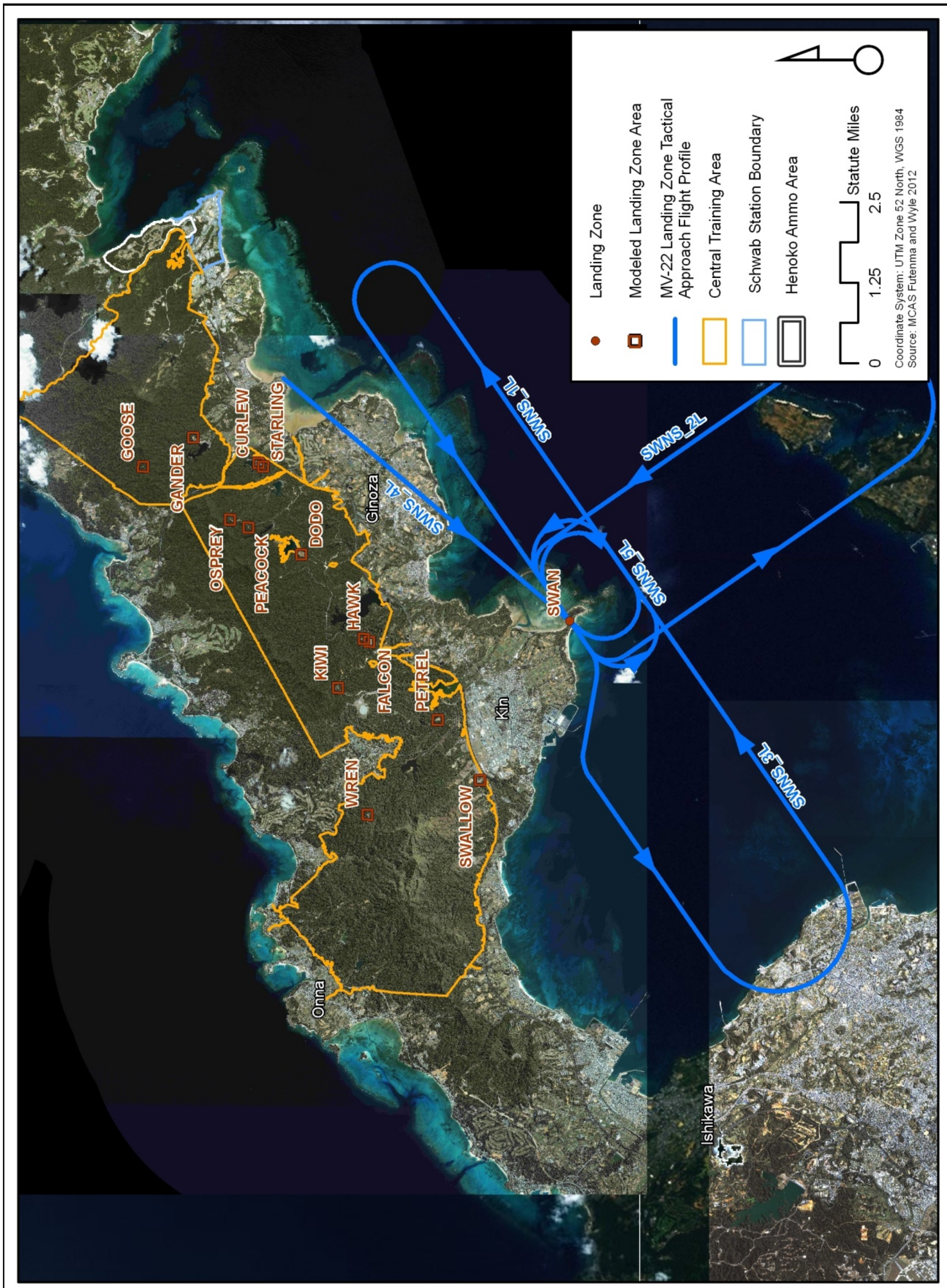

Figure 5-6a Modeled MV-22 Tactical Approach Flight Tracks at LZ Hansen 2 for Secondary Approach Heading with Left-hand Pattern

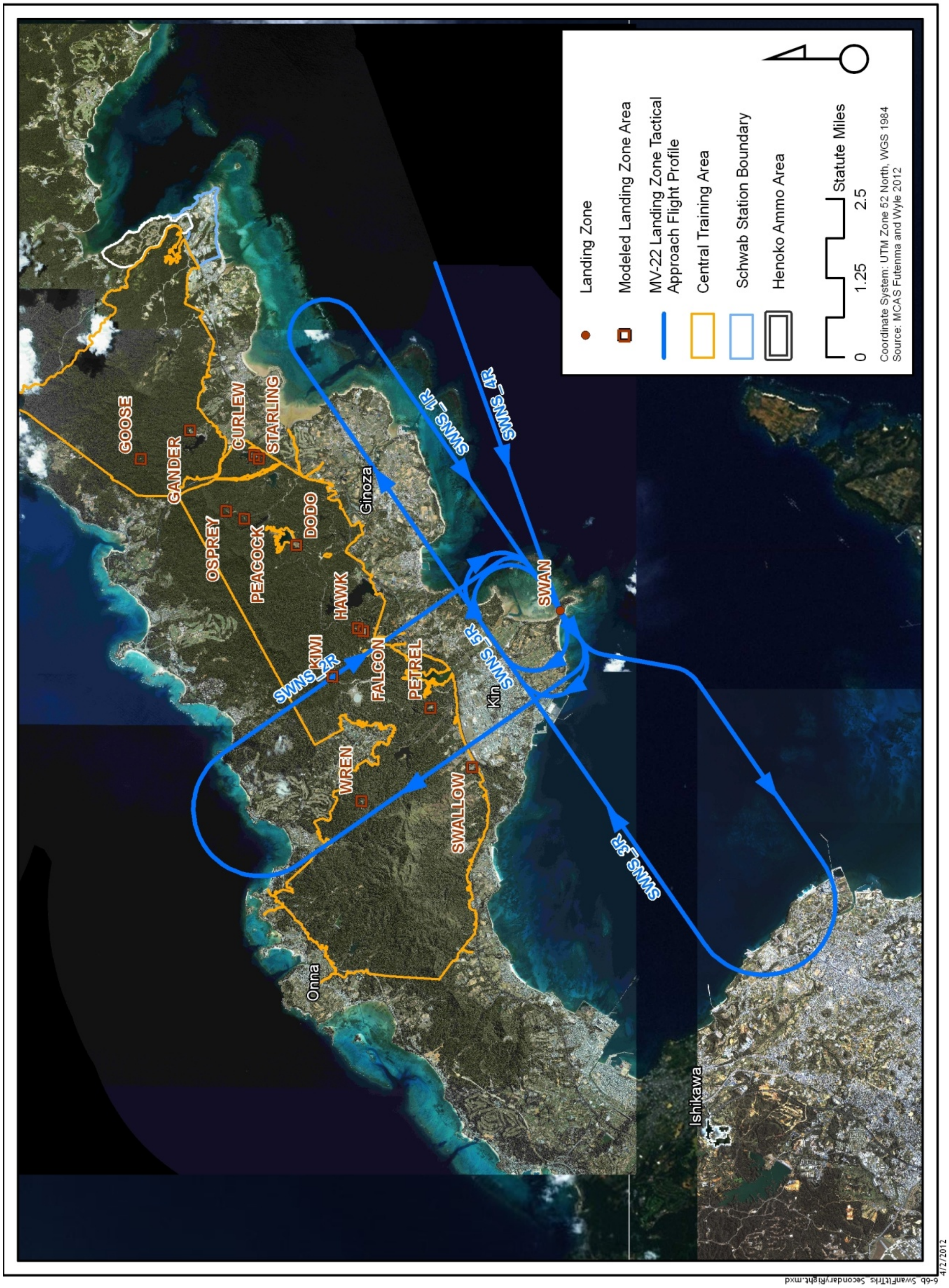

Figure 5-6b Modeled MV-22 Tactical Approach Flight Tracks at LZ Hansen 2 for Secondary Approach Heading with Right-hand Pattern

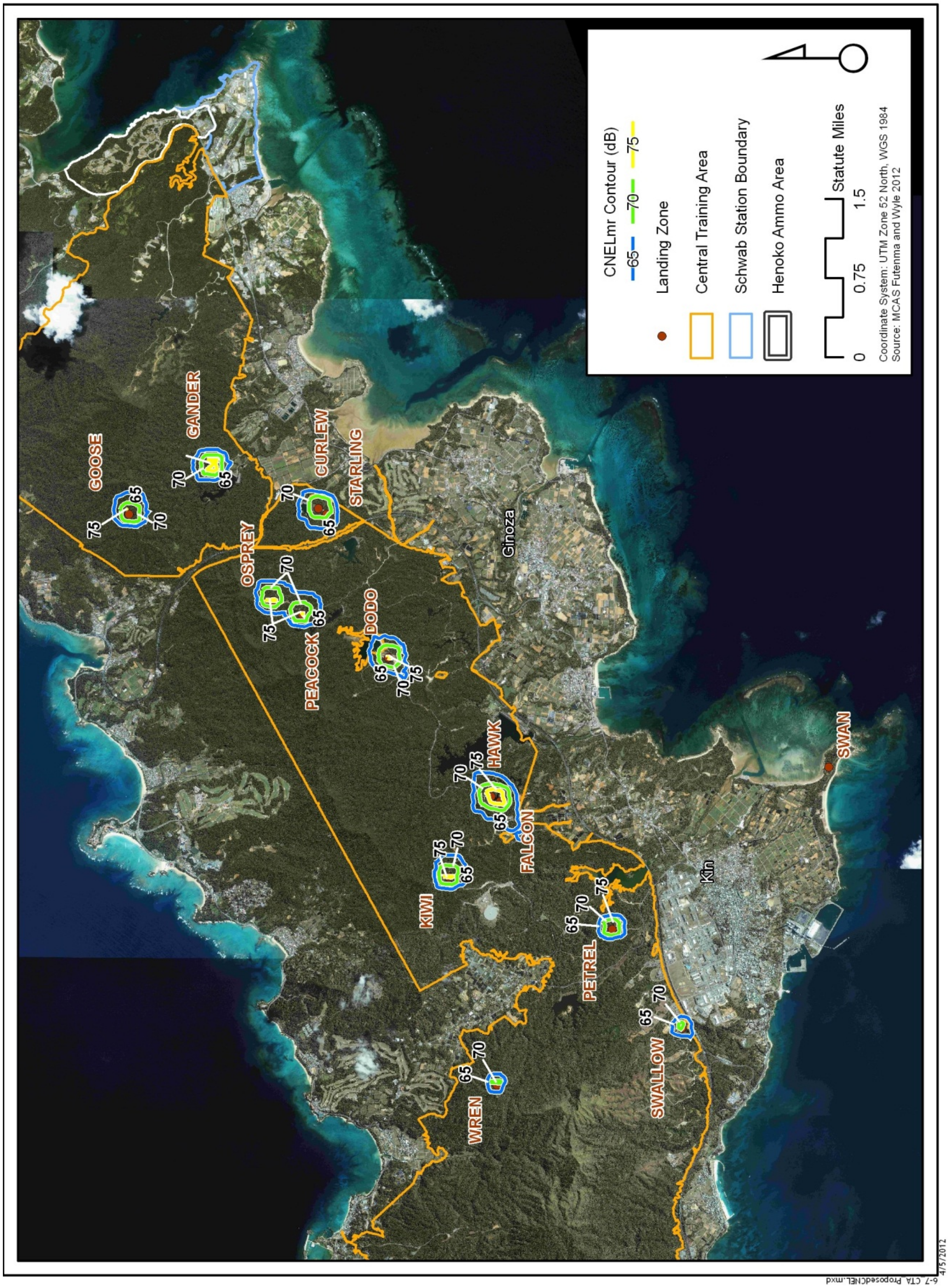

Figure 5-7 Aircraft $CNEL_{mr}$ Contours for Proposed Operations in the CTA

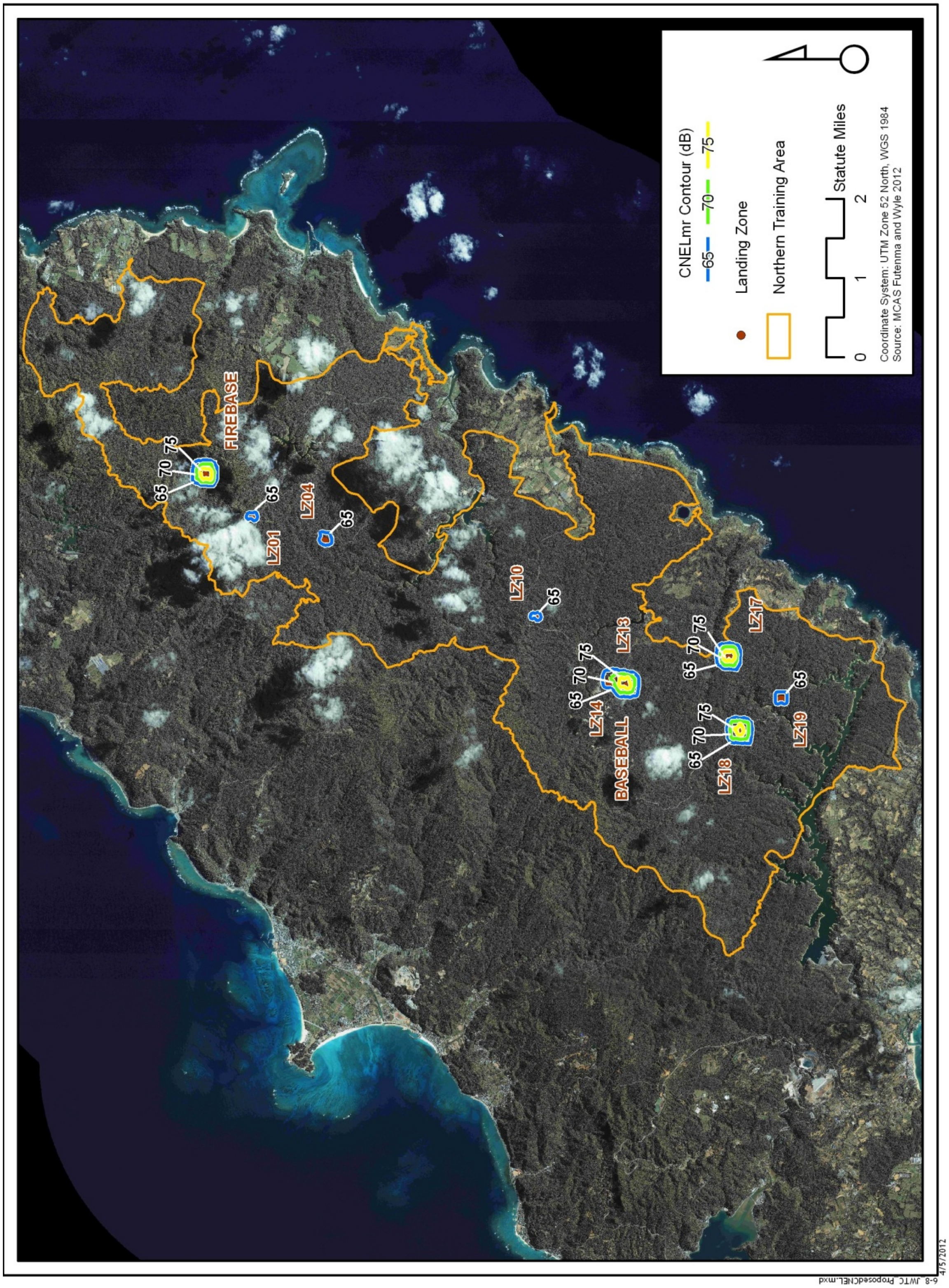

Figure 5-8 Aircraft CNEL$_{mr}$ Contours for Proposed Operations at the NTA

For the CTA, LZ Hawk would experience the maximum $CNEL_{mr}$ of nearly 78 dB, approximately 1 dB less than Baseline. Eight of the modeled LZ sites would have a maximum $CNEL_{mr}$ between 75 and 80 dB, which is two less than Baseline. Most of the noise caused by CAL operations would be contained to the vicinity directly surrounding each LZ, and the 65 dB $CNEL_{mr}$ contour around each LZ would approximate a circular shape and would not exceed approximately 2,300 feet in diameter except at LZs Hawk and LZ Falcon and LZs Osprey and Peacock. LZs Hawk and Falcon are located only 500 feet apart and under the Proposed scenario the 65 dB $CNEL_{mr}$ contour would grow to approximately 4,000 ft in length. LZs Osprey and Peacock are located only 1,500 feet apart and under the Proposed scenario the 65 dB $CNEL_{mr}$ contour would grow to approximately 3,500 ft in length. This is caused by the MV-22 being greater in terms of SEL than the CH-46, on a single-event basis, when in conversion mode or VTOL mode operating at slow speeds between 60 knots and hover. Once the MV-22 fully converts to airplane mode it is quieter than the CH-46 on a single event basis due in part to its higher airspeed.

The 65 $CNEL_{mr}$ contours extend beyond U.S. areas and facilities at five LZs (Swallow, Falcon, Dodo, Starling and Curlew[11]). From inspection of the aerial photo of Figure 5-5, LZ Swallow is adjacent to Camp Hansen and the remaining four are adjacent to rural (civilian) land use. The noise exposure from the associated transit area operations would be less than 65 dB $CNEL_{mr}$ thus contour would exist.

For the NTA, LZ 17, LZ 18, LZ Baseball and LZ Firebase Jones would experience the maximum $CNEL_{mr}$ of nearly 80 dB. Most of the noise caused by CAL operations would be contained to the vicinity directly surrounding each LZ, and the 65 dB $CNEL_{mr}$ contour around each LZ would approximate a circle in shape and would not exceed approximately 2,200 feet in diameter except at LZ Baseball. Three LZs (LZ 13, LZ 14, and LZ Baseline) are located less than 1,500 feet away from each and the 65 dB $CNEL_{mr}$ contour would surround all three less than 2,800 feet in length.

The 65 dB $CNEL_{mr}$ contours would be wholly contained within the NTA boundary except the one for LZ 17. The noise exposure from the associated transit area operations was added to the exposure from the LZ operations but the total exposure would be less than 65 dB $CNEL_{mr}$ contour, thus there is no contour shown following the shape of the transit area.

Similarly, the proposed TERF operations would not generate 65 dB CNEL (i.e., their $CNEL_{mr}$ would be less than 65 dB and less than the $CNEL_{mr}$ for the Baseline scenario) thus there is no contour shown for the TERF route.

It was not practical to analyze every single LZ that MV-22 might utilize and difficult to precisely predict the number of landings at each. Alternatively, a group of 10 LZs expected to receive the most use by the MV-22 were selected for this analysis. This means the analysis overestimates the noise exposure at the selected ten LZs. Based upon this analysis, any other LZs which may be utilized but were not modeled in this study would experience noise exposure less than that of LZ17. Other LZs not modeled would have 65 dB $CNEL_{mr}$ extending less than 1,000 from the center of the LZ because usage by the MV-22 and other helicopters would be less than the operations modeled at LZ17.

[11] The 65 dB CNELmr contours for LZ Swallow, LZ Hansen2 and LZ Swan would extend onto or be contained within the boundary for Camp Hansen (boundary not shown).

5.4 Navigation Routes

The MV-22 training requirements include Navigation training. This occurs during the day, at night during High Light Level (HLL), and at night during Low Light Level (LLL). This training is expected to occur on the following NAV routes shown in Appendix A:

- Blue,
- Green,
- Orange,
- Pink,
- Yellow, and
- Purple.

None of these routes are on the island of Okinawa but traverse areas of mainland Japan.

Currently, MAG-12 is the primary user of the above NAV routes as well as the scheduling agency. Table 5-7 lists a total of 771 flight hours flown during the 12-month period from December 2009 through November 2010. According to MAG-12, the most common aircraft to utilize these routes are the AV-8B, the FA-18C/D, and to a lesser extent the KC-130J.

Table 5-7 NAV Annual Flight Hours for MAG-12 for Baseline Scenario

Route Name	Annual Flight Hours (1)
Blue	159
Green	80
Orange	169
Pink	49
Yellow	111
Purple	203
Total	771

Note: (1) from December 2009 through November 2010

The annual MV-22 NAV route sorties are estimated to total 199 for the Proposed scenario as shown in Table 5-8. Distribution of those sorties among the six identified routes is unknown but assumed equal for the purposes of this analysis. The MV-22 would typically depart MCAS Iwakuni to conduct training on these routes and then return back to MCAS Iwakuni.

Table 5-8 MV-22 NAV Route Sorties for Proposed Scenario

Aircraft Type	Mission	Annual Sorties			
		day (0700 - 1900)	eve (1900 - 2200)	night (2200 - 0700)	Total
MV22	Day	99	0	0	99
	HLL	0	45	5	50
	LLL	0	45	5	50
Total		99	90	10	199

Notes: (1) One sortie is assumed to constitute one trip along the entire NAV Route length; MV-22 would start and finish at MCAS Iwakuni

(2) Assumed even use of six NAV Routes: Brown, Orange, Pink, and Green

A typical route event for each aircraft type was modeled with MR_NMAP using the assumed flight parameters in Table 5-9. The FA-18C/D Hornet and the AV-8B Harrier would generate an estimated rise-time corrected SEL (SEL_r) of 119 and 113 dB, respectively, at an altitude of 500 feet. The quieter KC-130J would generate an estimated SEL_r of 95 dB. The MV-22 would be at least 18 dB quieter than the Hornet and 12 dB quieter than the Harrier for all mission types along NAV routes. Given the relatively low number of MV-22 sorties and the greatly lower MV-22 single-event sound levels anticipated, the proposed MV-22 route operations would cause a negligible change in the existing noise exposure along the six considered routes.

Table 5-9 Rate-Adjusted Sound Exposure Level for NAV Route Single Event Flyover

Aircraft Type	Mission Type	Altitude (ft AGL)	Speed (KIAS)	Power Setting	SEL_r[1] (dBA)
FA-18C/D	NAV	500	500	92 % NC	119
AV-8B	NAV	500	300	95% RPM	113
KC-130 [2]	NAV	500	250	850 C TIT	95
MV22	Day	200	120	N/A	101
	HLL	200	250	N/A	92
	LLL	500	250	N/A	97

Notes: (1) Rate-adjusted Sound Exposure Level adjusts level based on rate of onset (startle effect)

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Appendix A

SUPPORTIVE TABULAR AND GRAPHIC DATA

Appendix A-1: MCAS Futenma

Appendix A-2: Ie Shima Training Facility

Appendix A-3: Associated Airspace

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Appendix A-1: MCAS Futenma

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Table A-1 Rotary-Wing Runway and Flight Track Utilization Percentages

Op Type	Runway ID	Runway Percentages (1)	Flight Track ID	Description	Track Percentages (2)
Departure	06	**80%**	06D1	Helo departure to Point Kilo	70%
			06D2	Helo departure to Point Sierra	30%
	subtotal				*100%*
	24	**20%**	24D1	Helo departure to Point Tango	70%
			24D2	Helo departure to Point Sierra	30%
	subtotal				*100%*
Nonbreak Arrival	06	**70%**	06A1	Helo arrival from Point Kilo	65%
			06A2	Helo arrival from Point Sierra	25%
			06A3	Copter TACAN 040	10%
	subtotal				*100%*
	24	**18%**	24A1	Helo arrival from Point Tango	65%
			24A2	Helo arrival from Point Sierra	25%
			24A3	Copter TACAN 24	10%
	subtotal				*100%*
	Pad 2	**12%**	PAD2A1	Helo straight in from southeast	100%
	subtotal				*100%*
Touch and Go	06	**80%**	06T1	Helo, 0.4nm abeam, 0.6 nm downwind to runway	60%
			06T2	Helo, 0.4nm abeam, 0.6 nm downwind to CAL	40%
	subtotal				*100%*
	24	**20%**	24T1	Helo, 0.4nm abeam, 0.6 nm downwind to runway	100%
	subtotal				100%
GCA Box	06	**80%**	06G1	Helo Radar Pattern, 3 nm abeam, 7.4 nm downwind	100%
	subtotal				*100%*
	24	**20%**	24G1	Helo Radar Pattern, 3 nm abeam, 7.4 nm downwind	100%
	subtotal				*100%*

Note:

(1) within Operation Type

(2) within specific runway

Table A-2 Fixed-Wing Runway and Flight Track Utilization Percentages

Op Type	Runway ID	Runway Percentages (1)	Flight Track ID	Description	Track Percentages (2)
Departure	06	80%	06D1	Helo departure to Point Kilo	-
			06D2	Helo departure to Point Sierra	-
			06D3	ADDAN ONE	10%
			06D4	CHINEN ONE	10%
			06D5	Standard Instrument Departure SE	40%
			06D6	Standard Instrument Departure NE	40%
	subtotal				*100%*
	24	20%	24D1	Helo departure to Point Tango	-
			24D2	Helo departure to Point Sierra	-
			24D3	ADDAN ONE	10%
			24D4	CHINEN ONE	10%
			24D5	Standard Instrument Departure South	80%
	subtotal				*100%*
Nonbreak Arrival	06	80%	06A1	Helo arrival from Point Kilo	-
			06A2	Helo arrival from Point Sierra	-
			06A3	Copter TACAN 040	-
			06A4	Straight-in Visual	100%
	subtotal				*100%*
	24	20%	24A1	Helo arrival from Point Tango	-
			24A2	Helo arrival from Point Sierra	-
			24A3	Copter TACAN 24	-
			24A4	Straight-in Visual	100%
	subtotal				*100%*
Instrument Arrival	06	80%	06A5	TACAN Y	50%
			06A6	TACAN Z	50%
	24	20%	24A5	TACAN	100%
Overhead Break Arrival	06	80%	06O1A	break at downwind numbers	10%
			06O1B	break at midfield	80%
			06O1C	break at upwind numbers	10%
	subtotal				100%
	24	20%	24O1A	break at downwind numbers	10%
			24O1B	break at midfield	80%
			24O1C	break at upwind numbers	10%
	subtotal				100%
Touch and Go	06	80%	06T1	Helo, 0.4nm abeam, 0.6 nm downwind to runway	-
			06T2	Helo, 0.4nm abeam, 0.6 nm downwind to CAL	-
			06T3	Fixed Wing, circle southeast of runway	100%
	subtotal				*100%*
	24	20%	24T1	Helo, 0.4nm abeam, 0.6 nm downwind to runway	-
			24T2	Fixed Wing, circle southeast of runway	100%
	subtotal				100%
GCA Box	06	80%	06G1	Helo Radar Pattern, 3 nm abeam, 7.4 nm downwind	-
			06G2	Fixed Wing pattern	100%
	subtotal				*100%*
	24	20%	24G1	Helo Radar Pattern, 3 nm abeam, 7.4 nm downwind	-
			24G2	Fixed Wing pattern	100%
	subtotal				*100%*

Notes:
(1) within Operation Type
(2) within specific runway

Table A-3 Average Annual Daily Rotary-Wing Flight Events for Baseline Scenario at MCAS Futenma

Op Type	Runway ID	Flight Track ID	CH-46E				CH-53E				AH-1W				UH-1N				Helicopter Total			
			Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total
Departure	06	06D1	1.867	1.366	-	3.233	0.233	0.170	-	0.404	0.324	0.236	-	0.560	0.236	0.172	-	0.408	2.660	1.944	-	4.604
		06D2	0.800	0.585	-	1.385	0.100	0.073	-	0.173	0.139	0.101	-	0.240	0.101	0.074	-	0.175	1.140	0.833	-	1.973
	24	24D1	0.467	0.341	-	0.808	0.058	0.043	-	0.101	0.081	0.059	-	0.140	0.059	0.043	-	0.102	0.665	0.486	-	1.151
		24D2	0.200	0.146	-	0.346	0.025	0.018	-	0.043	0.035	0.025	-	0.060	0.025	0.018	-	0.044	0.285	0.208	-	0.493
Nonbreak Arrival	06	06A1	1.514	1.038	0.102	2.654	0.188	0.129	0.012	0.329	0.262	0.180	0.018	0.459	0.191	0.132	0.013	0.336	2.155	1.478	0.145	3.778
		06A2	0.649	0.445	0.044	1.137	0.081	0.055	0.005	0.141	0.112	0.077	0.008	0.197	0.082	0.056	0.006	0.144	0.923	0.633	0.062	1.619
		06A3	0.156	0.121	-	0.276	0.020	0.016	-	0.036	0.026	0.022	-	0.048	0.020	0.016	-	0.036	0.221	0.175	-	0.397
	24	24A1	0.389	0.267	0.026	0.682	0.048	0.033	0.003	0.085	0.067	0.046	0.005	0.118	0.049	0.034	0.004	0.086	0.554	0.380	0.037	0.971
		24A2	0.167	0.114	0.011	0.293	0.021	0.014	0.001	0.036	0.029	0.020	0.002	0.051	0.021	0.015	0.002	0.037	0.237	0.163	0.016	0.416
		24A3	0.039	-	-	0.039	0.005	-	-	0.005	0.007	-	-	0.007	0.005	-	-	0.005	0.055	-	-	0.055
	Pad 2	PAD2A1	0.371	0.254	0.025	0.650	0.046	0.032	0.003	0.081	0.064	0.044	0.004	0.113	0.047	0.032	0.003	0.082	0.528	0.362	0.036	0.925
Touch and Go	06	06T1	1.304	0.472	-	1.776	0.162	0.059	-	0.221	0.226	0.082	-	0.307	0.164	0.060	-	0.224	1.856	0.672	-	2.528
		06T2	0.869	0.315	-	1.184	0.108	0.039	-	0.147	0.150	0.054	-	0.205	0.110	0.040	-	0.150	1.238	0.448	-	1.686
	24	24T1	0.543	0.197	-	0.740	0.068	0.024	-	0.092	0.094	0.034	-	0.128	0.069	0.025	-	0.093	0.774	0.280	-	1.054
GCA Box	06	06G1	2.035	0.568	-	2.603	0.253	0.070	-	0.323	0.353	0.098	-	0.450	0.256	0.071	-	0.328	2.898	0.807	-	3.704
	24	24G1	0.509	0.142	-	0.651	0.063	0.018	-	0.081	0.088	0.024	-	0.113	0.064	0.018	-	0.082	0.724	0.202	-	0.926
Departure Total			**3.334**	**2.438**	**-**	**5.773**	**0.416**	**0.304**	**-**	**0.721**	**0.578**	**0.422**	**-**	**1.000**	**0.422**	**0.307**	**-**	**0.729**	**4.751**	**3.471**	**-**	**8.222**
Nonbreak Arrival			**3.285**	**2.238**	**0.208**	**5.731**	**0.408**	**0.279**	**0.025**	**0.712**	**0.567**	**0.389**	**0.036**	**0.992**	**0.414**	**0.285**	**0.028**	**0.726**	**4.674**	**3.192**	**0.296**	**8.161**
Touch and Go Total			**2.717**	**0.984**	**-**	**3.700**	**0.338**	**0.122**	**-**	**0.460**	**0.470**	**0.170**	**-**	**0.640**	**0.343**	**0.125**	**-**	**0.467**	**3.867**	**1.400**	**-**	**5.267**
GCA Box Total			**2.544**	**0.710**	**-**	**3.254**	**0.317**	**0.088**	**-**	**0.404**	**0.441**	**0.122**	**-**	**0.563**	**0.321**	**0.089**	**-**	**0.410**	**3.622**	**1.008**	**-**	**4.630**
Grand Totals			**11.880**	**6.370**	**0.208**	**18.457**	**1.479**	**0.793**	**0.025**	**2.297**	**2.056**	**1.103**	**0.036**	**3.195**	**1.499**	**0.805**	**0.028**	**2.331**	**16.914**	**9.071**	**0.296**	**26.281**

Table A-4 Average Annual Daily Fixed-Wing Flight Events at MCAS Futenma

Op Type	Runway ID	Flight Track ID	KC-130J				UC-12W				UC-35				FA-18C/D				Fixed-Wing Total			
			Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total
Departures	06	06D3	0.133	0.022	-	0.156	0.115	0.021	0.000	0.137	0.112	0.005	-	0.117	0.075	0.015	-	0.090	0.435	0.064	0.000	0.499
		06D4	0.133	0.022	-	0.156	0.115	0.021	0.000	0.137	0.112	0.005	-	0.117	0.075	0.015	-	0.090	0.435	0.064	0.000	0.499
		06D5	0.533	0.089	-	0.622	0.460	0.085	0.002	0.547	0.447	0.020	-	0.467	0.299	0.061	-	0.360	1.739	0.255	0.002	1.996
		06D6	0.533	0.089	-	0.622	0.460	0.085	0.002	0.547	0.447	0.020	-	0.467	0.299	0.061	-	0.360	1.739	0.255	0.002	1.996
	24	24D3	0.033	0.006	-	0.039	0.029	0.005	0.000	0.034	0.028	0.001	-	0.029	0.019	0.004	-	0.023	0.109	0.016	0.000	0.125
		24D4	0.033	0.006	-	0.039	0.029	0.005	0.000	0.034	0.028	0.001	-	0.029	0.019	0.004	-	0.023	0.109	0.016	0.000	0.125
		24D5	0.267	0.045	-	0.311	0.230	0.043	0.001	0.274	0.224	0.010	-	0.234	0.150	0.030	-	0.180	0.870	0.128	0.001	0.998
Nonbreak Arrival	06	06A4	0.055	0.029	0.011	0.094	0.121	0.002	0.002	0.125	0.066	0.013	0.002	0.081	0.384	0.042	-	0.425	0.625	0.086	0.015	0.726
	24	24A4	0.551	0.163	0.014	0.729	0.419	0.174	0.012	0.605	0.274	0.254	0.015	0.544	0.023	-	-	0.023	1.267	0.592	0.042	1.900
Instrument Arrival	06	06A5	0.551	0.163	0.014	0.729	0.419	0.174	0.012	0.605	0.274	0.254	0.015	0.544	0.023	-	-	0.023	1.267	0.592	0.042	1.900
		06A6	0.014	0.007	0.003	0.024	0.030	0.001	0.001	0.031	0.016	0.003	0.001	0.020	0.096	0.010	-	0.106	0.156	0.021	0.004	0.181
	24	24A5	0.276	0.082	0.007	0.364	0.209	0.087	0.006	0.302	0.137	0.127	0.008	0.272	0.012	-	-	0.012	0.633	0.296	0.021	0.950
Overhead Break Arrival	06	06O1A	-	-	-	-	-	-	-	-	-	-	-	-	0.043	-	-	0.043	0.043	-	-	0.043
		06O1B	-	-	-	-	-	-	-	-	-	-	-	-	0.342	-	-	0.342	0.342	-	-	0.342
		06O1C	-	-	-	-	-	-	-	-	-	-	-	-	0.043	-	-	0.043	0.043	-	-	0.043
	24	24O1A	-	-	-	-	-	-	-	-	-	-	-	-	0.011	-	-	0.011	0.011	-	-	0.011
		24O1B	-	-	-	-	-	-	-	-	-	-	-	-	0.086	-	-	0.086	0.086	-	-	0.086
		24O1C	-	-	-	-	-	-	-	-	-	-	-	-	0.011	-	-	0.011	0.011	-	-	0.011
Touch and Go	06	06T3	1.145	0.104	-	1.249	0.409	0.030	-	0.438	0.350	0.066	-	0.415	0.080	0.016	-	0.096	1.984	0.216	-	2.200
	24	24T2	0.286	0.026	-	0.312	0.102	0.007	-	0.110	0.087	0.016	-	0.104	0.020	0.004	-	0.024	0.496	0.054	-	0.550
GCA Box	06	06G2	0.070	0.008	-	0.078	0.153	0.012	-	0.166	0.272	0.006	-	0.277	-	-	-	-	0.495	0.025	-	0.521
	24	24G2	0.018	0.002	-	0.019	0.038	0.003	-	0.041	0.068	0.001	-	0.069	-	-	-	-	0.124	0.006	-	0.130
Departure Total			**1.666**	**0.280**	**-**	**1.945**	**1.439**	**0.266**	**0.006**	**1.710**	**1.397**	**0.063**	**-**	**1.460**	**0.934**	**0.189**	**-**	**1.123**	**5.436**	**0.797**	**0.006**	**6.239**
Nonbreak Arrival Total			**0.606**	**0.192**	**0.025**	**0.823**	**0.539**	**0.176**	**0.014**	**0.730**	**0.340**	**0.267**	**0.018**	**0.625**	**0.407**	**0.042**	**-**	**0.448**	**1.892**	**0.677**	**0.057**	**2.626**
Instrument Arrival			**0.841**	**0.252**	**0.024**	**1.117**	**0.658**	**0.262**	**0.019**	**0.938**	**0.427**	**0.385**	**0.024**	**0.836**	**0.130**	**0.010**	**-**	**0.141**	**2.056**	**0.909**	**0.066**	**3.031**
Overhead Break			**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**0.534**	**-**	**-**	**0.534**	**0.534**	**-**	**-**	**0.534**
Touch and Go Total			**1.432**	**0.130**	**-**	**1.562**	**0.511**	**0.037**	**-**	**0.548**	**0.437**	**0.082**	**-**	**0.519**	**0.100**	**0.021**	**-**	**0.121**	**2.480**	**0.270**	**-**	**2.749**
GCA Box Total			**0.088**	**0.010**	**-**	**0.097**	**0.192**	**0.015**	**-**	**0.207**	**0.340**	**0.007**	**-**	**0.347**	**-**	**-**	**-**	**-**	**0.619**	**0.032**	**-**	**0.651**
Grand Totals			**4.631**	**0.863**	**0.049**	**5.544**	**3.338**	**0.756**	**0.038**	**4.133**	**2.941**	**0.804**	**0.041**	**3.786**	**2.106**	**0.262**	**-**	**2.367**	**13.016**	**2.685**	**0.129**	**15.830**

Table A-5 Runway and Flight Track Utilization Percentages for MV-22

Op Type	Runway ID	Runway Percentages (1)	Flight Track ID	Description	Track Percentages (2)
Departure	06	80%	06D1	Helo departure to Point Kilo	10%
			06D2B	Helo departure to Point Sierra	10%
			06D3	ADDAN ONE	10%
			06D4B	South	10%
			06D5	Standard Instrument Departure SE	30%
			06D6	Standard Instrument Departure NE	30%
	subtotal				*100%*
	24	20%	24D1	Helo departure to Point Tango	10%
			24D2B	Helo departure to Point Sierra	10%
			24D3	ADDAN ONE	10%
			24D4	CHINEN ONE	10%
			24D5	Standard Instrument Departure South	60%
	subtotal				*100%*
Nonbreak Arrival	06	80%	06A1	Helo arrival from Point Kilo	15%
			06A2B	Helo arrival from Point Sierra	15%
			06A3	Copter TACAN 040	10%
			06A4	Straight-in Visual	60%
	subtotal				*100%*
	24	20%	24A1	Helo arrival from Point Tango	15%
			24A2B	Helo arrival from Point Sierra	15%
			24A3	Copter TACAN 24	10%
			24A4	Straight-in Visual	60%
	subtotal				*100%*
Instrument Arrival	06	80%	06A5	TACAN Y	50%
			06A6	TACAN Z	50%
	24	20%	24A5	TACAN	100%
Overhead Break Arrival	06	80%	06O1A	from SW; break at downwind numbers	1%
			06O2A	from SW; break at midfield	8%
			06O1A	from SW; break at upwind numbers	1%
			06O1B	from SE; break at downwind numbers	9%
			06O2B	from SE; break at midfield	72%
			06O3B	from SE; break at upwind numbers	9%
	subtotal				100%
	24	20%	24O1	break at downwind numbers	10%
			24O2	break at midfield	80%
			24O3	break at upwind numbers	10%
	subtotal				100%
Touch and Go	06	80%	06T1	Helo, 0.4nm abeam, 0.6 nm downwind to runway	28%
			06T2	Helo, 0.4nm abeam, 0.6 nm downwind to CAL	14%
			06T3	Fixed Wing, circle southeast of runway	58%
	subtotal				*100%*
	24	20%	24T1	Helo, 0.4nm abeam, 0.6 nm downwind to runway	42%
			24T2	Fixed Wing, circle southeast of runway	58%
	subtotal				100%
GCA Box	06	80%	06G1	Helo Radar Pattern, 3 nm abeam, 7.4 nm downwind	
			06G2	Fixed Wing pattern over Naha	0%
			06G3	Fixed Wing pattern around Naha	100%
	subtotal				*100%*
	24	20%	24G1	Helo Radar Pattern, 3 nm abeam, 7.4 nm downwind	
			24G2	Fixed Wing pattern	100%
	subtotal				*100%*

Notes:

(1) within Operation Type

(2) within specific runway

Day = 0700 - 2200; Night = 2200 - 0700

Table A-6 Average Annual Daily Rotary-Wing Flight Events for Proposed Scenario at MCAS Futenma

Op Type	Runway ID	Flight Track ID	CH-53E				AH-1W				UH-1N				Helicopter Total			
			Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total
Departure	06	06D1	0.2332	0.1703	-	0.4035	0.3237	0.2363	-	0.5600	0.2363	0.1718	-	0.4081	0.7932	0.5784	-	1.3716
		06D2	0.0999	0.0730	-	0.1729	0.1387	0.1013	-	0.2400	0.1013	0.0736	-	0.1749	0.3399	0.2479	-	0.5878
	24	24D1	0.0583	0.0426	-	0.1009	0.0809	0.0591	-	0.1400	0.0591	0.0430	-	0.1021	0.1983	0.1447	-	0.3430
		24D2	0.0250	0.0182	-	0.0432	0.0347	0.0253	-	0.0600	0.0253	0.0184	-	0.0437	0.0850	0.0619	-	0.1469
Nonbreak Arrival	06	06A1	0.1879	0.1289	0.0121	0.3289	0.2618	0.1799	0.0175	0.4592	0.1906	0.1316	0.0134	0.3356	0.6403	0.4404	0.0430	1.1237
		06A2	0.0805	0.0552	0.0052	0.1409	0.1122	0.0771	0.0075	0.1968	0.0817	0.0564	0.0058	0.1439	0.2744	0.1887	0.0185	0.4816
		06A3	0.0197	0.0164	-	0.0361	0.0263	0.0219	-	0.0482	0.0197	0.0164	-	0.0361	0.0657	0.0547	-	0.1204
	24	24A1	0.0483	0.0331	0.0031	0.0845	0.0673	0.0463	0.0045	0.1181	0.0490	0.0338	0.0035	0.0863	0.1646	0.1132	0.0111	0.2889
		24A2	0.0207	0.0142	0.0013	0.0362	0.0288	0.0198	0.0019	0.0505	0.0210	0.0145	0.0015	0.0370	0.0705	0.0485	0.0047	0.1237
		24A3	0.0049	-	-	0.0049	0.0066	-	-	0.0066	0.0049	-	-	0.0049	0.0164	-	-	0.0164
	Pad 2	PAD2A1	0.0460	0.0316	0.0030	0.0806	0.0641	0.0441	0.0043	0.1125	0.0467	0.0322	0.0033	0.0822	0.1568	0.1079	0.0106	0.2753
Touch and Go	06	06T1	0.1624	0.0585	-	0.2209	0.2255	0.0815	-	0.3070	0.1644	0.0598	-	0.2242	0.5523	0.1998	-	0.7521
		06T2	0.1083	0.0390	-	0.1473	0.1504	0.0544	-	0.2048	0.1096	0.0399	-	0.1495	0.3683	0.1333	-	0.5016
	24	24T1	0.0677	0.0244	-	0.0921	0.0940	0.0340	-	0.1280	0.0685	0.0249	-	0.0934	0.2302	0.0833	-	0.3135
GCA Box	06	06G1	0.2532	0.0701	-	0.3233	0.3529	0.0975	-	0.4504	0.2564	0.0712	-	0.3276	0.8625	0.2388	-	1.1013
	24	24G1	0.0633	0.0175	-	0.0808	0.0882	0.0244	-	0.1126	0.0641	0.0178	-	0.0819	0.2156	0.0597	-	0.2753
Departure Total			**0.4164**	**0.3041**	**-**	**0.7205**	**0.5780**	**0.4220**	**-**	**1.0000**	**0.4220**	**0.3068**	**-**	**0.7288**	**1.4164**	**1.0329**	**-**	**2.4493**
Nonbreak Arrival			**0.4080**	**0.2794**	**0.0247**	**0.7121**	**0.5671**	**0.3891**	**0.0357**	**0.9919**	**0.4136**	**0.2849**	**0.0275**	**0.7260**	**1.3887**	**0.9534**	**0.0879**	**2.4300**
Touch and Go Total			**0.3384**	**0.1219**	**-**	**0.4603**	**0.4699**	**0.1699**	**-**	**0.6398**	**0.3425**	**0.1246**	**-**	**0.4671**	**1.1508**	**0.4164**	**-**	**1.5672**
GCA Box Total			**0.3165**	**0.0876**	**-**	**0.4041**	**0.4411**	**0.1219**	**-**	**0.5630**	**0.3205**	**0.0890**	**-**	**0.4095**	**1.0781**	**0.2985**	**-**	**1.3766**
Grand Totals			**1.4793**	**0.7930**	**0.0247**	**2.2970**	**2.0561**	**1.1029**	**0.0357**	**3.1947**	**1.4986**	**0.8053**	**0.0275**	**2.3314**	**5.0340**	**2.7012**	**0.0879**	**7.8231**

Table A-7 Average Annual Daily MV-22 Flight Events for Proposed Scenario at MCAS Futenma

Op Type	Runway ID	Flight Track ID	MV-22 Day (0700 - 1900)	MV-22 Eve (1900 - 2200)	MV-22 Night (2200 - 0700)	MV-22 Total
Departure	06	06D1	0.3816	0.1633	0.0188	0.5637
		06D2B	0.3816	0.1633	0.0188	0.5637
		06D3	0.3816	0.1633	0.0188	0.5637
		06D4B	0.3816	0.1633	0.0188	0.5637
		06D5	1.1448	0.4899	0.0565	1.6912
		06D6	1.1448	0.4899	0.0565	1.6912
	24	24D1	0.0954	0.0408	0.0047	0.1409
		24D2B	0.0954	0.0408	0.0047	0.1409
		24D3	0.0954	0.0408	0.0047	0.1409
		24D4	0.0954	0.0408	0.0047	0.1409
		24D5	0.5724	0.2449	0.0283	0.8456
Nonbreak Arrival	06	06A1	0.0973	0.0391	0.0072	0.1436
		06A2B	0.0973	0.0391	0.0072	0.1436
		06A3	0.0649	0.0261	0.0048	0.0958
		06A4	0.3893	0.1565	0.0289	0.5747
	24	24A1	0.0243	0.0098	0.0018	0.0359
		24A2B	0.0243	0.0098	0.0018	0.0359
		24A3	0.0162	0.0065	0.0012	0.0239
		24A4	0.0973	0.0391	0.0072	0.1436
Instrument Arrival	06	06A5	0.4197	0.1688	0.0307	0.6192
		06A6	0.4197	0.1688	0.0307	0.6192
	24	24A5	0.2099	0.0844	0.0153	0.3096
Overhead Break Arrival	06	06O1A	0.0234	0.0106	0.0018	0.0358
		06O2A	0.2109	0.0950	0.0162	0.3221
		06O1A	0.1874	0.0750	0.0144	0.2768
		06O1B	1.6870	0.6754	0.1296	2.4920
		06O2B	0.0234	0.0094	0.0018	0.0346
		06O3B	0.2109	0.0844	0.0162	0.3115
	24	24O1	0.0586	0.0117	0.0020	0.0723
		24O2	0.4686	0.1876	0.0160	0.6722
		24O3	0.0586	0.0235	0.0020	0.0841
Touch and Go	06	06T1	0.0589	0.0242	0.0034	0.0865
		06T2	0.0295	0.0121	0.0017	0.0433
		06T3	0.1220	0.0502	0.0070	0.1792
	24	24T1	0.0221	0.0091	0.0013	0.0325
		24T2	0.0305	0.0126	0.0017	0.0448
GCA Box	06	06G1	-	-	-	-
		06G2	-	-	-	-
		06G3	0.9523	0.3847	0.0658	1.4028
	24	24G1	-	-	-	-
		24G2	0.2381	0.0962	0.0164	0.3507
Departure Total			**4.7700**	**2.0411**	**0.2353**	**7.0464**
Nonbreak Arrival Total			**0.8109**	**0.3260**	**0.0601**	**1.1970**
Instrument Arrival			**0.8109**	**0.3260**	**0.0601**	**1.1970**
Overhead Break Arrival			**2.9288**	**1.1726**	**0.2000**	**4.3014**
Touch and Go Total			**0.2630**	**0.1082**	**0.0151**	**0.3863**
GCA Box Total			**1.1904**	**0.4809**	**0.0822**	**1.7535**
Grand Totals			**11.0124**	**4.5508**	**0.6694**	**16.2326**

Table A-8 Average Annual Daily Fixed-Wing Flight Events at MCAS Futenma

Op Type	Runway ID	Flight Track ID	KC-130J				UC-12W				UC-35				FA-18C/D				Fixed-Wing Total			
			Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total
Departures	06	06D3	0.1333	0.0224	-	0.1557	0.1151	0.0213	0.0004	0.1368	0.1118	0.0050	-	0.1168	0.0747	0.0151	-	0.0898	0.4349	0.0638	0.0004	0.4991
		06D4	0.1333	0.0224	-	0.1557	0.1151	0.0213	0.0004	0.1368	0.1118	0.0050	-	0.1168	0.0747	0.0151	-	0.0898	0.4349	0.0638	0.0004	0.4991
		06D5	0.5330	0.0894	-	0.6224	0.4603	0.0850	0.0018	0.5471	0.4471	0.0202	-	0.4673	0.2990	0.0605	-	0.3595	1.7394	0.2551	0.0018	1.9963
		06D6	0.5330	0.0894	-	0.6224	0.4603	0.0850	0.0018	0.5471	0.4471	0.0202	-	0.4673	0.2990	0.0605	-	0.3595	1.7394	0.2551	0.0018	1.9963
	24	24D3	0.0333	0.0056	-	0.0389	0.0288	0.0053	0.0001	0.0342	0.0279	0.0013	-	0.0292	0.0187	0.0038	-	0.0225	0.1087	0.0160	0.0001	0.1248
		24D4	0.0333	0.0056	-	0.0389	0.0288	0.0053	0.0001	0.0342	0.0279	0.0013	-	0.0292	0.0187	0.0038	-	0.0225	0.1087	0.0160	0.0001	0.1248
		24D5	0.2665	0.0447	-	0.3112	0.2301	0.0425	0.0009	0.2735	0.2236	0.0101	-	0.2337	0.1495	0.0302	-	0.1797	0.8697	0.1275	0.0009	0.9981
Nonbreak Arrival	06	06A4	0.0548	0.0285	0.0110	0.0943	0.1205	0.0022	0.0022	0.1249	0.0658	0.0132	0.0022	0.0812	0.3836	0.0416	-	0.4252	0.6247	0.0855	0.0154	0.7256
	24	24A4	0.5512	0.1633	0.0142	0.7287	0.4186	0.1742	0.0121	0.6049	0.2740	0.2542	0.0153	0.5435	0.0230	-	-	0.0230	1.2668	0.5917	0.0416	1.9001
Instrument Arrival	06	06A5	0.5512	0.1633	0.0142	0.7287	0.4186	0.1742	0.0121	0.6049	0.2740	0.2542	0.0153	0.5435	0.0230	-	-	0.0230	1.2668	0.5917	0.0416	1.9001
		06A6	0.0137	0.0071	0.0027	0.0235	0.0301	0.0005	0.0005	0.0311	0.0164	0.0033	0.0005	0.0202	0.0959	0.0104	-	0.1063	0.1561	0.0213	0.0037	0.1811
	24	24A5	0.2756	0.0816	0.0071	0.3643	0.2093	0.0871	0.0060	0.3024	0.1370	0.1271	0.0077	0.2718	0.0115	-	-	0.0115	0.6334	0.2958	0.0208	0.9500
Overhead Break Arrival	06	06O1A	-	-	-	-	-	-	-	-	-	-	-	-	0.0427	-	-	0.0427	0.0427	-	-	0.0427
		06O1B	-	-	-	-	-	-	-	-	-	-	-	-	0.3419	-	-	0.3419	0.3419	-	-	0.3419
		06O1C	-	-	-	-	-	-	-	-	-	-	-	-	0.0427	-	-	0.0427	0.0427	-	-	0.0427
	24	24O1A	-	-	-	-	-	-	-	-	-	-	-	-	0.0107	-	-	0.0107	0.0107	-	-	0.0107
		24O1B	-	-	-	-	-	-	-	-	-	-	-	-	0.0855	-	-	0.0855	0.0855	-	-	0.0855
		24O1C	-	-	-	-	-	-	-	-	-	-	-	-	0.0107	-	-	0.0107	0.0107	-	-	0.0107
Touch and Go	06	06T3	1.1452	0.1041	-	1.2493	0.4088	0.0296	-	0.4384	0.3496	0.0658	-	0.4154	0.0800	0.0164	-	0.0964	1.9836	0.2159	-	2.1995
	24	24T2	0.2863	0.0260	-	0.3123	0.1022	0.0074	-	0.1096	0.0874	0.0164	-	0.1038	0.0200	0.0041	-	0.0241	0.4959	0.0539	-	0.5498
GCA Box	06	06G2	0.0701	0.0077	-	0.0778	0.1534	0.0121	-	0.1655	0.2718	0.0055	-	0.2773	-	-	-	-	0.4953	0.0253	-	0.5206
	24	24G2	0.0175	0.0019	-	0.0194	0.0384	0.0030	-	0.0414	0.0679	0.0014	-	0.0693	-	-	-	-	0.1238	0.0063	-	0.1301
Departure Total			**1.6657**	**0.2795**	**-**	**1.9452**	**1.4385**	**0.2657**	**0.0055**	**1.7097**	**1.3972**	**0.0631**	**-**	**1.4603**	**0.9343**	**0.1890**	**-**	**1.1233**	**5.4357**	**0.7973**	**0.0055**	**6.2385**
Nonbreak Arrival Total			**0.6060**	**0.1918**	**0.0252**	**0.8230**	**0.5391**	**0.1764**	**0.0143**	**0.7298**	**0.3398**	**0.2674**	**0.0175**	**0.6247**	**0.4066**	**0.0416**	**-**	**0.4482**	**1.8915**	**0.6772**	**0.0570**	**2.6257**
Instrument Arrival			**0.8405**	**0.2520**	**0.0240**	**1.1165**	**0.6580**	**0.2618**	**0.0186**	**0.9384**	**0.4274**	**0.3846**	**0.0235**	**0.8355**	**0.1304**	**0.0104**	**-**	**0.1408**	**2.0563**	**0.9088**	**0.0661**	**3.0312**
Overhead Break			**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**0.5342**	**-**	**-**	**0.5342**	**0.5342**	**-**	**-**	**0.5342**
Touch and Go Total			**1.4315**	**0.1301**	**-**	**1.5616**	**0.5110**	**0.0370**	**-**	**0.5480**	**0.4370**	**0.0822**	**-**	**0.5192**	**0.1000**	**0.0205**	**-**	**0.1205**	**2.4795**	**0.2698**	**-**	**2.7493**
GCA Box Total			**0.0876**	**0.0096**	**-**	**0.0972**	**0.1918**	**0.0151**	**-**	**0.2069**	**0.3397**	**0.0069**	**-**	**0.3466**	**-**	**-**	**-**	**-**	**0.6191**	**0.0316**	**-**	**0.6507**
Grand Totals			**4.6313**	**0.8630**	**0.0492**	**5.5435**	**3.3384**	**0.7560**	**0.0384**	**4.1328**	**2.9411**	**0.8042**	**0.0410**	**3.7863**	**2.1055**	**0.2615**	**-**	**2.3670**	**13.0163**	**2.6847**	**0.1286**	**15.8296**

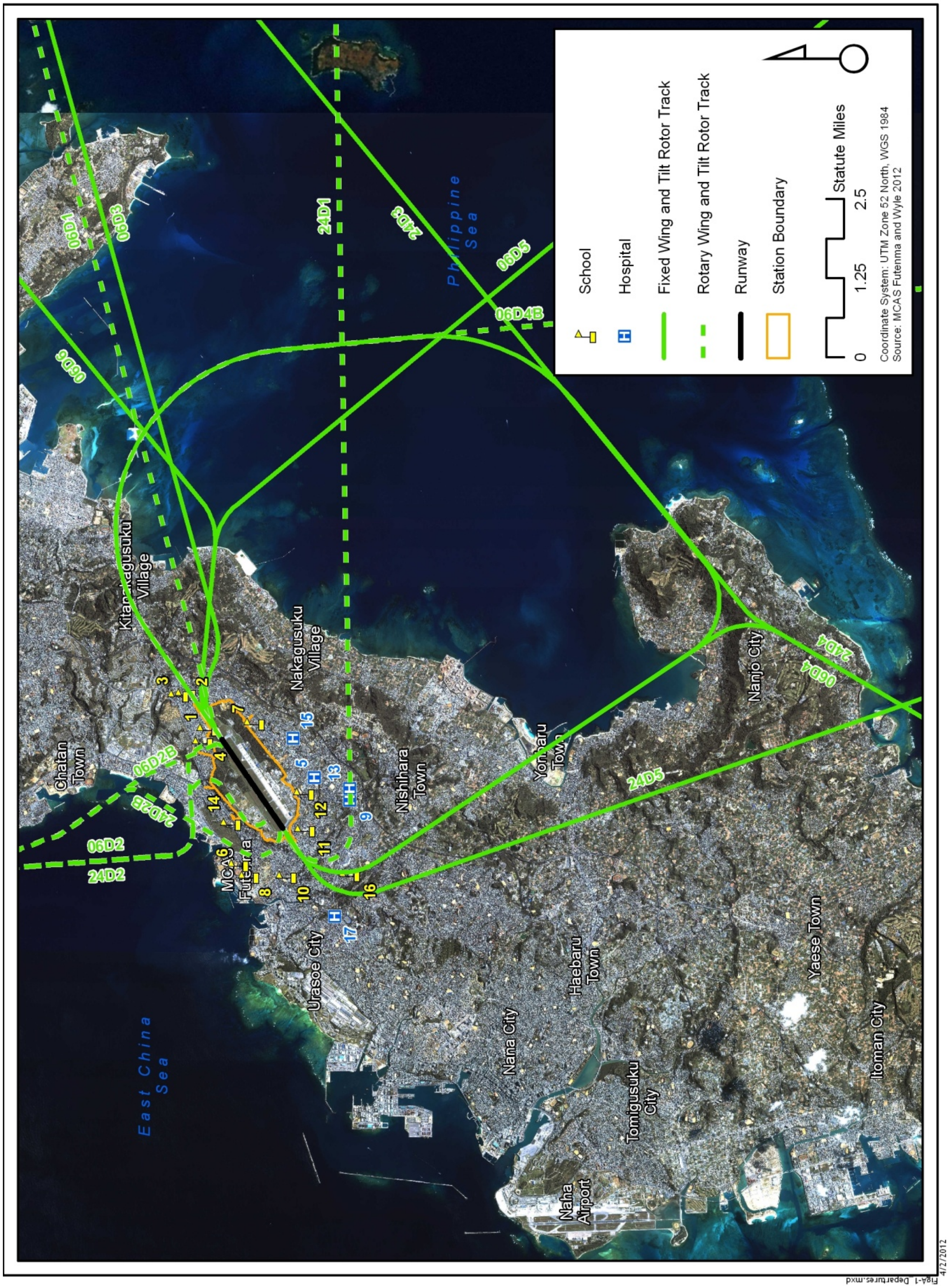


Figure A-1 Modeled Average Daily Departure Flight Tracks

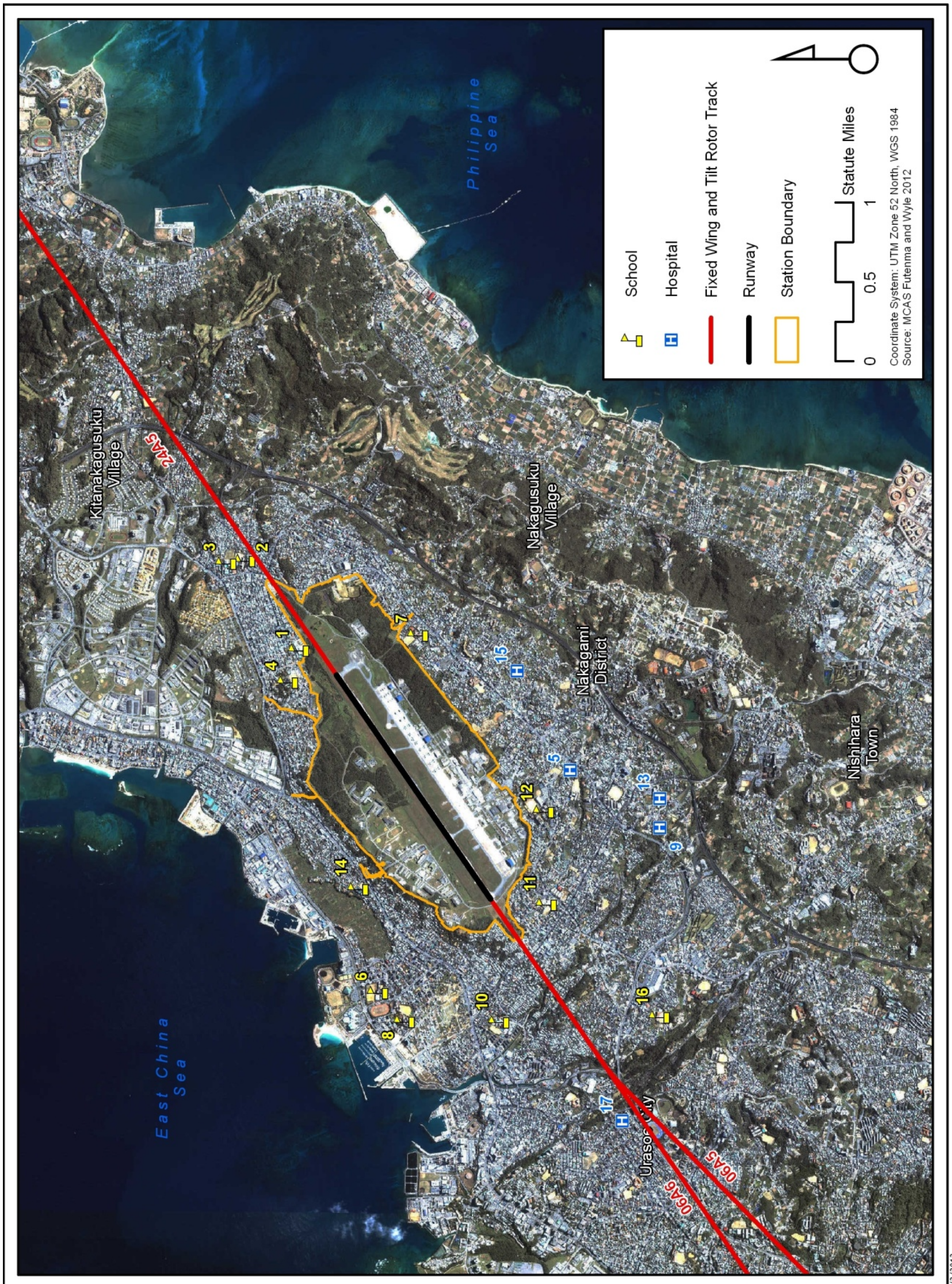


Figure A-2 Modeled Average Daily Instrument Arrival Flight Tracks

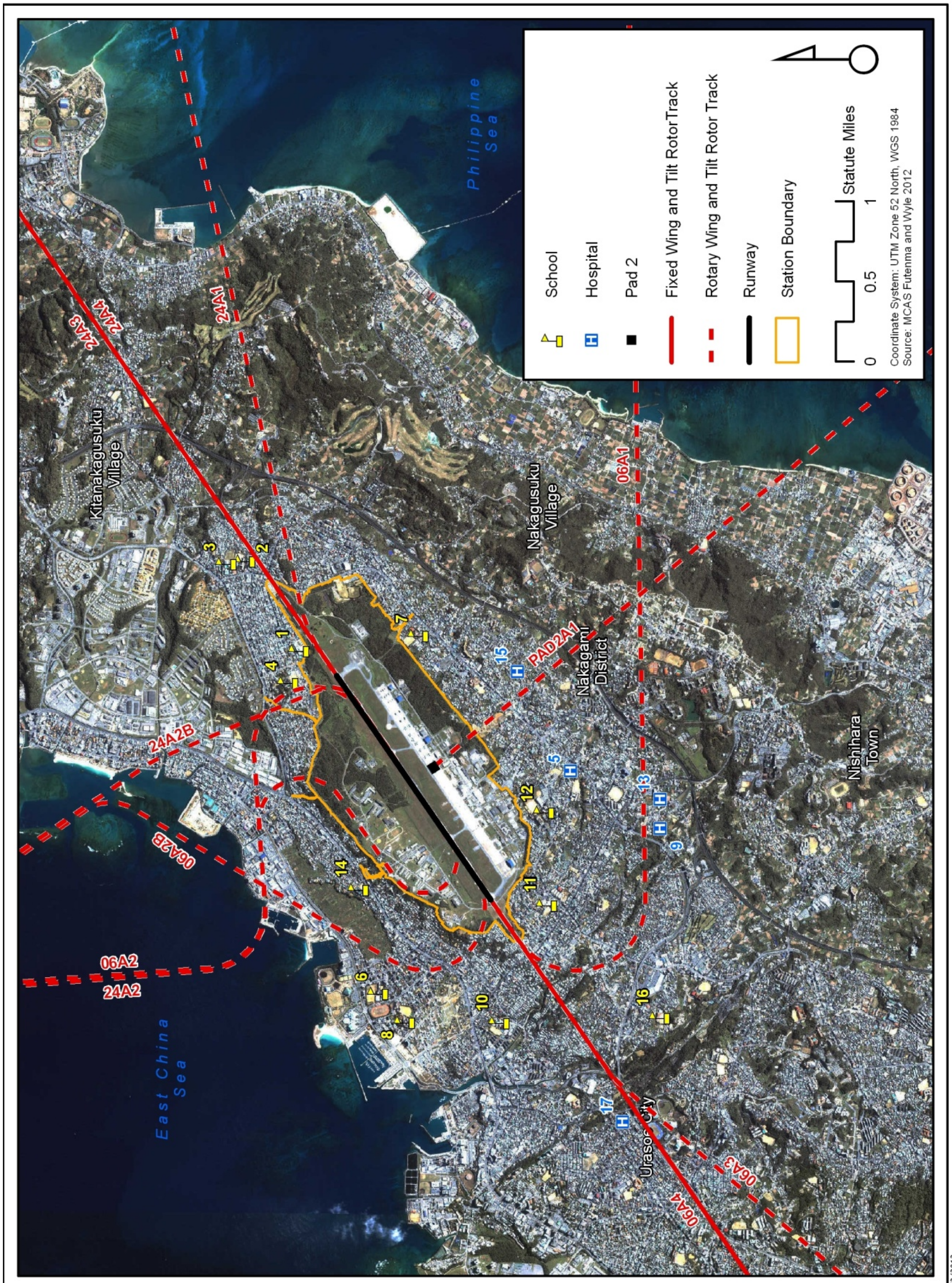


Figure A-3 Modeled Average Daily Visual Non-break Arrival Flight Tracks

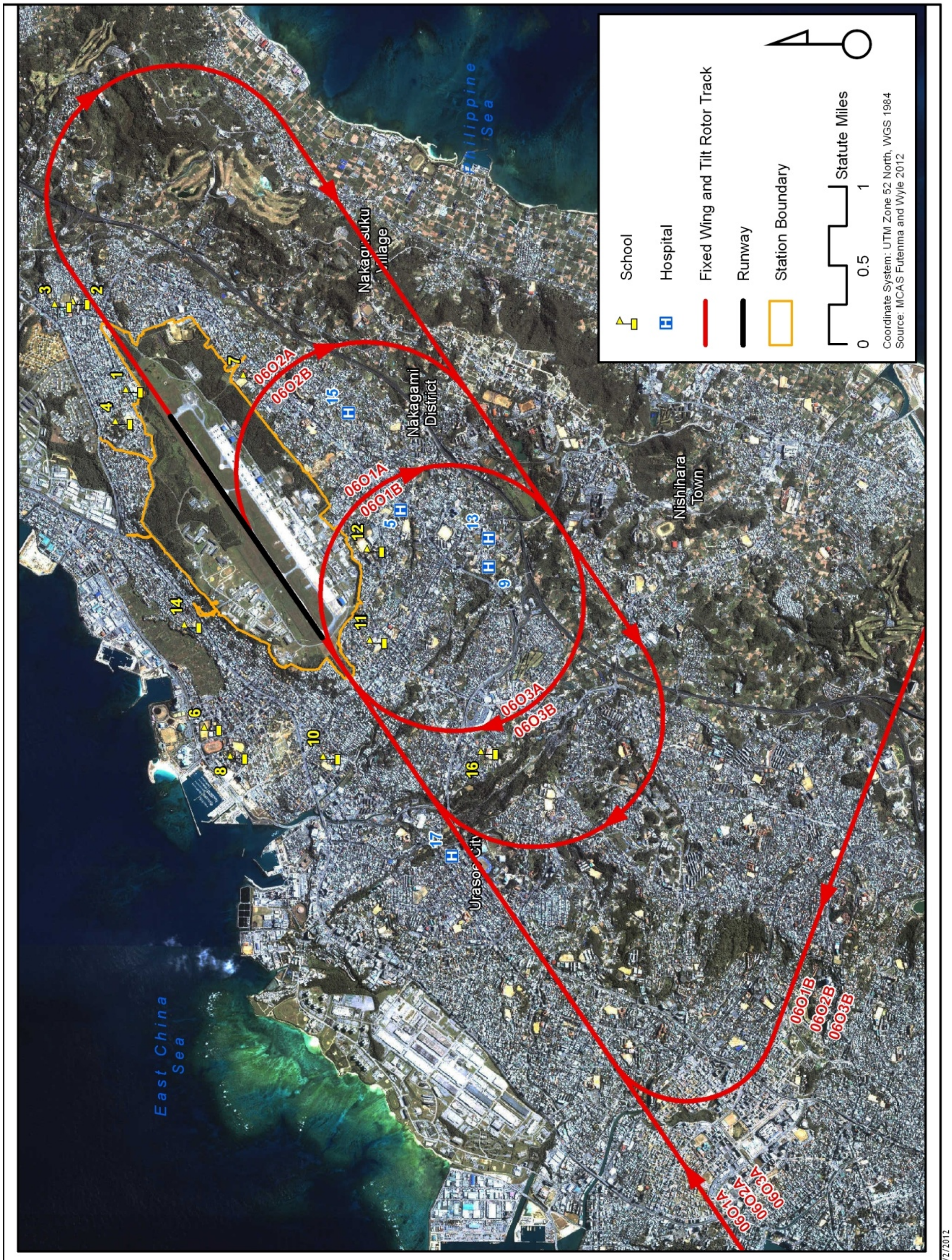
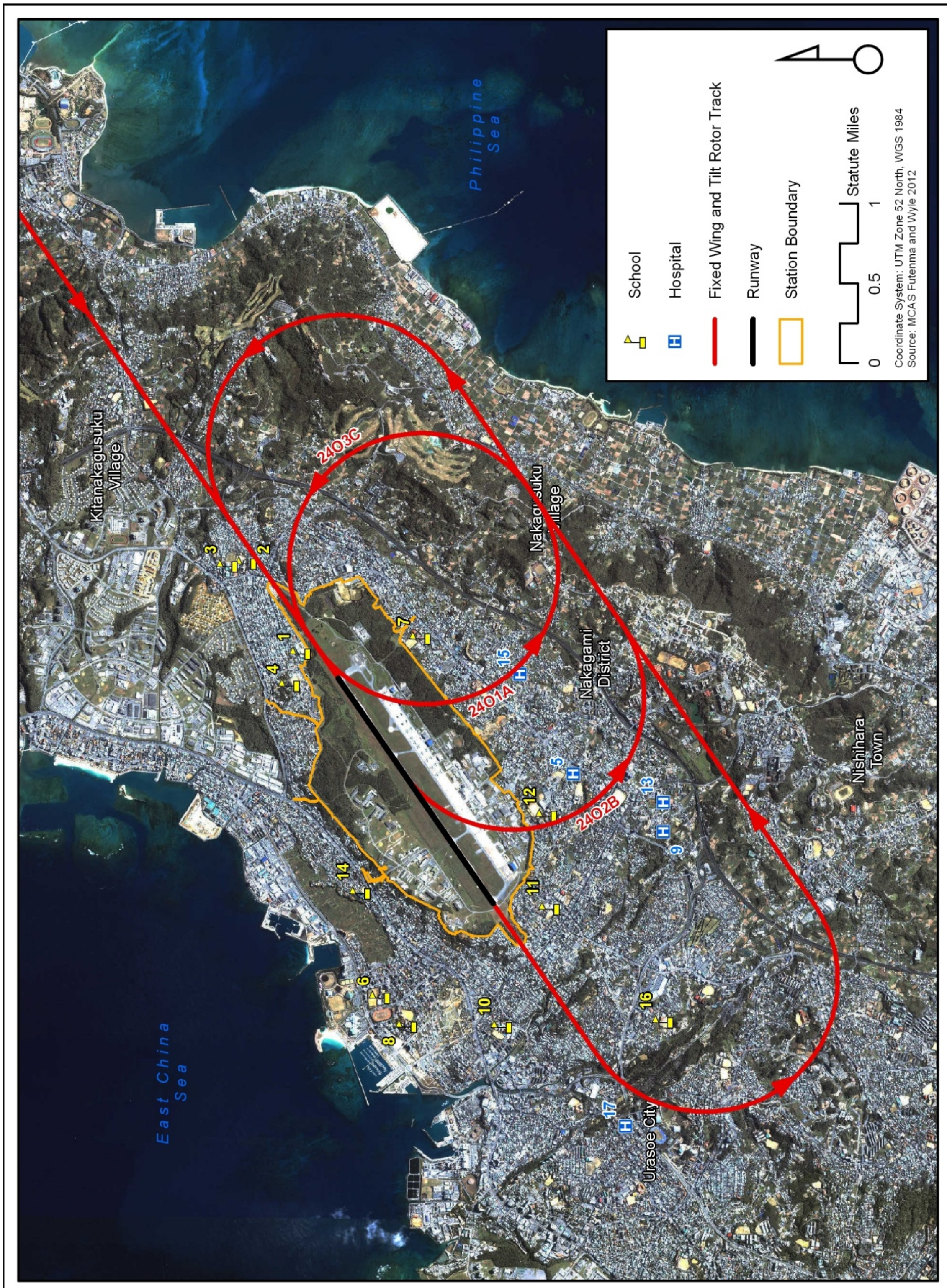


Figure A-4 Modeled Average Daily Overhead Break Arrival Flight Tracks for Runway 06



FigA-5_24OverheadBreakArrivals.mxd 4/2/2012

Figure A-5 Modeled Average Daily Overhead Break Arrival Flight Tracks for Runway 24

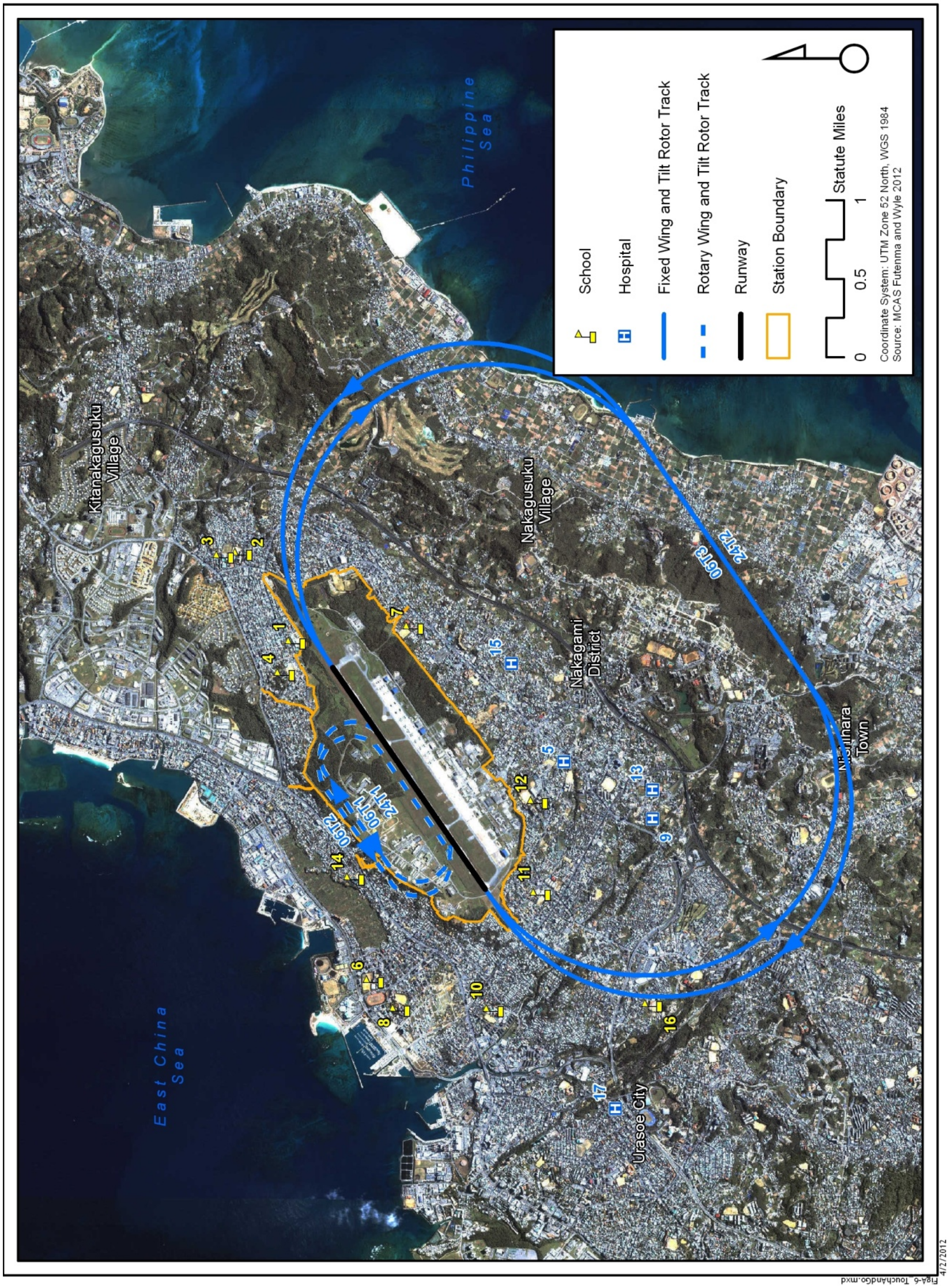


Figure A-6 Modeled Average Daily Touch and Go Flight Tracks

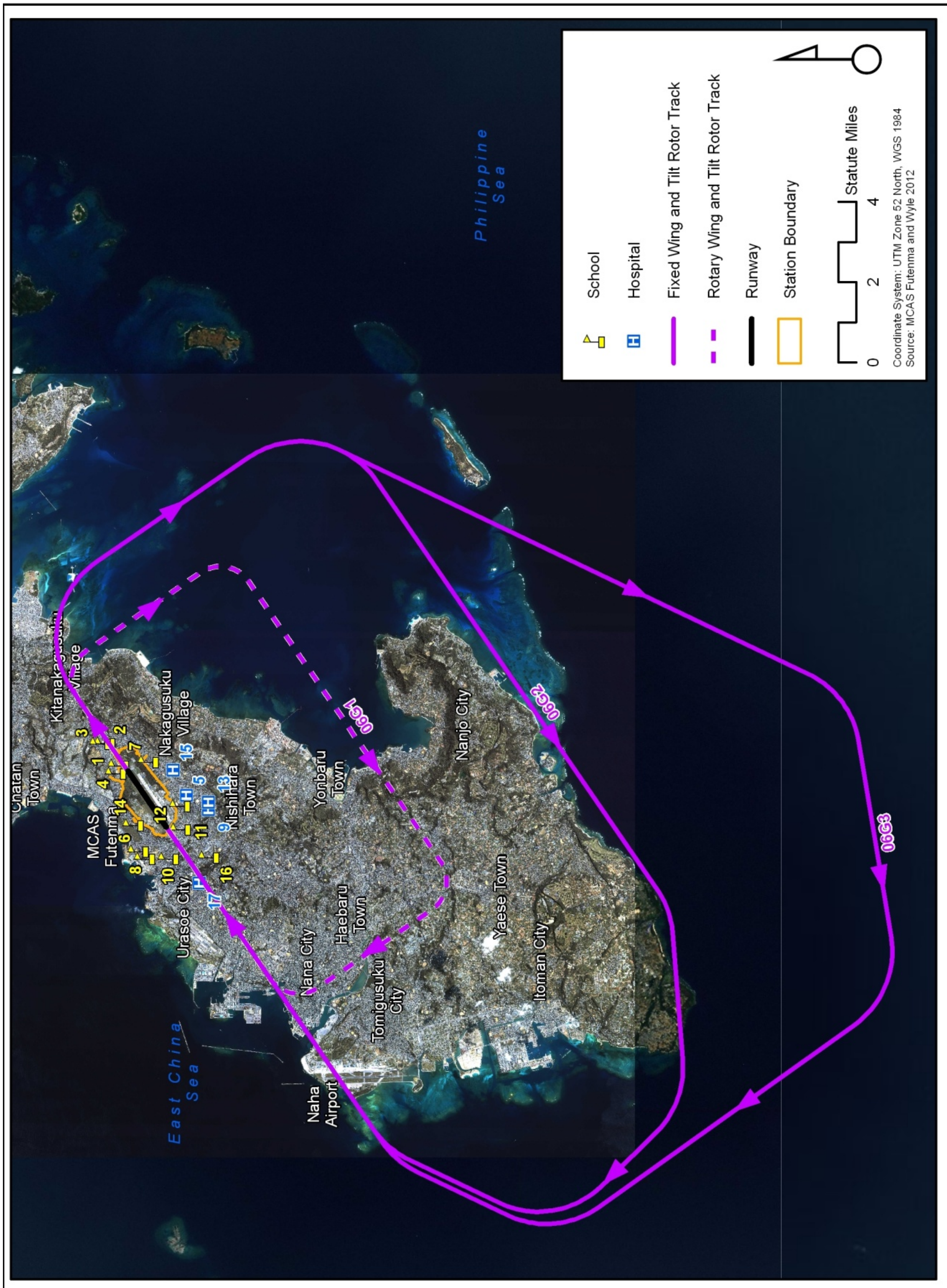


Figure A-7 Modeled Average Daily GCA Box Flight Tracks for Runway 06

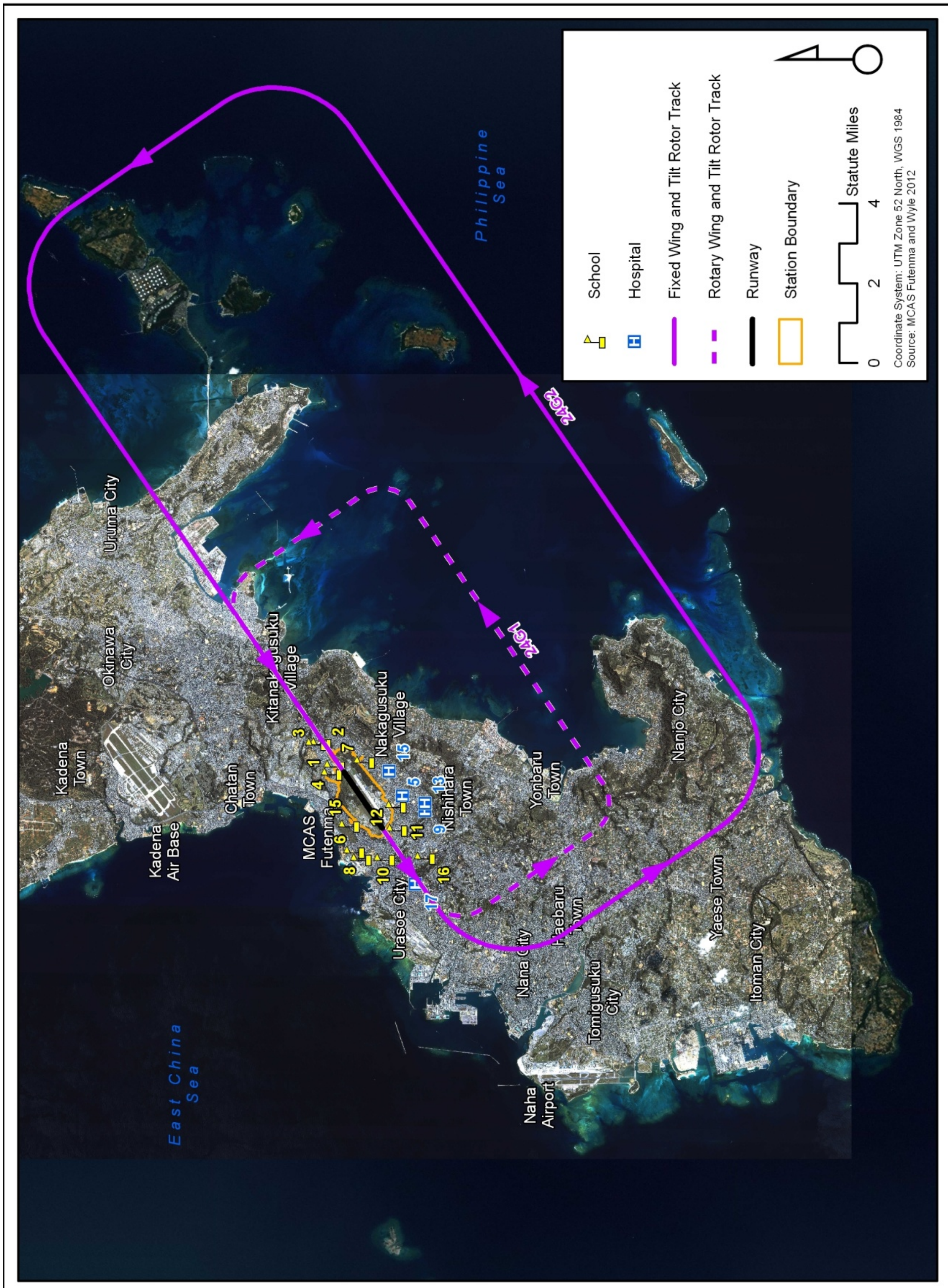


Figure A-8 Modeled Average Daily GCA Box Flight Tracks for Runway 24

Appendix A-2: Ie Shima Training Facility

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Table A-9 Flight Track use at ISTF

Aircraft Type	Op Type	Runway	Flight Track	
			ID	Description
Rotary-Wing	Arrival	Coral Runway	05A1	Arrival to Ie Shima runway
	FCLP	LHA Deck	05LF	Left-hand FCLP Pattern
	Departure	Coral Runway	05D1	Departure from Ie Shima runway
AV-8B	Arrival	LHA Deck	05LHA1	Break arrival to LHA Deck
	T&G	LHA Deck	05LHF	Left-hand FCLP Pattern
	Departure	LHA Deck	05D1	Short Takeoff Departure from LHA Deck
KC-130J	Arrival	Coral Runway	05A2	Straight-in arrival to Ie Shima runway
	T&G	Coral Runway	05T1	Touch and go pattern on runway
	Departure	Coral Runway	05D2	Departure from Ie Shima runway

Table A-10 Average Annual Daily Flight Events at ISTF for Baseline

Op Type	Runway ID	Flight Track ID	CH-46E				CH-53E				AH-1W				UH-1N			
			Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total
Arrival	Coral Runway	05A1	0.2466	0.2137	0.0329	0.4932	0.0849	0.0740	0.0110	0.1699	0.0438	0.0356	0.0082	0.0876	0.0219	0.0192	0.0027	0.0438
FCLP	LHA Deck	05LF	1.7260	1.4959	0.2301	3.4520	0.5945	0.5178	0.0767	1.1890	0.3068	0.2493	0.0575	0.6136	0.1534	0.1342	0.0192	0.3068
Departure	Coral Runway	05D1	0.2466	0.2137	0.0329	0.4932	0.0849	0.0740	0.0110	0.1699	0.0438	0.0356	0.0082	0.0876	0.0219	0.0192	0.0027	0.0438
Arrival	LHA Deck	05LHA1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T&G	LHA Deck	05LHF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Departure	LHA Deck	05D1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arrival	Coral Runway	05A2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T&G	Coral Runway	05T1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Departure	Coral Runway	05D2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Totals			**2.2192**	**1.9233**	**0.2959**	**4.4384**	**0.7643**	**0.6658**	**0.0987**	**1.5288**	**0.3944**	**0.3205**	**0.0739**	**0.7888**	**0.1972**	**0.1726**	**0.0246**	**0.3944**

Op Type	Runway ID	Flight Track ID	AV-8B				KC-130J				Totals			
			Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total
Arrival	Coral Runway	05A1	-	-	-	-	-	-	-	-	0.3972	0.3425	0.0548	0.7945
FCLP	LHA Deck	05LF	-	-	-	-	-	-	-	-	2.7807	2.3972	0.3835	5.5614
Departure	Coral Runway	05D1	-	-	-	-	-	-	-	-	0.3972	0.3425	0.0548	0.7945
Arrival	LHA Deck	05LHA1	-	-	-	-	0.0685	0.0575	0.0082	0.1342	0.0685	0.0575	0.0082	0.1342
T&G	LHA Deck	05LHF	-	-	-	-	0.4795	0.4027	0.0575	0.9397	0.4795	0.4027	0.0575	0.9397
Departure	LHA Deck	05D1	-	-	-	-	0.0685	0.0575	0.0082	0.1342	0.0685	0.0575	0.0082	0.1342
Arrival	Coral Runway	05A2	0.0822	0.0712	0.0110	0.1644	-	-	-	-	0.0822	0.0712	0.0110	0.1644
T&G	Coral Runway	05T1	0.3288	0.4986	0.0767	0.9041	-	-	-	-	0.3288	0.4986	0.0767	0.9041
Departure	Coral Runway	05D2	0.0822	0.0712	0.0110	0.1644	-	-	-	-	0.0822	0.0712	0.0110	0.1644
Totals			**0.4932**	**0.6410**	**0.0987**	**1.2329**	**0.6165**	**0.5177**	**0.0739**	**1.2081**	**4.6848**	**4.2409**	**0.6657**	**9.5914**

Table A-11 Average Annual Daily Flight Events at ISTF for Proposed

Op Type	Runway ID	Flight Track ID	CH-46E				CH-53E				AH-1W				UH-1N			
			Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total
Arrival	Coral Runway	05A1	-	-	-	-	0.0849	0.0740	0.0110	0.1699	0.0438	0.0356	0.0082	0.0876	0.0219	0.0192	0.0027	0.0438
FCLP	LHA Deck	05LF	-	-	-	-	0.5945	0.5178	0.0767	1.1890	0.3068	0.2493	0.0575	0.6136	0.1534	0.1342	0.0192	0.3068
Departure	Coral Runway	05D1	-	-	-	-	0.0849	0.0740	0.0110	0.1699	0.0438	0.0356	0.0082	0.0876	0.0219	0.0192	0.0027	0.0438
Arrival	LHA Deck	05LHA1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T&G	LHA Deck	05LHF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Departure	LHA Deck	05D1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arrival	Coral Runway	05A2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T&G	Coral Runway	05T1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Departure	Coral Runway	05D2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Totals			**-**	**-**	**-**	**-**	**0.7643**	**0.6658**	**0.0987**	**1.5288**	**0.3944**	**0.3205**	**0.0739**	**0.7888**	**0.1972**	**0.1726**	**0.0246**	**0.3944**

Op Type	Runway ID	Flight Track ID	AV-8B				KC-130J				MV-22				Totals			
			Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 1900)	Eve (1900 - 2200)	Night (2200 - 0700)	Total
Arrival	Coral Runway	05A1	-	-	-	-	-	-	-	-	0.5781	0.5041	0.0740	1.1562	0.7287	0.6329	0.0959	1.4575
FCLP	LHA Deck	05LF	-	-	-	-	-	-	-	-	4.0521	3.5192	0.5329	8.1042	5.1068	4.4205	0.6863	10.2136
Departure	Coral Runway	05D1	-	-	-	-	-	-	-	-	0.5781	0.5041	0.0740	1.1562	0.7287	0.6329	0.0959	1.4575
Arrival	LHA Deck	05LHA1	-	-	-	-	0.0685	0.0575	0.0082	0.1342	-	-	-	-	0.0685	0.0575	0.0082	0.1342
T&G	LHA Deck	05LHF	-	-	-	-	0.4795	0.4027	0.0575	0.9397	-	-	-	-	0.4795	0.4027	0.0575	0.9397
Departure	LHA Deck	05D1	-	-	-	-	0.0685	0.0575	0.0082	0.1342	-	-	-	-	0.0685	0.0575	0.0082	0.1342
Arrival	Coral Runway	05A2	0.0822	0.0712	0.0110	0.1644	-	-	-	-	-	-	-	-	0.0822	0.0712	0.0110	0.1644
T&G	Coral Runway	05T1	0.3288	0.4986	0.0767	0.9041	-	-	-	-	-	-	-	-	0.3288	0.4986	0.0767	0.9041
Departure	Coral Runway	05D2	0.0822	0.0712	0.0110	0.1644	-	-	-	-	-	-	-	-	0.0822	0.0712	0.0110	0.1644
Totals			**0.4932**	**0.6410**	**0.0987**	**1.2329**	**0.6165**	**0.5177**	**0.0739**	**1.2081**	**5.2083**	**4.5274**	**0.6809**	**10.4166**	**7.6739**	**6.8450**	**1.0507**	**15.5696**

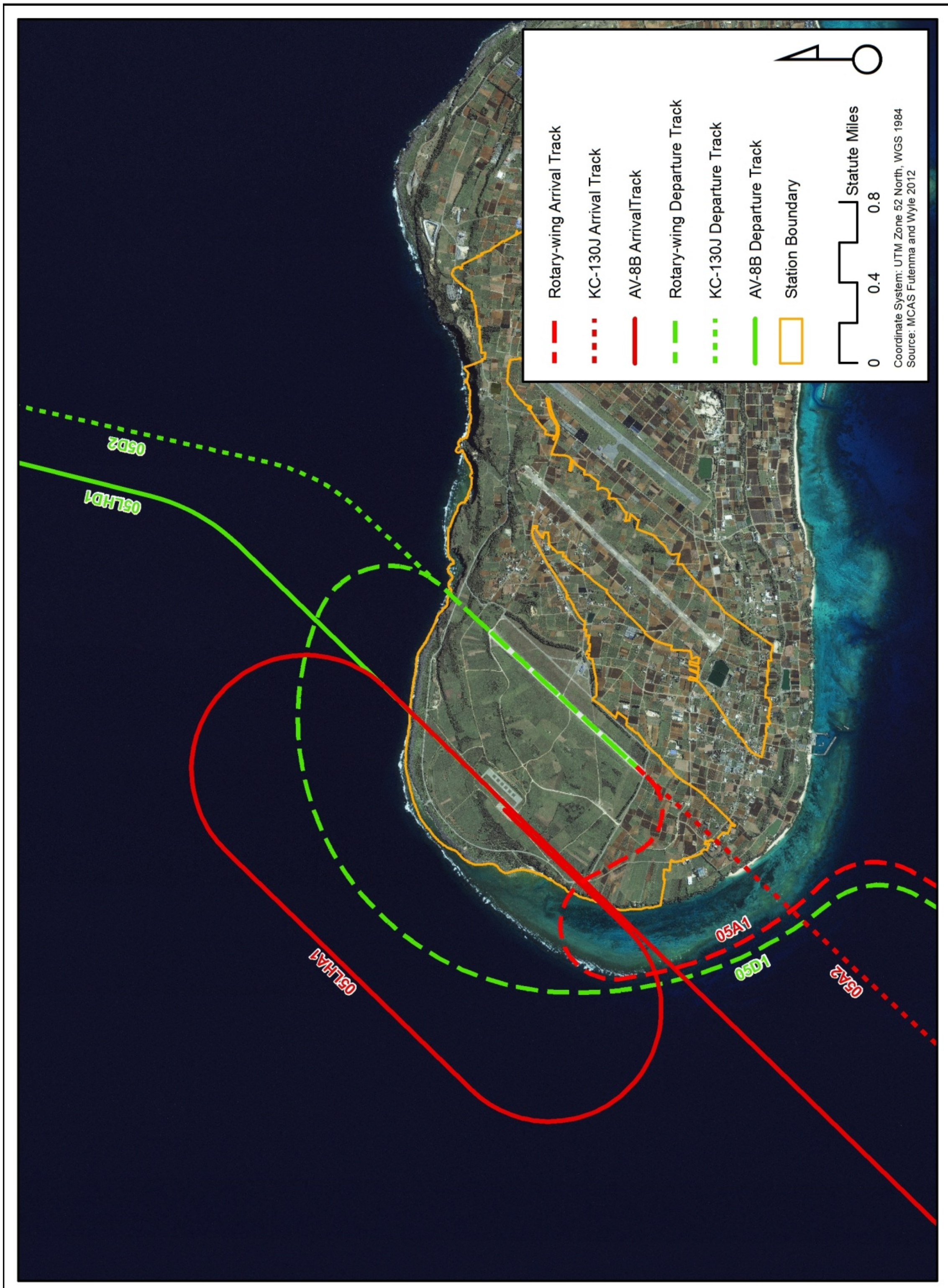

Figure A-9 Flight Tracks for ISTF

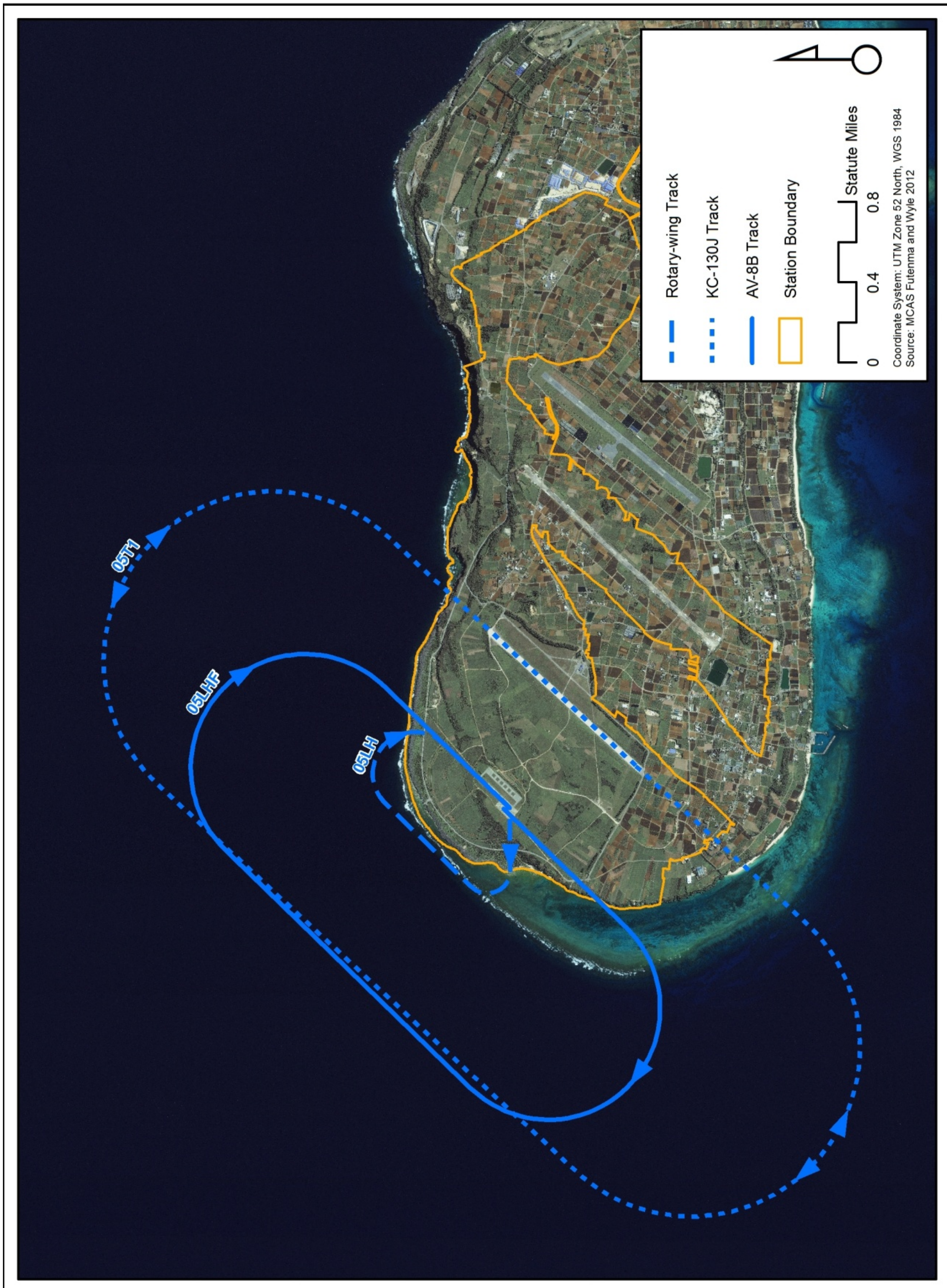

Figure A-10 Flight Track Patterns for ISTF

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Appendix A-3: Associated Airspace

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Table A-12 Central Training Area Modeled Profiles for Baseline

AIRSPACE ID	MISSION ID	AIRCRAFT ID	Speed	Power	Period of Day	Busy Month Sorties	Annual Sorties	Time Per Sortie (Minutes)	Altitude Range (ft AGL)	
			KIAS	Description					0 50	300 1000
CURLEW	CH-53_LZ	CH-53E	50		daytime	1.65	18	30	100	0
CURLEW	CH-53_LZ	CH-53E	50		evening	1.57	17.1	30	100	0
CURLEW	CH-53_LZ	CH-53E	50		nighttime	0.08	0.9	30	100	0
CURLEW	AH-1_LZ	AH-1G	40	LND LITE40 KTS	daytime	0.17	1.9	30	100	0
CURLEW	AH-1_LZ	AH-1G	40	LND LITE40 KTS	evening	0.16	1.7	30	100	0
CURLEW	AH-1_LZ	AH-1G	40	LND LITE40 KTS	nighttime	0.01	0.1	30	100	0
CURLEW	UH-1_LZ	UH-1N	80	FLT AT 80KTS	daytime	0.82	8.9	30	100	0
CURLEW	UH-1_LZ	UH-1N	80	FLT AT 80KTS	evening	0.74	8.1	30	100	0
CURLEW	UH-1_LZ	UH-1N	80	FLT AT 80KTS	nighttime	0.08	0.9	30	100	0
CURLEW	CH-46_LZ	CH-46E	50		daytime	4.92	53.7	30	100	0
CURLEW	CH-46_LZ	CH-46E	50		evening	4.46	48.7	30	100	0
CURLEW	CH-46_LZ	CH-46E	50		nighttime	0.49	5.3	30	100	0
DODO	CH-53_LZ	CH-53E	50		daytime	1.65	18	30	100	0
DODO	CH-53_LZ	CH-53E	50		evening	1.57	17.1	30	100	0
DODO	CH-53_LZ	CH-53E	50		nighttime	0.08	0.9	30	100	0
DODO	AH-1_LZ	AH-1G	40	LND LITE40 KTS	daytime	0.17	1.9	30	100	0
DODO	AH-1_LZ	AH-1G	40	LND LITE40 KTS	evening	0.16	1.7	30	100	0
DODO	AH-1_LZ	AH-1G	40	LND LITE40 KTS	nighttime	0.01	0.1	30	100	0
DODO	UH-1_LZ	UH-1N	80	FLT AT 80KTS	daytime	0.82	8.9	30	100	0
DODO	UH-1_LZ	UH-1N	80	FLT AT 80KTS	evening	0.74	8.1	30	100	0
DODO	UH-1_LZ	UH-1N	80	FLT AT 80KTS	nighttime	0.08	0.9	30	100	0
DODO	CH-46_LZ	CH-46E	50		daytime	4.92	53.7	30	100	0
DODO	CH-46_LZ	CH-46E	50		evening	4.46	48.7	30	100	0
DODO	CH-46_LZ	CH-46E	50		nighttime	0.49	5.3	30	100	0
FALCON	CH-53_LZ	CH-53E	50		daytime	1.65	18	30	100	0
FALCON	CH-53_LZ	CH-53E	50		evening	1.57	17.1	30	100	0
FALCON	CH-53_LZ	CH-53E	50		nighttime	0.08	0.9	30	100	0
FALCON	AH-1_LZ	AH-1G	40	LND LITE40 KTS	daytime	0.17	1.9	30	100	0
FALCON	AH-1_LZ	AH-1G	40	LND LITE40 KTS	evening	0.16	1.7	30	100	0
FALCON	AH-1_LZ	AH-1G	40	LND LITE40 KTS	nighttime	0.01	0.1	30	100	0
FALCON	UH-1_LZ	UH-1N	80	FLT AT 80KTS	daytime	0.82	8.9	30	100	0
FALCON	UH-1_LZ	UH-1N	80	FLT AT 80KTS	evening	0.74	8.1	30	100	0
FALCON	UH-1_LZ	UH-1N	80	FLT AT 80KTS	nighttime	0.08	0.9	30	100	0
FALCON	CH-46_LZ	CH-46E	50		daytime	4.92	53.7	30	100	0
FALCON	CH-46_LZ	CH-46E	50		evening	4.46	48.7	30	100	0
FALCON	CH-46_LZ	CH-46E	50		nighttime	0.49	5.3	30	100	0
GANDER	CH-53_LZ	CH-53E	50		daytime	1.65	18	30	100	0
GANDER	CH-53_LZ	CH-53E	50		evening	1.57	17.1	30	100	0
GANDER	CH-53_LZ	CH-53E	50		nighttime	0.08	0.9	30	100	0
GANDER	AH-1_LZ	AH-1G	40	LND LITE40 KTS	daytime	0.17	1.9	30	100	0
GANDER	AH-1_LZ	AH-1G	40	LND LITE40 KTS	evening	0.16	1.7	30	100	0
GANDER	AH-1_LZ	AH-1G	40	LND LITE40 KTS	nighttime	0.01	0.1	30	100	0
GANDER	UH-1_LZ	UH-1N	80	FLT AT 80KTS	daytime	0.82	8.9	30	100	0
GANDER	UH-1_LZ	UH-1N	80	FLT AT 80KTS	evening	0.74	8.1	30	100	0
GANDER	UH-1_LZ	UH-1N	80	FLT AT 80KTS	nighttime	0.08	0.9	30	100	0
GANDER	CH-46_LZ	CH-46E	50		daytime	4.92	53.7	30	100	0
GANDER	CH-46_LZ	CH-46E	50		evening	4.46	48.7	30	100	0
GANDER	CH-46_LZ	CH-46E	50		nighttime	0.49	5.3	30	100	0
GOOSE	CH-53_LZ	CH-53E	50		daytime	1.65	18	30	100	0
GOOSE	CH-53_LZ	CH-53E	50		evening	1.57	17.1	30	100	0
GOOSE	CH-53_LZ	CH-53E	50		nighttime	0.08	0.9	30	100	0
GOOSE	AH-1_LZ	AH-1G	40	LND LITE40 KTS	daytime	0.17	1.9	30	100	0
GOOSE	AH-1_LZ	AH-1G	40	LND LITE40 KTS	evening	0.16	1.7	30	100	0
GOOSE	AH-1_LZ	AH-1G	40	LND LITE40 KTS	nighttime	0.01	0.1	30	100	0
GOOSE	UH-1_LZ	UH-1N	80	FLT AT 80KTS	daytime	0.82	8.9	30	100	0
GOOSE	UH-1_LZ	UH-1N	80	FLT AT 80KTS	evening	0.74	8.1	30	100	0
GOOSE	UH-1_LZ	UH-1N	80	FLT AT 80KTS	nighttime	0.08	0.9	30	100	0
GOOSE	CH-46_LZ	CH-46E	50		daytime	4.92	53.7	30	100	0
GOOSE	CH-46_LZ	CH-46E	50		evening	4.46	48.7	30	100	0
GOOSE	CH-46_LZ	CH-46E	50		nighttime	0.49	5.3	30	100	0
HAWK	CH-53_LZ	CH-53E	50		daytime	1.65	18	30	100	0
HAWK	CH-53_LZ	CH-53E	50		evening	1.57	17.1	30	100	0
HAWK	CH-53_LZ	CH-53E	50		nighttime	0.08	0.9	30	100	0
HAWK	AH-1_LZ	AH-1G	40	LND LITE40 KTS	daytime	0.17	1.9	30	100	0
HAWK	AH-1_LZ	AH-1G	40	LND LITE40 KTS	evening	0.16	1.7	30	100	0
HAWK	AH-1_LZ	AH-1G	40	LND LITE40 KTS	nighttime	0.01	0.1	30	100	0
HAWK	UH-1_LZ	UH-1N	80	FLT AT 80KTS	daytime	0.82	8.9	30	100	0
HAWK	UH-1_LZ	UH-1N	80	FLT AT 80KTS	evening	0.74	8.1	30	100	0
HAWK	UH-1_LZ	UH-1N	80	FLT AT 80KTS	nighttime	0.08	0.9	30	100	0
HAWK	CH-46_LZ	CH-46E	50		daytime	4.92	53.7	30	100	0
HAWK	CH-46_LZ	CH-46E	50		evening	4.46	48.7	30	100	0
HAWK	CH-46_LZ	CH-46E	50		nighttime	0.49	5.3	30	100	0

Table A-12 Central Training Area Modeled Profiles for Baseline (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	Speed	Power	Period of Day	Busy Month Sorties	Annual Sorties	Time Per Sortie (Minutes)	Altitude Range (ft AGL)	
			KIAS	Description					0 50	300 1000
KIWI	CH-53_LZ	CH-53E	50		daytime	1.65	18	30	100	0
KIWI	CH-53_LZ	CH-53E	50		evening	1.57	17.1	30	100	0
KIWI	CH-53_LZ	CH-53E	50		nighttime	0.08	0.9	30	100	0
KIWI	AH-1_LZ	AH-1G	40	LND LITE40 KTS	daytime	0.17	1.9	30	100	0
KIWI	AH-1_LZ	AH-1G	40	LND LITE40 KTS	evening	0.16	1.7	30	100	0
KIWI	AH-1_LZ	AH-1G	40	LND LITE40 KTS	nighttime	0.01	0.1	30	100	0
KIWI	UH-1_LZ	UH-1N	80	FLT AT 80KTS	daytime	0.82	8.9	30	100	0
KIWI	UH-1_LZ	UH-1N	80	FLT AT 80KTS	evening	0.74	8.1	30	100	0
KIWI	UH-1_LZ	UH-1N	80	FLT AT 80KTS	nighttime	0.08	0.9	30	100	0
KIWI	CH-46_LZ	CH-46E	50		daytime	4.92	53.7	30	100	0
KIWI	CH-46_LZ	CH-46E	50		evening	4.46	48.7	30	100	0
KIWI	CH-46_LZ	CH-46E	50		nighttime	0.49	5.3	30	100	0
OSPREY	CH-53_LZ	CH-53E	50		daytime	1.65	18	30	100	0
OSPREY	CH-53_LZ	CH-53E	50		evening	1.57	17.1	30	100	0
OSPREY	CH-53_LZ	CH-53E	50		nighttime	0.08	0.9	30	100	0
OSPREY	AH-1_LZ	AH-1G	40	LND LITE40 KTS	daytime	0.17	1.9	30	100	0
OSPREY	AH-1_LZ	AH-1G	40	LND LITE40 KTS	evening	0.16	1.7	30	100	0
OSPREY	AH-1_LZ	AH-1G	40	LND LITE40 KTS	nighttime	0.01	0.1	30	100	0
OSPREY	UH-1_LZ	UH-1N	80	FLT AT 80KTS	daytime	0.82	8.9	30	100	0
OSPREY	UH-1_LZ	UH-1N	80	FLT AT 80KTS	evening	0.74	8.1	30	100	0
OSPREY	UH-1_LZ	UH-1N	80	FLT AT 80KTS	nighttime	0.08	0.9	30	100	0
OSPREY	CH-46_LZ	CH-46E	50		daytime	4.92	53.7	30	100	0
OSPREY	CH-46_LZ	CH-46E	50		evening	4.46	48.7	30	100	0
OSPREY	CH-46_LZ	CH-46E	50		nighttime	0.49	5.3	30	100	0
PEACOCK	CH-53_LZ	CH-53E	50		daytime	1.65	18	30	100	0
PEACOCK	CH-53_LZ	CH-53E	50		evening	1.57	17.1	30	100	0
PEACOCK	CH-53_LZ	CH-53E	50		nighttime	0.08	0.9	30	100	0
PEACOCK	AH-1_LZ	AH-1G	40	LND LITE40 KTS	daytime	0.17	1.9	30	100	0
PEACOCK	AH-1_LZ	AH-1G	40	LND LITE40 KTS	evening	0.16	1.7	30	100	0
PEACOCK	AH-1_LZ	AH-1G	40	LND LITE40 KTS	nighttime	0.01	0.1	30	100	0
PEACOCK	UH-1_LZ	UH-1N	80	FLT AT 80KTS	daytime	0.82	8.9	30	100	0
PEACOCK	UH-1_LZ	UH-1N	80	FLT AT 80KTS	evening	0.74	8.1	30	100	0
PEACOCK	UH-1_LZ	UH-1N	80	FLT AT 80KTS	nighttime	0.08	0.9	30	100	0
PEACOCK	CH-46_LZ	CH-46E	50		daytime	4.92	53.7	30	100	0
PEACOCK	CH-46_LZ	CH-46E	50		evening	4.46	48.7	30	100	0
PEACOCK	CH-46_LZ	CH-46E	50		nighttime	0.49	5.3	30	100	0
PETREL	CH-53_LZ	CH-53E	50		daytime	1.65	18	30	100	0
PETREL	CH-53_LZ	CH-53E	50		evening	1.57	17.1	30	100	0
PETREL	CH-53_LZ	CH-53E	50		nighttime	0.08	0.9	30	100	0
PETREL	AH-1_LZ	AH-1G	40	LND LITE40 KTS	daytime	0.17	1.9	30	100	0
PETREL	AH-1_LZ	AH-1G	40	LND LITE40 KTS	evening	0.16	1.7	30	100	0
PETREL	AH-1_LZ	AH-1G	40	LND LITE40 KTS	nighttime	0.01	0.1	30	100	0
PETREL	UH-1_LZ	UH-1N	80	FLT AT 80KTS	daytime	0.82	8.9	30	100	0
PETREL	UH-1_LZ	UH-1N	80	FLT AT 80KTS	evening	0.74	8.1	30	100	0
PETREL	UH-1_LZ	UH-1N	80	FLT AT 80KTS	nighttime	0.08	0.9	30	100	0
PETREL	CH-46_LZ	CH-46E	50		daytime	4.92	53.7	30	100	0
PETREL	CH-46_LZ	CH-46E	50		evening	4.46	48.7	30	100	0
PETREL	CH-46_LZ	CH-46E	50		nighttime	0.49	5.3	30	100	0
STARLING	CH-53_LZ	CH-53E	50		daytime	0.61	6.7	30	100	0
STARLING	CH-53_LZ	CH-53E	50		evening	0.58	6.3	30	100	0
STARLING	CH-53_LZ	CH-53E	50		nighttime	0.03	0.3	30	100	0
STARLING	AH-1_LZ	AH-1G	40	LND LITE40 KTS	daytime	0.06	0.7	30	100	0
STARLING	AH-1_LZ	AH-1G	40	LND LITE40 KTS	evening	0.06	0.7	30	100	0
STARLING	UH-1_LZ	UH-1N	80	FLT AT 80KTS	daytime	0.31	3.4	30	100	0
STARLING	UH-1_LZ	UH-1N	80	FLT AT 80KTS	evening	0.28	3.1	30	100	0
STARLING	UH-1_LZ	UH-1N	80	FLT AT 80KTS	nighttime	0.03	0.3	30	100	0
STARLING	CH-46_LZ	CH-46E	50		daytime	1.83	20	30	100	0
STARLING	CH-46_LZ	CH-46E	50		evening	1.65	18	30	100	0
STARLING	CH-46_LZ	CH-46E	50		nighttime	0.18	2	30	100	0
SWALLOW	CH-53_LZ	CH-53E	50		daytime	0.61	6.7	30	100	0
SWALLOW	CH-53_LZ	CH-53E	50		evening	0.58	6.3	30	100	0
SWALLOW	CH-53_LZ	CH-53E	50		nighttime	0.03	0.3	30	100	0
SWALLOW	AH-1_LZ	AH-1G	40	LND LITE40 KTS	daytime	0.06	0.7	30	100	0
SWALLOW	AH-1_LZ	AH-1G	40	LND LITE40 KTS	evening	0.06	0.7	30	100	0
SWALLOW	UH-1_LZ	UH-1N	80	FLT AT 80KTS	daytime	0.31	3.4	30	100	0
SWALLOW	UH-1_LZ	UH-1N	80	FLT AT 80KTS	evening	0.28	3.1	30	100	0
SWALLOW	CH-46_LZ	CH-46E	50		daytime	1.83	20	30	100	0
SWALLOW	CH-46_LZ	CH-46E	50		evening	1.65	18	30	100	0
SWALLOW	CH-46_LZ	CH-46E	50		nighttime	0.18	2	30	100	0
WREN	CH-53_LZ	CH-53E	50		daytime	0.61	6.7	30	100	0
WREN	CH-53_LZ	CH-53E	50		evening	0.58	6.3	30	100	0
WREN	CH-53_LZ	CH-53E	50		nighttime	0.03	0.3	30	100	0
WREN	AH-1_LZ	AH-1G	40	LND LITE40 KTS	daytime	0.06	0.7	30	100	0
WREN	AH-1_LZ	AH-1G	40	LND LITE40 KTS	evening	0.06	0.7	30	100	0
WREN	UH-1_LZ	UH-1N	80	FLT AT 80KTS	daytime	0.31	3.4	30	100	0
WREN	UH-1_LZ	UH-1N	80	FLT AT 80KTS	evening	0.28	3.1	30	100	0
WREN	UH-1_LZ	UH-1N	80	FLT AT 80KTS	nighttime	0.03	0.3	30	100	0
WREN	CH-46_LZ	CH-46E	50		daytime	1.83	20	30	100	0
WREN	CH-46_LZ	CH-46E	50		evening	1.65	18	30	100	0
WREN	CH-46_LZ	CH-46E	50		nighttime	0.18	2	30	100	0

Table A-12 Central Training Area Modeled Profiles for Baseline (concluded)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	Speed	Power	Period of Day	Busy Month Sorties	Annual Sorties	Time Per Sortie (Minutes)	Altitude Range (ft AGL)	
			KIAS	Description					0 / 50	300 / 1000
LZ_AREA	CH-53_RT	CH-53E	120	CRUISE POWER	daytime	18.33	200	30	0	100
LZ_AREA	CH-53_RT	CH-53E	120	CRUISE POWER	evening	17.42	190	30	0	100
LZ_AREA	CH-53_RT	CH-53E	120	CRUISE POWER	nighttime	0.92	10	30	0	100
LZ_AREA	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	daytime	18.33	200	30	0	100
LZ_AREA	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	evening	17.42	190	30	0	100
LZ_AREA	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	nighttime	0.92	10	30	0	100
LZ_AREA	UH-1_RT	UH-1N	80	FLT AT 80KTS	daytime	9.17	100	30	0	100
LZ_AREA	UH-1_RT	UH-1N	80	FLT AT 80KTS	evening	8.25	90	30	0	100
LZ_AREA	UH-1_RT	UH-1N	80	FLT AT 80KTS	nighttime	0.92	10	30	0	100
LZ_AREA	CH-46_RT	CH-46E	110	CRUISE POWER	daytime	55	600	30	0	100
LZ_AREA	CH-46_RT	CH-46E	110	CRUISE POWER	evening	49.5	540	30	0	100
LZ_AREA	CH-46_RT	CH-46E	110	CRUISE POWER	nighttime	5.5	60	30	0	100
INGRESS	CH-53_RT	CH-53E	120	CRUISE POWER	daytime	18.33	200		0	100
INGRESS	CH-53_RT	CH-53E	120	CRUISE POWER	evening	17.42	190		0	100
INGRESS	CH-53_RT	CH-53E	120	CRUISE POWER	nighttime	0.92	10		0	100
INGRESS	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	daytime	18.33	200		0	100
INGRESS	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	evening	17.42	190		0	100
INGRESS	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	nighttime	0.92	10		0	100
INGRESS	UH-1_RT	UH-1N	80	FLT AT 80KTS	daytime	9.17	100		0	100
INGRESS	UH-1_RT	UH-1N	80	FLT AT 80KTS	evening	8.25	90		0	100
INGRESS	UH-1_RT	UH-1N	80	FLT AT 80KTS	nighttime	0.92	10		0	100
INGRESS	CH-46_RT	CH-46E	110	CRUISE POWER	daytime	55	600		0	100
INGRESS	CH-46_RT	CH-46E	110	CRUISE POWER	evening	49.5	540		0	100
INGRESS	CH-46_RT	CH-46E	110	CRUISE POWER	nighttime	5.5	60		0	100
EGRESS	CH-53_RT	CH-53E	120	CRUISE POWER	daytime	18.33	200		0	100
EGRESS	CH-53_RT	CH-53E	120	CRUISE POWER	evening	17.42	190		0	100
EGRESS	CH-53_RT	CH-53E	120	CRUISE POWER	nighttime	0.92	10		0	100
EGRESS	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	daytime	18.33	200		0	100
EGRESS	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	evening	17.42	190		0	100
EGRESS	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	nighttime	0.92	10		0	100
EGRESS	UH-1_RT	UH-1N	80	FLT AT 80KTS	daytime	9.17	100		0	100
EGRESS	UH-1_RT	UH-1N	80	FLT AT 80KTS	evening	8.25	90		0	100
EGRESS	UH-1_RT	UH-1N	80	FLT AT 80KTS	nighttime	0.92	10		0	100
EGRESS	CH-46_RT	CH-46E	110	CRUISE POWER	daytime	55	600		0	100
EGRESS	CH-46_RT	CH-46E	110	CRUISE POWER	evening	49.5	540		0	100
EGRESS	CH-46_RT	CH-46E	110	CRUISE POWER	nighttime	5.5	60		0	100

Table A-13 NTA Modeled Profiles for Baseline

AIRSPACE ID	MISSION ID	AIRCRAFT ID	Speed	Power	Period of Day	Busy Month Sorties	Annual Sorties	Time Per Sortie (Minutes)	Altitude Range (ft AGL)		
									0	50	300
			KIAS	Description					50	200	1000
LZ01	CH-53_LZ	CH-53E	50		daytime	0.31	3.4	30	100		
LZ01	CH-53_LZ	CH-53E	50		evening	0.29	3.2	30	100		
LZ01	CH-53_LZ	CH-53E	50		nighttime	0.02	0.2	30	100		
LZ01	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.03	0.3	30	100		
LZ01	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.03	0.3	30	100		
LZ01	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	0.15	1.6	30	100		
LZ01	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	0.14	1.5	30	100		
LZ01	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.02	0.2	30	100		
LZ01	CH-46_LZ	CH-46E	50		daytime	0.92	10	30	100		
LZ01	CH-46_LZ	CH-46E	50		evening	0.82	8.9	30	100		
LZ01	CH-46_LZ	CH-46E	50		nighttime	0.09	1	30	100		
LZ04	CH-53_LZ	CH-53E	50		daytime	0.31	3.4	30	100		
LZ04	CH-53_LZ	CH-53E	50		evening	0.29	3.2	30	100		
LZ04	CH-53_LZ	CH-53E	50		nighttime	0.02	0.2	30	100		
LZ04	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.03	0.3	30	100		
LZ04	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.03	0.3	30	100		
LZ04	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	0.15	1.6	30	100		
LZ04	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	0.14	1.5	30	100		
LZ04	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.02	0.2	30	100		
LZ04	CH-46_LZ	CH-46E	50		daytime	0.92	10	30	100		
LZ04	CH-46_LZ	CH-46E	50		evening	0.82	8.9	30	100		
LZ04	CH-46_LZ	CH-46E	50		nighttime	0.09	1	30	100		
LZ10	CH-53_LZ	CH-53E	50		daytime	0.31	3.4	30	100		
LZ10	CH-53_LZ	CH-53E	50		evening	0.29	3.2	30	100		
LZ10	CH-53_LZ	CH-53E	50		nighttime	0.02	0.2	30	100		
LZ10	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.03	0.3	30	100		
LZ10	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.03	0.3	30	100		
LZ10	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	0.15	1.6	30	100		
LZ10	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	0.14	1.5	30	100		
LZ10	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.02	0.2	30	100		
LZ10	CH-46_LZ	CH-46E	50		daytime	0.92	10	30	100		
LZ10	CH-46_LZ	CH-46E	50		evening	0.82	8.9	30	100		
LZ10	CH-46_LZ	CH-46E	50		nighttime	0.09	1	30	100		
LZ13	CH-53_LZ	CH-53E	50		daytime	0.31	3.4	30	100		
LZ13	CH-53_LZ	CH-53E	50		evening	0.29	3.2	30	100		
LZ13	CH-53_LZ	CH-53E	50		nighttime	0.02	0.2	30	100		
LZ13	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.03	0.3	30	100		
LZ13	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.03	0.3	30	100		
LZ13	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	0.15	1.6	30	100		
LZ13	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	0.14	1.5	30	100		
LZ13	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.02	0.2	30	100		
LZ13	CH-46_LZ	CH-46E	50		daytime	0.92	10	30	100		
LZ13	CH-46_LZ	CH-46E	50		evening	0.82	8.9	30	100		
LZ13	CH-46_LZ	CH-46E	50		nighttime	0.09	1	30	100		
LZ14	CH-53_LZ	CH-53E	50		daytime	0.31	3.4	30	100		
LZ14	CH-53_LZ	CH-53E	50		evening	0.29	3.2	30	100		
LZ14	CH-53_LZ	CH-53E	50		nighttime	0.02	0.2	30	100		
LZ14	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.03	0.3	30	100		
LZ14	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.03	0.3	30	100		
LZ14	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	0.15	1.6	30	100		
LZ14	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	0.14	1.5	30	100		
LZ14	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.02	0.2	30	100		
LZ14	CH-46_LZ	CH-46E	50		daytime	0.92	10	30	100		
LZ14	CH-46_LZ	CH-46E	50		evening	0.82	8.9	30	100		
LZ14	CH-46_LZ	CH-46E	50		nighttime	0.09	1	30	100		
LZ17	CH-53_LZ	CH-53E	50		daytime	4.12	44.9	30	100		
LZ17	CH-53_LZ	CH-53E	50		evening	3.92	42.8	30	100		
LZ17	CH-53_LZ	CH-53E	50		nighttime	0.21	2.3	30	100		
LZ17	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.42	4.6	30	100		
LZ17	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.39	4.3	30	100		
LZ17	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	nighttime	0.02	0.2	30	100		
LZ17	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	2.07	22.6	30	100		
LZ17	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	1.86	20.3	30	100		
LZ17	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.21	2.3	30	100		
LZ17	CH-46_LZ	CH-46E	50		daytime	12.38	135.1	30	100		
LZ17	CH-46_LZ	CH-46E	50		evening	11.14	121.5	30	100		
LZ17	CH-46_LZ	CH-46E	50		nighttime	1.24	13.5	30	100		
LZ18	CH-53_LZ	CH-53E	50		daytime	4.12	44.9	30	100		
LZ18	CH-53_LZ	CH-53E	50		evening	3.92	42.8	30	100		

Table A-13 NTA Modeled Profiles for Baseline (continued)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	Speed	Power	Period of Day	Busy Month Sorties	Annual Sorties	Time Per Sortie (Minutes)	Altitude Range (ft AGL)		
			KIAS	Description					0 50	50 200	300 1000
LZ18	CH-53_LZ	CH-53E	50		nighttime	0.21	2.3	30	100		
LZ18	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.42	4.6	30	100		
LZ18	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.39	4.3	30	100		
LZ18	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	nighttime	0.02	0.2	30	100		
LZ18	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	2.07	22.6	30	100		
LZ18	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	1.86	20.3	30	100		
LZ18	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.21	2.3	30	100		
LZ18	CH-46_LZ	CH-46E	50		daytime	12.38	135.1	30	100		
LZ18	CH-46_LZ	CH-46E	50		evening	11.14	121.5	30	100		
LZ18	CH-46_LZ	CH-46E	50		nighttime	1.24	13.5	30	100		
LZ19	CH-53_LZ	CH-53E	50		daytime	0.31	3.4	30	100		
LZ19	CH-53_LZ	CH-53E	50		evening	0.29	3.2	30	100		
LZ19	CH-53_LZ	CH-53E	50		nighttime	0.02	0.2	30	100		
LZ19	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.03	0.3	30	100		
LZ19	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.03	0.3	30	100		
LZ19	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	0.15	1.6	30	100		
LZ19	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	0.14	1.5	30	100		
LZ19	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.02	0.2	30	100		
LZ19	CH-46_LZ	CH-46E	50		daytime	0.92	10	30	100		
LZ19	CH-46_LZ	CH-46E	50		evening	0.82	8.9	30	100		
LZ19	CH-46_LZ	CH-46E	50		nighttime	0.09	1	30	100		
BASEBALL	CH-53_LZ	CH-53E	50		daytime	4.12	44.9	30	100		
BASEBALL	CH-53_LZ	CH-53E	50		evening	3.92	42.8	30	100		
BASEBALL	CH-53_LZ	CH-53E	50		nighttime	0.21	2.3	30	100		
BASEBALL	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.42	4.6	30	100		
BASEBALL	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.39	4.3	30	100		
BASEBALL	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	nighttime	0.02	0.2	30	100		
BASEBALL	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	2.07	22.6	30	100		
BASEBALL	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	1.86	20.3	30	100		
BASEBALL	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.21	2.3	30	100		
BASEBALL	CH-46_LZ	CH-46E	50		daytime	12.38	135.1	30	100		
BASEBALL	CH-46_LZ	CH-46E	50		evening	11.14	121.5	30	100		
BASEBALL	CH-46_LZ	CH-46E	50		nighttime	1.24	13.5	30	100		
FIREBASE	CH-53_LZ	CH-53E	50		daytime	4.12	44.9	30	100		
FIREBASE	CH-53_LZ	CH-53E	50		evening	3.92	42.8	30	100		
FIREBASE	CH-53_LZ	CH-53E	50		nighttime	0.21	2.3	30	100		
FIREBASE	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.42	4.6	30	100		
FIREBASE	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.39	4.3	30	100		
FIREBASE	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	nighttime	0.02	0.2	30	100		
FIREBASE	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	2.07	22.6	30	100		
FIREBASE	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	1.86	20.3	30	100		
FIREBASE	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.21	2.3	30	100		
FIREBASE	CH-46_LZ	CH-46E	50		daytime	12.38	135.1	30	100		
FIREBASE	CH-46_LZ	CH-46E	50		evening	11.14	121.5	30	100		
FIREBASE	CH-46_LZ	CH-46E	50		nighttime	1.24	13.5	30	100		
LZ_AREA	CH-53_RT	CH-53E	120	CRUISE POWER	evening	17.42	190	30			100
LZ_AREA	CH-53_RT	CH-53E	120	CRUISE POWER	nighttime	0.92	10	30			100
LZ_AREA	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	daytime	18.33	200	30			100
LZ_AREA	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	evening	17.42	190	30			100
LZ_AREA	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	nighttime	0.92	10	30			100
LZ_AREA	UH-1_RT	UH-1N	80	FLT AT 80 KTS	daytime	9.17	100	30			100
LZ_AREA	UH-1_RT	UH-1N	80	FLT AT 80 KTS	evening	8.25	90	30			100
LZ_AREA	UH-1_RT	UH-1N	80	FLT AT 80 KTS	nighttime	0.92	10	30			100
LZ_AREA	CH-46_RT	CH-46E	110	CRUISE POWER	daytime	55	600	30			100
LZ_AREA	CH-46_RT	CH-46E	110	CRUISE POWER	evening	49.5	540	30			100
LZ_AREA	CH-46_RT	CH-46E	110	CRUISE POWER	nighttime	5.5	60	30			100
TERFN	CH-53_RT	CH-53E	120	CRUISE POWER	daytime	1.74	19			100	
TERFN	CH-53_RT	CH-53E	120	CRUISE POWER	evening	1.38	15.1			100	
TERFN	CH-53_RT	CH-53E	120	CRUISE POWER	nighttime	0.92	10			100	
TERFN	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	daytime	2.48	27.1			100	

Table A-13 NTA Modeled Profiles for Baseline (concluded)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	Speed	Power	Period of Day	Busy Month Sorties	Annual Sorties	Time Per Sortie (Minutes)	Altitude Range (ft AGL)		
			KIAS	Description					0 50	50 200	300 1000
TERFN	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	evening	1.83	20			100	
TERFN	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	nighttime	0.92	10			100	
TERFN	UH-1_RT	UH-1N	80	FLT AT 80 KTS	daytime	1.83	20			100	
TERFN	UH-1_RT	UH-1N	80	FLT AT 80 KTS	evening	1.38	15.1			100	
TERFN	UH-1_RT	UH-1N	80	FLT AT 80 KTS	nighttime	0.92	10			100	
TERFN	CH-46_RT	CH-46E	110	CRUISE POWER	daytime	14.3	156			100	
TERFN	CH-46_RT	CH-46E	110	CRUISE POWER	evening	10.82	118			100	
TERFN	CH-46_RT	CH-46E	110	CRUISE POWER	nighttime	5.5	60			100	
TERFS	CH-53_RT	CH-53E	120	CRUISE POWER	daytime	1.74	19			100	
TERFS	CH-53_RT	CH-53E	120	CRUISE POWER	evening	1.38	15.1			100	
TERFS	CH-53_RT	CH-53E	120	CRUISE POWER	nighttime	0.92	10			100	
TERFS	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	daytime	2.48	27.1			100	
TERFS	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	evening	1.83	20			100	
TERFS	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	nighttime	0.92	10			100	
TERFS	UH-1_RT	UH-1N	80	FLT AT 80 KTS	daytime	1.83	20			100	
TERFS	UH-1_RT	UH-1N	80	FLT AT 80 KTS	evening	1.38	15.1			100	
TERFS	UH-1_RT	UH-1N	80	FLT AT 80 KTS	nighttime	0.92	10			100	
TERFS	CH-46_RT	CH-46E	110	CRUISE POWER	daytime	14.3	156			100	
TERFS	CH-46_RT	CH-46E	110	CRUISE POWER	evening	10.82	118			100	
TERFS	CH-46_RT	CH-46E	110	CRUISE POWER	nighttime	5.5	60			100	

Table A-14 Central Training Area Modeled Profiles for Proposed Action

AIRSPACE ID	MISSION ID	AIRCRAFT ID	Speed	Power	Period of Day	Busy Month Sorties	Annual Sorties	Time Per Sortie (Minutes)	Altitude Range (ft AGL)	
			KIAS	Description					0 / 50	300 / 1000
CURLEW	CH-53_LZ	CH-53E	50		daytime	1.65	18	30	100	
CURLEW	CH-53_LZ	CH-53E	50		evening	1.57	17.1	30	100	
CURLEW	CH-53_LZ	CH-53E	50		nighttime	0.08	0.9	30	100	
CURLEW	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.17	1.9	30	100	
CURLEW	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.16	1.7	30	100	
CURLEW	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	nighttime	0.01	0.1	30	100	
CURLEW	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	0.82	8.9	30	100	
CURLEW	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	0.74	8.1	30	100	
CURLEW	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.08	0.9	30	100	
DODO	CH-53_LZ	CH-53E	50		daytime	1.65	18	30	100	
DODO	CH-53_LZ	CH-53E	50		evening	1.57	17.1	30	100	
DODO	CH-53_LZ	CH-53E	50		nighttime	0.08	0.9	30	100	
DODO	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.17	1.9	30	100	
DODO	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.16	1.7	30	100	
DODO	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	nighttime	0.01	0.1	30	100	
DODO	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	0.82	8.9	30	100	
DODO	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	0.74	8.1	30	100	
DODO	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.08	0.9	30	100	
FALCON	CH-53_LZ	CH-53E	50		daytime	1.65	18	30	100	
FALCON	CH-53_LZ	CH-53E	50		evening	1.57	17.1	30	100	
FALCON	CH-53_LZ	CH-53E	50		nighttime	0.08	0.9	30	100	
FALCON	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.17	1.9	30	100	
FALCON	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.16	1.7	30	100	
FALCON	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	nighttime	0.01	0.1	30	100	
FALCON	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	0.82	8.9	30	100	
FALCON	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	0.74	8.1	30	100	
FALCON	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.08	0.9	30	100	
GANDER	CH-53_LZ	CH-53E	50		daytime	1.65	18	30	100	
GANDER	CH-53_LZ	CH-53E	50		evening	1.57	17.1	30	100	
GANDER	CH-53_LZ	CH-53E	50		nighttime	0.08	0.9	30	100	
GANDER	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.17	1.9	30	100	
GANDER	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.16	1.7	30	100	
GANDER	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	nighttime	0.01	0.1	30	100	
GANDER	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	0.82	8.9	30	100	
GANDER	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	0.74	8.1	30	100	
GANDER	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.08	0.9	30	100	
GOOSE	CH-53_LZ	CH-53E	50		daytime	1.65	18	30	100	
GOOSE	CH-53_LZ	CH-53E	50		evening	1.57	17.1	30	100	
GOOSE	CH-53_LZ	CH-53E	50		nighttime	0.08	0.9	30	100	
GOOSE	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.17	1.9	30	100	
GOOSE	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.16	1.7	30	100	
GOOSE	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	nighttime	0.01	0.1	30	100	
GOOSE	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	0.82	8.9	30	100	
GOOSE	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	0.74	8.1	30	100	
GOOSE	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.08	0.9	30	100	
HAWK	CH-53_LZ	CH-53E	50		daytime	1.65	18	30	100	
HAWK	CH-53_LZ	CH-53E	50		evening	1.57	17.1	30	100	
HAWK	CH-53_LZ	CH-53E	50		nighttime	0.08	0.9	30	100	
HAWK	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.17	1.9	30	100	
HAWK	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.16	1.7	30	100	
HAWK	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	nighttime	0.01	0.1	30	100	
HAWK	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	0.82	8.9	30	100	
HAWK	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	0.74	8.1	30	100	
HAWK	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.08	0.9	30	100	
KIWI	CH-53_LZ	CH-53E	50		daytime	1.65	18	30	100	
KIWI	CH-53_LZ	CH-53E	50		evening	1.57	17.1	30	100	
KIWI	CH-53_LZ	CH-53E	50		nighttime	0.08	0.9	30	100	
KIWI	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.17	1.9	30	100	
KIWI	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.16	1.7	30	100	
KIWI	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	nighttime	0.01	0.1	30	100	
KIWI	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	0.82	8.9	30	100	
KIWI	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	0.74	8.1	30	100	
KIWI	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.08	0.9	30	100	
OSPREY	CH-53_LZ	CH-53E	50		daytime	1.65	18	30	100	
OSPREY	CH-53_LZ	CH-53E	50		evening	1.57	17.1	30	100	
OSPREY	CH-53_LZ	CH-53E	50		nighttime	0.08	0.9	30	100	
OSPREY	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.17	1.9	30	100	
OSPREY	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.16	1.7	30	100	
OSPREY	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	nighttime	0.01	0.1	30	100	
OSPREY	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	0.82	8.9	30	100	
OSPREY	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	0.74	8.1	30	100	
OSPREY	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.08	0.9	30	100	
PEACOCK	CH-53_LZ	CH-53E	50		daytime	1.65	18	30	100	
PEACOCK	CH-53_LZ	CH-53E	50		evening	1.57	17.1	30	100	
PEACOCK	CH-53_LZ	CH-53E	50		nighttime	0.08	0.9	30	100	

Table A-14 Central Training Area Modeled Profiles for Proposed Action (concluded)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	Speed	Power	Period of Day	Busy Month Sorties	Annual Sorties	Time Per Sortie (Minutes)	Altitude Range (ft AGL) 0	300
			KIAS	Description					50	1000
PEACOCK	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.17	1.9	30	100	
PEACOCK	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.16	1.7	30	100	
PEACOCK	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	nighttime	0.01	0.1	30	100	
PEACOCK	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	0.82	8.9	30	100	
PEACOCK	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	0.74	8.1	30	100	
PEACOCK	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.08	0.9	30	100	
PETREL	CH-53_LZ	CH-53E	50		daytime	1.65	18	30	100	
PETREL	CH-53_LZ	CH-53E	50		evening	1.57	17.1	30	100	
PETREL	CH-53_LZ	CH-53E	50		nighttime	0.08	0.9	30	100	
PETREL	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.17	1.9	30	100	
PETREL	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.16	1.7	30	100	
PETREL	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	nighttime	0.01	0.1	30	100	
PETREL	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	0.82	8.9	30	100	
PETREL	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	0.74	8.1	30	100	
PETREL	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.08	0.9	30	100	
STARLING	CH-53_LZ	CH-53E	50		daytime	0.61	6.7	30	100	
STARLING	CH-53_LZ	CH-53E	50		evening	0.58	6.3	30	100	
STARLING	CH-53_LZ	CH-53E	50		nighttime	0.03	0.3	30	100	
STARLING	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.06	0.7	30	100	
STARLING	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.06	0.7	30	100	
STARLING	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	0.31	3.4	30	100	
STARLING	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	0.28	3.1	30	100	
STARLING	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.03	0.3	30	100	
SWALLOW	CH-53_LZ	CH-53E	50		daytime	0.61	6.7	30	100	
SWALLOW	CH-53_LZ	CH-53E	50		evening	0.58	6.3	30	100	
SWALLOW	CH-53_LZ	CH-53E	50		nighttime	0.03	0.3	30	100	
SWALLOW	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.06	0.7	30	100	
SWALLOW	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.06	0.7	30	100	
SWALLOW	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	0.31	3.4	30	100	
SWALLOW	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	0.28	3.1	30	100	
SWALLOW	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.03	0.3	30	100	
WREN	CH-53_LZ	CH-53E	50		daytime	0.61	6.7	30	100	
WREN	CH-53_LZ	CH-53E	50		evening	0.58	6.3	30	100	
WREN	CH-53_LZ	CH-53E	50		nighttime	0.03	0.3	30	100	
WREN	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.06	0.7	30	100	
WREN	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.06	0.7	30	100	
WREN	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	0.31	3.4	30	100	
WREN	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	0.28	3.1	30	100	
WREN	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.03	0.3	30	100	
LZ_AREA	CH-53_RT	CH-53E	120	CRUISE POWER	daytime	18.33	200	30		100
LZ_AREA	CH-53_RT	CH-53E	120	CRUISE POWER	evening	17.42	190	30		100
LZ_AREA	CH-53_RT	CH-53E	120	CRUISE POWER	nighttime	0.92	10	30		100
LZ_AREA	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	daytime	18.33	200	30		100
LZ_AREA	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	evening	17.42	190	30		100
LZ_AREA	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	nighttime	0.92	10	30		100
LZ_AREA	UH-1_RT	UH-1N	80	FLT AT 80 KTS	daytime	9.17	100	30		100
LZ_AREA	UH-1_RT	UH-1N	80	FLT AT 80 KTS	evening	8.25	90	30		100
LZ_AREA	UH-1_RT	UH-1N	80	FLT AT 80 KTS	nighttime	0.92	10	30		100
LZ_AREA	MV-22_RT	MV-22B	220		daytime	32.42	353.7	30		100
LZ_AREA	MV-22_RT	MV-22B	220		evening	29.25	319.1	30		100
LZ_AREA	MV-22_RT	MV-22B	220		nighttime	3.33	36.3	30		100
INGRESS	CH-53_RT	CH-53E	120	CRUISE POWER	daytime	18.33	200	30		100
INGRESS	CH-53_RT	CH-53E	120	CRUISE POWER	evening	17.42	190	30		100
INGRESS	CH-53_RT	CH-53E	120	CRUISE POWER	nighttime	0.92	10	30		100
INGRESS	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	daytime	18.33	200	30		100
INGRESS	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	evening	17.42	190	30		100
INGRESS	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	nighttime	0.92	10	30		100
INGRESS	UH-1_RT	UH-1N	80	FLT AT 80 KTS	daytime	9.17	100	30		100
INGRESS	UH-1_RT	UH-1N	80	FLT AT 80 KTS	evening	8.25	90	30		100
INGRESS	UH-1_RT	UH-1N	80	FLT AT 80 KTS	nighttime	0.92	10	30		100
EGRESS	CH-53_RT	CH-53E	120	CRUISE POWER	daytime	18.33	200	30		100
EGRESS	CH-53_RT	CH-53E	120	CRUISE POWER	evening	17.42	190	30		100
EGRESS	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	daytime	18.33	200	30		100
EGRESS	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	evening	17.42	190	30		100
EGRESS	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	nighttime	0.92	10	30		100
EGRESS	UH-1_RT	UH-1N	80	FLT AT 80 KTS	daytime	9.17	100	30		100
EGRESS	UH-1_RT	UH-1N	80	FLT AT 80 KTS	evening	8.25	90	30		100
EGRESS	UH-1_RT	UH-1N	80	FLT AT 80 KTS	nighttime	0.92	10	30		100
EGRESS	MV-22_RT	MV-22B	220		daytime	32.42	353.7	30		100
EGRESS	MV-22_RT	MV-22B	220		evening	29.25	319.1	30		100
EGRESS	MV-22_RT	MV-22B	220		nighttime	3.33	36.3	30		100

Table A-15 NTA Modeled Profiles for Proposed Action

AIRSPACE ID	MISSION ID	AIRCRAFT ID	Speed KIAS	Power Description	Period of Day	Busy Month Sorties	Annual Sorties	Time Per Sortie (Minutes)	Altitude Range (ft AGL) 0 - 50	50 - 200	300 - 1000
LZ01	CH-53_LZ	CH-53E	50		daytime	0.31	3.4	30	100		
LZ01	CH-53_LZ	CH-53E	50		evening	0.29	3.2	30	100		
LZ01	CH-53_LZ	CH-53E	50		nighttime	0.02	0.2	30	100		
LZ01	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.03	0.3	30	100		
LZ01	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.03	0.3	30	100		
LZ01	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	0.15	1.6	30	100		
LZ01	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	0.14	1.5	30	100		
LZ01	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.02	0.2	30	100		
LZ04	CH-53_LZ	CH-53E	50		daytime	0.31	3.4	30	100		
LZ04	CH-53_LZ	CH-53E	50		evening	0.29	3.2	30	100		
LZ04	CH-53_LZ	CH-53E	50		nighttime	0.02	0.2	30	100		
LZ04	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.03	0.3	30	100		
LZ04	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.03	0.3	30	100		
LZ04	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	0.15	1.6	30	100		
LZ04	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	0.14	1.5	30	100		
LZ04	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.02	0.2	30	100		
LZ10	CH-53_LZ	CH-53E	50		daytime	0.31	3.4	30	100		
LZ10	CH-53_LZ	CH-53E	50		evening	0.29	3.2	30	100		
LZ10	CH-53_LZ	CH-53E	50		nighttime	0.02	0.2	30	100		
LZ10	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.03	0.3	30	100		
LZ10	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.03	0.3	30	100		
LZ10	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	0.15	1.6	30	100		
LZ10	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	0.14	1.5	30	100		
LZ10	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.02	0.2	30	100		
LZ13	CH-53_LZ	CH-53E	50		daytime	0.31	3.4	30	100		
LZ13	CH-53_LZ	CH-53E	50		evening	0.29	3.2	30	100		
LZ13	CH-53_LZ	CH-53E	50		nighttime	0.02	0.2	30	100		
LZ13	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.03	0.3	30	100		
LZ13	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.03	0.3	30	100		
LZ13	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	0.15	1.6	30	100		
LZ13	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	0.14	1.5	30	100		
LZ13	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.02	0.2	30	100		
LZ14	CH-53_LZ	CH-53E	50		daytime	0.31	3.4	30	100		
LZ14	CH-53_LZ	CH-53E	50		evening	0.29	3.2	30	100		
LZ14	CH-53_LZ	CH-53E	50		nighttime	0.02	0.2	30	100		
LZ14	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.03	0.3	30	100		
LZ14	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.03	0.3	30	100		
LZ14	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	0.15	1.6	30	100		
LZ14	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	0.14	1.5	30	100		
LZ14	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.02	0.2	30	100		
LZ17	CH-53_LZ	CH-53E	50		daytime	4.12	44.9	30	100		
LZ17	CH-53_LZ	CH-53E	50		evening	3.92	42.8	30	100		
LZ17	CH-53_LZ	CH-53E	50		nighttime	0.21	2.3	30	100		
LZ17	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.42	4.6	30	100		
LZ17	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.39	4.3	30	100		
LZ17	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	nighttime	0.02	0.2	30	100		
LZ17	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	2.07	22.6	30	100		
LZ17	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	1.86	20.3	30	100		
LZ17	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.21	2.3	30	100		
LZ18	CH-53_LZ	CH-53E	50		daytime	4.12	44.9	30	100		
LZ18	CH-53_LZ	CH-53E	50		evening	3.92	42.8	30	100		
LZ18	CH-53_LZ	CH-53E	50		nighttime	0.21	2.3	30	100		
LZ18	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.42	4.6	30	100		
LZ18	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.39	4.3	30	100		
LZ18	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	nighttime	0.02	0.2	30	100		
LZ18	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	2.07	22.6	30	100		
LZ18	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	1.86	20.3	30	100		
LZ18	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.21	2.3	30	100		

Table A-15 NTA Modeled Profiles for Proposed Action (concluded)

AIRSPACE ID	MISSION ID	AIRCRAFT ID	Speed KIAS	Power Description	Period of Day	Busy Month Sorties	Annual Sorties	Time Per Sortie (Minutes)	Altitude Range (ft AGL) 0 - 50	50 - 200	300 - 1000
LZ19	CH-53_LZ	CH-53E	50		daytime	0.31	3.4	30	100		
LZ19	CH-53_LZ	CH-53E	50		evening	0.29	3.2	30	100		
LZ19	CH-53_LZ	CH-53E	50		nighttime	0.02	0.2	30	100		
LZ19	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.03	0.3	30	100		
LZ19	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.03	0.3	30	100		
LZ19	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	0.15	1.6	30	100		
LZ19	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	0.14	1.5	30	100		
LZ19	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.02	0.2	30	100		
BASEBALL	CH-53_LZ	CH-53E	50		daytime	4.12	44.9	30	100		
BASEBALL	CH-53_LZ	CH-53E	50		evening	3.92	42.8	30	100		
BASEBALL	CH-53_LZ	CH-53E	50		nighttime	0.21	2.3	30	100		
BASEBALL	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.42	4.6	30	100		
BASEBALL	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.39	4.3	30	100		
BASEBALL	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	nighttime	0.02	0.2	30	100		
BASEBALL	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	2.07	22.6	30	100		
BASEBALL	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	1.86	20.3	30	100		
BASEBALL	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.21	2.3	30	100		
FIREBASE	CH-53_LZ	CH-53E	50		daytime	4.12	44.9	30	100		
FIREBASE	CH-53_LZ	CH-53E	50		evening	3.92	42.8	30	100		
FIREBASE	CH-53_LZ	CH-53E	50		nighttime	0.21	2.3	30	100		
FIREBASE	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	daytime	0.42	4.6	30	100		
FIREBASE	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	evening	0.39	4.3	30	100		
FIREBASE	AH-1_LZ	AH-1G	40	LND LITE 40 KTS	nighttime	0.02	0.2	30	100		
FIREBASE	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	daytime	2.07	22.6	30	100		
FIREBASE	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	evening	1.86	20.3	30	100		
FIREBASE	UH-1_LZ	UH-1N	80	FLT AT 80 KTS	nighttime	0.21	2.3	30	100		
LZ_AREA	CH-53_RT	CH-53E	120	CRUISE POWER	daytime	18.33	200	30	100		100
LZ_AREA	CH-53_RT	CH-53E	120	CRUISE POWER	evening	17.42	190	30	100		100
LZ_AREA	CH-53_RT	CH-53E	120	CRUISE POWER	nighttime	0.92	10	30	100		100
LZ_AREA	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	daytime	18.33	200	30	100		100
LZ_AREA	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	evening	17.42	190	30	100		100
LZ_AREA	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	nighttime	0.92	10	30	100		100
LZ_AREA	UH-1_RT	UH-1N	80	FLT AT 80 KTS	daytime	9.17	100	30	100		100
LZ_AREA	UH-1_RT	UH-1N	80	FLT AT 80 KTS	evening	8.25	90	30	100		100
LZ_AREA	UH-1_RT	UH-1N	80	FLT AT 80 KTS	nighttime	0.92	10	30	100		100
LZ_AREA	MV-22_RT	MV-22B	220		daytime	32.42	353.7	30	100		100
LZ_AREA	MV-22_RT	MV-22B	220		evening	29.25	319.1	30	100		100
LZ_AREA	MV-22_RT	MV-22B	220		nighttime	3.33	36.3	30	100		100
TERFN	CH-53_RT	CH-53E	120	CRUISE POWER	daytime	1.74	19			100	
TERFN	CH-53_RT	CH-53E	120	CRUISE POWER	evening	1.38	15.1			100	
TERFN	CH-53_RT	CH-53E	120	CRUISE POWER	nighttime	0.92	10			100	
TERFN	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	daytime	2.48	27.1			100	
TERFN	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	evening	1.83	20			100	
TERFN	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	nighttime	0.92	10			100	
TERFN	UH-1_RT	UH-1N	80	FLT AT 80 KTS	daytime	1.83	20			100	
TERFN	UH-1_RT	UH-1N	80	FLT AT 80 KTS	evening	1.38	15.1			100	
TERFN	UH-1_RT	UH-1N	80	FLT AT 80 KTS	nighttime	0.92	10			100	
TERFS	CH-53_RT	CH-53E	120	CRUISE POWER	daytime	1.74	19			100	
TERFS	CH-53_RT	CH-53E	120	CRUISE POWER	evening	1.38	15.1			100	
TERFS	CH-53_RT	CH-53E	120	CRUISE POWER	nighttime	0.92	10			100	
TERFS	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	daytime	2.48	27.1			100	
TERFS	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	evening	1.83	20			100	
TERFS	AH-1_RT	AH-1G	100	LFO LITE 100 KTS	nighttime	0.92	10			100	
TERFS	UH-1_RT	UH-1N	80	FLT AT 80 KTS	daytime	1.83	20			100	
TERFS	UH-1_RT	UH-1N	80	FLT AT 80 KTS	evening	1.38	15.1			100	

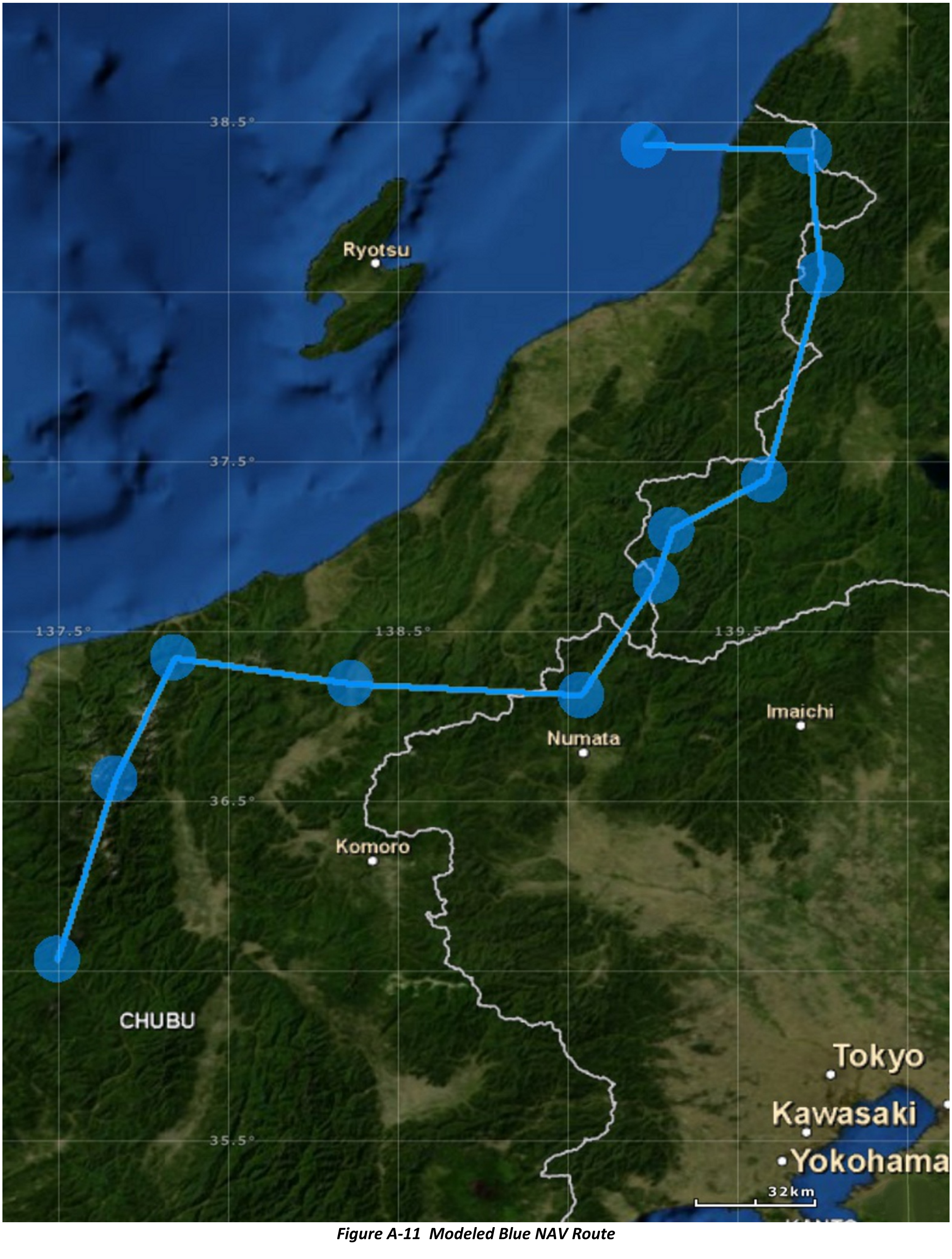

Figure A-11 Modeled Blue NAV Route

Figure A-12 Modeled Green NAV Route

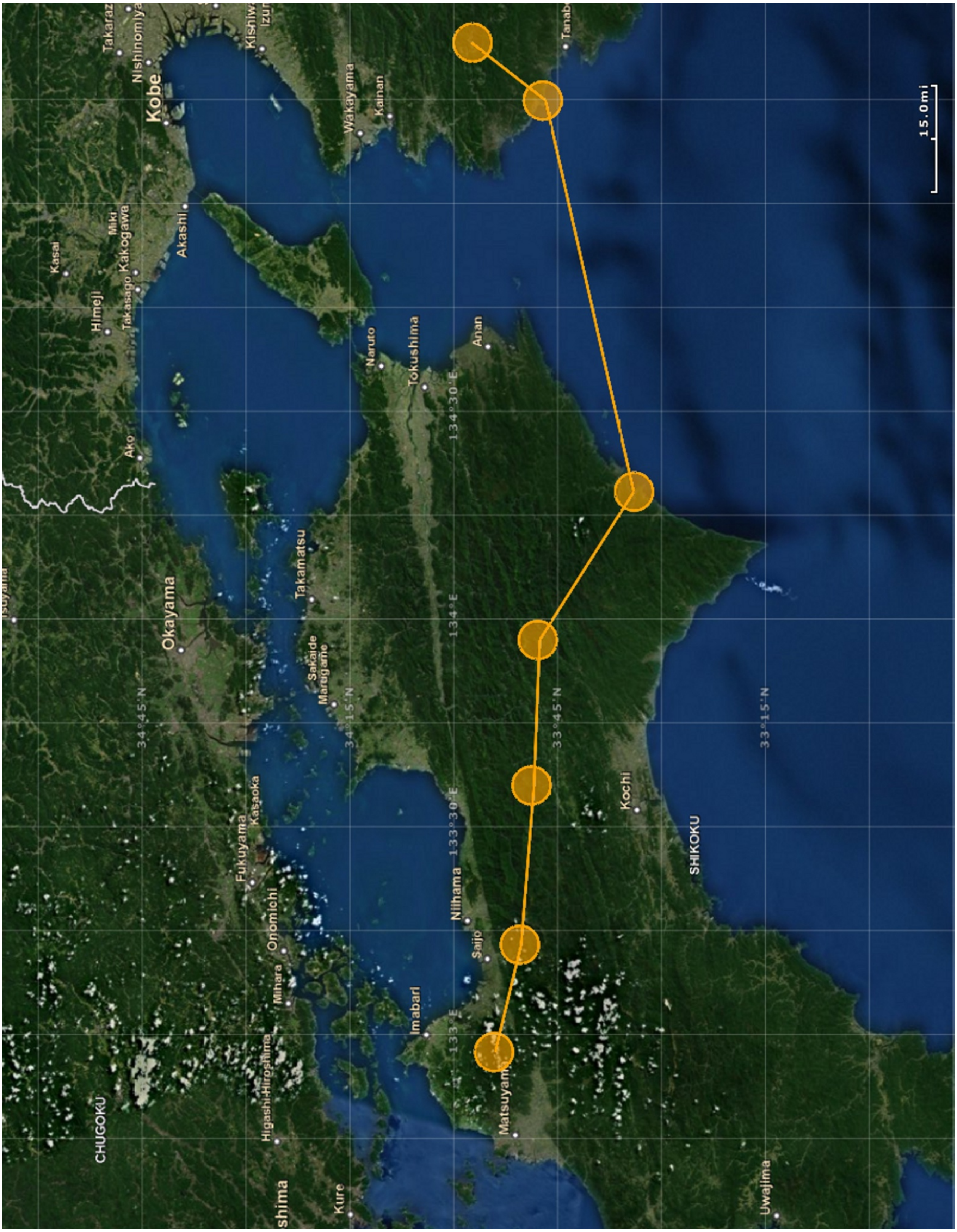

Figure A-13 Modeled Orange NAV Route

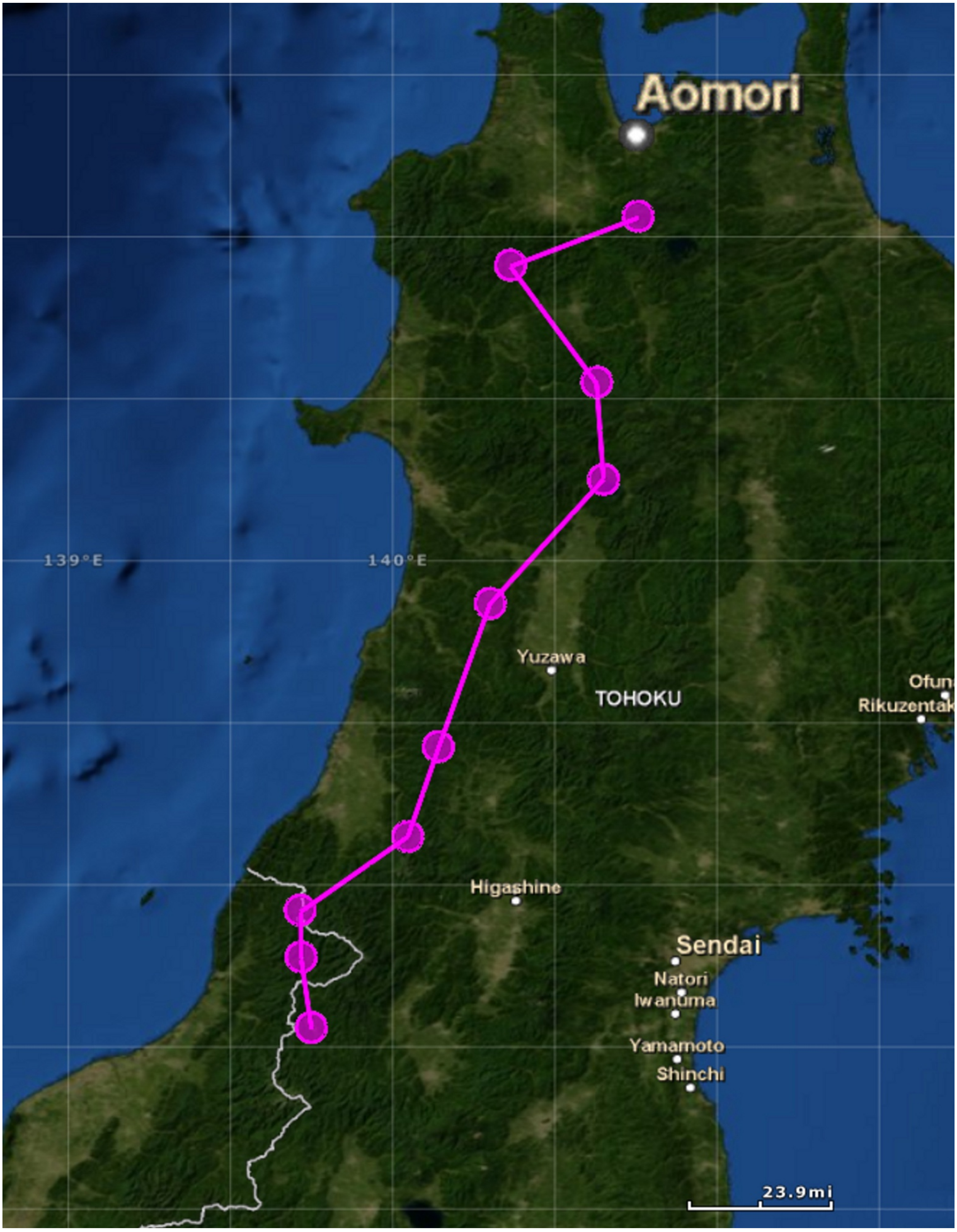

Figure A-14 Modeled Pink NAV Route

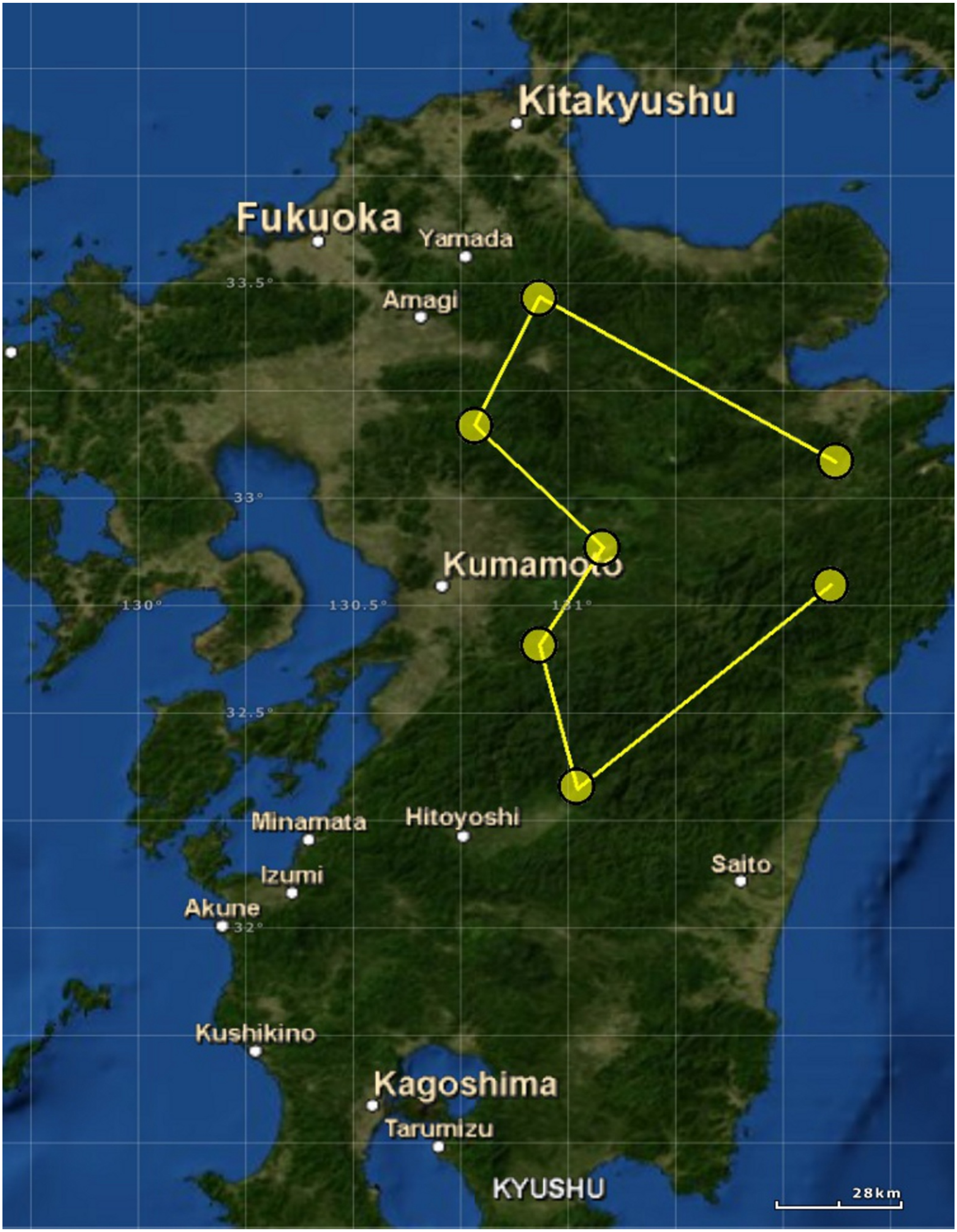

Figure A-15 Modeled Yellow NAV Route

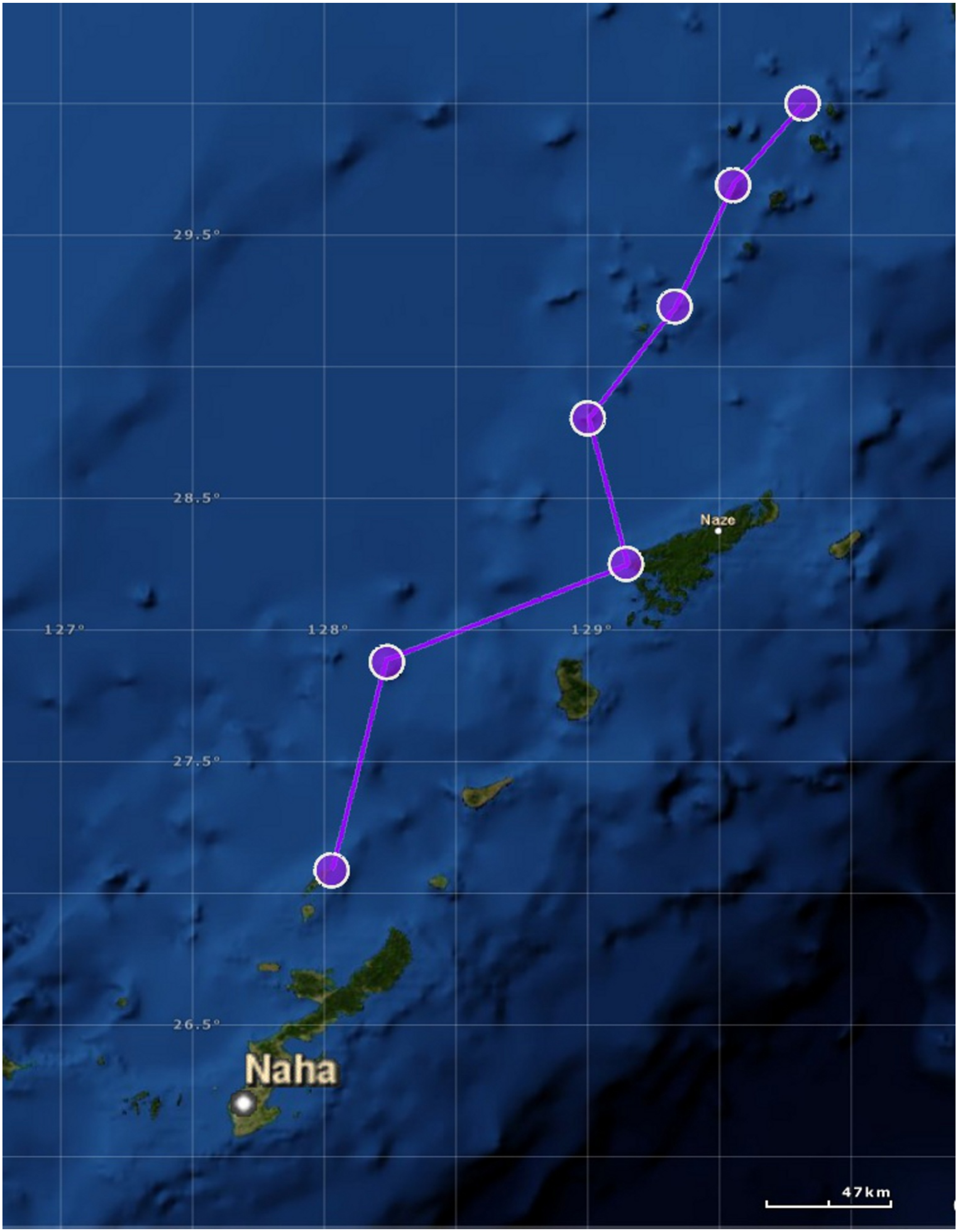

Figure A-16 Modeled Purple NAV Route

Appendix B

REPRESENTATIVE FLIGHT PERFORMANCE PROFILES

This appendix provides scaled plots of individual flight profiles for each modeled aircraft type. The background for MCAS Futenma, Ie Shima, the CTA and JWTC maps are aerial image files provided by MCAS Futenma.

Each figure includes a table describing the profile parameters of the associated flight track. The columns of the profile data tables are described below:

Column Heading	Description
Point	Sequence letter along flight track denoting change in flight parameters
Distance (feet)	Distance along flight track from runway threshold in feet
Height (feet)	Altitude of aircraft in feet Above Ground Level (AGL) or relative to Mean Sea Level (MSL); In this model, AGL reflects Altitude above Field Elevation (AFE); MCAS Futenma is located at 247 feet MSL
Power (Appropriate Unit)*	Engine power setting and Drag Configuration/Interpolation Code (defines sets of interpolation code in NOISEMAP (F for FIXED, P for PARALLEL, V for VARIABLE))
Speed (kts)	Indicated airspeed of aircraft in knots
Yaw Angle (degrees)**	Angle of the aircraft relative to its vertical axis in degrees; positive nose left
Angle of Attack (degrees)**	Angle of the aircraft, not of the wing; angle between the climb angle and the pitch angle, in degrees, positive nose up. The climb angle is the angle between the horizontal and the velocity vector (same convention). The pitch angle is the angle between the horizontal and the thrust vector (same convention)
Roll Angle (degrees)**	Angle of the aircraft relative to its longitudinal axis in degrees; positive left side down.
Nacelle Angle (degrees)***	Angle of engine nacelle pylon relative to the horizontal (airplane) mode; positive up; maximum of 90

Notes: * not applicable to rotary wing aircraft
** for rotary wing aircraft only
*** for tilt-rotor aircraft (e.g., MV-22B) only; fixed to 90 degrees for RNM helicopters

MCAS Futenma B-5

Page	Aircraft
6 - 10	Cessna-500 (UC-35)
11 - 15	UC-12W
16 - 20	KC-130J
21 - 32	CH-53E
33 - 44	AH-1W
45 - 56	UH-1N
57 - 68	CH-46E
69 - 73	Transient FA-18C/D
74 - 83	MV-22B

Ie Shima ISTF B-85

Page	Aircraft
86-88	AH-1W
89-91	CH-46E
92-94	CH-53E
95-97	UH-1N
98-100	MV-22B
101-103	AV-8B
104-106	KC-130J

Associated Airspace B-107

Page	Aircraft
108-127	MV-22B

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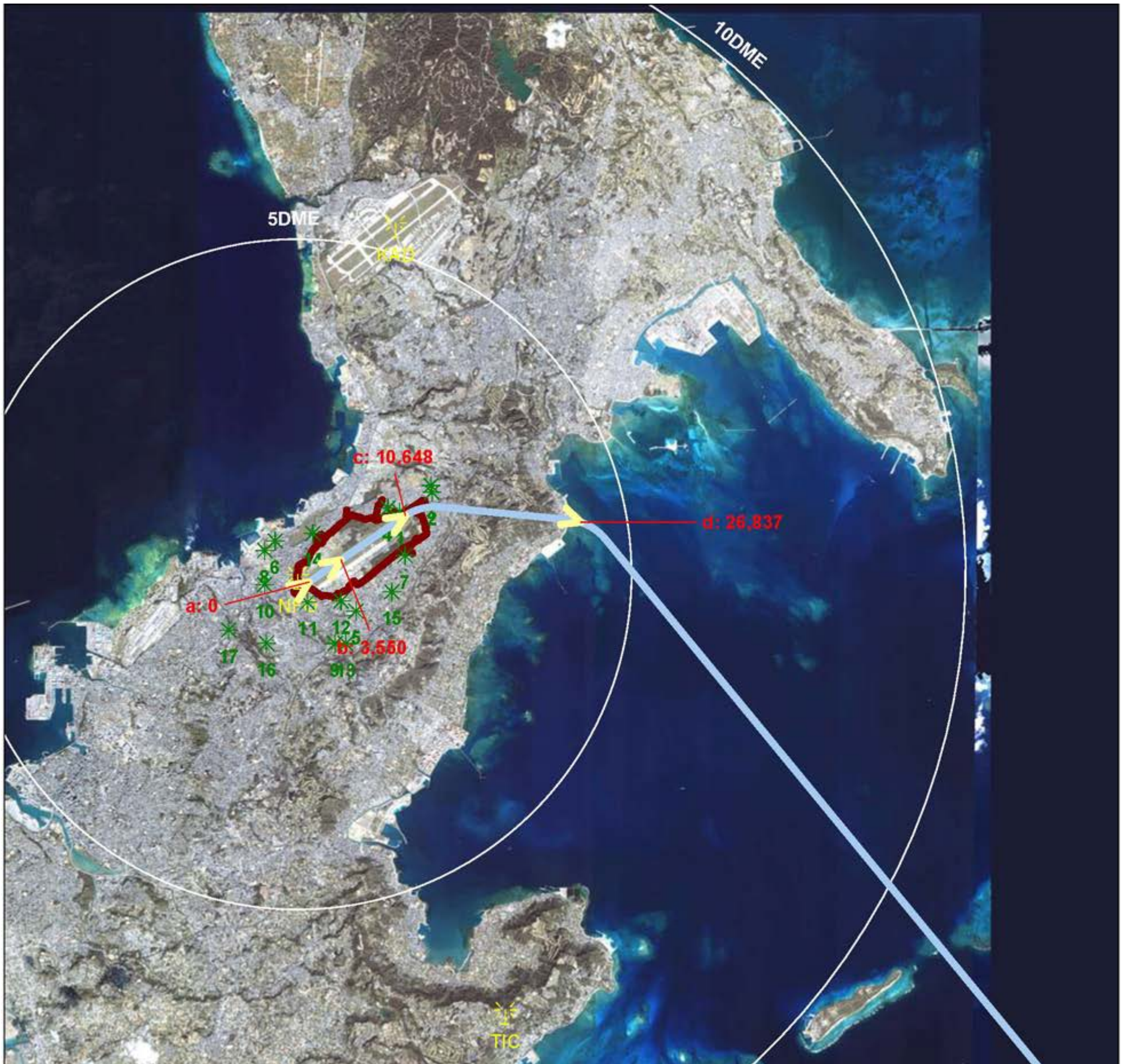
Appendix B-1: MCAS Futenma



Flight Profile 703

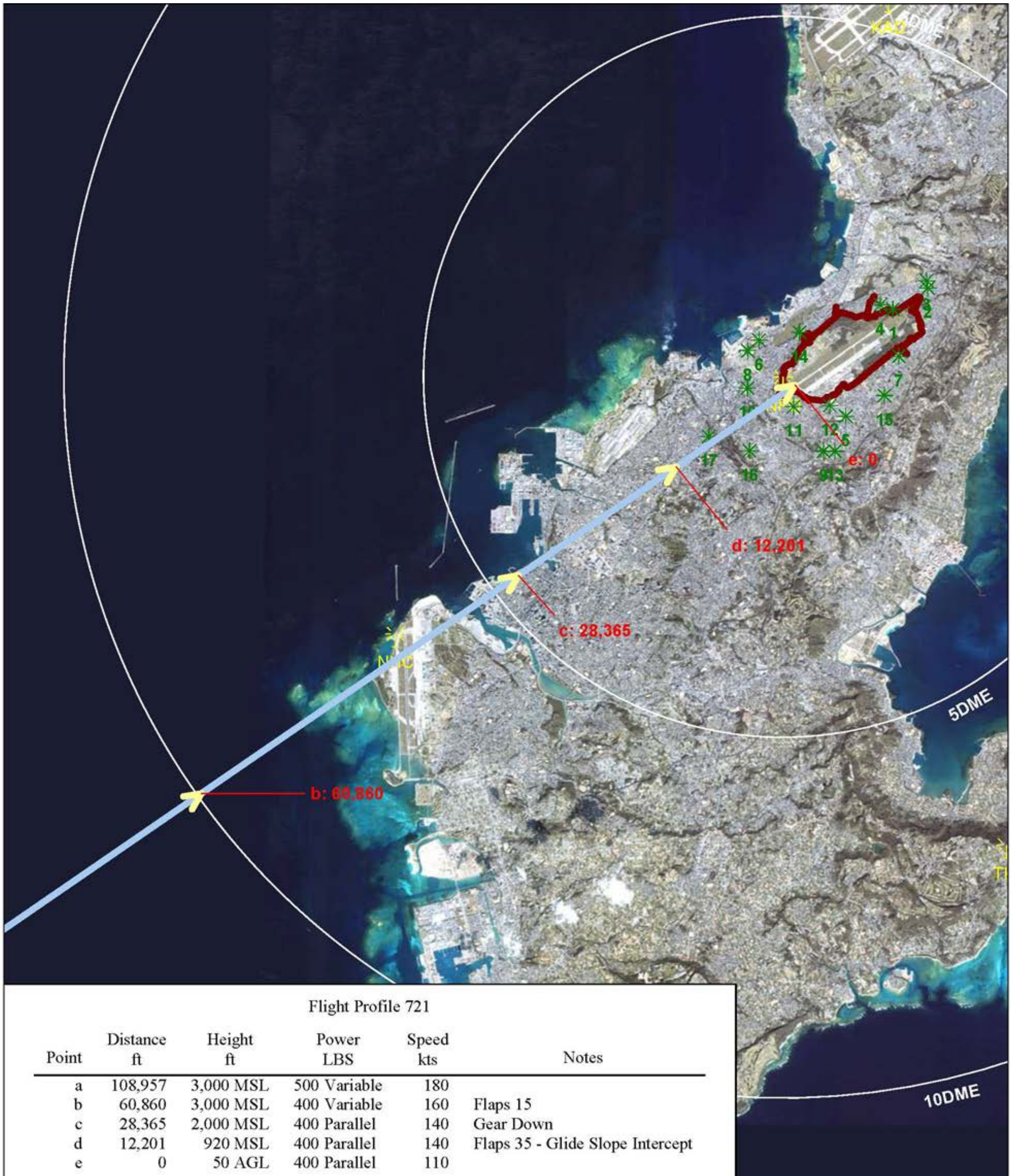
Point	Distance ft	Height ft	Power LBS	Speed kts	Notes
a	0	0 AGL	2200 Takeoff	0	
b	3,550	0 AGL	2200 Takeoff	105	
c	10,648	700 AGL	2200 Takeoff	150	Flaps 0
d	26,837	2,000 MSL	1500 Takeoff	200	
e	100,000	2,000 MSL	2200 Takeoff	200	
f	195,626	38,000 MSL	1800 Variable	250	

Flight Profile 703
Cessna-500 (UC-35)
on Runway 06, Flight Track 06D5

0 10,000 20,000 30,000 40,000 50,000 60,000

Scale in Feet 1:187,000 (1 inch = 15,600 feet)

N



Flight Profile 721

Point	Distance ft	Height ft	Power LBS	Speed kts	Notes
a	108,957	3,000 MSL	500 Variable	180	
b	60,860	3,000 MSL	400 Variable	160	Flaps 15
c	28,365	2,000 MSL	400 Parallel	140	Gear Down
d	12,201	920 MSL	400 Parallel	140	Flaps 35 - Glide Slope Intercept
e	0	50 AGL	400 Parallel	110	

Flight Profile 721
Cessna-500 (UC-35)
on Runway 06, Flight Track 06A4

0 10,000 20,000 30,000 40,000 50,000

Scale in Feet 1:157,000 (1 inch = 13,100 feet)

N

Flight Profile 731

Point	Distance ft	Height ft	Power LBS	Speed kts	Notes
a	107,000	3,000 MSL	500 Variable	180	
b	60,925	2,000 MSL	400 Variable	160	Flaps 15
c	30,217	2,000 MSL	400 Parallel	140	Gear Down
d	12,485	920 MSL	400 Parallel	140	Flaps 35 - Glide Slope Intercept
e	0	50 AGL	400 Parallel	110	

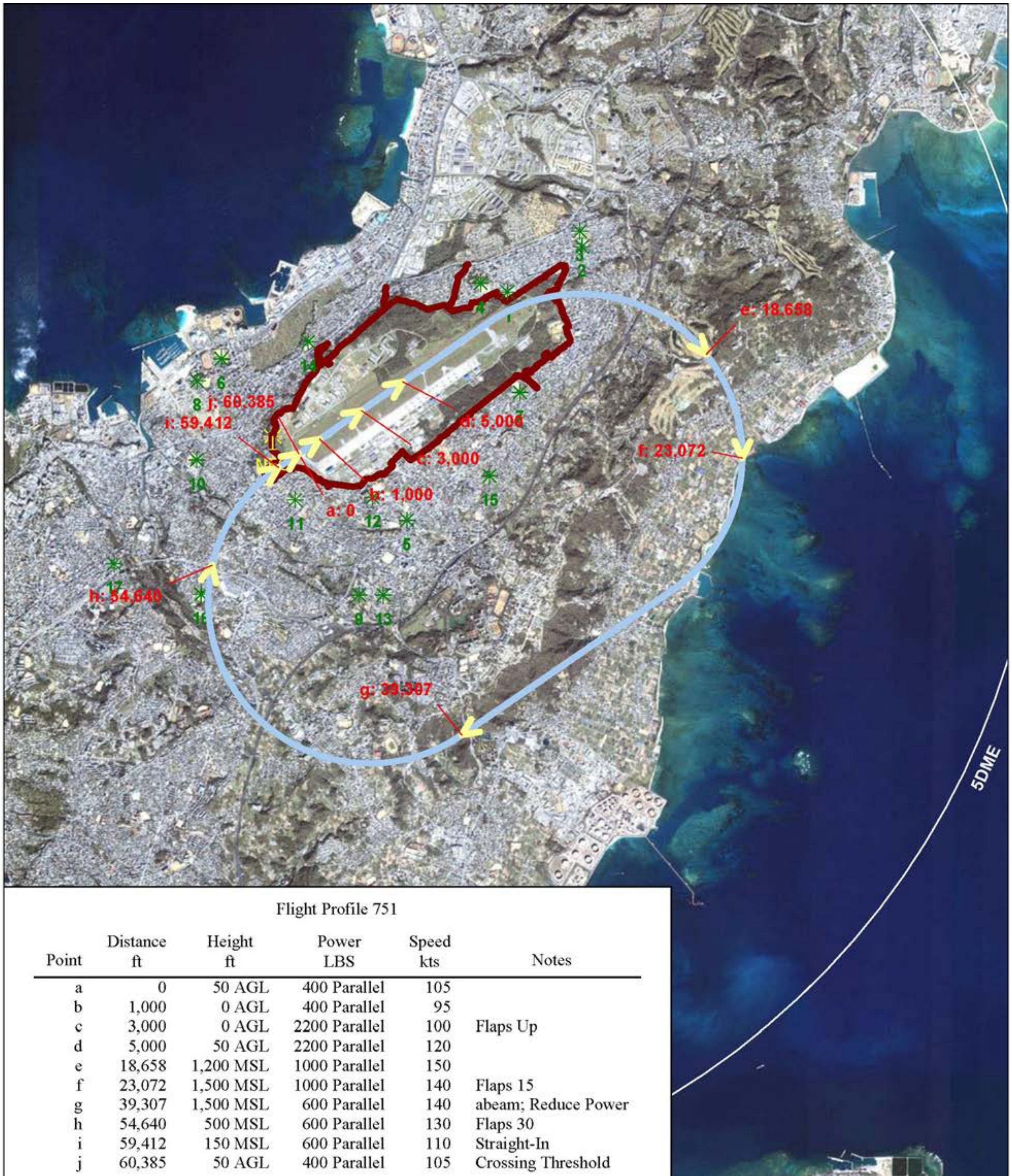
Flight Profile 731

Cessna-500 (UC-35)

on Runway 06, Flight Track 06A5

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000 44,000 48,000 52,000

Scale in Feet 1:147,000 (1 inch = 12,200 feet)



Flight Profile 751

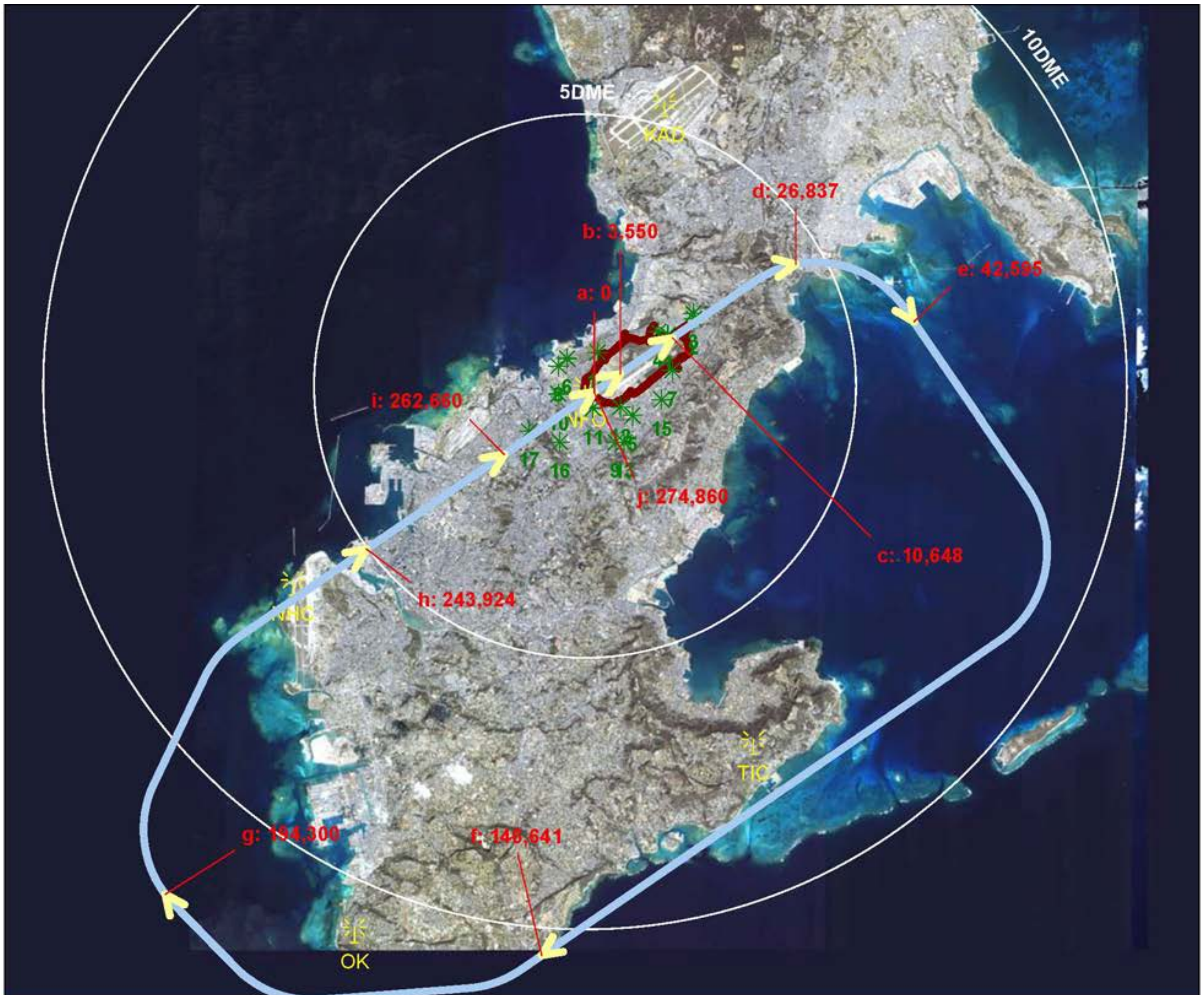
Point	Distance ft	Height ft	Power LBS	Speed kts	Notes
a	0	50 AGL	400 Parallel	105	
b	1,000	0 AGL	400 Parallel	95	
c	3,000	0 AGL	2200 Parallel	100	Flaps Up
d	5,000	50 AGL	2200 Parallel	120	
e	18,658	1,200 MSL	1000 Parallel	150	
f	23,072	1,500 MSL	1000 Parallel	140	Flaps 15
g	39,307	1,500 MSL	600 Parallel	140	abeam; Reduce Power
h	54,640	500 MSL	600 Parallel	130	Flaps 30
i	59,412	150 MSL	600 Parallel	110	Straight-In
j	60,385	50 AGL	400 Parallel	105	Crossing Threshold

Flight Profile 751
Cessna-500 (UC-35)
on Runway 06, Flight Track 06T3

0 4,000 8,000 12,000 16,000 20,000 24,000

Scale in Feet 1:73,300 (1 inch = 6,110 feet)

N



Flight Profile 761

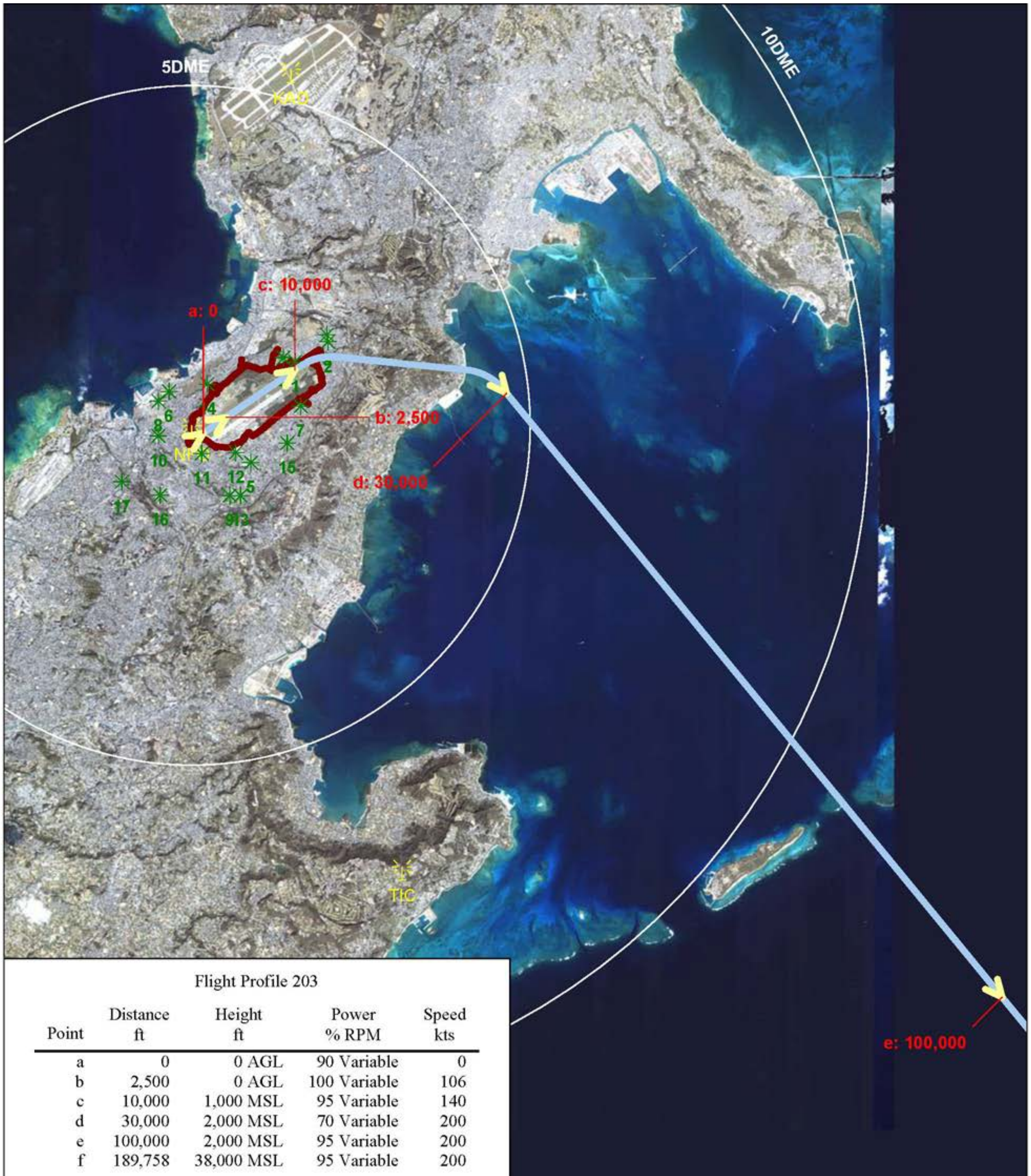
Point	Distance ft	Height ft	Power LBS	Speed kts	Notes
a	0	0 AGL	2200 Variable	0	
b	3,550	0 AGL	2200 Variable	100	
c	10,648	700 MSL	1800 Variable	130	Gear Up
d	26,837	2,000 MSL	1800 Variable	150	
e	42,595	3,000 MSL	1500 Variable	200	
f	146,641	3,000 MSL	1500 Variable	200	
g	194,300	2,000 MSL	1500 Variable	180	
h	243,924	2,000 MSL	1500 Parallel	180	
i	262,660	920 MSL	400 Parallel	140	
j	274,860	50 AGL	400 Parallel	110	

Flight Profile 761
Cessna-500 (UC-35)
on Runway 06, Flight Track 06G2

0 10,000 20,000 30,000 40,000 50,000 60,000 70,000 80,000

Scale in Feet 1:247,000 (1 inch = 20,600 feet)

N



Flight Profile 203

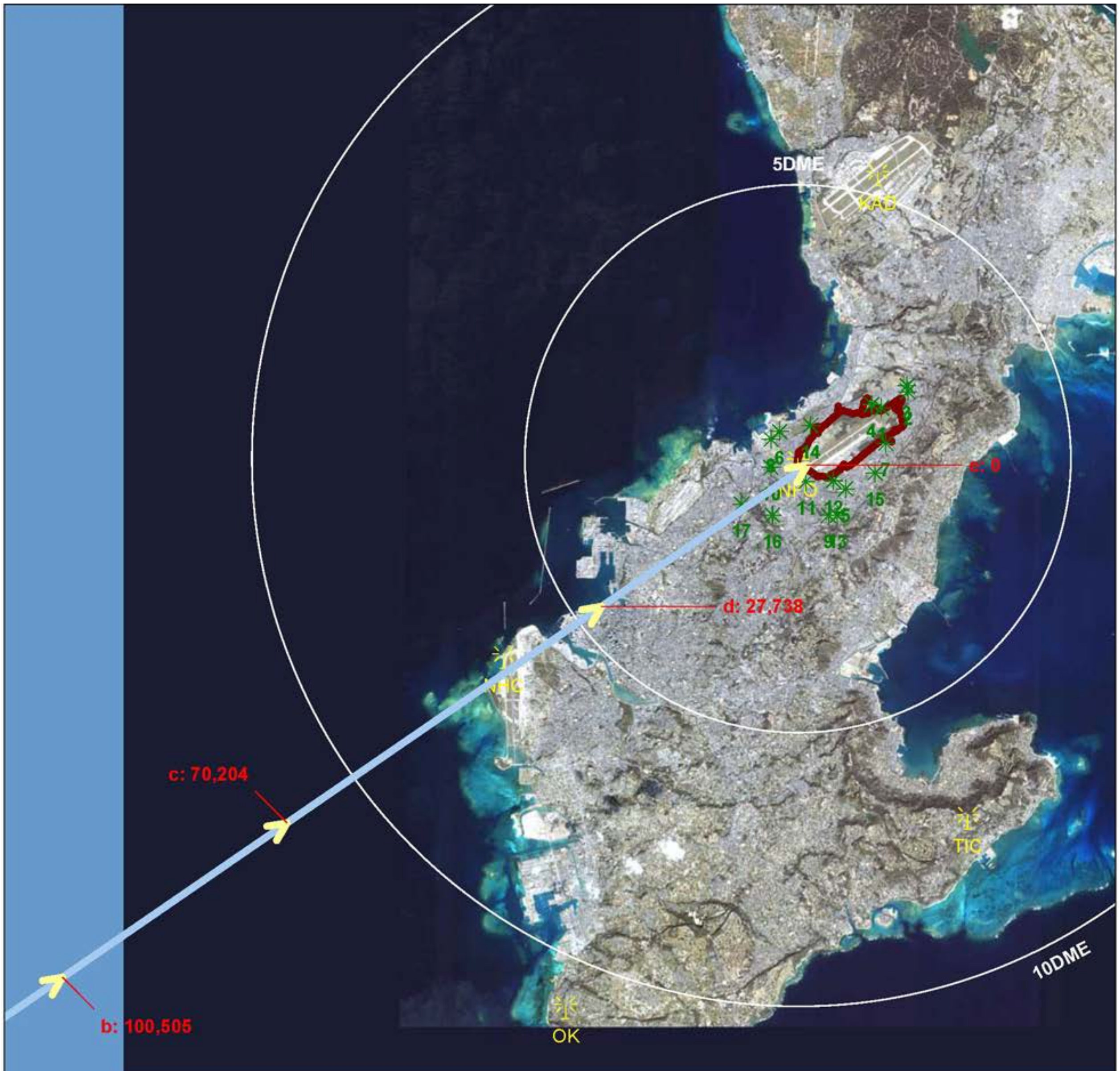
Point	Distance ft	Height ft	Power % RPM	Speed kts
a	0	0 AGL	90 Variable	0
b	2,500	0 AGL	100 Variable	106
c	10,000	1,000 MSL	95 Variable	140
d	30,000	2,000 MSL	70 Variable	200
e	100,000	2,000 MSL	95 Variable	200
f	189,758	38,000 MSL	95 Variable	200

Flight Profile 203
UC-12W
on Runway 06, Flight Track 06D5
Prior to brake release, aircraft sits at 90 % RPM Variable for 15 sec

0 10,000 20,000 30,000 40,000 50,000

Scale in Feet 1:170,000 (1 inch = 14,100 feet)

N



Flight Profile 221

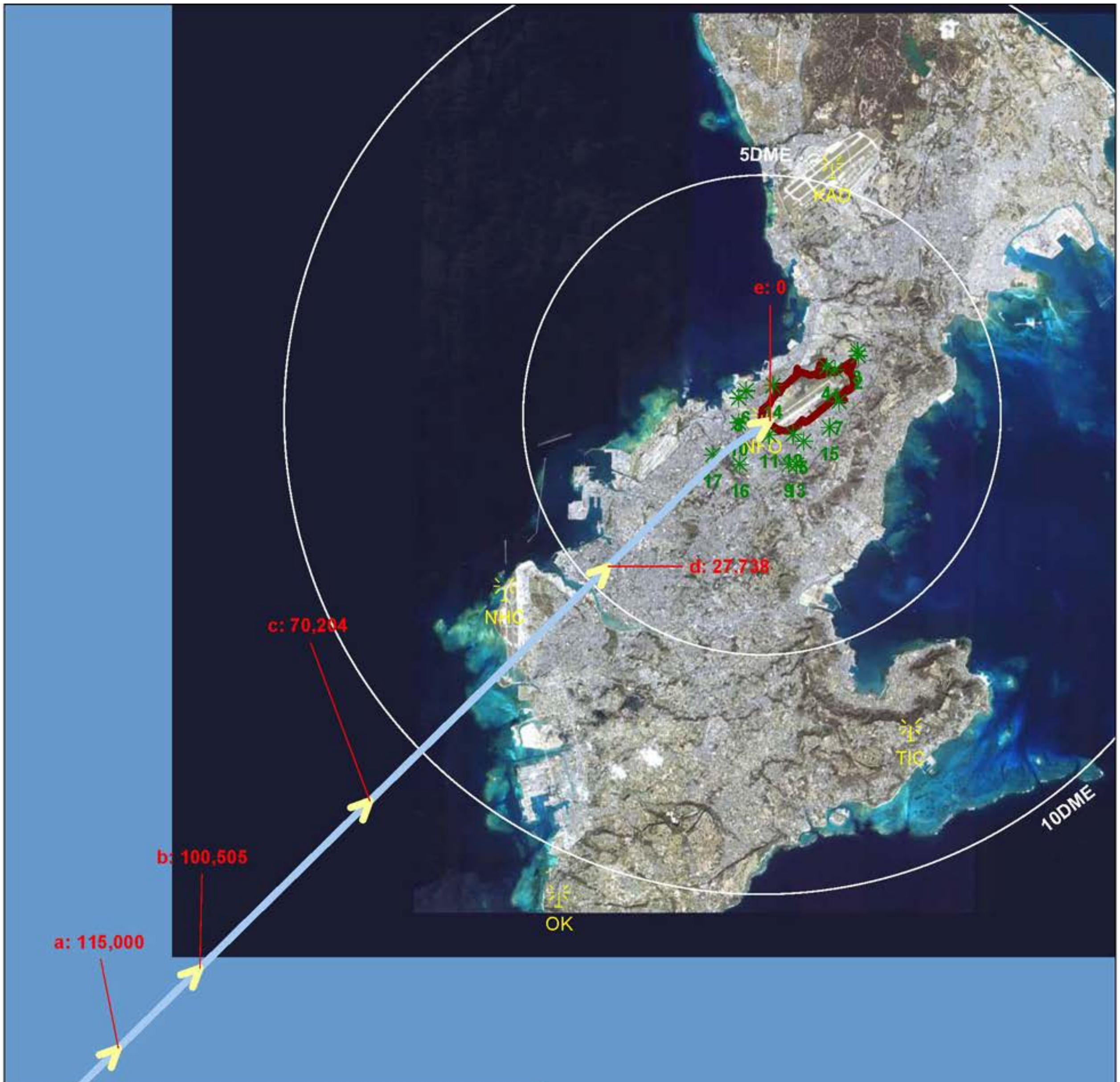
Point	Distance ft	Height ft	Power % RPM	Speed kts
a	115,000	3,000 MSL	80 Variable	200
b	100,505	3,000 MSL	60 Variable	160
c	70,204	2,000 MSL	50 Variable	150
d	27,738	2,000 MSL	50 Landing	130
e	0	50 AGL	30 Landing	105

Flight Profile 221
UC-12W
on Runway 06, Flight Track 06A4

0 10,000 20,000 30,000 40,000 50,000 60,000 70,000

Scale in Feet 1:228,000 (1 inch = 19,000 feet)

N



Flight Profile 231

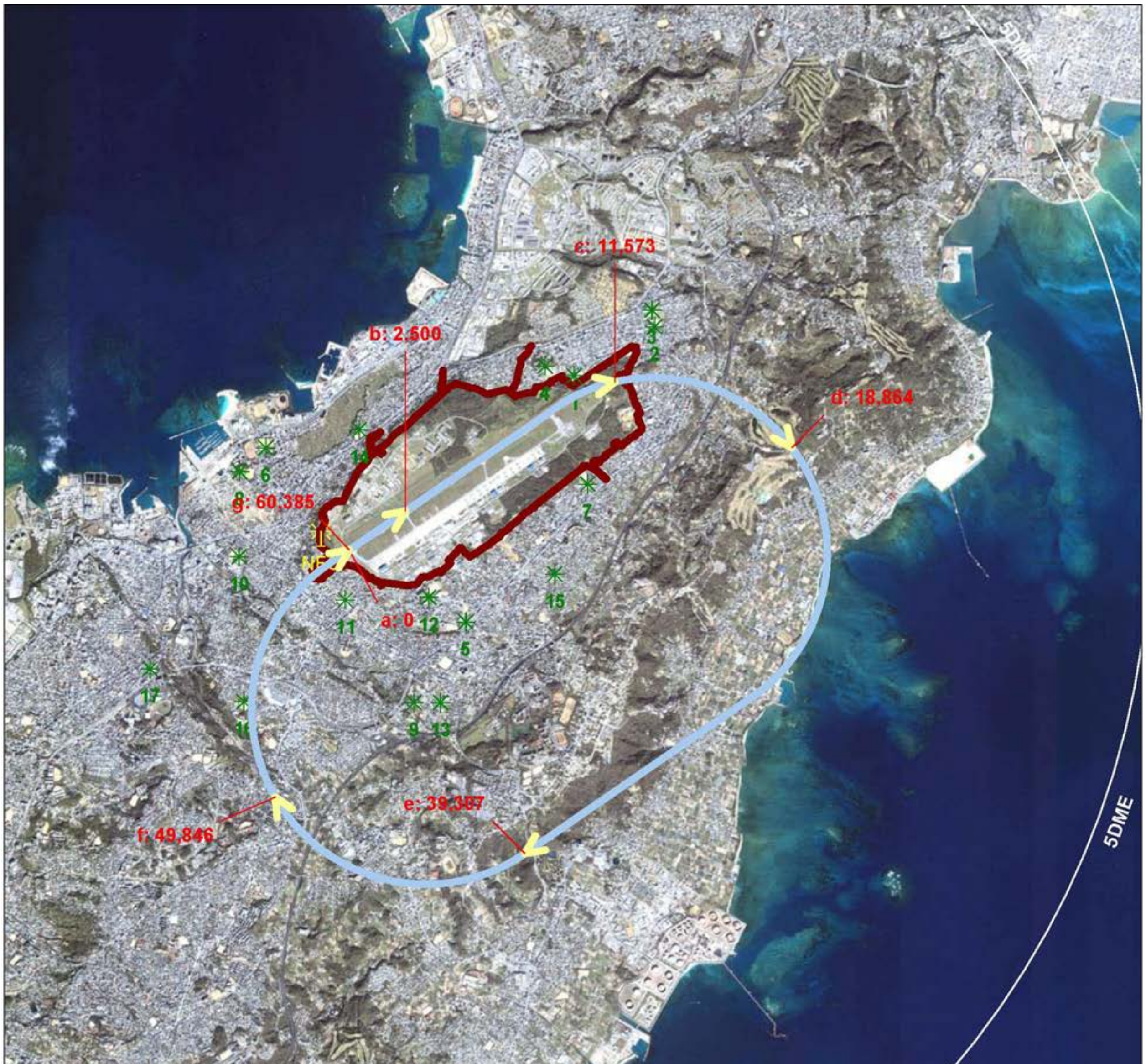
Point	Distance ft	Height ft	Power % RPM	Speed kts
a	115,000	3,000 MSL	80 Variable	200
b	100,505	3,000 MSL	60 Variable	160
c	70,204	2,000 MSL	50 Variable	150
d	27,738	2,000 MSL	50 Landing	130
e	0	50 AGL	30 Landing	105

Flight Profile 231
UC-12W
on Runway 06, Flight Track 06A5

0 10,000 20,000 30,000 40,000 50,000 60,000 70,000 80,000 90,000

Scale in Feet 1:261,000 (1 inch = 21,700 feet)

N



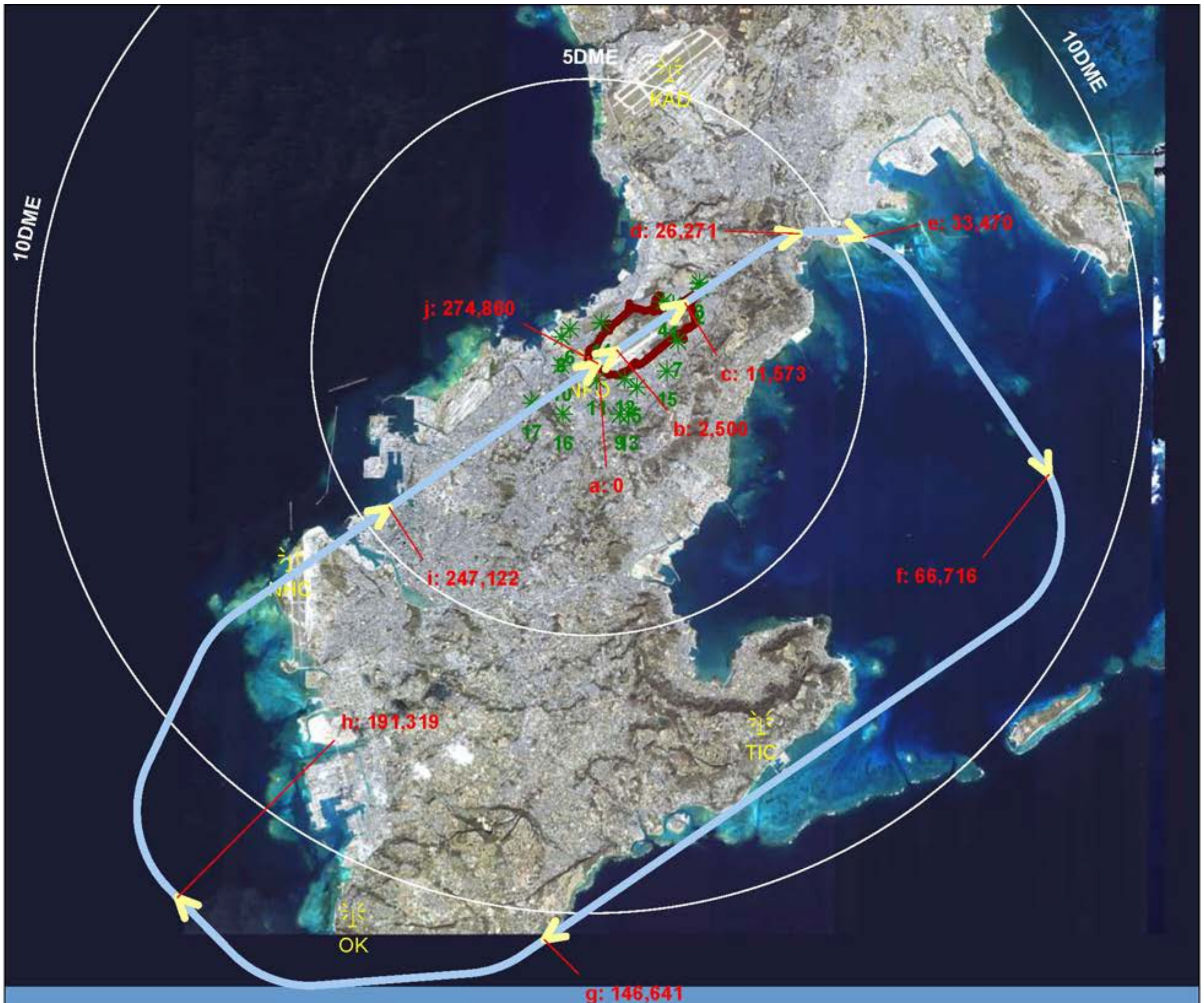
Flight Profile 251

Point	Distance ft	Height ft	Power % RPM	Speed kts
a	0	0 AGL	90 Variable	0
b	2,500	0 AGL	100 Variable	106
c	11,573	1,000 MSL	95 Variable	140
d	18,864	1,500 MSL	70 Variable	140
e	39,307	1,500 MSL	50 Parallel	140
f	49,846	650 AGL	50 Parallel	120
g	60,385	50 AGL	30 Parallel	110

Flight Profile 251
UC-12W
on Runway 06, Flight Track 06T3

0 4,000 8,000 12,000 16,000 20,000 24,000

Scale in Feet 1:77,000 (1 inch = 6,420 feet)



Flight Profile 261

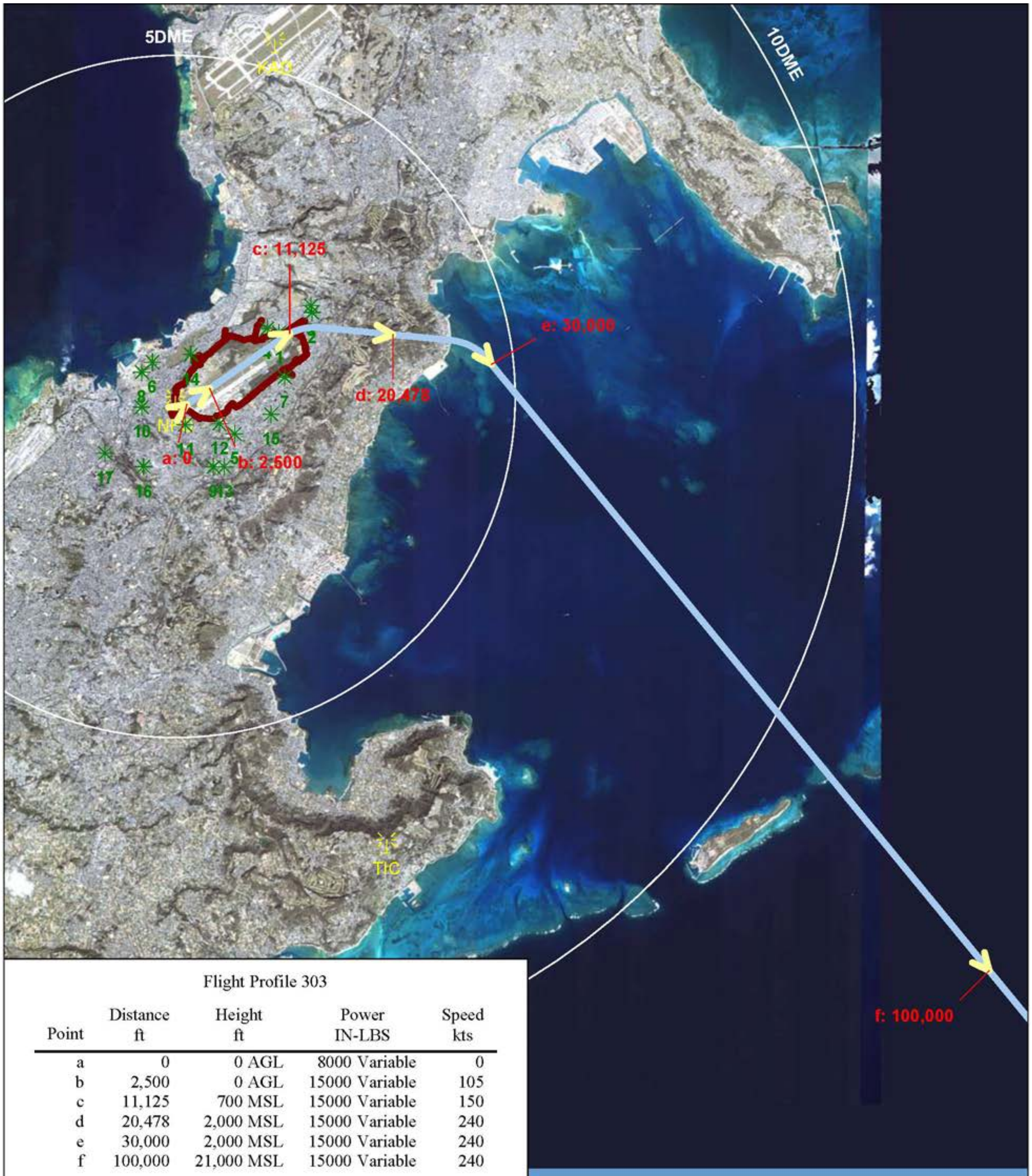
Point	Distance ft	Height ft	Power % RPM	Speed kts
a	0	0 AGL	90 Variable	0
b	2,500	0 AGL	100 Variable	106
c	11,573	1,000 MSL	95 Variable	140
d	26,271	2,000 MSL	70 Variable	200
e	33,470	3,000 MSL	95 Variable	200
f	66,716	3,000 MSL	70 Variable	200
g	146,641	3,000 MSL	60 Variable	200
h	191,319	2,000 MSL	60 Variable	180
i	247,122	2,000 MSL	50 Parallel	130
j	274,860	50 AGL	30 Parallel	105

Flight Profile 261

UC-12W

on Runway 06, Flight Track 06G2

Scale in Feet 1:242,000 (1 inch = 20,100 feet)



Flight Profile 303

Point	Distance ft	Height ft	Power IN-LBS	Speed kts
a	0	0 AGL	8000 Variable	0
b	2,500	0 AGL	15000 Variable	105
c	11,125	700 MSL	15000 Variable	150
d	20,478	2,000 MSL	15000 Variable	240
e	30,000	2,000 MSL	15000 Variable	240
f	100,000	21,000 MSL	15000 Variable	240

Flight Profile 303

KC-130J

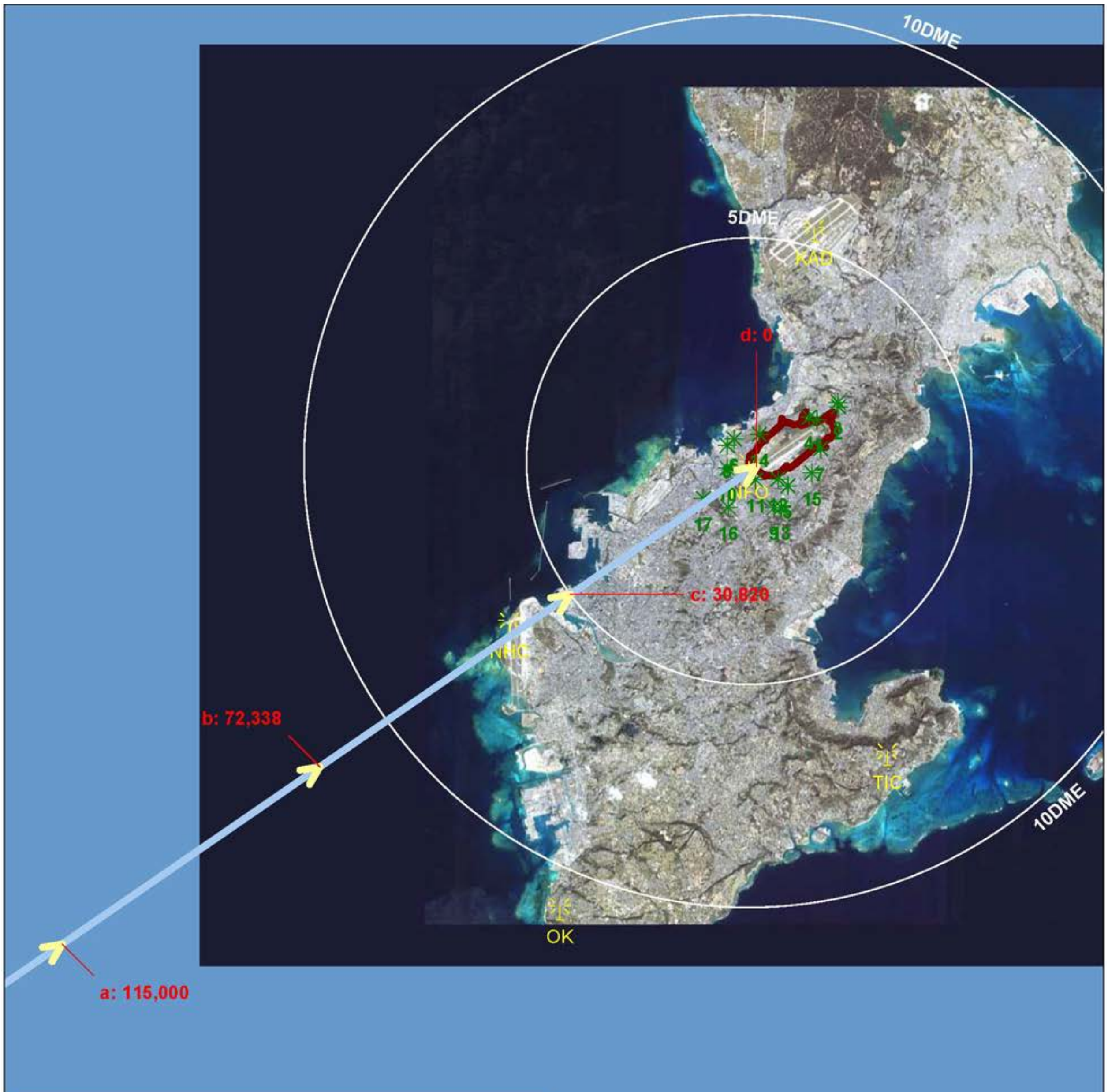
on Runway 06, Flight Track 06D5

Prior to brake release, aircraft sits at 8000 IN-LBS Variable for 10 sec

0 10,000 20,000 30,000 40,000 50,000

Scale in Feet 1:169,000 (1 inch = 14,100 feet)

N



Flight Profile 321

Point	Distance ft	Height ft	Power HP	Speed kts
a	115,000	3,000 MSL	4000 Variable	240
b	72,338	3,000 MSL	4000 Variable	150
c	30,820	2,000 MSL	3000 Parallel	140
d	0	50 AGL	2000 Parallel	120

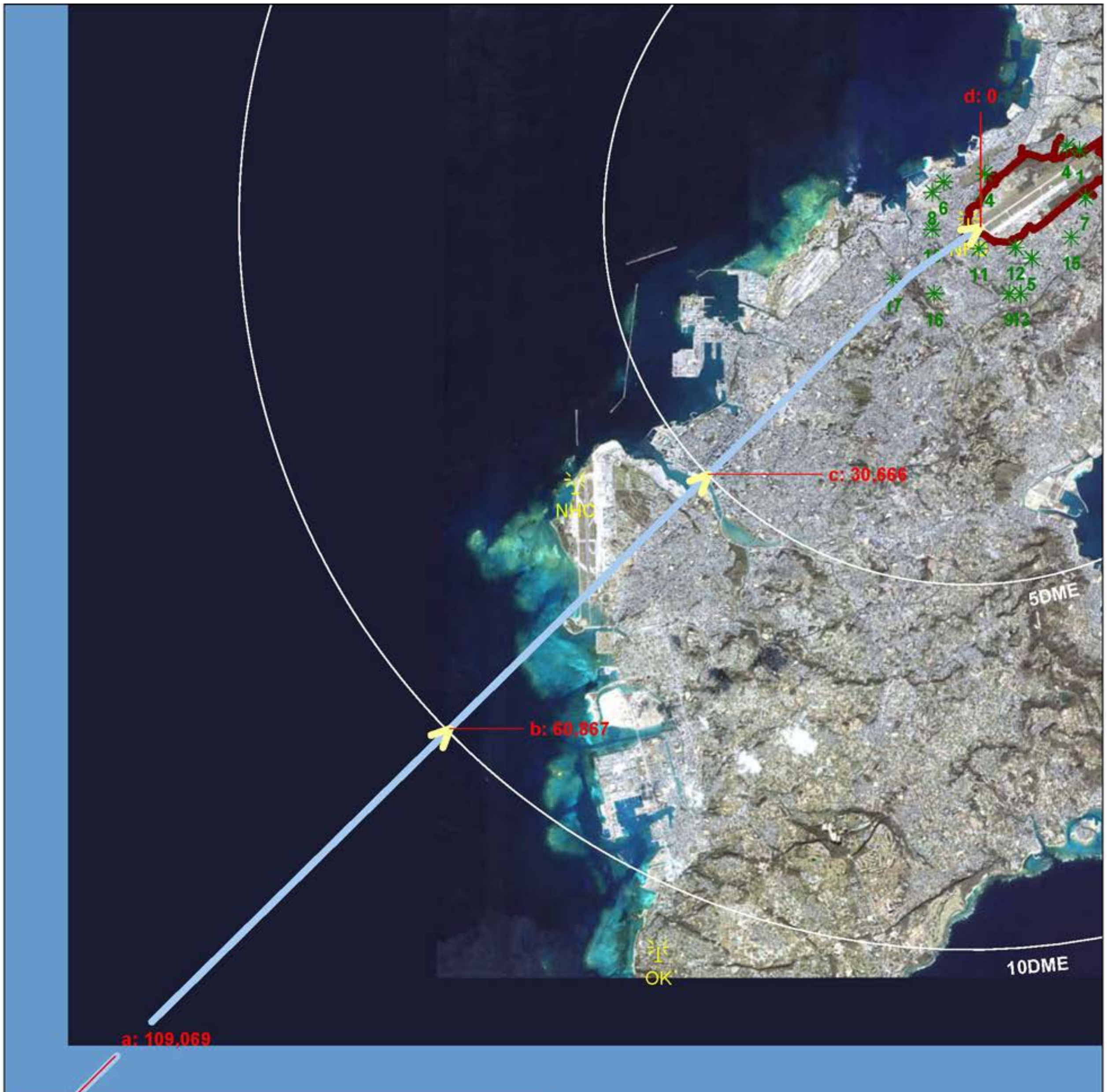
Flight Profile 321

KC-130J

on Runway 06, Flight Track 06A4

0 10,000 20,000 30,000 40,000 50,000 60,000 70,000 80,000 90,000

Scale in Feet 1:277,000 (1 inch = 23,100 feet)



Point	Distance ft	Height ft	Power HP	Speed kts
a	109,069	3,000 MSL	4000 Variable	240
b	60,867	2,000 MSL	4000 Variable	150
c	30,666	2,000 MSL	3000 Parallel	140
d	0	50 AGL	2000 Parallel	120

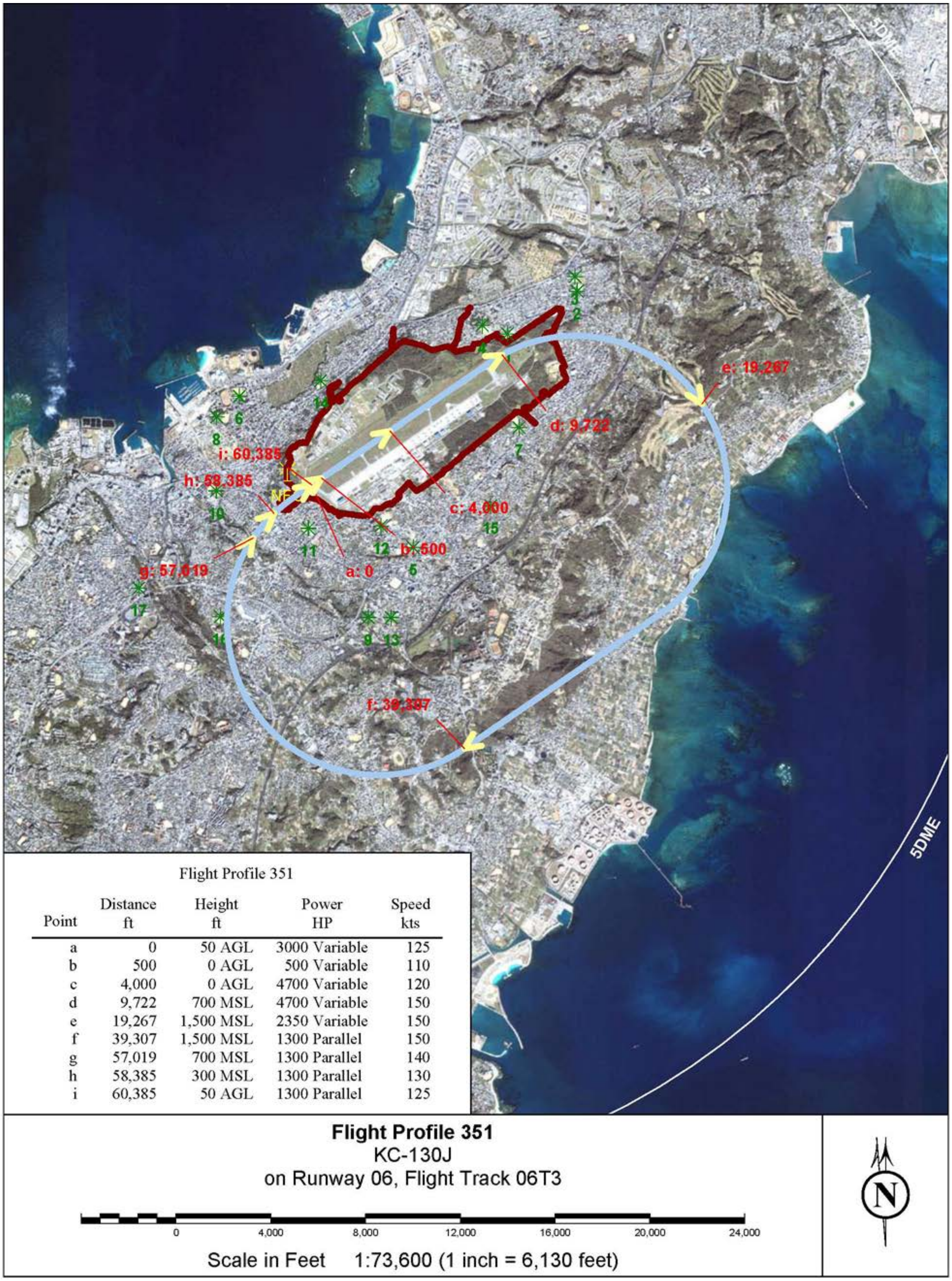
Flight Profile 331

Flight Profile 331
KC-130J
on Runway 06, Flight Track 06A5

0 10,000 20,000 30,000 40,000 50,000

Scale in Feet 1:169,000 (1 inch = 14,100 feet)

N

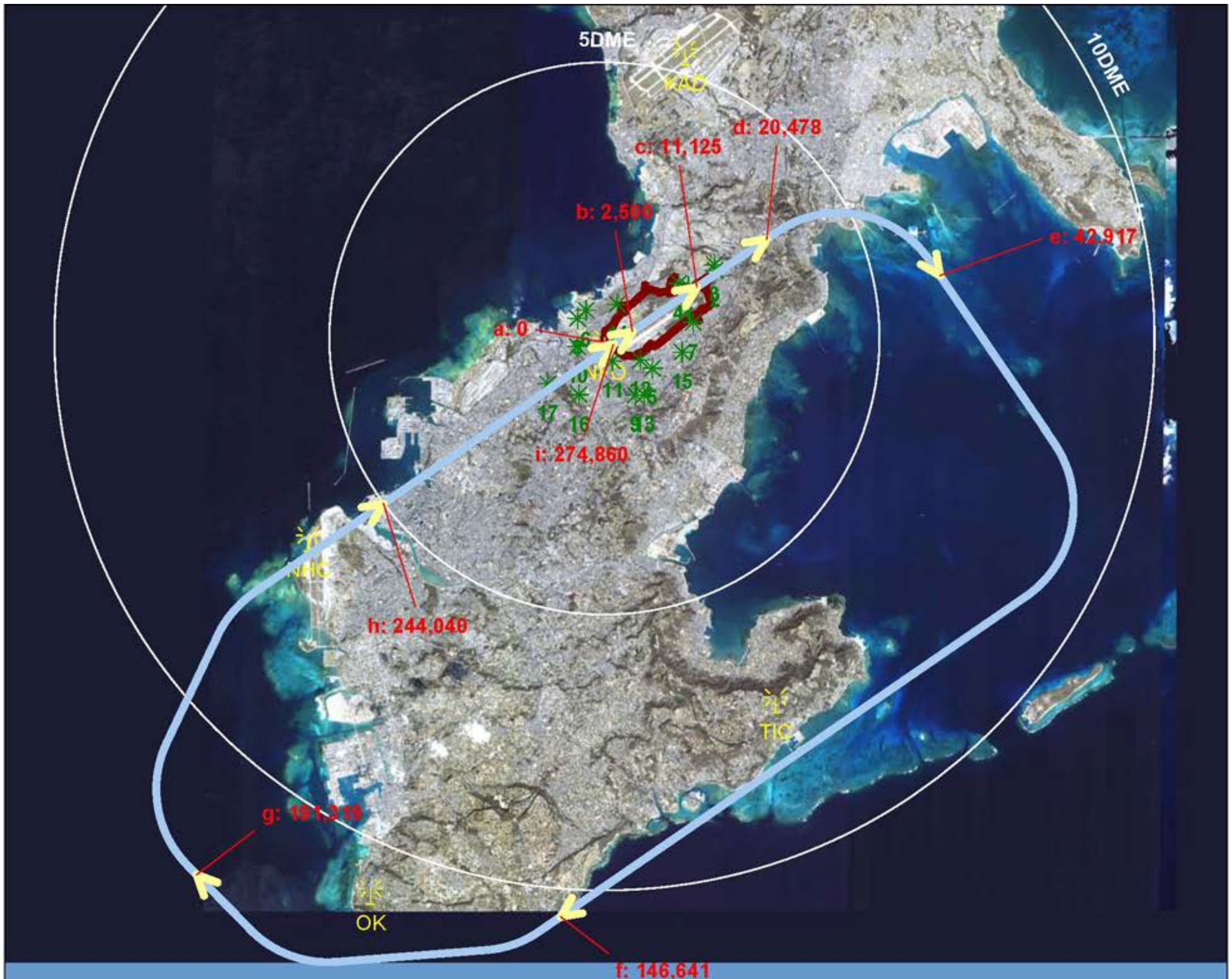


Flight Profile 351

Point	Distance ft	Height ft	Power HP	Speed kts
a	0	50 AGL	3000 Variable	125
b	500	0 AGL	500 Variable	110
c	4,000	0 AGL	4700 Variable	120
d	9,722	700 MSL	4700 Variable	150
e	19,267	1,500 MSL	2350 Variable	150
f	39,307	1,500 MSL	1300 Parallel	150
g	57,019	700 MSL	1300 Parallel	140
h	58,385	300 MSL	1300 Parallel	130
i	60,385	50 AGL	1300 Parallel	125

Flight Profile 351
KC-130J
on Runway 06, Flight Track 06T3

Scale in Feet 1:73,600 (1 inch = 6,130 feet)



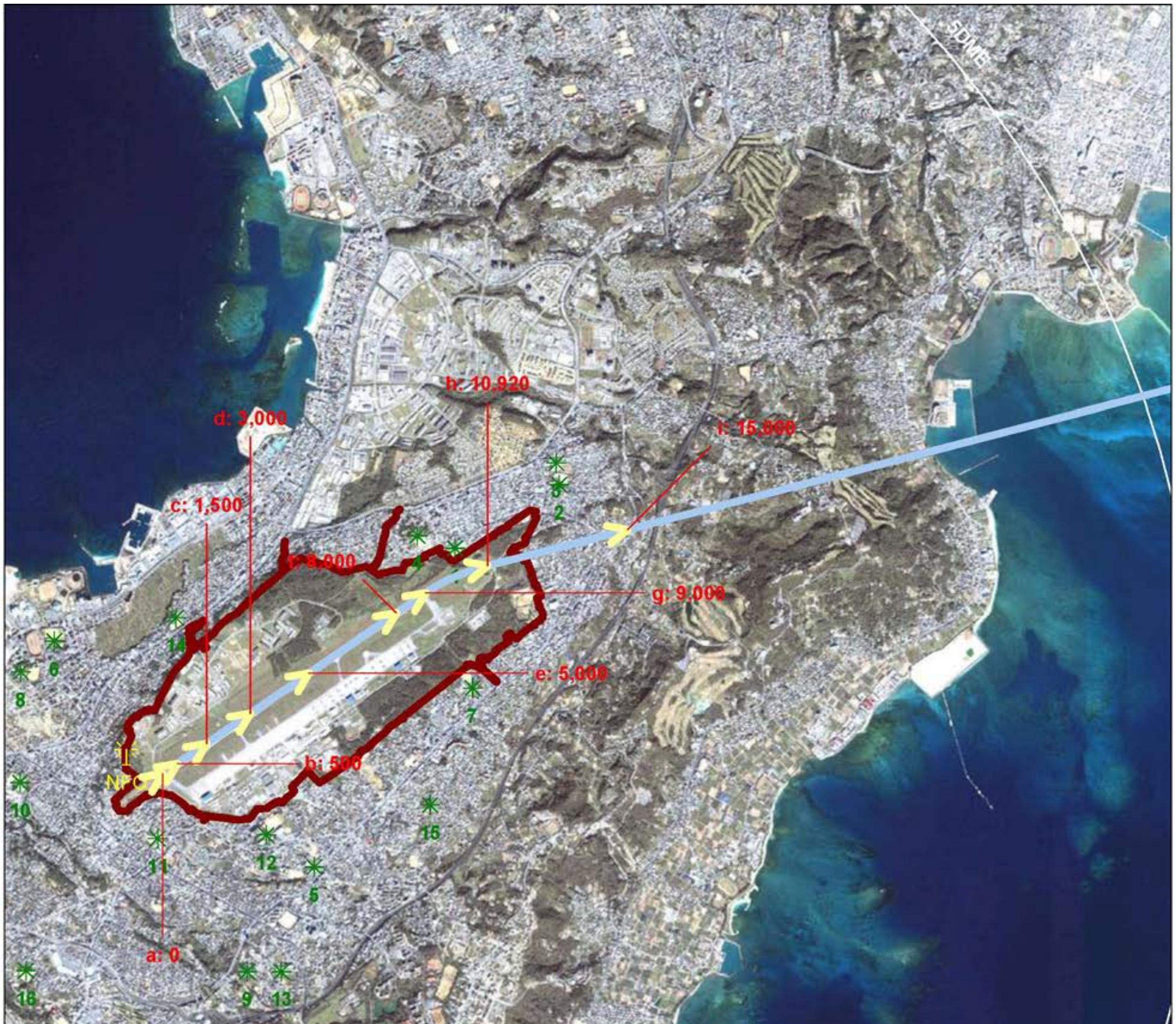
Flight Profile 361

Point	Distance ft	Height ft	Power HP	Speed kts
a	0	0 AGL	4700 Variable	0
b	2,500	0 AGL	4700 Variable	105
c	11,125	700 MSL	4700 Variable	150
d	20,478	2,000 MSL	4700 Variable	240
e	42,917	3,000 MSL	4000 Variable	240
f	146,641	3,000 MSL	2350 Variable	240
g	191,319	2,000 MSL	3000 Variable	200
h	244,040	2,000 MSL	3000 Parallel	140
i	274,860	50 AGL	2000 Parallel	120

Flight Profile 361
KC-130J
on Runway 06, Flight Track 06G2

0 10,000 20,000 30,000 40,000 50,000 60,000 70,000 80,000

Scale in Feet 1:249,000 (1 inch = 20,800 feet)



Flight Profile 801

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	15 AGL	0	0	0	0	90	
b	500	50 AGL	10	0	5	0	90	
c	1,500	200 AGL	60	0	-5	0	90	
d	3,000	500 AGL	90	0	0	0	90	
e	5,000	700 AGL	100	0	5	0	90	
f	8,000	1,000 MSL	100	0	5	0	90	
g	9,000	1,000 MSL	102	0	5	30	90	begin turn
h	10,920	1,000 MSL	110	0	5	0	90	end turn
i	15,000	1,000 MSL	120	0	3	0	90	
j	120,000	1,000 MSL	120	0	3	0	90	

MCAS Futenma - Flight Profile 801 - Departure

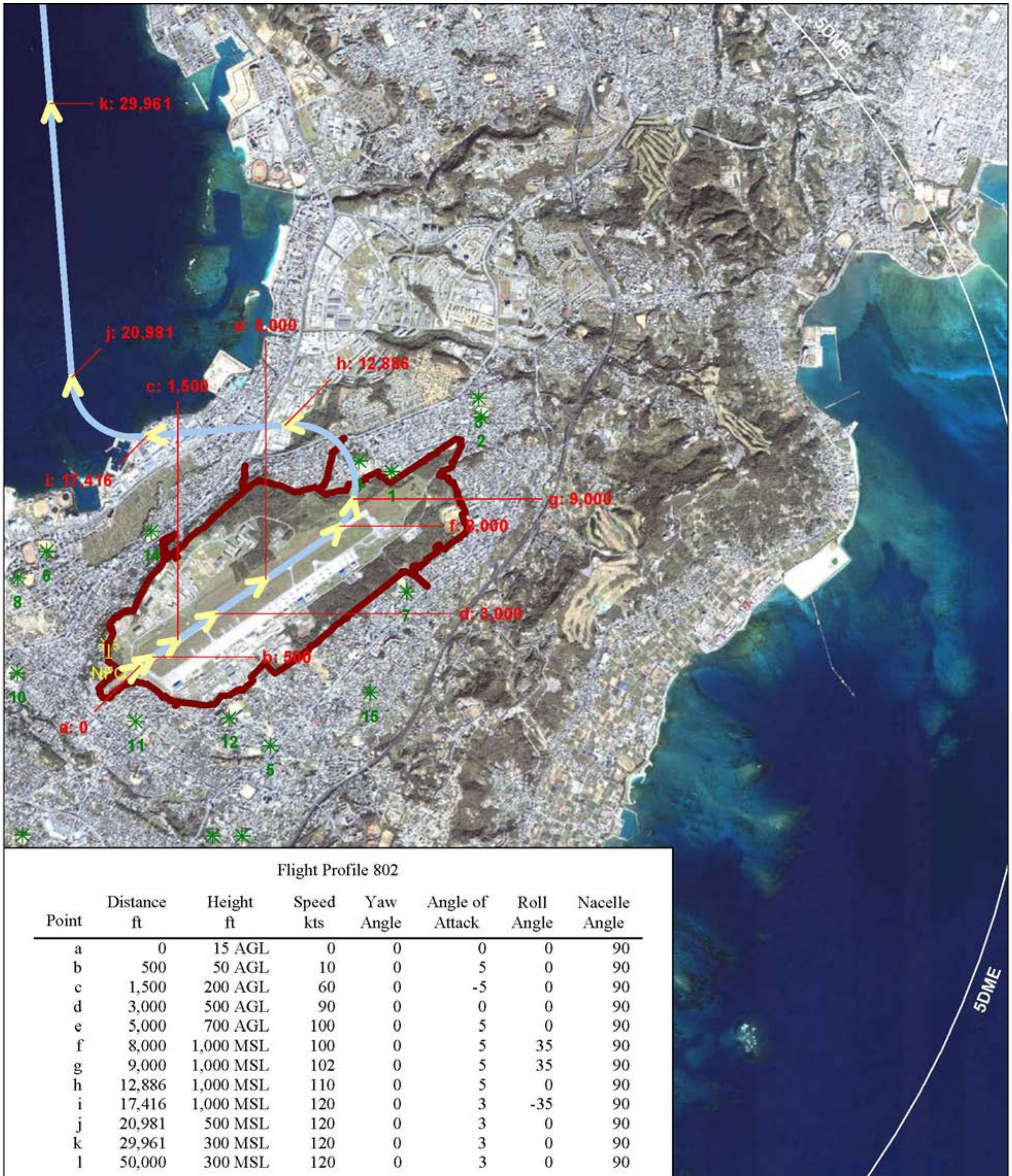
CH-53E

on Runway 06, Flight Track 06D1

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000 20,000

Scale in Feet 1:60,800 (1 inch = 5,070 feet)

N



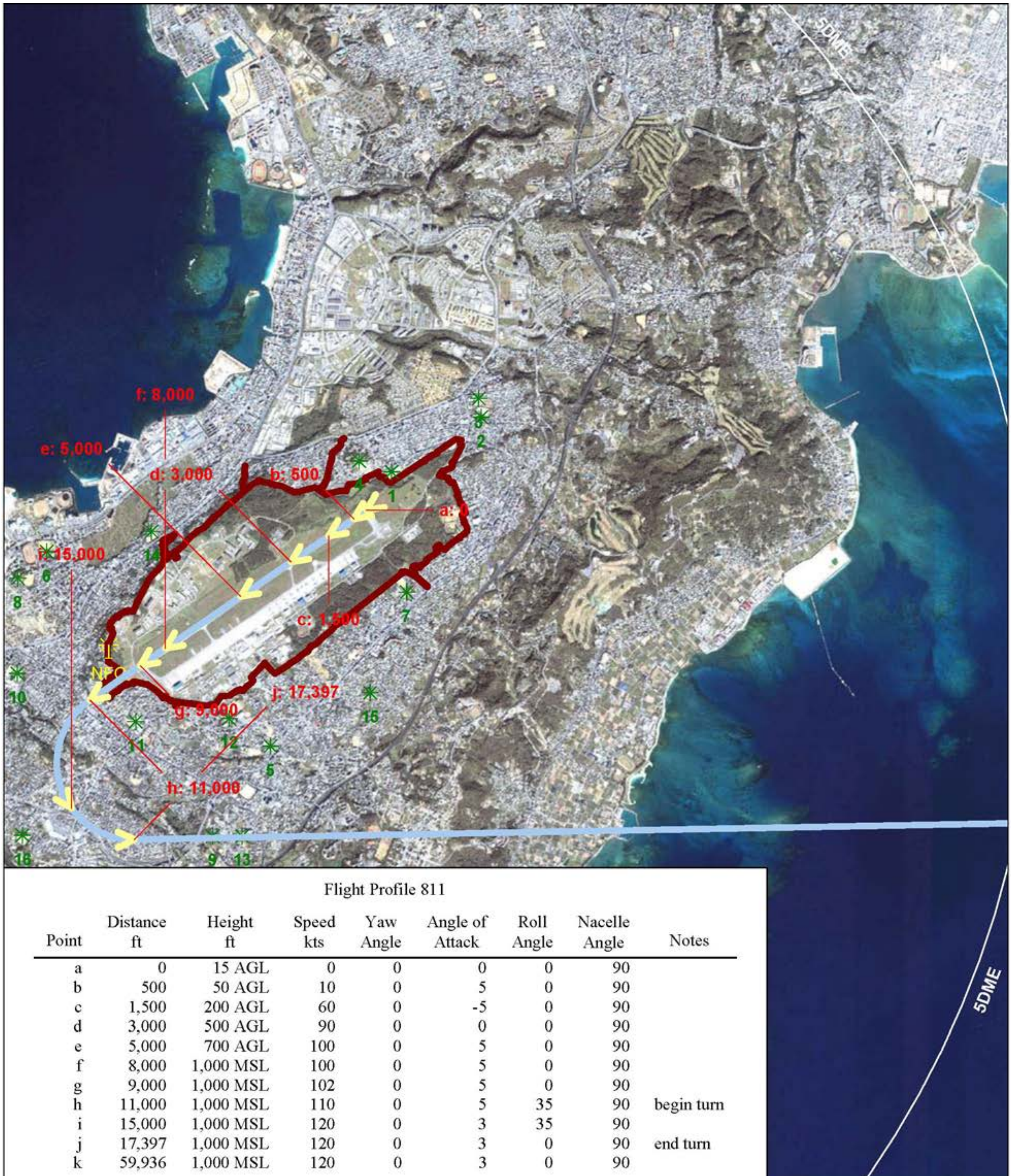
Flight Profile 802

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	0	15 AGL	0	0	0	0	90
b	500	50 AGL	10	0	5	0	90
c	1,500	200 AGL	60	0	-5	0	90
d	3,000	500 AGL	90	0	0	0	90
e	5,000	700 AGL	100	0	5	0	90
f	8,000	1,000 MSL	100	0	5	35	90
g	9,000	1,000 MSL	102	0	5	35	90
h	12,886	1,000 MSL	110	0	5	0	90
i	17,416	1,000 MSL	120	0	3	-35	90
j	20,981	500 MSL	120	0	3	0	90
k	29,961	300 MSL	120	0	3	0	90
l	50,000	300 MSL	120	0	3	0	90

MCAS Futenma - Flight Profile 802 - Departure
CH-53E
on Runway 06, Flight Track 06D2

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000 20,000

Scale in Feet 1:60,800 (1 inch = 5,070 feet)



Flight Profile 811

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	15 AGL	0	0	0	0	90	
b	500	50 AGL	10	0	5	0	90	
c	1,500	200 AGL	60	0	-5	0	90	
d	3,000	500 AGL	90	0	0	0	90	
e	5,000	700 AGL	100	0	5	0	90	
f	8,000	1,000 MSL	100	0	5	0	90	
g	9,000	1,000 MSL	102	0	5	0	90	
h	11,000	1,000 MSL	110	0	5	35	90	begin turn
i	15,000	1,000 MSL	120	0	3	35	90	
j	17,397	1,000 MSL	120	0	3	0	90	end turn
k	59,936	1,000 MSL	120	0	3	0	90	

MCAS Futenma - Flight Profile 811 - Departure
CH-53E
on Runway 24, Flight Track 24D1

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000 20,000

Scale in Feet 1:60,800 (1 inch = 5,070 feet)

N

Flight Profile 812

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	15 AGL	0	0	0	0	90	
b	500	50 AGL	10	0	5	0	90	
c	1,500	200 AGL	60	0	-5	0	90	
d	3,000	500 AGL	90	0	0	0	90	
e	5,000	700 AGL	100	0	5	0	90	
f	6,600	1,000 MSL	100	0	5	-35	90	begin turn; interpolated point
g	8,000	1,000 MSL	100	0	5	-35	90	
h	9,000	1,000 MSL	102	0	5	-35	90	
i	10,056	1,000 MSL	106	0	5	0	90	end turn; interpolated point
j	10,920	1,000 MSL	110	0	5	0	90	
k	13,318	1,000 MSL	110	0	5	35	90	begin turn; interpolated point
l	17,156	1,000 MSL	116	0	5	0	90	end turn, shift back 260'; interpolated point
m	19,756	1,000 MSL	120	0	3	-35	90	begin turn and descent; interpolated point
n	22,897	500 MSL	120	0	3	0	90	end tun; interpolated point
o	29,961	300 MSL	120	0	3	0	90	
p	50,000	300 MSL	120	0	3	0	90	

MCAS Futenma - Flight Profile 812 - Departure

CH-53E

on Runway 24, Flight Track 24D2

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000 20,000

Scale in Feet 1:60,800 (1 inch = 5,070 feet)

N

Flight Profile 821

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	115,000	1,000 MSL	120	0	3	0	90	
b	10,000	1,000 MSL	100	0	5	0	90	
c	7,485	1,000 MSL	96	0	7	-35	90	begin turn; interpolated point
d	3,000	700 AGL	90	0	8	-35	90	
e	2,000	500 AGL	80	0	9	-35	90	
f	1,600	420 AGL	76	0	9	0	90	end turn; interpolated point
g	1,000	300 AGL	70	0	9	0	90	
h	500	200 AGL	60	0	9	0	90	
i	300	100 AGL	40	0	9	0	90	
j	150	50 AGL	20	0	9	0	90	
k	75	25 AGL	10	0	5	0	90	
l	0	15 AGL	0	0	0	0	90	

MCAS Futenma - Flight Profile 821 - Non break arrival

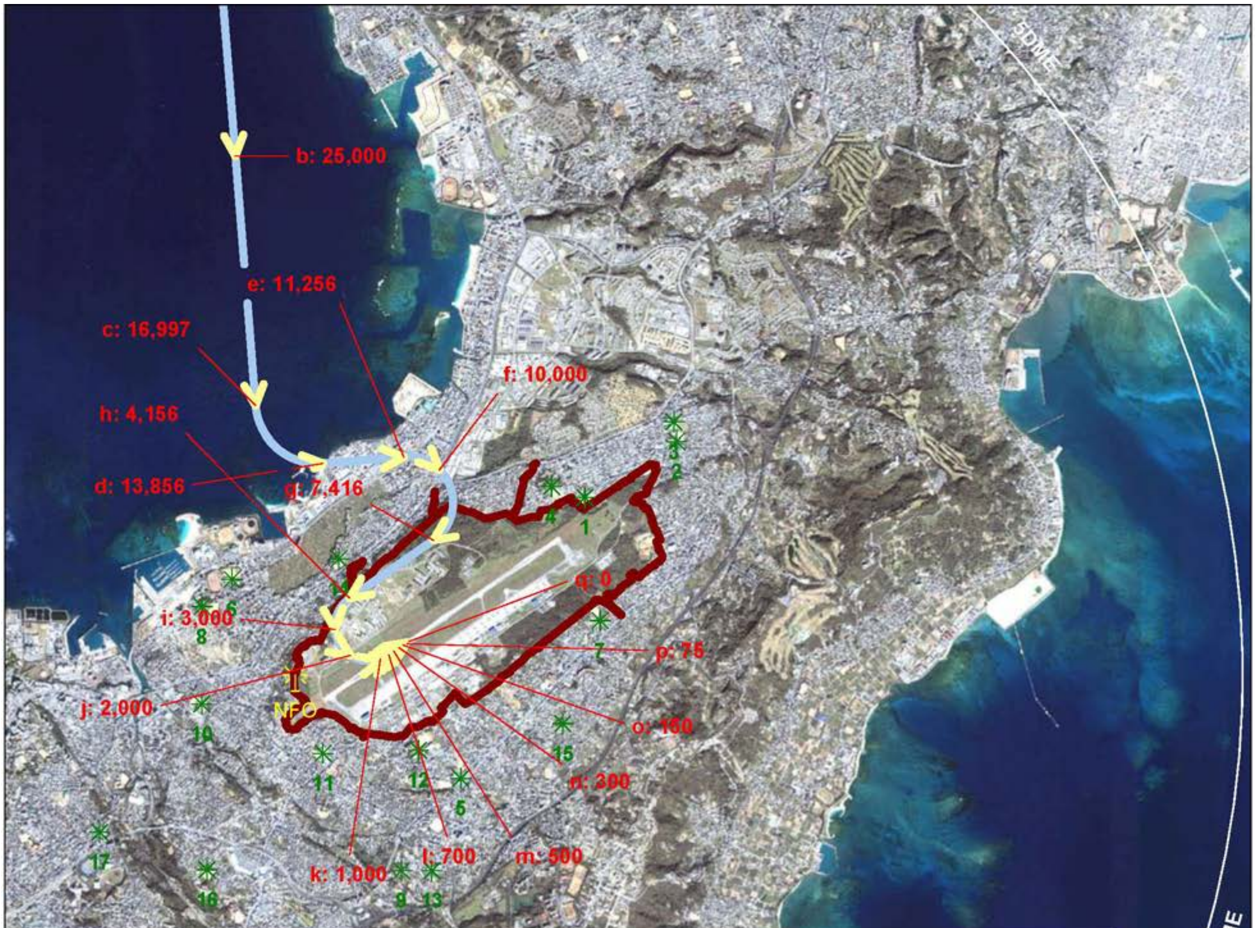
CH-53E

on Runway 06, Flight Track 06A1

0 4,000 8,000 12,000 16,000 20,000

Scale in Feet 1:72,300 (1 inch = 6,030 feet)

N



Flight Profile 822

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	60,000	300 MSL	120	0	3	0	90	
b	25,000	300 MSL	120	0	3	0	90	
c	16,997	500 MSL	120	0	3	35	90	begin turn; interpolated point
d	13,856	1,000 MSL	100	0	5	0	90	end turn; interpolated point
e	11,256	1,000 MSL	100	0	5	-35	90	begin turn; interpolated point
f	10,000	1,000 MSL	100	0	5	-35	90	
g	7,416	1,000 MSL	97	0	7	0	90	end turn; interpolated point
h	4,156	1,000 MSL	93	0	8	35	90	begin turn: interpolated point
i	3,000	700 AGL	90	0	8	35	90	
j	2,000	500 AGL	80	0	9	35	90	
k	1,000	300 AGL	70	0	9	35	90	
l	700	240 AGL	64	0	9	0	90	end turn; interpolated point
m	500	200 AGL	60	0	9	0	90	
n	300	100 AGL	40	0	9	0	90	
o	150	50 AGL	20	0	9	0	90	
p	75	25 AGL	10	0	5	0	90	
q	0	15 AGL	0	0	0	0	90	

MCAS Futenma - Flight Profile 822 - Non break arrival

CH-53E

on Runway 06_mid, Flight Track 06A2

0 4,000 8,000 12,000 16,000 20,000 24,000

Scale in Feet 1:73,800 (1 inch = 6,150 feet)

N

Flight Profile 826

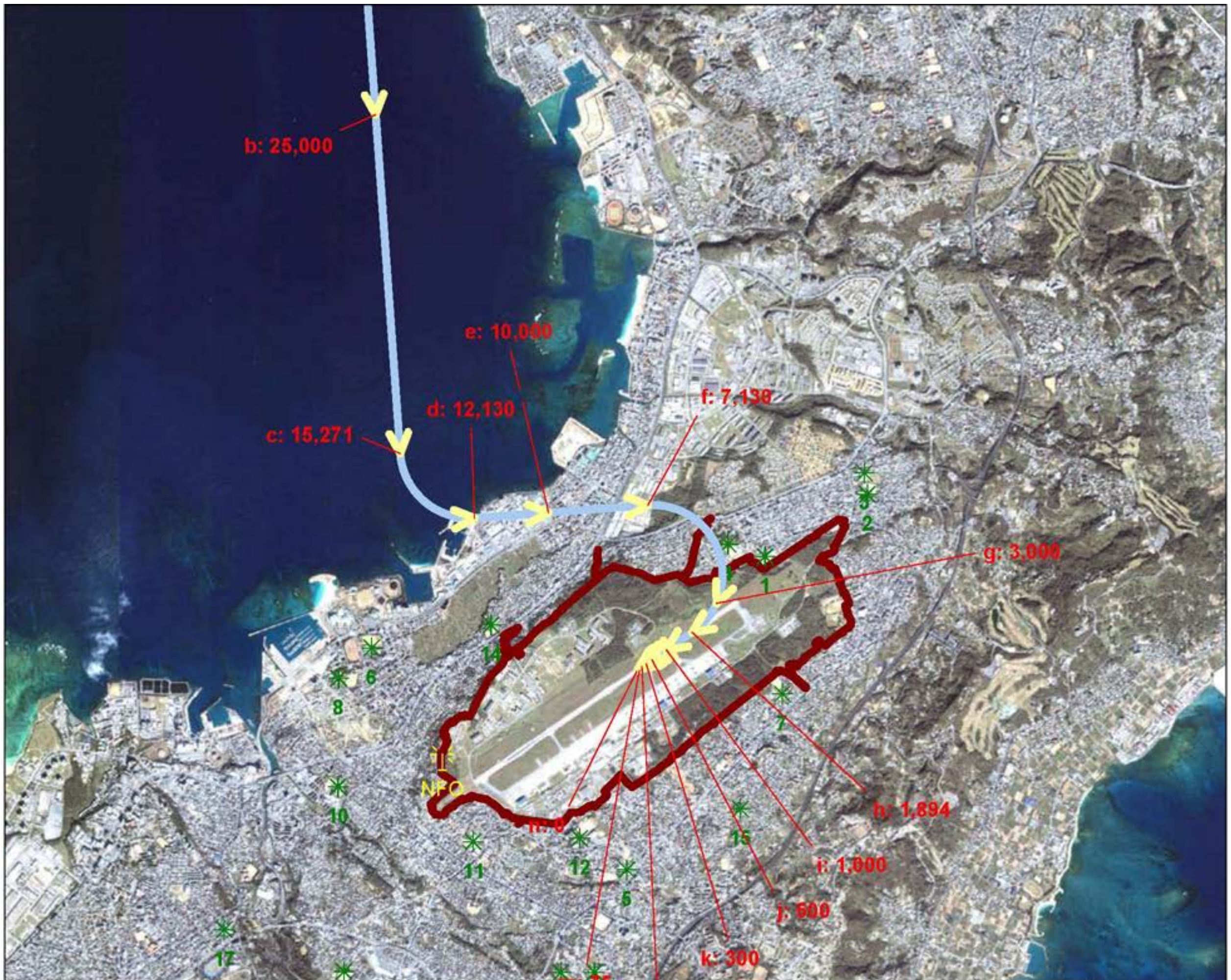
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	115,000	1,000 MSL	120	0	3	0	90	
b	10,000	1,000 MSL	100	0	5	0	90	
c	7,416	1,000 MSL	100	0	7	0	90	
d	3,000	700 AGL	90	0	8	-35	90	turn right
e	2,000	500 AGL	80	0	9	-35	90	
f	1,000	300 AGL	70	0	9	0	90	end turn
g	500	200 AGL	60	0	9	0	90	
h	300	100 AGL	40	0	9	0	90	
i	150	50 AGL	20	0	9	0	90	
j	75	25 AGL	10	0	5	0	90	
k	0	15 AGL	0	0	0	0	90	

MCAS Futenma - Flight Profile 826 - Non break arrival
CH-53E
on Runway 24, Flight Track 24A1

0 4,000 8,000 12,000 16,000 20,000

Scale in Feet 1:65,600 (1 inch = 5,470 feet)

N



Flight Profile 827

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	58,000	300 MSL	120	0	3	0	90	
b	25,000	300 MSL	120	0	3	0	90	
c	15,271	500 MSL	101	0	5	35	90	begin turn; interpolated point
d	12,130	1,000 MSL	100	0	5	0	90	end turn: interpolated point
e	10,000	1,000 MSL	100	0	5	0	90	
f	7,130	1,000 MSL	100	0	8	-35	90	begin turn; interpolated point
g	3,000	700 AGL	90	0	8	-35	90	
h	1,894	300 AGL	78	0	9	0	90	end turn: interpolated point
i	1,000	300 AGL	70	0	9	0	90	
j	500	200 AGL	60	0	9	0	90	
k	300	100 AGL	40	0	9	0	90	
l	150	50 AGL	20	0	9	0	90	
m	75	25 AGL	10	0	5	0	90	
n	0	15 AGL	0	0	0	0	90	

MCAS Futenma - Flight Profile 827 - Non break arrival

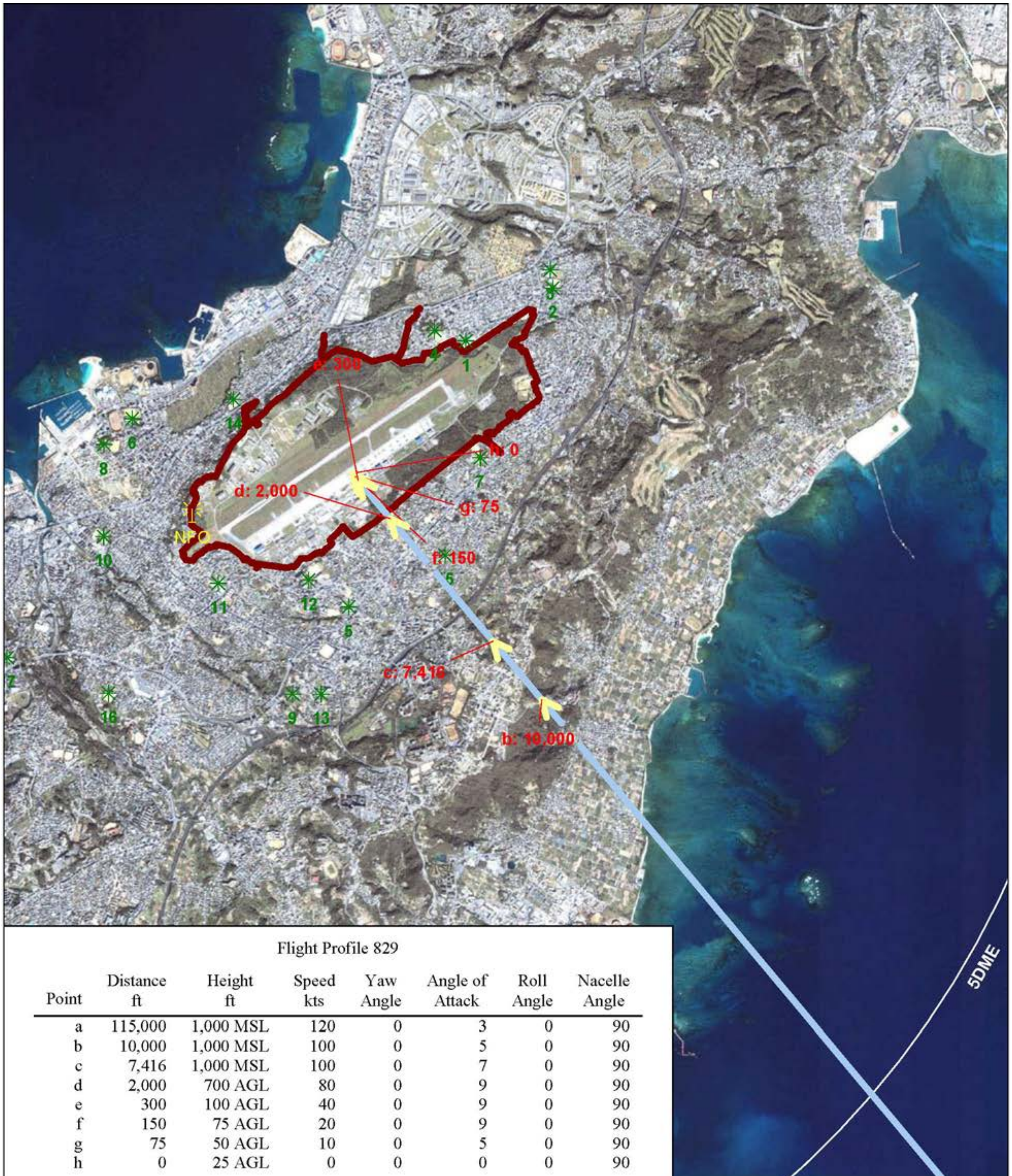
CH-53E

on Runway 24_mid, Flight Track 24A2

0 4,000 8,000 12,000 16,000 20,000

Scale in Feet 1:64,900 (1 inch = 5,410 feet)

N



Flight Profile 829

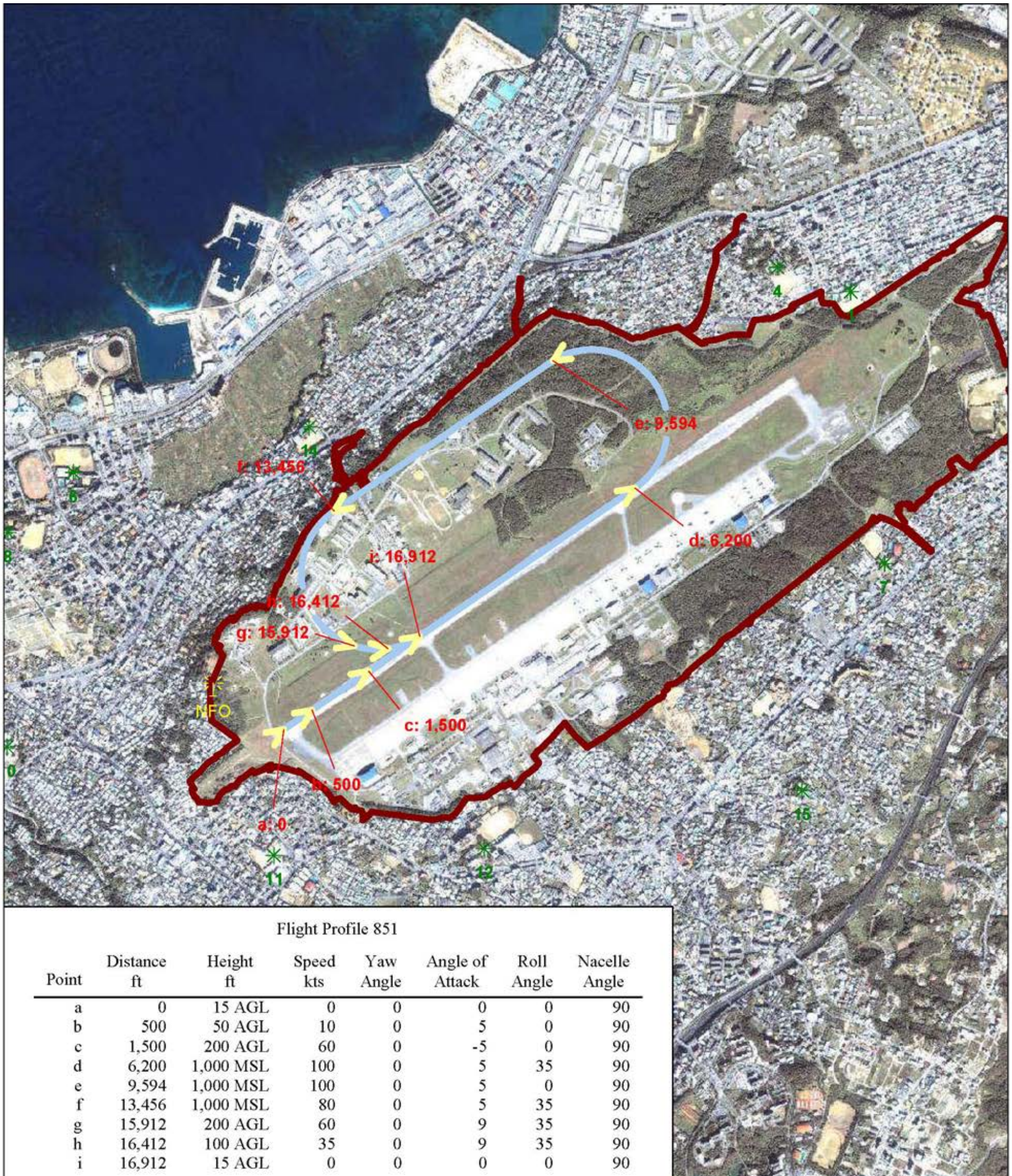
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	115,000	1,000 MSL	120	0	3	0	90
b	10,000	1,000 MSL	100	0	5	0	90
c	7,416	1,000 MSL	100	0	7	0	90
d	2,000	700 AGL	80	0	9	0	90
e	300	100 AGL	40	0	9	0	90
f	150	75 AGL	20	0	9	0	90
g	75	50 AGL	10	0	5	0	90
h	0	25 AGL	0	0	0	0	90

MCAS Futenma - Flight Profile 829 - Non break arrival
CH-53E
on Runway Pad2, Flight Track PAD2A1

0 4,000 8,000 12,000 16,000 20,000

Scale in Feet 1:62,900 (1 inch = 5,240 feet)

N



Flight Profile 851

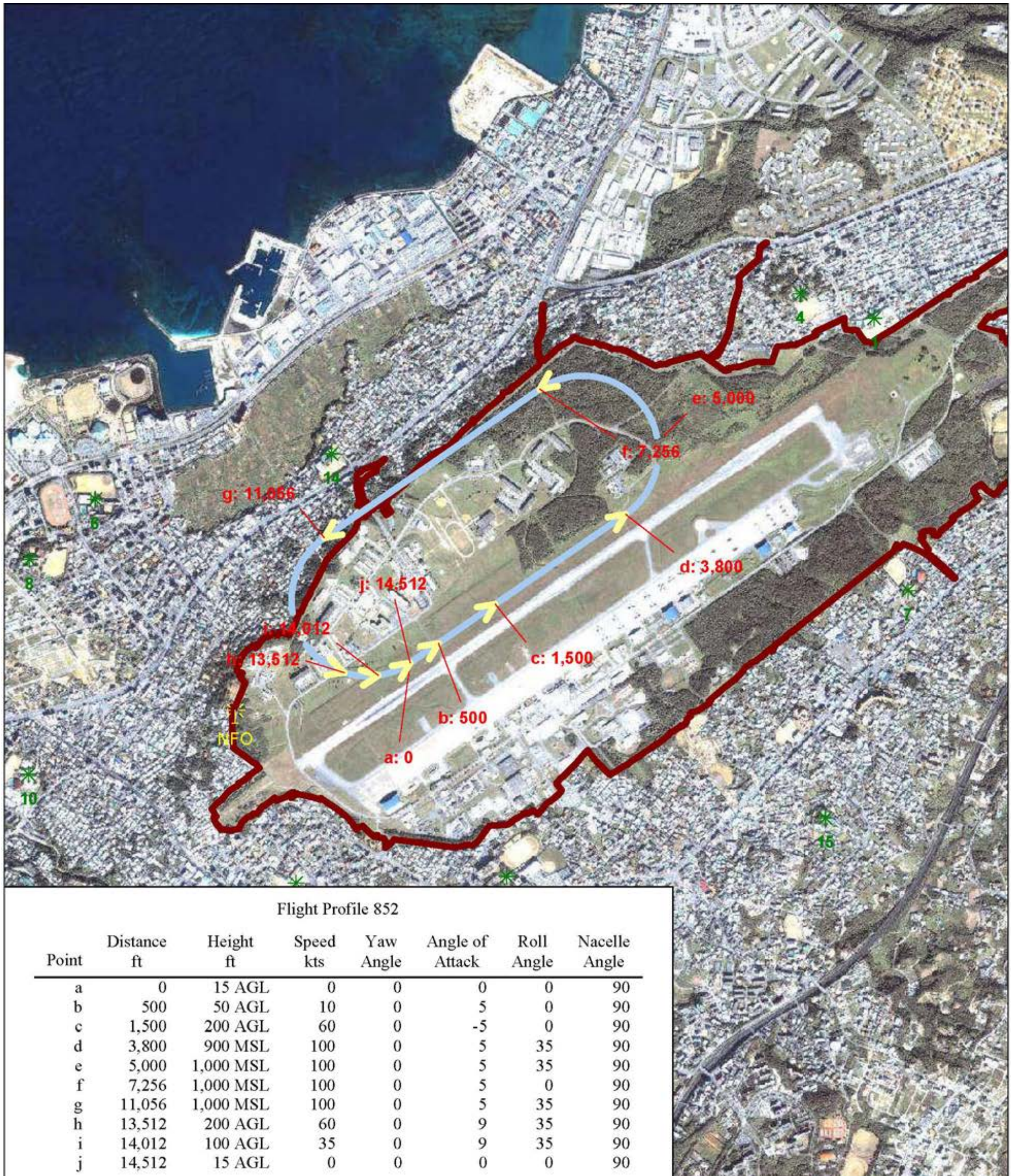
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	0	15 AGL	0	0	0	0	90
b	500	50 AGL	10	0	5	0	90
c	1,500	200 AGL	60	0	-5	0	90
d	6,200	1,000 MSL	100	0	5	35	90
e	9,594	1,000 MSL	100	0	5	0	90
f	13,456	1,000 MSL	80	0	5	35	90
g	15,912	200 AGL	60	0	9	35	90
h	16,412	100 AGL	35	0	9	35	90
i	16,912	15 AGL	0	0	0	0	90

MCAS Futenma - Flight Profile 851 - Touch and Go
CH-53E
on Runway 06, Flight Track 06T1

0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000 9,000

Scale in Feet 1:27,000 (1 inch = 2,250 feet)

N



Flight Profile 852

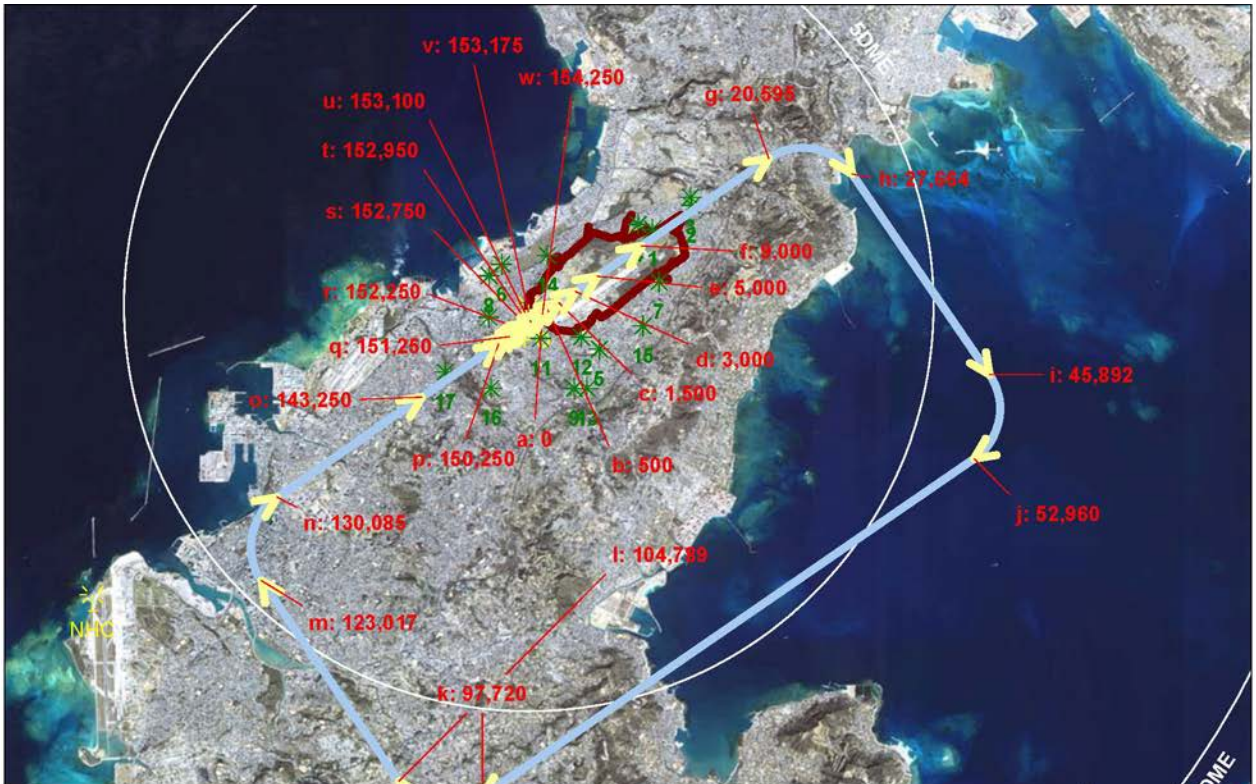
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	0	15 AGL	0	0	0	0	90
b	500	50 AGL	10	0	5	0	90
c	1,500	200 AGL	60	0	-5	0	90
d	3,800	900 MSL	100	0	5	35	90
e	5,000	1,000 MSL	100	0	5	35	90
f	7,256	1,000 MSL	100	0	5	0	90
g	11,056	1,000 MSL	100	0	5	35	90
h	13,512	200 AGL	60	0	9	35	90
i	14,012	100 AGL	35	0	9	35	90
j	14,512	15 AGL	0	0	0	0	90

MCAS Futenma - Flight Profile 852 - Touch and Go

CH-53E

on Runway 06CAL, Flight Track 06T2

Scale in Feet 1:26,900 (1 inch = 2,240 feet)



Flight Profile 861

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	15 AGL	0	0	0	0	90	
b	500	50 AGL	10	0	5	0	90	
c	1,500	200 AGL	60	0	-5	0	90	
d	3,000	500 AGL	90	0	0	0	90	
e	5,000	700 AGL	100	0	5	0	90	
f	9,000	1,000 MSL	110	0	5	0	90	
g	20,595	1,621 MSL	116	0	3	-35	90	interpolated pt, begin turn
h	27,664	2,000 MSL	120	0	3	0	90	added pt, end turn
i	45,892	2,000 MSL	120	0	3	-35	90	added pt, begin turn
j	52,960	2,000 MSL	120	0	3	0	90	added pt, end turn
k	97,720	2,000 MSL	120	0	3	-35	90	added pt, begin turn
l	104,789	2,000 MSL	120	0	3	0	90	added pt, end turn
m	123,017	2,000 MSL	120	0	3	-35	90	added pt, begin turn
n	130,085	2,000 MSL	120	0	3	0	90	added pt, end turn
o	143,250	1,000 MSL	100	0	5	0	90	
p	150,250	700 AGL	90	0	8	0	90	
q	151,250	500 AGL	80	0	9	0	90	
r	152,250	300 AGL	70	0	9	0	90	
s	152,750	200 AGL	60	0	9	0	90	
t	152,950	100 AGL	40	0	9	0	90	
u	153,100	50 AGL	20	0	9	0	90	
v	153,175	25 AGL	10	0	5	0	90	
w	154,250	15 AGL	0	0	3	0	90	

MCAS Futenma - Flight Profile 861 - GCA
CH-53E
on Runway 06, Flight Track 06G1

0 10,000 20,000 30,000 40,000 50,000

Scale in Feet 1:173,000 (1 inch = 14,400 feet)

N

Flight Profile 101

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	15 AGL	0	0	0	0	90	
b	500	25 AGL	50	0	-5	0	90	
c	1,000	60 AGL	70	0	-5	0	90	
d	3,000	500 AGL	80	0	-5	0	90	
e	6,684	1,000 MSL	120	0	0	0	90	
f	8,953	1,000 MSL	120	0	0	-20	90	
g	10,745	1,000 MSL	120	0	0	0	90	end turn
h	25,000	1,000 MSL	120	0	0	0	90	
i	70,000	1,000 MSL	120	0	0	0	90	

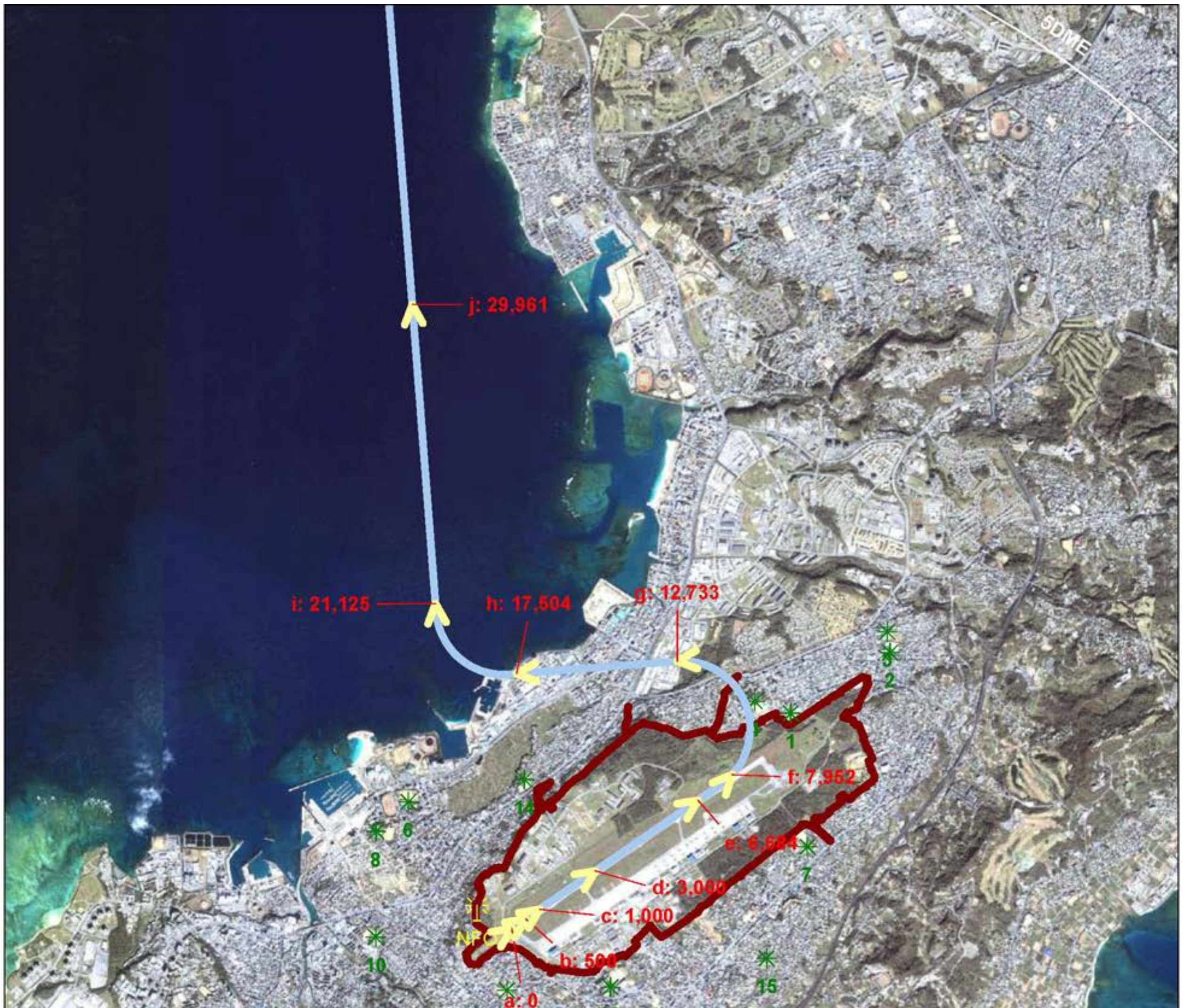
MCAS Futenma - Flight Profile 101 - Departure to Point Kilo

AH-1W

on Runway 06, Flight Track 06D1

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000

Scale in Feet 1:53,300 (1 inch = 4,440 feet)



Flight Profile 102

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	0	15 AGL	0	0	0	0	90
b	500	25 AGL	50	0	-5	0	90
c	1,000	60 AGL	70	0	-5	0	90
d	3,000	500 AGL	80	0	-5	0	90
e	6,684	1,000 MSL	120	0	0	0	90
f	7,952	1,000 MSL	120	0	0	35	90
g	12,733	1,000 MSL	120	0	0	0	90
h	17,504	1,000 MSL	120	0	0	-35	90
i	21,125	500 MSL	120	0	0	0	90
j	29,961	300 MSL	120	0	0	0	90
k	50,000	300 MSL	120	0	0	0	90

MCAS Futenma - Flight Profile 102 - Departure to Point Sierra

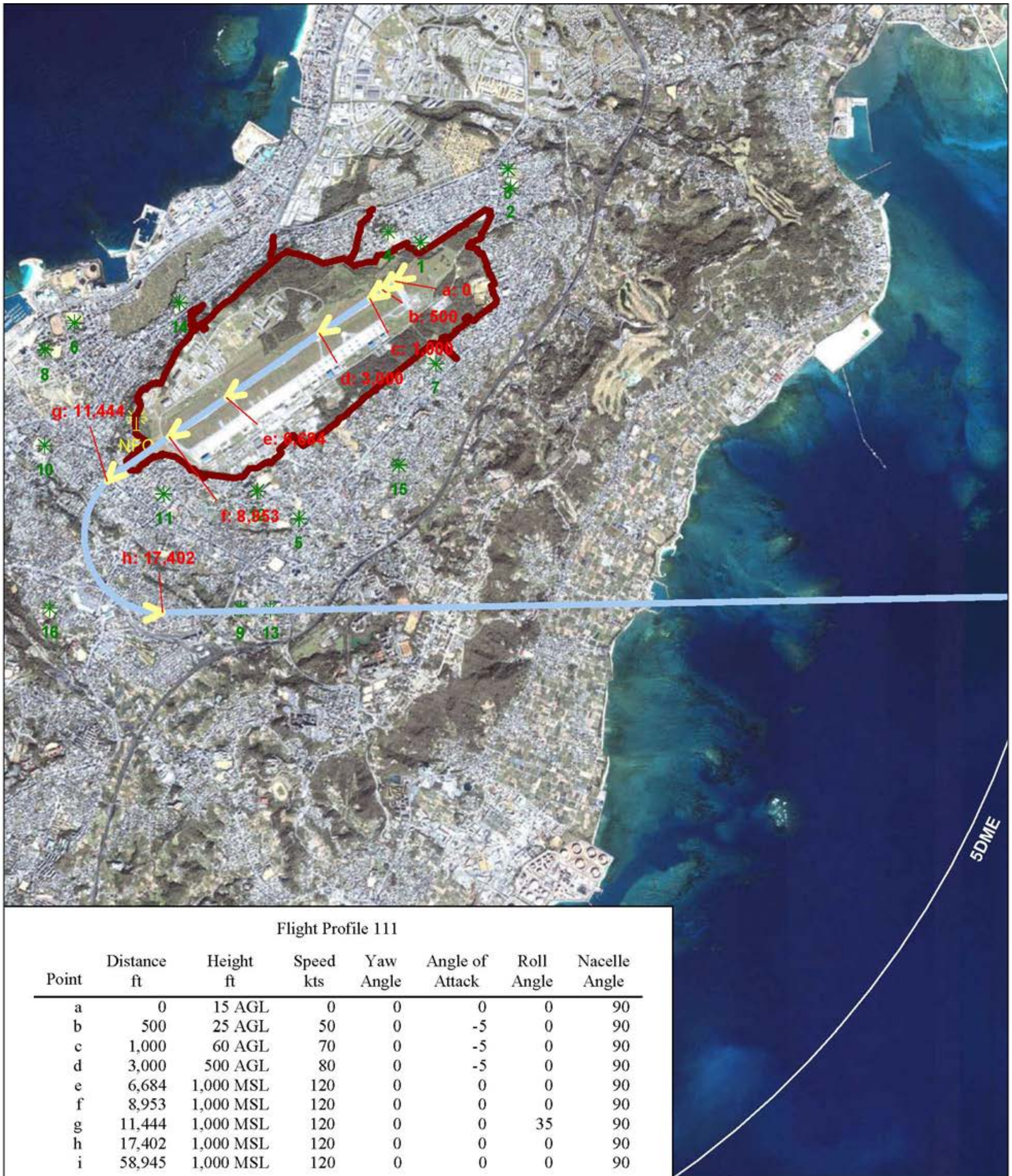
AH-1W

on Runway 06, Flight Track 06D2

0 4,000 8,000 12,000 16,000 20,000

Scale in Feet 1:64,100 (1 inch = 5,350 feet)

N



Flight Profile 111

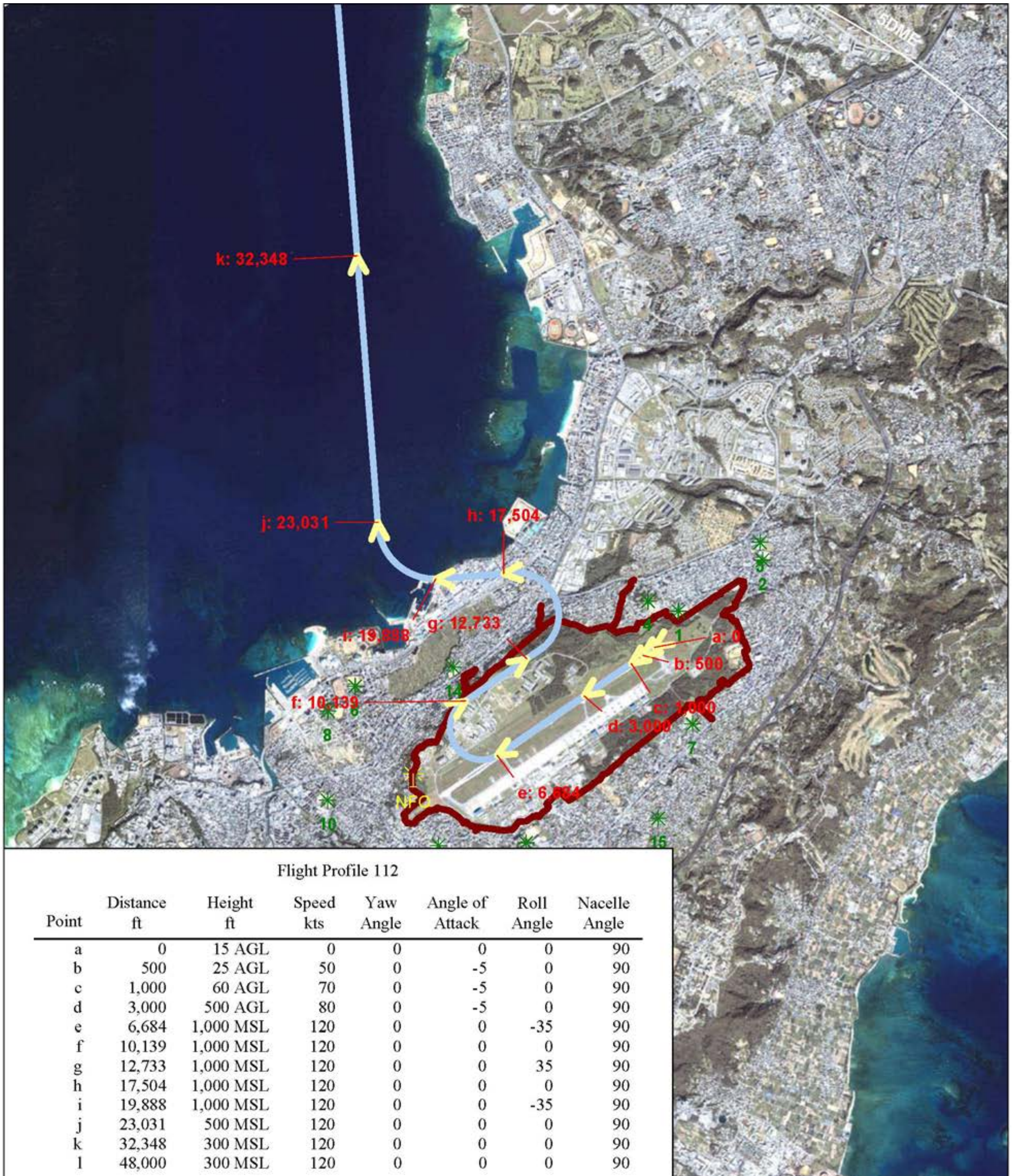
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	0	15 AGL	0	0	0	0	90
b	500	25 AGL	50	0	-5	0	90
c	1,000	60 AGL	70	0	-5	0	90
d	3,000	500 AGL	80	0	-5	0	90
e	6,684	1,000 MSL	120	0	0	0	90
f	8,953	1,000 MSL	120	0	0	0	90
g	11,444	1,000 MSL	120	0	0	35	90
h	17,402	1,000 MSL	120	0	0	0	90
i	58,945	1,000 MSL	120	0	0	0	90

MCAS Futenma - Flight Profile 111 - Departure to Point Tango
AH-1W
on Runway 24, Flight Track 24D1

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000 20,000

Scale in Feet 1:60,600 (1 inch = 5,050 feet)

N



Flight Profile 112

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	0	15 AGL	0	0	0	0	90
b	500	25 AGL	50	0	-5	0	90
c	1,000	60 AGL	70	0	-5	0	90
d	3,000	500 AGL	80	0	-5	0	90
e	6,684	1,000 MSL	120	0	0	-35	90
f	10,139	1,000 MSL	120	0	0	0	90
g	12,733	1,000 MSL	120	0	0	35	90
h	17,504	1,000 MSL	120	0	0	0	90
i	19,888	1,000 MSL	120	0	0	-35	90
j	23,031	500 MSL	120	0	0	0	90
k	32,348	300 MSL	120	0	0	0	90
l	48,000	300 MSL	120	0	0	0	90

MCAS Futenma - Flight Profile 112 - Departure to Point Sierra

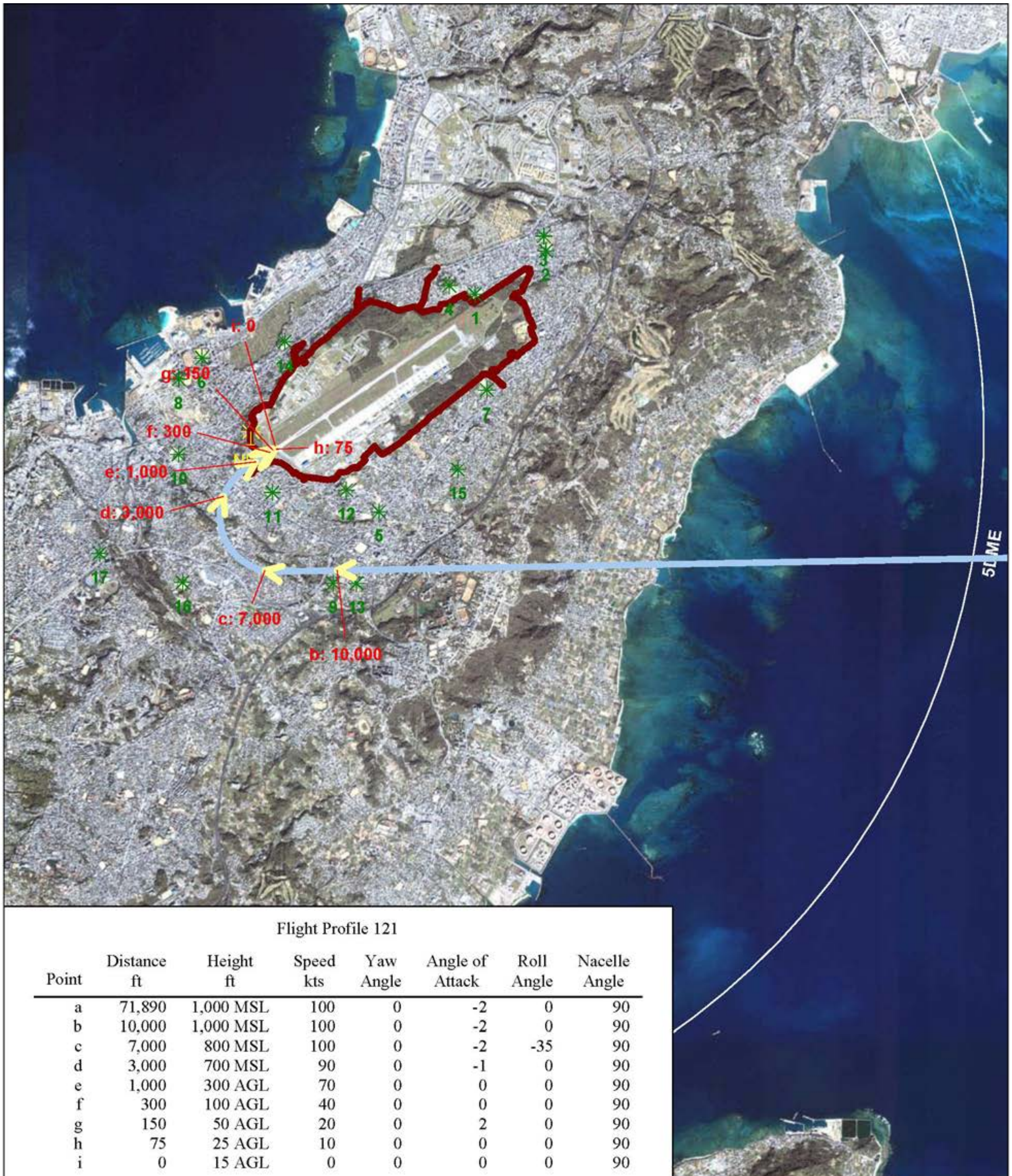
AH-1W

on Runway 24, Flight Track 24D2

0 4,000 8,000 12,000 16,000 20,000

Scale in Feet 1:64,900 (1 inch = 5,410 feet)

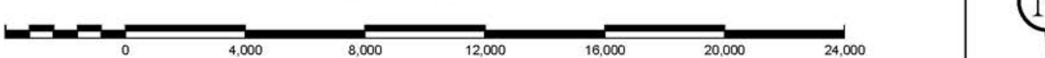
N



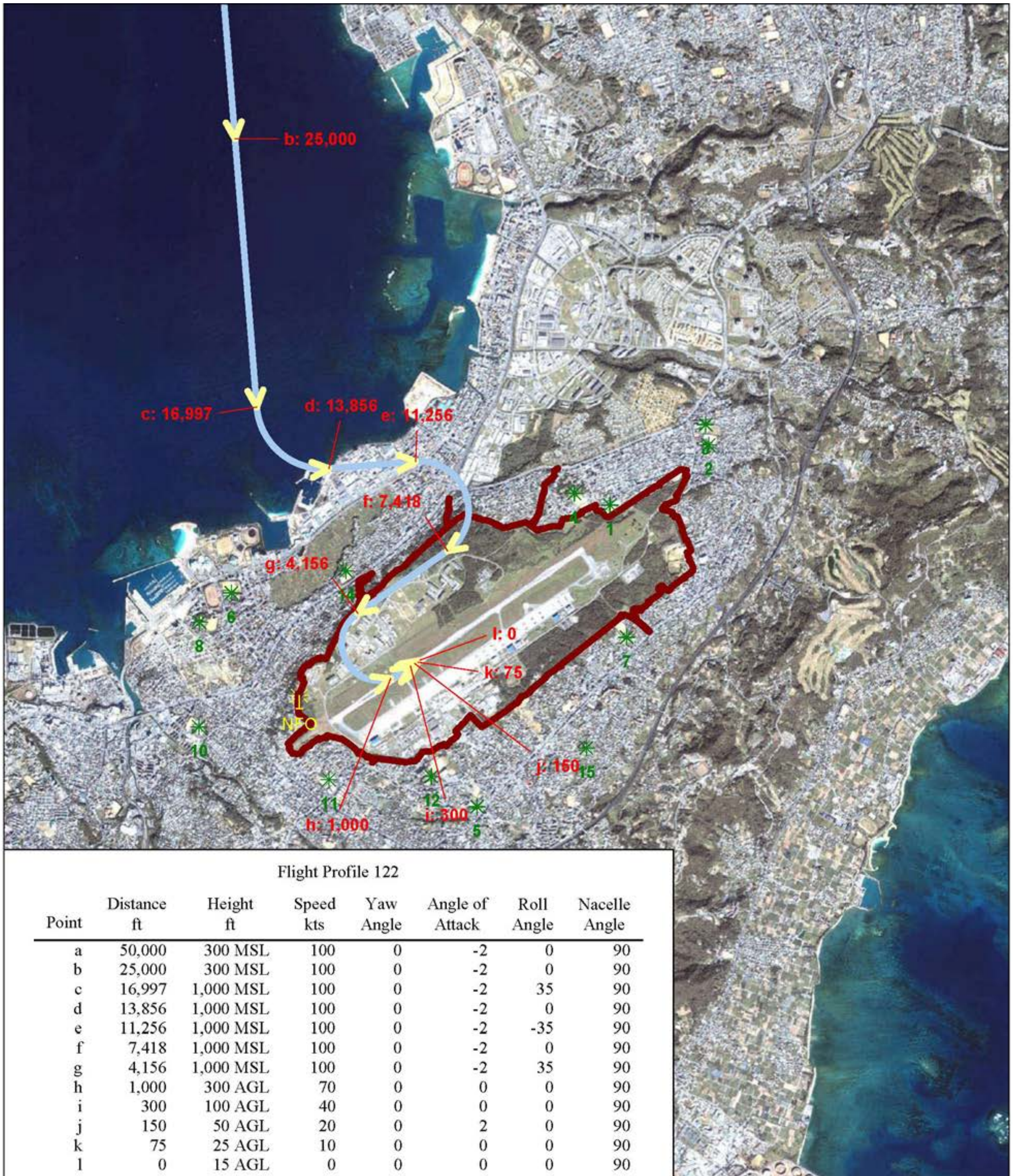
Flight Profile 121

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	71,890	1,000 MSL	100	0	-2	0	90
b	10,000	1,000 MSL	100	0	-2	0	90
c	7,000	800 MSL	100	0	-2	-35	90
d	3,000	700 MSL	90	0	-1	0	90
e	1,000	300 AGL	70	0	0	0	90
f	300	100 AGL	40	0	0	0	90
g	150	50 AGL	20	0	2	0	90
h	75	25 AGL	10	0	0	0	90
i	0	15 AGL	0	0	0	0	90

MCAS Futenma - Flight Profile 121 - Non Break Arrival from Point Tango
AH-1W
on Runway 06, Flight Track 06A1



Scale in Feet 1:76,900 (1 inch = 6,400 feet)



Flight Profile 122

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	50,000	300 MSL	100	0	-2	0	90
b	25,000	300 MSL	100	0	-2	0	90
c	16,997	1,000 MSL	100	0	-2	35	90
d	13,856	1,000 MSL	100	0	-2	0	90
e	11,256	1,000 MSL	100	0	-2	-35	90
f	7,418	1,000 MSL	100	0	-2	0	90
g	4,156	1,000 MSL	100	0	-2	35	90
h	1,000	300 AGL	70	0	0	0	90
i	300	100 AGL	40	0	0	0	90
j	150	50 AGL	20	0	2	0	90
k	75	25 AGL	10	0	0	0	90
l	0	15 AGL	0	0	0	0	90

MCAS Futenma - Flight Profile 122 - Non Break Arrival from Point Sierra
AH-1W
on Runway 06_mid, Flight Track 06A2

Scale in Feet 1:55,400 (1 inch = 4,620 feet)

Flight Profile 126

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	60,082	1,000 MSL	100	0	-2	0	90	
b	7,000	1,000 MSL	100	0	-2	0	90	
c	3,000	700 AGL	90	0	-1	0	90	700' crossing base boundary
d	2,000	500 AGL	80	0	-1	0	90	Roll Angle 20?
e	1,000	300 AGL	70	0	0	0	90	
f	500	200 AGL	60	0	0	0	90	
g	300	100 AGL	40	0	0	0	90	
h	150	50 AGL	20	0	2	0	90	
i	75	25 AGL	10	0	0	0	90	
j	0	15 AGL	0	0	0	0	90	

MCAS Futenma - Flight Profile 126 - Non Break Arrival from Point Kilo

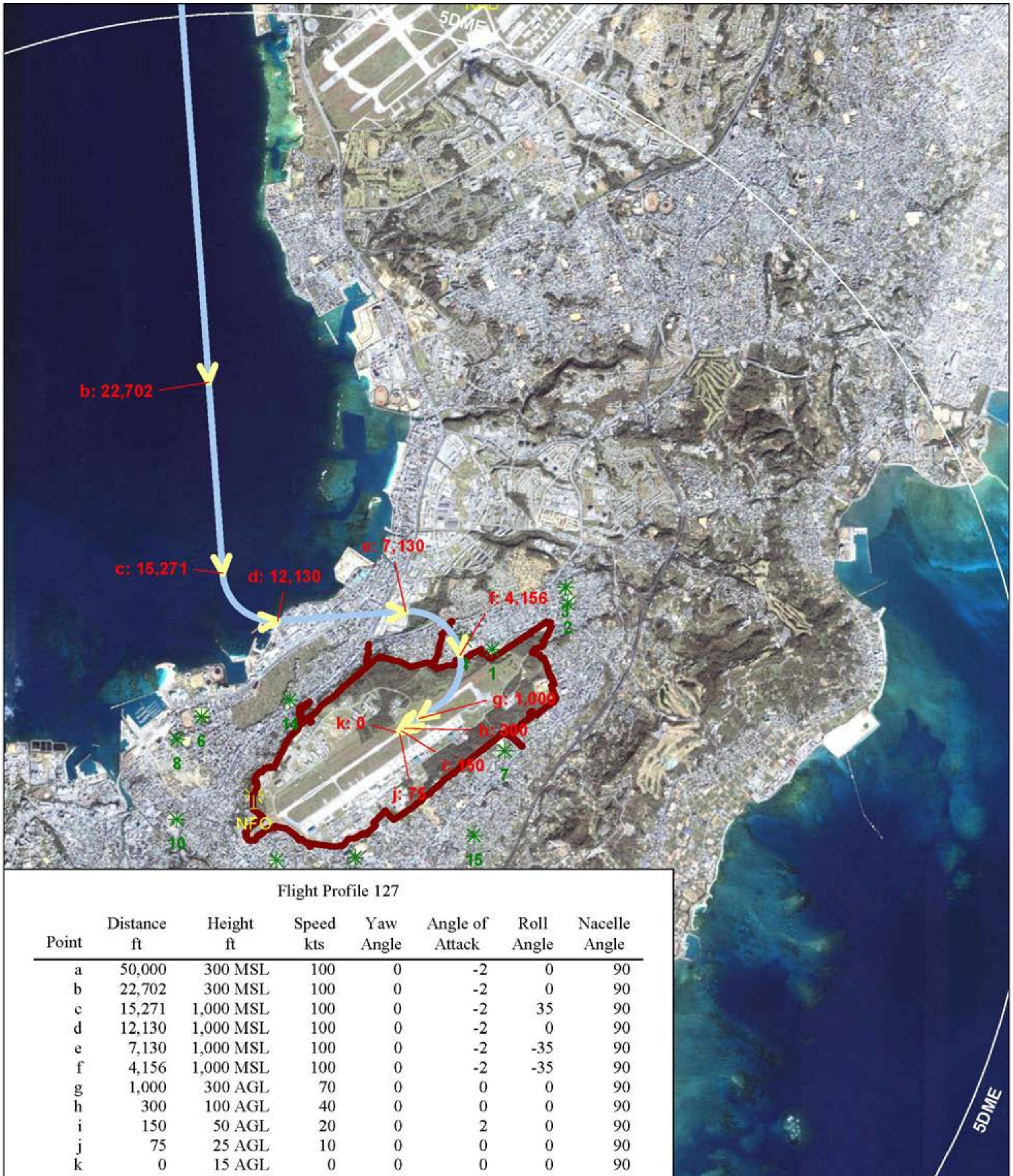
AH-1W

on Runway 24, Flight Track 24A1

0 4,000 8,000 12,000 16,000 20,000

Scale in Feet 1:63,700 (1 inch = 5,310 feet)

N



Flight Profile 127

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	50,000	300 MSL	100	0	-2	0	90
b	22,702	300 MSL	100	0	-2	0	90
c	15,271	1,000 MSL	100	0	-2	35	90
d	12,130	1,000 MSL	100	0	-2	0	90
e	7,130	1,000 MSL	100	0	-2	-35	90
f	4,156	1,000 MSL	100	0	-2	-35	90
g	1,000	300 AGL	70	0	0	0	90
h	300	100 AGL	40	0	0	0	90
i	150	50 AGL	20	0	2	0	90
j	75	25 AGL	10	0	0	0	90
k	0	15 AGL	0	0	0	0	90

MCAS Futenma - Flight Profile 127 - Non Break Arrival from Point Sierra

AH-1W

on Runway 24_mid, Flight Track 24A2

0 4,000 8,000 12,000 16,000 20,000

Scale in Feet 1:72,300 (1 inch = 6,020 feet)

N

Flight Profile 129

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	32,148	1,000 MSL	100	0	-2	0	90	
b	10,000	1,000 MSL	100	0	-2	0	90	
c	7,000	800 MSL	100	0	-2	0	90	
d	2,073	700 MSL	90	0	-1	0	90	700' crossing base boundary
e	1,000	300 AGL	70	0	0	0	90	
f	500	200 AGL	60	0	0	0	90	
g	300	100 AGL	40	0	0	0	90	
h	75	50 AGL	10	0	0	0	90	
i	0	25 AGL	0	0	0	0	90	

MCAS Futenma - Flight Profile 129 - Arrival to Pad 2
AH-1W
on Runway Pad2, Flight Track PAD2A1

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000

Scale in Feet 1:50,300 (1 inch = 4,190 feet)

N

Flight Profile 151

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	25 AGL	50	0	-5	0	90	
b	200	50 AGL	70	0	-5	0	90	
c	1,000	200 AGL	80	0	-5	0	90	
d	6,200	900 MSL	80	0	-2	20	90	
e	7,804	1,000 MSL	80	0	-2	20	90	
f	9,656	1,000 MSL	80	0	-2	0	90	
g	13,456	1,000 MSL	70	0	1	20	90	
h	15,812	125 AGL	60	0	1	20	90	1000 Feet From Runway
i	16,262	50 AGL	70	0	1	20	90	
j	16,912	25 AGL	50	0	1	0	90	

MCAS Futenma - Flight Profile 151 - Touch and Go

AH-1W

on Runway 06, Flight Track 06T1

0 1,000 2,000 3,000 4,000 5,000 6,000 7,000

Scale in Feet 1:22,500 (1 inch = 1,880 feet)

Flight Profile 152

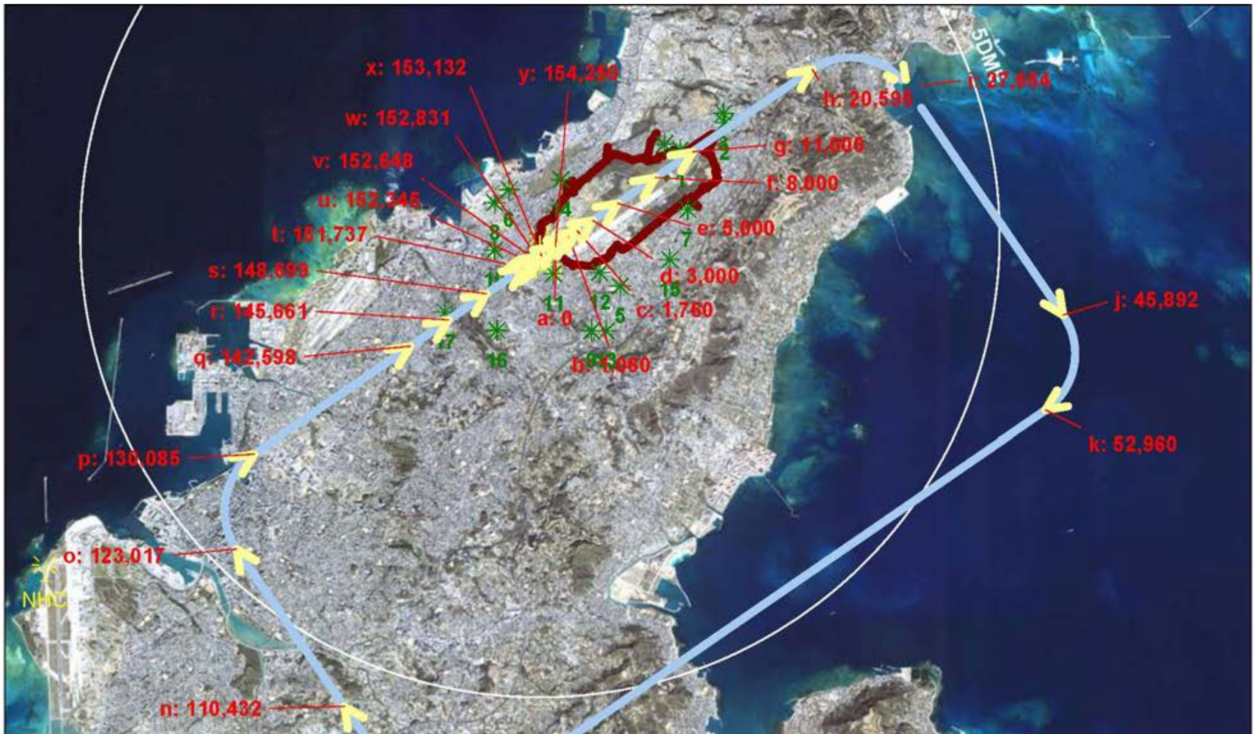
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	25 AGL	50	0	-5	0	90	
b	200	50 AGL	70	0	-5	0	90	
c	1,000	200 AGL	80	0	-5	0	90	
d	3,800	800 MSL	80	0	-2	20	90	
e	7,565	1,000 MSL	80	0	-2	0	90	
f	11,056	1,000 MSL	70	0	1	20	90	end downwind
g	13,412	125 AGL	60	0	1	20	90	1000 Feet From Runway
h	13,862	50 AGL	70	0	1	20	90	
i	14,512	25 AGL	50	0	1	0	90	

MCAS Futenma - Flight Profile 152 - Touch and Go

AH-1W

on Runway 06CAL, Flight Track 06T2

Scale in Feet 1:19,900 (1 inch = 1,660 feet)



Flight Profile 161

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	15 AGL	0	0	0	0	90	
b	1,060	25 AGL	50	0	-5	0	90	
c	1,760	50 AGL	70	0	-5	0	90	
d	3,000	700 MSL	80	0	-2	0	90	
e	5,000	1,000 MSL	80	0	-2	0	90	
f	8,000	1,500 MSL	80	0	-2	0	90	
g	11,000	2,000 MSL	120	0	0	0	90	
h	20,595	2,000 MSL	120	0	0	-20	90	
i	27,664	2,000 MSL	120	0	0	0	90	
j	45,892	2,000 MSL	120	0	0	-20	90	
k	52,960	2,000 MSL	120	0	0	0	90	
l	97,720	2,000 MSL	120	0	0	-20	90	
m	104,789	2,000 MSL	120	0	0	0	90	
n	110,432	2,000 MSL	120	0	2	0	90	Starts Descent Here
o	123,017	1,350 MSL	100	0	2	-20	90	
p	130,085	970 MSL	100	0	2	0	90	
q	142,598	317 AGL	100	0	2	0	90	
r	145,661	200 AGL	80	0	2	0	90	
s	148,699	200 AGL	70	0	2	0	90	
t	151,737	200 AGL	60	0	0	0	90	
u	152,345	150 AGL	45	0	0	0	90	
v	152,648	100 AGL	40	0	0	0	90	
w	152,831	50 AGL	25	0	1	0	90	
x	153,132	25 AGL	10	0	0	0	90	
y	154,250	15 AGL	0	0	0	0	90	

MCAS Futenma - Flight Profile 161 - GCA Box Pattern

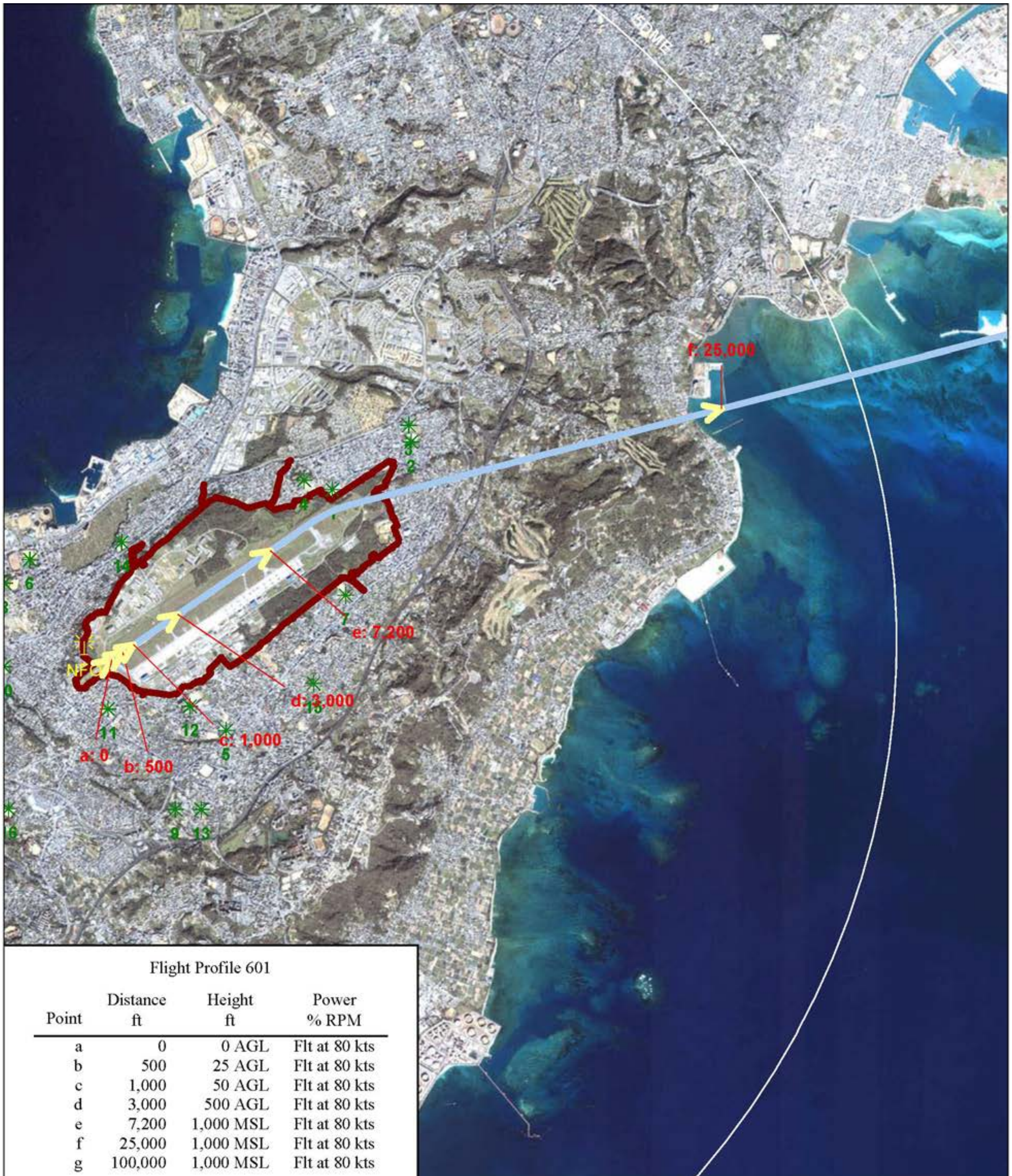
AH-1W

on Runway 06, Flight Track 06G1

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000 44,000 48,000 52,000

Scale in Feet 1:152,000 (1 inch = 12,700 feet)

N



Flight Profile 601

Point	Distance ft	Height ft	Power % RPM
a	0	0 AGL	Flt at 80 kts
b	500	25 AGL	Flt at 80 kts
c	1,000	50 AGL	Flt at 80 kts
d	3,000	500 AGL	Flt at 80 kts
e	7,200	1,000 MSL	Flt at 80 kts
f	25,000	1,000 MSL	Flt at 80 kts
g	100,000	1,000 MSL	Flt at 80 kts

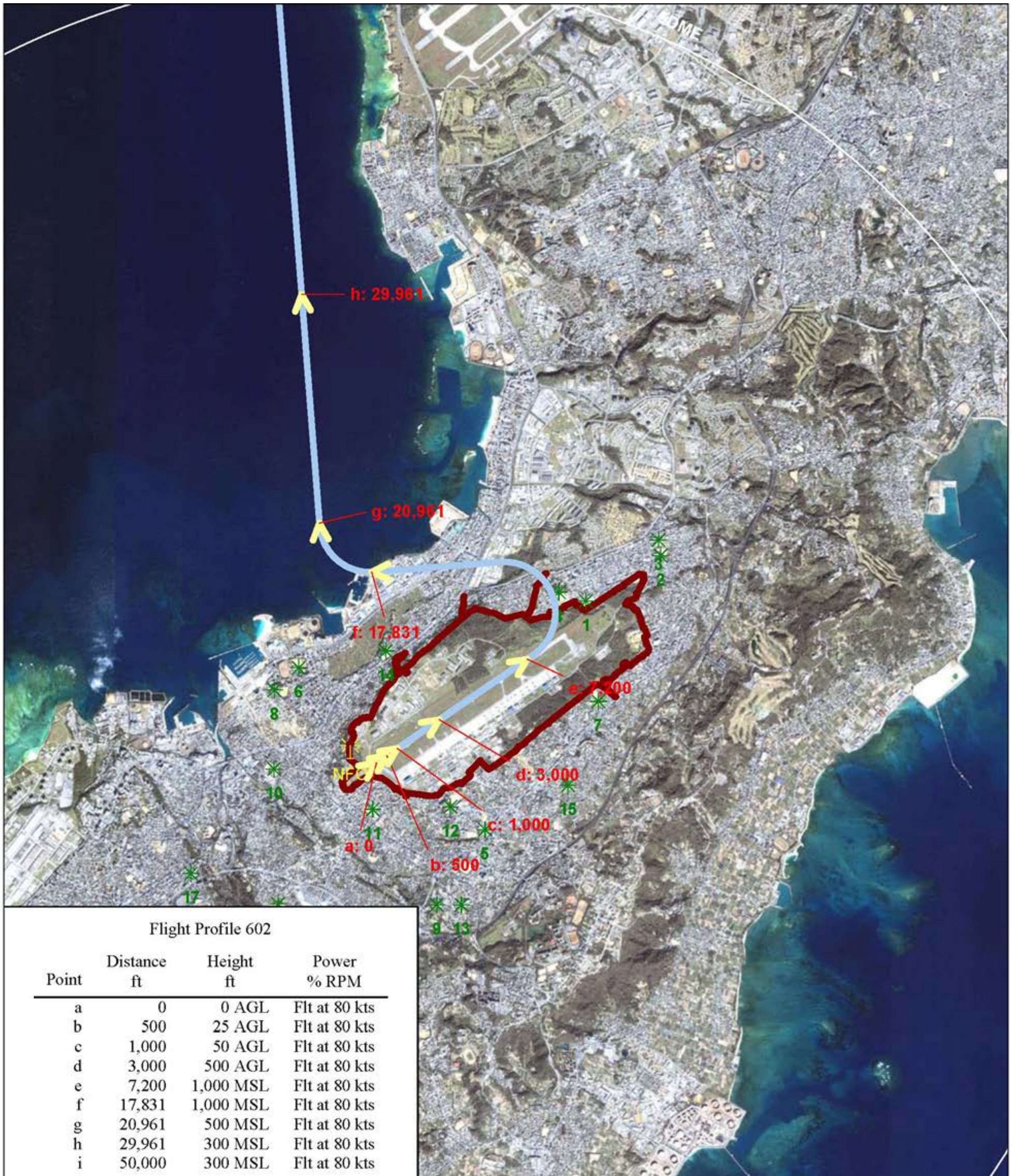
MCAS Futenma - Departure to Point Kilo - Flight Profile 601

UH-1N

on Runway 06, Flight Track 06D1

0 4,000 8,000 12,000 16,000 20,000

Scale in Feet 1:69,300 (1 inch = 5,780 feet)



Flight Profile 602

Point	Distance ft	Height ft	Power % RPM
a	0	0 AGL	Flt at 80 kts
b	500	25 AGL	Flt at 80 kts
c	1,000	50 AGL	Flt at 80 kts
d	3,000	500 AGL	Flt at 80 kts
e	7,200	1,000 MSL	Flt at 80 kts
f	17,831	1,000 MSL	Flt at 80 kts
g	20,961	500 MSL	Flt at 80 kts
h	29,961	300 MSL	Flt at 80 kts
i	50,000	300 MSL	Flt at 80 kts

MCAS Futenma - Departure to Point Sierra - Flight Profile 602

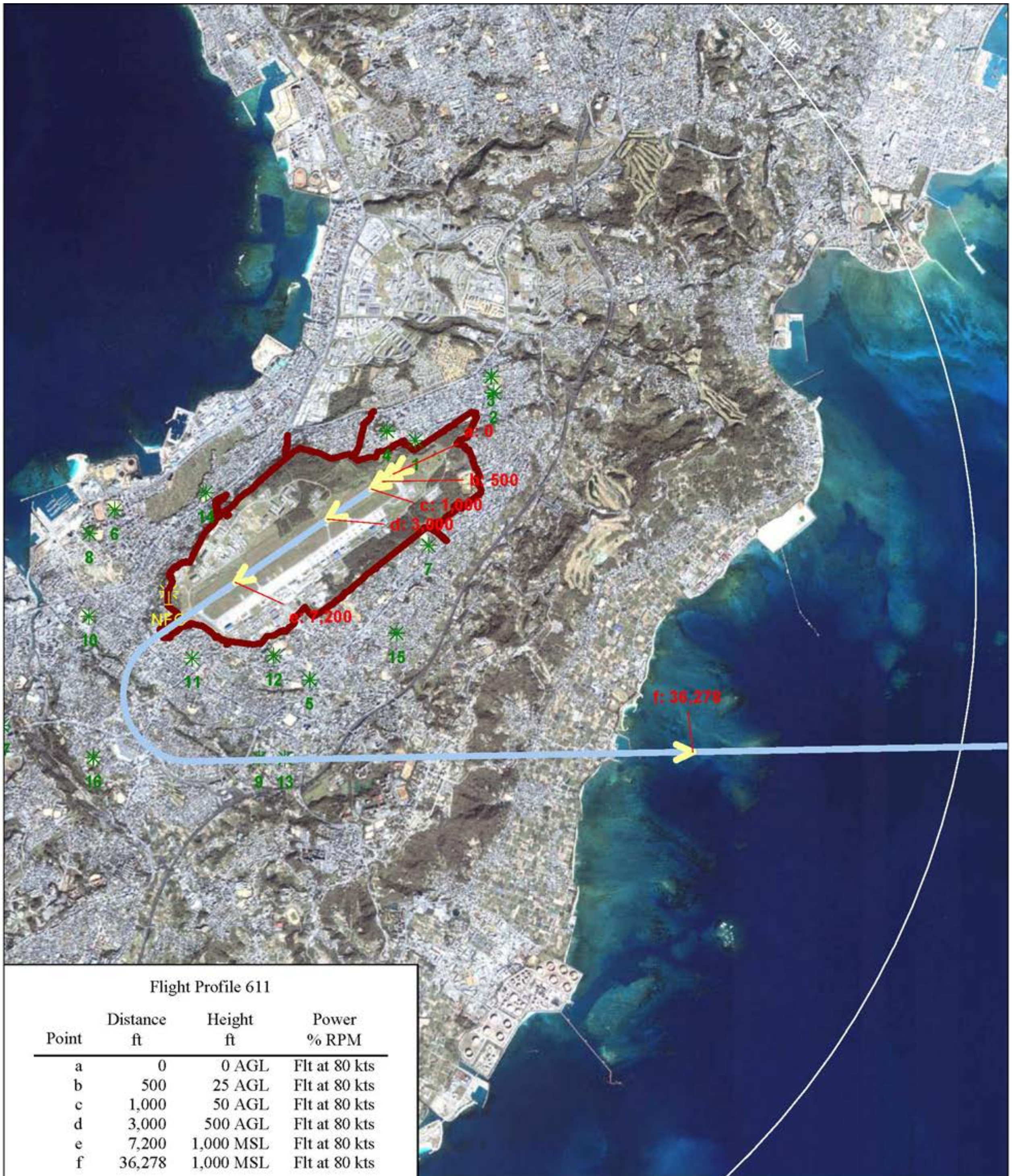
UH-1N

on Runway 06, Flight Track 06D2

0 4,000 8,000 12,000 16,000 20,000 24,000

Scale in Feet 1:73,000 (1 inch = 6,090 feet)

N



Flight Profile 611

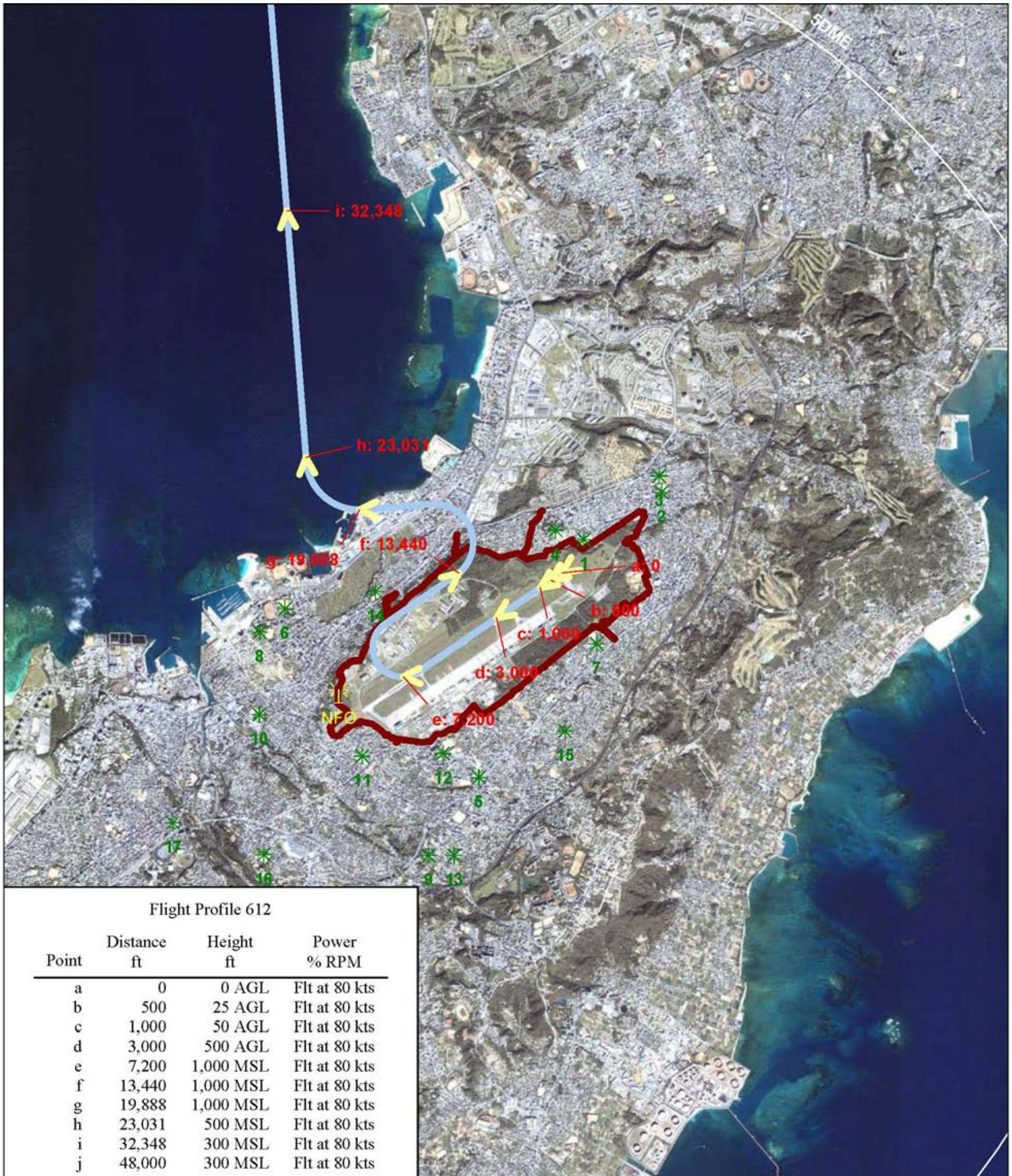
Point	Distance ft	Height ft	Power % RPM
a	0	0 AGL	Flt at 80 kts
b	500	25 AGL	Flt at 80 kts
c	1,000	50 AGL	Flt at 80 kts
d	3,000	500 AGL	Flt at 80 kts
e	7,200	1,000 MSL	Flt at 80 kts
f	36,278	1,000 MSL	Flt at 80 kts

MCAS Futenma - Departure to Point Tango - Flight Profile 611
UH-1N
on Runway 24, Flight Track 24D1

0 4,000 8,000 12,000 16,000 20,000

Scale in Feet 1:69,800 (1 inch = 5,810 feet)

N



Flight Profile 612

Point	Distance ft	Height ft	Power % RPM
a	0	0 AGL	Flt at 80 kts
b	500	25 AGL	Flt at 80 kts
c	1,000	50 AGL	Flt at 80 kts
d	3,000	500 AGL	Flt at 80 kts
e	7,200	1,000 MSL	Flt at 80 kts
f	13,440	1,000 MSL	Flt at 80 kts
g	19,888	1,000 MSL	Flt at 80 kts
h	23,031	500 MSL	Flt at 80 kts
i	32,348	300 MSL	Flt at 80 kts
j	48,000	300 MSL	Flt at 80 kts

MCAS Futenma - Departure to Point Sierra - Flight Profile 612

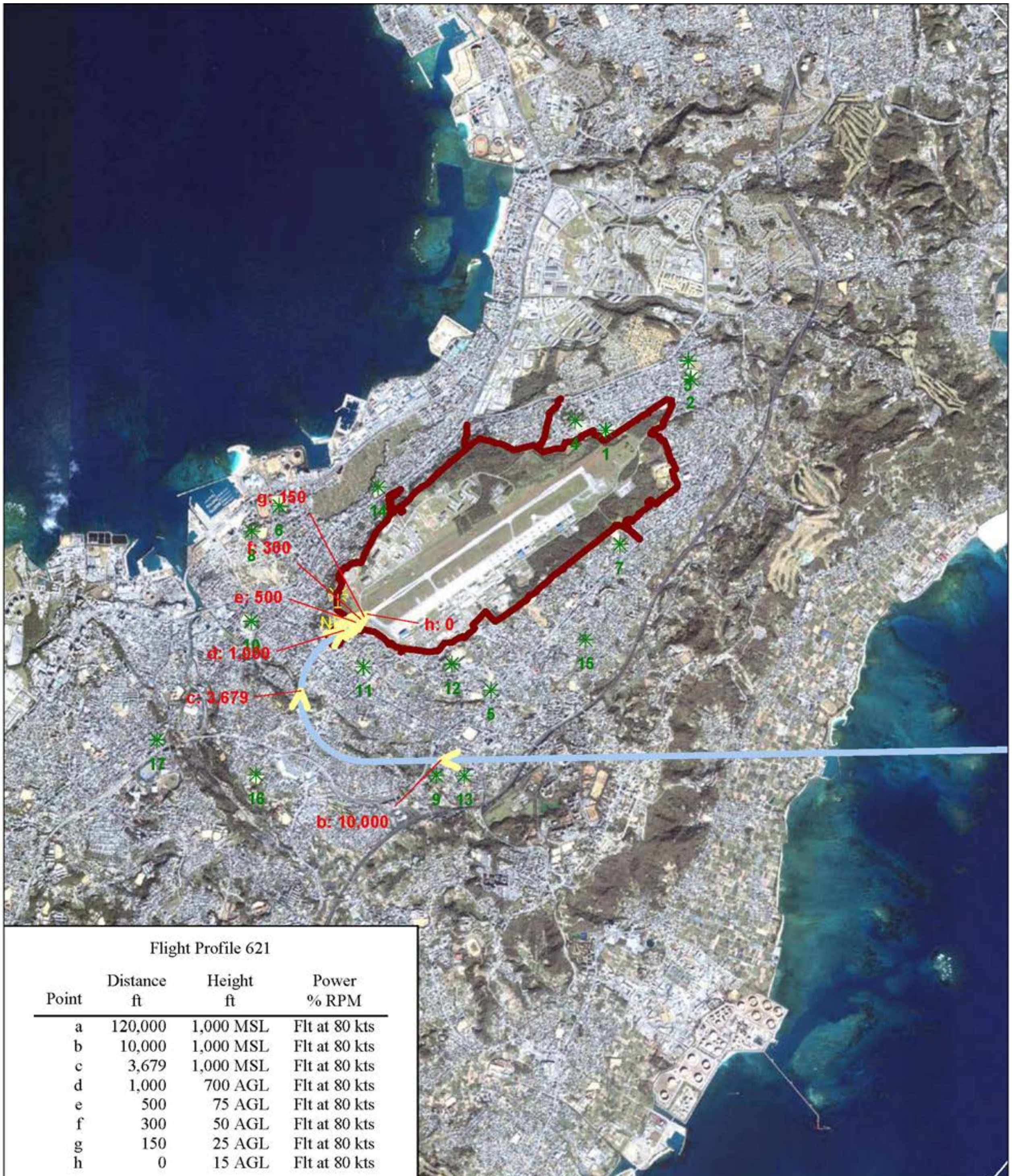
UH-1N

on Runway 24, Flight Track 24D2

0 4,000 8,000 12,000 16,000 20,000

Scale in Feet 1:70,200 (1 inch = 5,850 feet)

N



Flight Profile 621

Point	Distance ft	Height ft	Power % RPM
a	120,000	1,000 MSL	Flt at 80 kts
b	10,000	1,000 MSL	Flt at 80 kts
c	3,679	1,000 MSL	Flt at 80 kts
d	1,000	700 AGL	Flt at 80 kts
e	500	75 AGL	Flt at 80 kts
f	300	50 AGL	Flt at 80 kts
g	150	25 AGL	Flt at 80 kts
h	0	15 AGL	Flt at 80 kts

MCAS Futenma - Non Break Arrival from Point Tango - Flight Profile 621

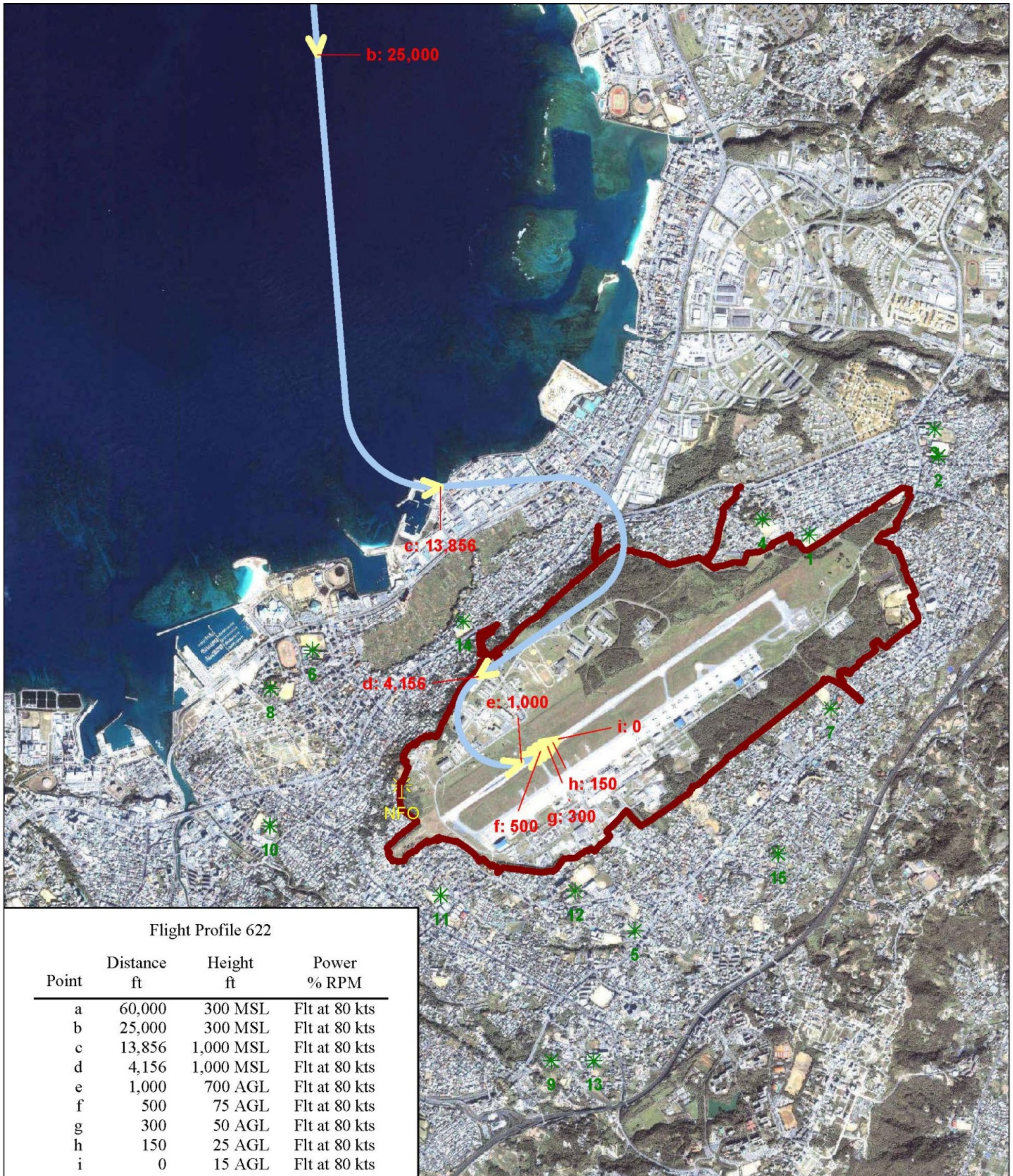
UH-1N

on Runway 06, Flight Track 06A1

0 4,000 8,000 12,000 16,000 20,000

Scale in Feet 1:64,200 (1 inch = 5,350 feet)

N



Flight Profile 622

Point	Distance ft	Height ft	Power % RPM
a	60,000	300 MSL	Flt at 80 kts
b	25,000	300 MSL	Flt at 80 kts
c	13,856	1,000 MSL	Flt at 80 kts
d	4,156	1,000 MSL	Flt at 80 kts
e	1,000	700 AGL	Flt at 80 kts
f	500	75 AGL	Flt at 80 kts
g	300	50 AGL	Flt at 80 kts
h	150	25 AGL	Flt at 80 kts
i	0	15 AGL	Flt at 80 kts

MCAS Futenma - Non Break Arrival from Point Sierra - Flight Profile 622

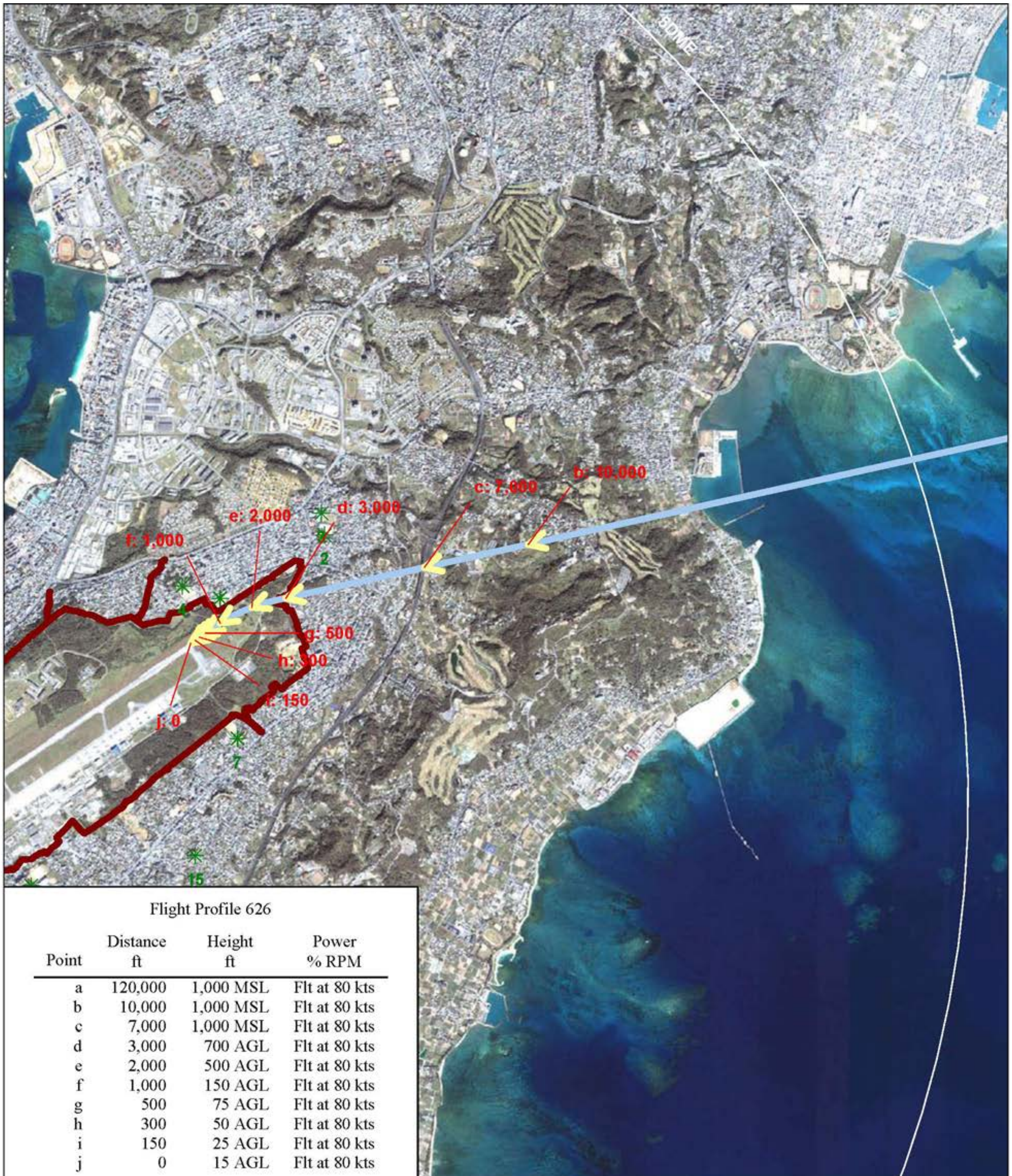
UH-1N

on Runway 06_mid, Flight Track 06A2

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000

Scale in Feet 1:42,300 (1 inch = 3,520 feet)

N



Flight Profile 626

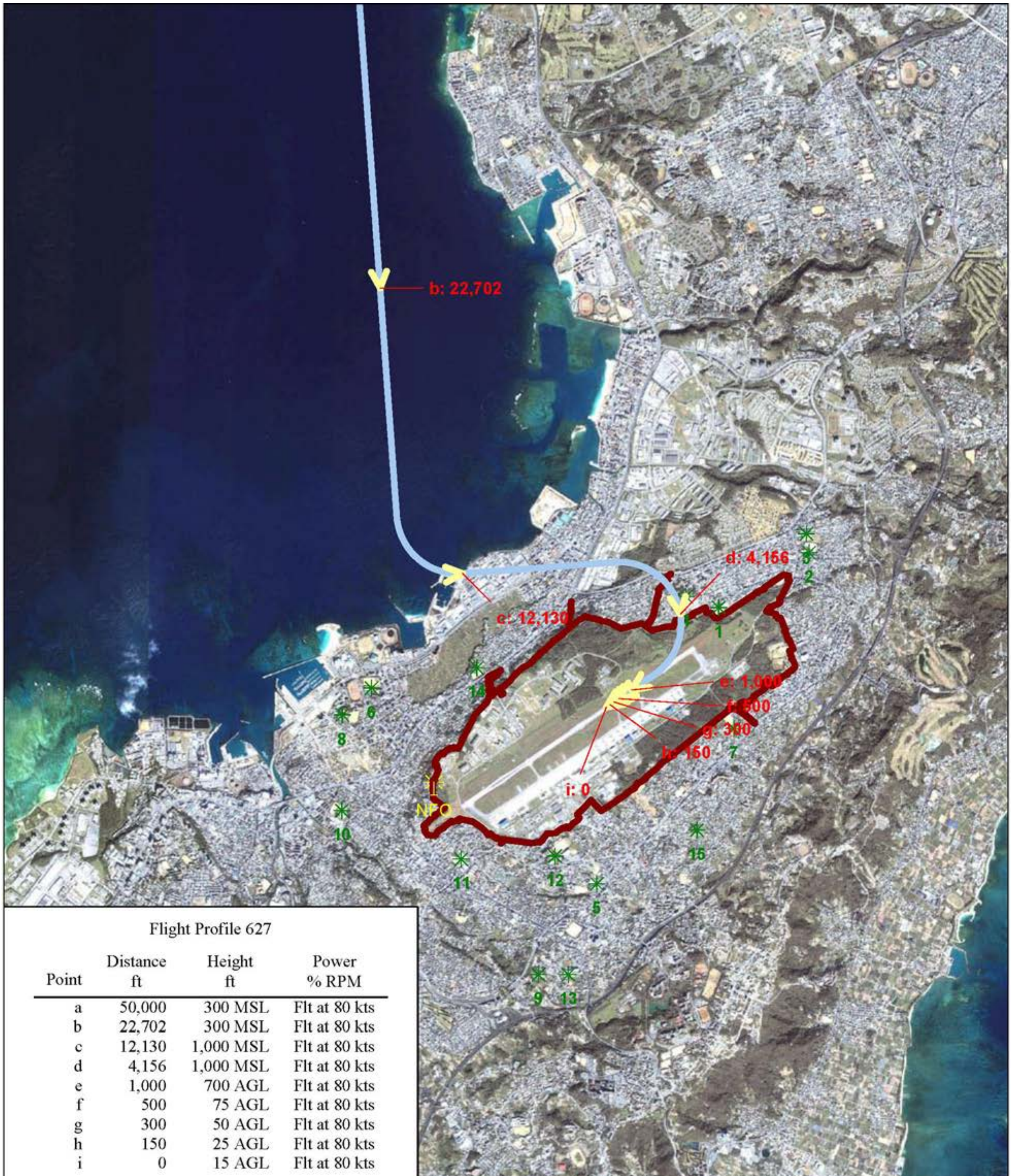
Point	Distance ft	Height ft	Power % RPM
a	120,000	1,000 MSL	Flt at 80 kts
b	10,000	1,000 MSL	Flt at 80 kts
c	7,000	1,000 MSL	Flt at 80 kts
d	3,000	700 AGL	Flt at 80 kts
e	2,000	500 AGL	Flt at 80 kts
f	1,000	150 AGL	Flt at 80 kts
g	500	75 AGL	Flt at 80 kts
h	300	50 AGL	Flt at 80 kts
i	150	25 AGL	Flt at 80 kts
j	0	15 AGL	Flt at 80 kts

MCAS Futenma - Non Break Arrival from Point Kilo - Flight Profile 626
UH-1N
on Runway 24, Flight Track 24A1

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000

Scale in Feet 1:52,300 (1 inch = 4,360 feet)

N



Flight Profile 627

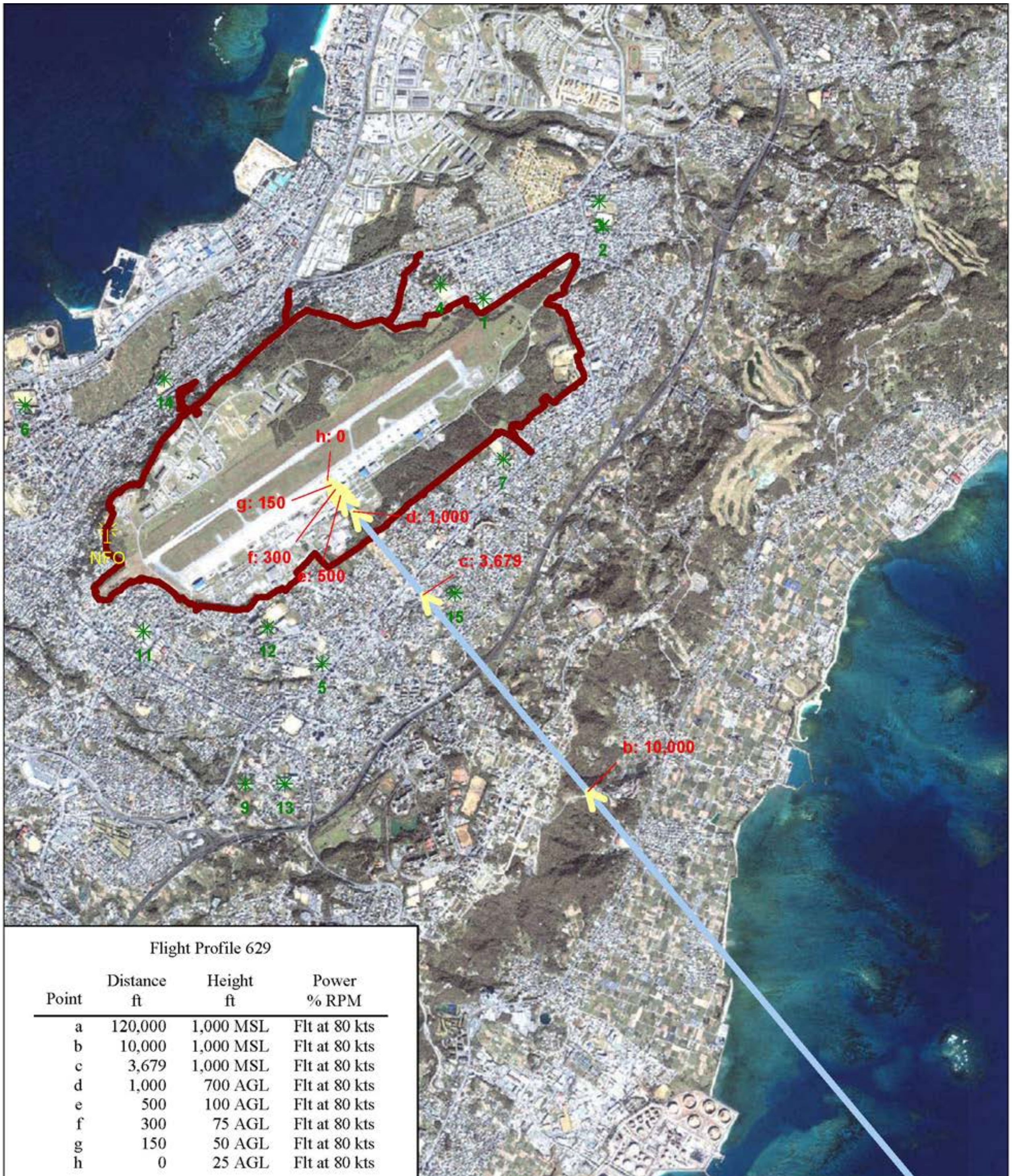
Point	Distance ft	Height ft	Power % RPM
a	50,000	300 MSL	Flt at 80 kts
b	22,702	300 MSL	Flt at 80 kts
c	12,130	1,000 MSL	Flt at 80 kts
d	4,156	1,000 MSL	Flt at 80 kts
e	1,000	700 AGL	Flt at 80 kts
f	500	75 AGL	Flt at 80 kts
g	300	50 AGL	Flt at 80 kts
h	150	25 AGL	Flt at 80 kts
i	0	15 AGL	Flt at 80 kts

MCAS Futenma - Non Break Arrival from Point Sierra - Flight Profile 627
UH-1N
on Runway 24_mid, Flight Track 24A2

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000 20,000

Scale in Feet 1:60,400 (1 inch = 5,040 feet)

N



Flight Profile 629

Point	Distance ft	Height ft	Power % RPM
a	120,000	1,000 MSL	Flt at 80 kts
b	10,000	1,000 MSL	Flt at 80 kts
c	3,679	1,000 MSL	Flt at 80 kts
d	1,000	700 AGL	Flt at 80 kts
e	500	100 AGL	Flt at 80 kts
f	300	75 AGL	Flt at 80 kts
g	150	50 AGL	Flt at 80 kts
h	0	25 AGL	Flt at 80 kts

MCAS Futenma - Arrival to Pad 2 - Flight Profile 629

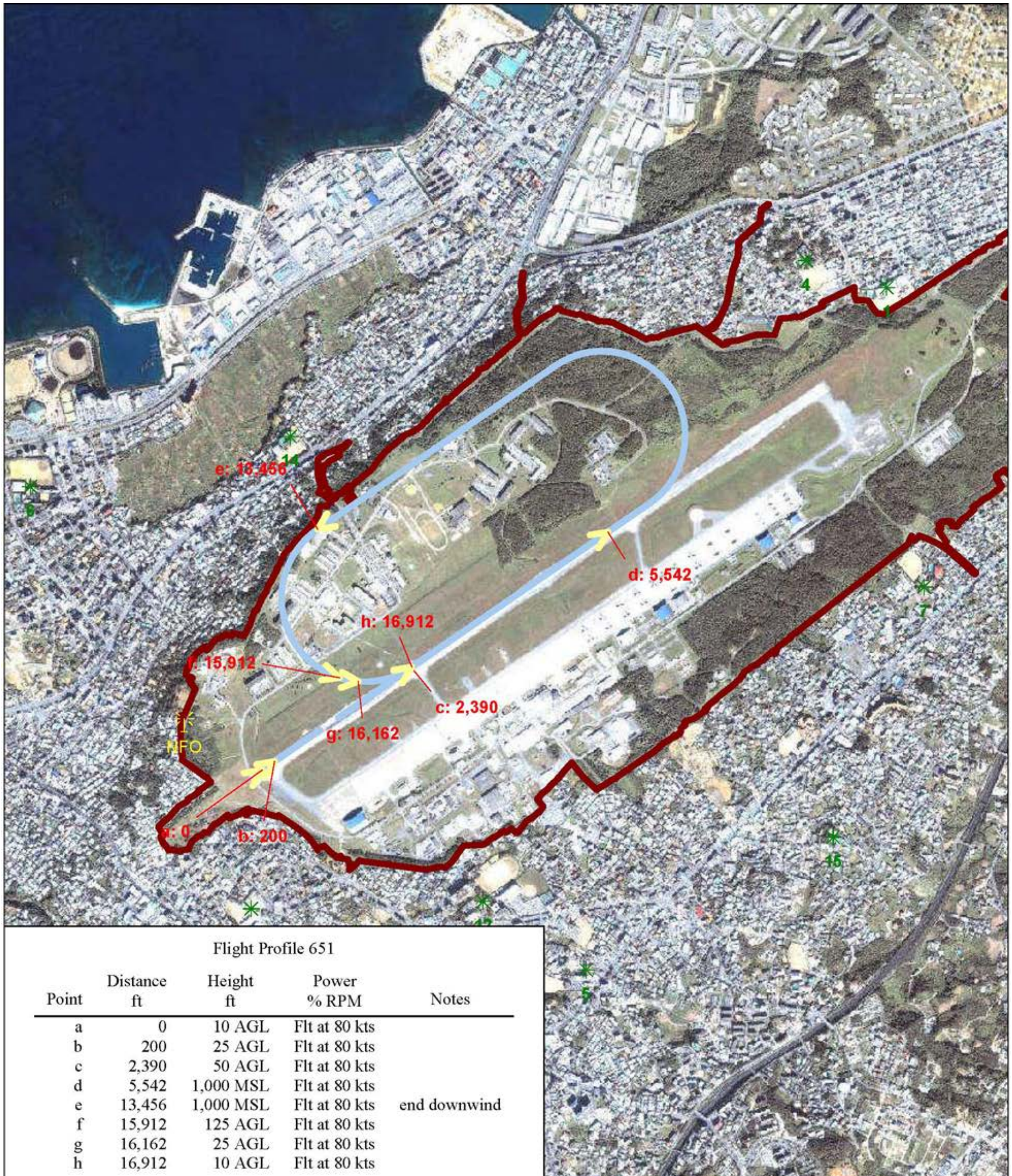
UH-1N

on Runway Pad2, Flight Track PAD2A1

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000

Scale in Feet 1:45,800 (1 inch = 3,810 feet)

N



Flight Profile 651

Point	Distance ft	Height ft	Power % RPM	Notes
a	0	10 AGL	Flt at 80 kts	
b	200	25 AGL	Flt at 80 kts	
c	2,390	50 AGL	Flt at 80 kts	
d	5,542	1,000 MSL	Flt at 80 kts	
e	13,456	1,000 MSL	Flt at 80 kts	end downwind
f	15,912	125 AGL	Flt at 80 kts	
g	16,162	25 AGL	Flt at 80 kts	
h	16,912	10 AGL	Flt at 80 kts	

MCAS Futenma - Touch and Go - Flight Profile 651

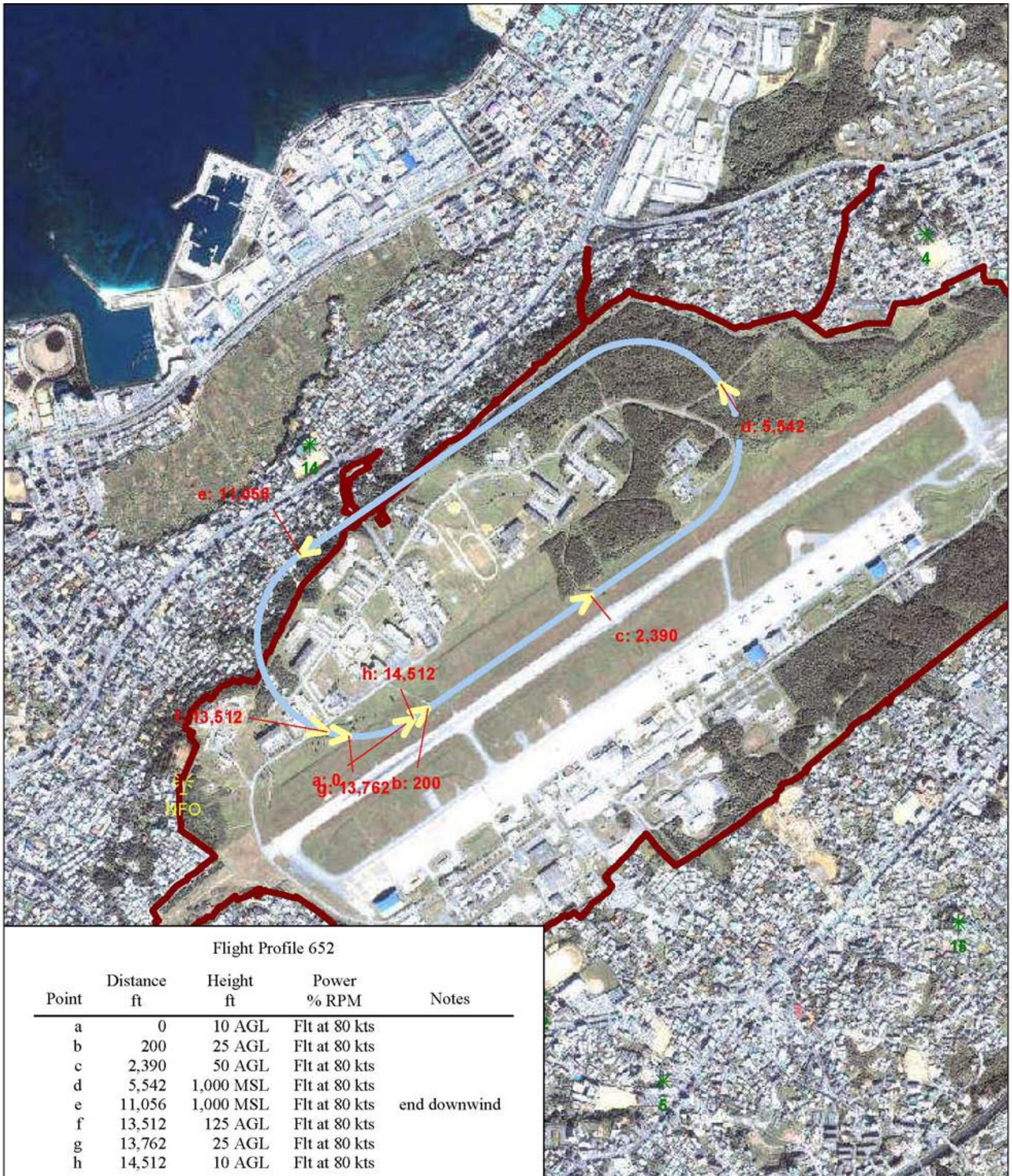
UH-1N

on Runway 06, Flight Track 06T1

0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000

Scale in Feet 1:24,500 (1 inch = 2,040 feet)

N



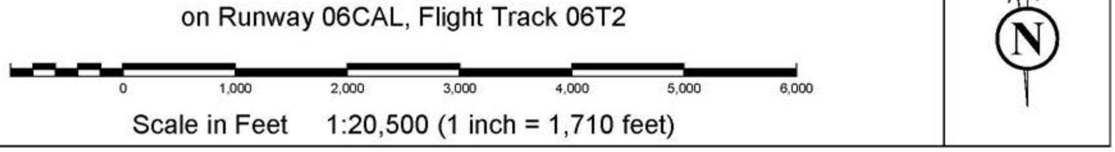
Flight Profile 652

Point	Distance ft	Height ft	Power % RPM	Notes
a	0	10 AGL	Flt at 80 kts	
b	200	25 AGL	Flt at 80 kts	
c	2,390	50 AGL	Flt at 80 kts	
d	5,542	1,000 MSL	Flt at 80 kts	
e	11,056	1,000 MSL	Flt at 80 kts	end downwind
f	13,512	125 AGL	Flt at 80 kts	
g	13,762	25 AGL	Flt at 80 kts	
h	14,512	10 AGL	Flt at 80 kts	

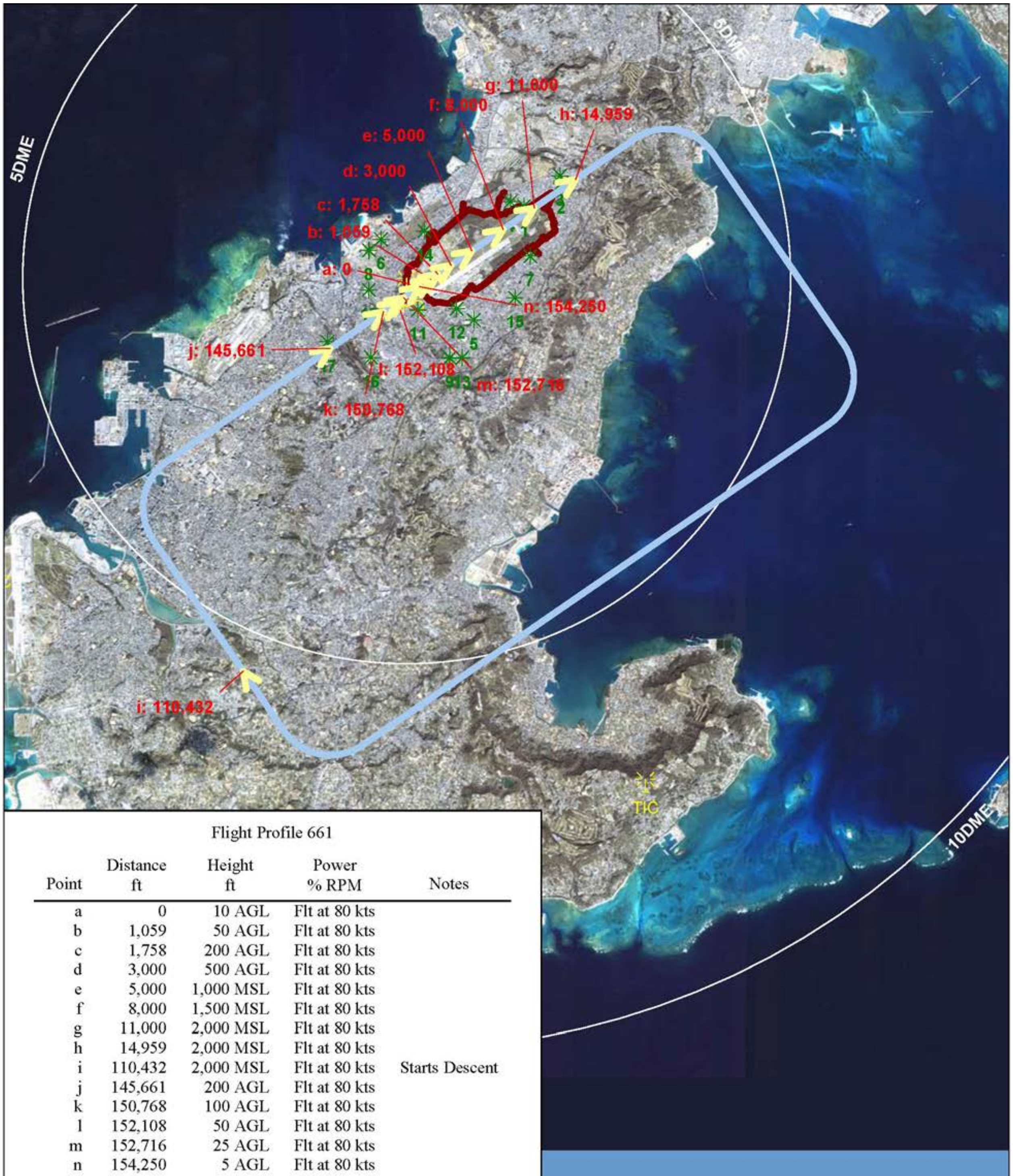
MCAS Futenma - Touch and Go - Flight Profile 652

UH-1N

on Runway 06CAL, Flight Track 06T2



Scale in Feet 1:20,500 (1 inch = 1,710 feet)



Flight Profile 661

Point	Distance ft	Height ft	Power % RPM	Notes
a	0	10 AGL	Flt at 80 kts	
b	1,059	50 AGL	Flt at 80 kts	
c	1,758	200 AGL	Flt at 80 kts	
d	3,000	500 AGL	Flt at 80 kts	
e	5,000	1,000 MSL	Flt at 80 kts	
f	8,000	1,500 MSL	Flt at 80 kts	
g	11,000	2,000 MSL	Flt at 80 kts	
h	14,959	2,000 MSL	Flt at 80 kts	
i	110,432	2,000 MSL	Flt at 80 kts	Starts Descent
j	145,661	200 AGL	Flt at 80 kts	
k	150,768	100 AGL	Flt at 80 kts	
l	152,108	50 AGL	Flt at 80 kts	
m	152,716	25 AGL	Flt at 80 kts	
n	154,250	5 AGL	Flt at 80 kts	

MCAS Futenma - GCA Box Pattern - Flight Profile 661

UH-1N

on Runway 06, Flight Track 06G1

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000 44,000 48,000 52,000

Scale in Feet 1:147,000 (1 inch = 12,200 feet)

N

Flight Profile 401

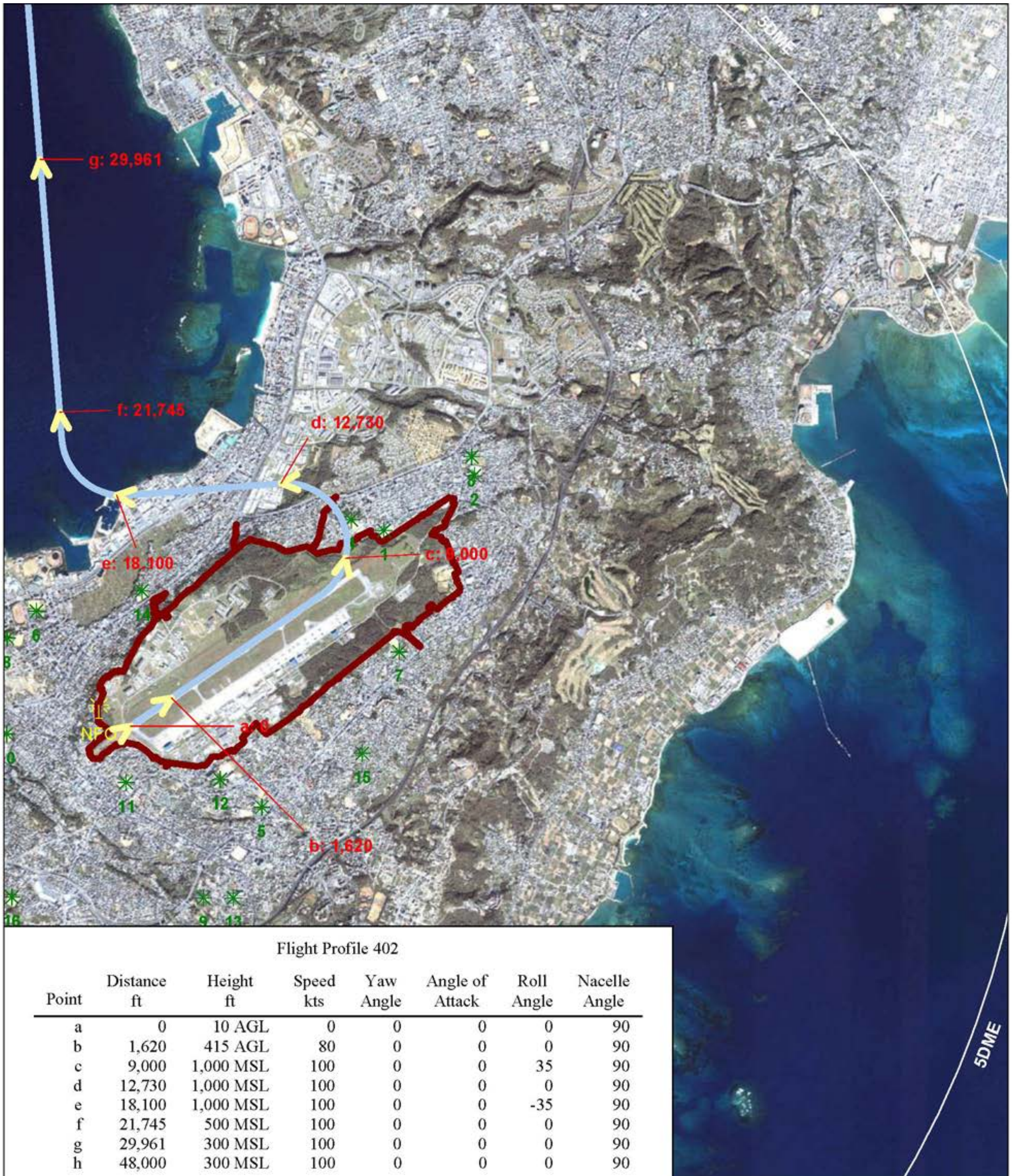
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	0	10 AGL	0	0	0	0	90
b	1,620	415 AGL	80	0	0	0	90
c	9,000	850 MSL	100	0	0	-30	90
d	10,920	1,000 MSL	100	0	0	0	90
e	41,880	1,000 MSL	100	0	0	0	90
f	55,000	1,000 MSL	100	0	0	0	90

MCAS Futenma - Flight Profile 401 - Departure
CH-46E
on Runway 06, Flight Track 06D1

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000 20,000

Scale in Feet 1:60,400 (1 inch = 5,030 feet)

N



Flight Profile 402

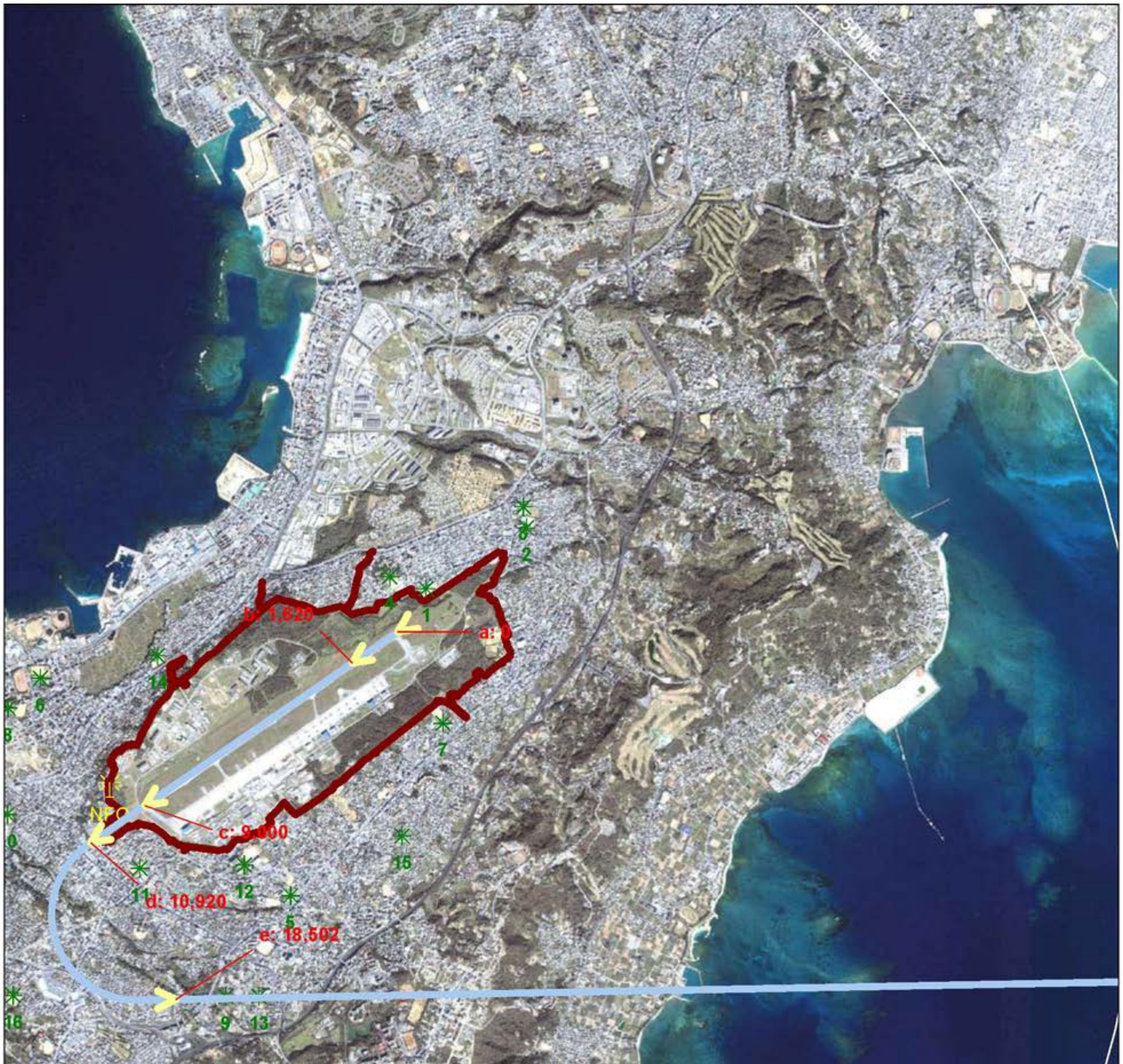
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	0	10 AGL	0	0	0	0	90
b	1,620	415 AGL	80	0	0	0	90
c	9,000	1,000 MSL	100	0	0	35	90
d	12,730	1,000 MSL	100	0	0	0	90
e	18,100	1,000 MSL	100	0	0	-35	90
f	21,745	500 MSL	100	0	0	0	90
g	29,961	300 MSL	100	0	0	0	90
h	48,000	300 MSL	100	0	0	0	90

MCAS Futenma - Flight Profile 402 - Departue
CH-46E
on Runway 06, Flight Track 06D2

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000 20,000

Scale in Feet 1:60,400 (1 inch = 5,030 feet)

N



Flight Profile 411

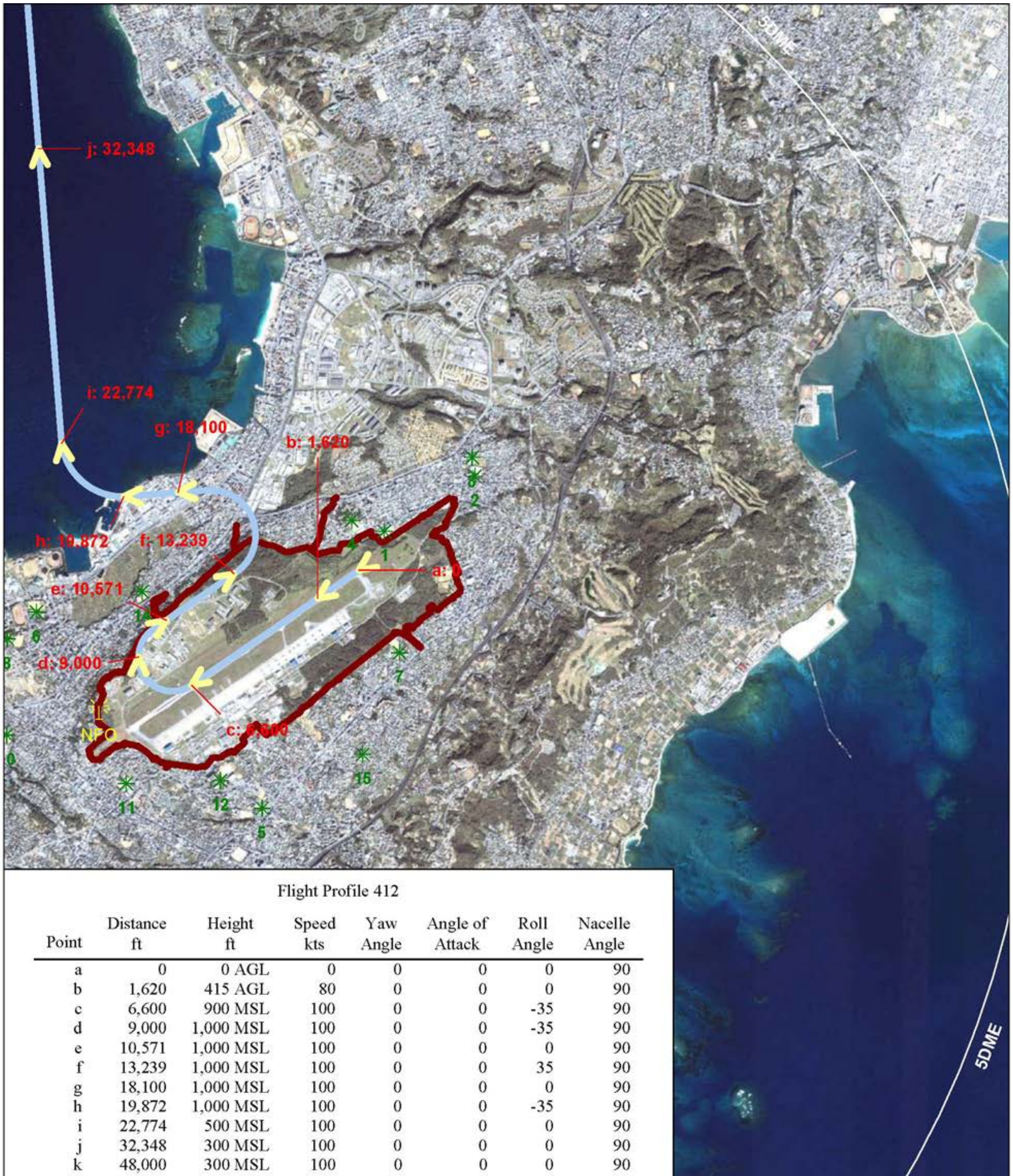
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	0	0 AGL	0	0	0	0	90
b	1,620	415 AGL	80	0	0	0	90
c	9,000	850 MSL	100	0	0	0	90
d	10,920	1,000 MSL	100	0	0	-35	90
e	18,502	1,000 MSL	100	0	0	0	90
f	57,493	1,000 MSL	100	0	0	0	90

MCAS Futenma - Flight Profile 411 - Departure
CH-46E
on Runway 24, Flight Track 24D1

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000 20,000

Scale in Feet 1:60,400 (1 inch = 5,030 feet)

N



Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	0	0 AGL	0	0	0	0	90
b	1,620	415 AGL	80	0	0	0	90
c	6,600	900 MSL	100	0	0	-35	90
d	9,000	1,000 MSL	100	0	0	-35	90
e	10,571	1,000 MSL	100	0	0	0	90
f	13,239	1,000 MSL	100	0	0	35	90
g	18,100	1,000 MSL	100	0	0	0	90
h	19,872	1,000 MSL	100	0	0	-35	90
i	22,774	500 MSL	100	0	0	0	90
j	32,348	300 MSL	100	0	0	0	90
k	48,000	300 MSL	100	0	0	0	90

Flight Profile 412

MCAS Futenma - Flight Profile 412 - Departure
CH-46E
on Runway 24, Flight Track 24D2

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000 20,000

Scale in Feet 1:60,400 (1 inch = 5,030 feet)

Flight Profile 421

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	50,000	1,000 MSL	100	0	0	0	90	
b	26,445	1,000 MSL	100	0	0	0	90	
c	8,897	1,000 MSL	100	0	0	0	90	
d	7,317	1,000 MSL	100	0	0	-30	90	
e	2,902	1,000 MSL	85	0	5	0	90	end turn
f	1,620	415 AGL	80	0	5	0	90	
g	0	15 AGL	0	0	0	0	90	

MCAS Futenma - Flight Profile 421 - Non break arrival

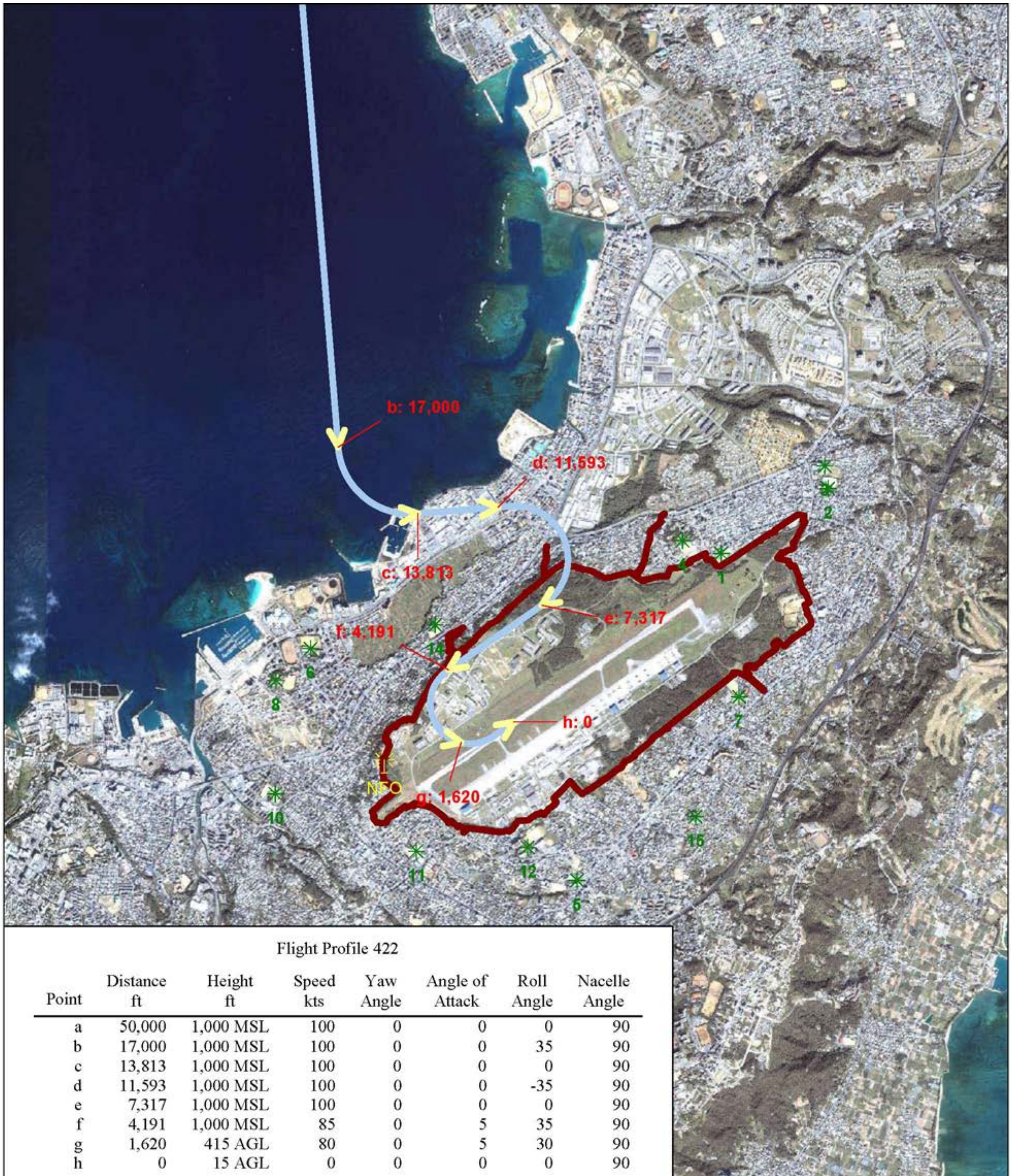
CH-46E

on Runway 06, Flight Track 06A1

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000 20,000

Scale in Feet 1:60,800 (1 inch = 5,070 feet)

N



Flight Profile 422

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	50,000	1,000 MSL	100	0	0	0	90
b	17,000	1,000 MSL	100	0	0	35	90
c	13,813	1,000 MSL	100	0	0	0	90
d	11,593	1,000 MSL	100	0	0	-35	90
e	7,317	1,000 MSL	100	0	0	0	90
f	4,191	1,000 MSL	85	0	5	35	90
g	1,620	415 AGL	80	0	5	30	90
h	0	15 AGL	0	0	0	0	90

MCAS Futenma - Flight Profile 422 - Non break arrival

CH-46E

on Runway 06_mid, Flight Track 06A2

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000

Scale in Feet 1:51,100 (1 inch = 4,260 feet)

N

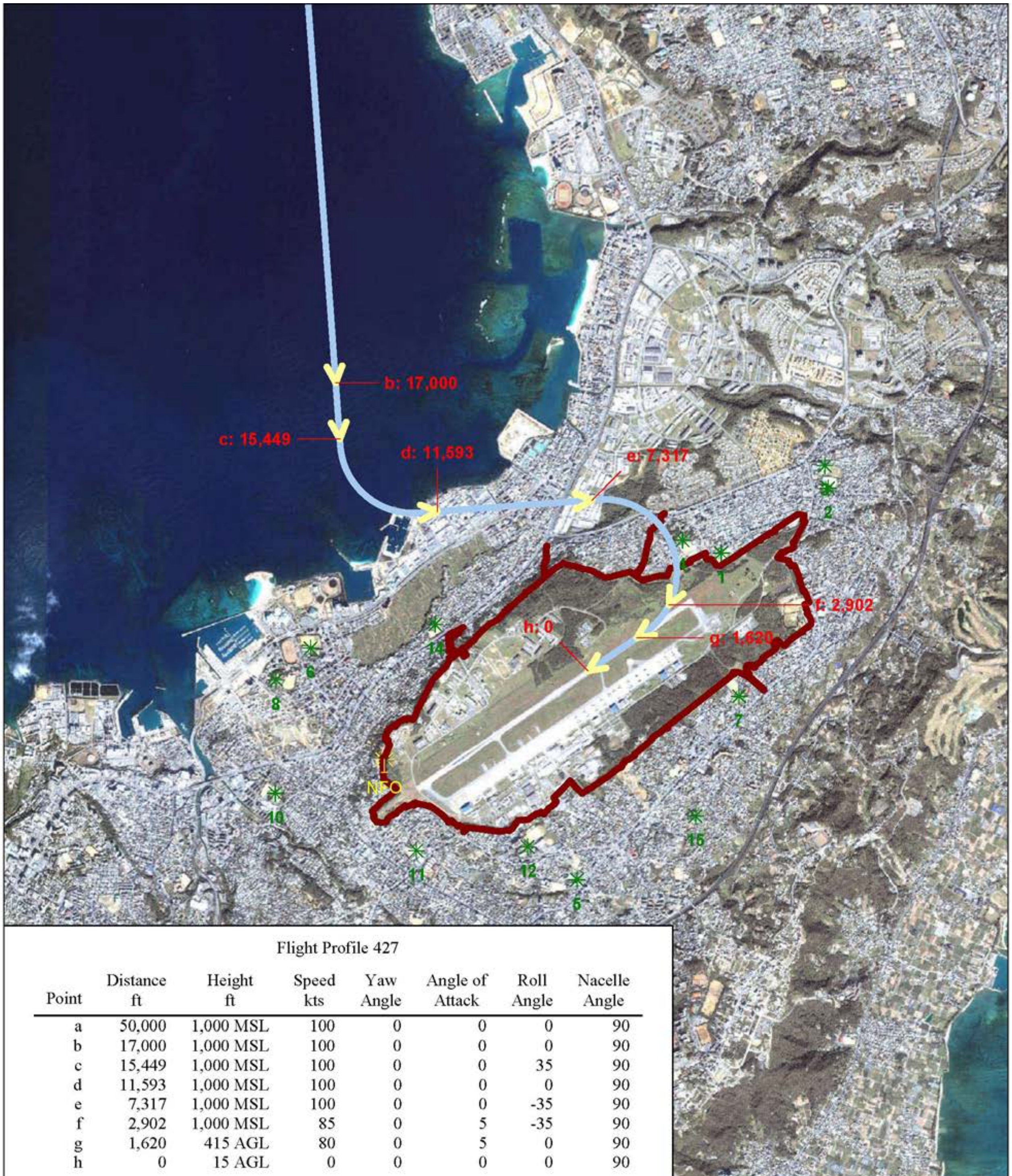
Flight Profile 426

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	62,693	1,000 MSL	100	0	0	0	90
b	26,445	1,000 MSL	100	0	0	0	90
c	2,902	1,000 MSL	85	0	5	30	90
d	1,620	415 AGL	80	0	5	0	90
e	0	15 AGL	0	0	0	0	90

MCAS Futenma - Flight Profile 426 - Non break arrival
CH-46E
on Runway 24, Flight Track 24A1

0 4,000 8,000 12,000 16,000 20,000

Scale in Feet 1:68,300 (1 inch = 5,690 feet)



Flight Profile 427

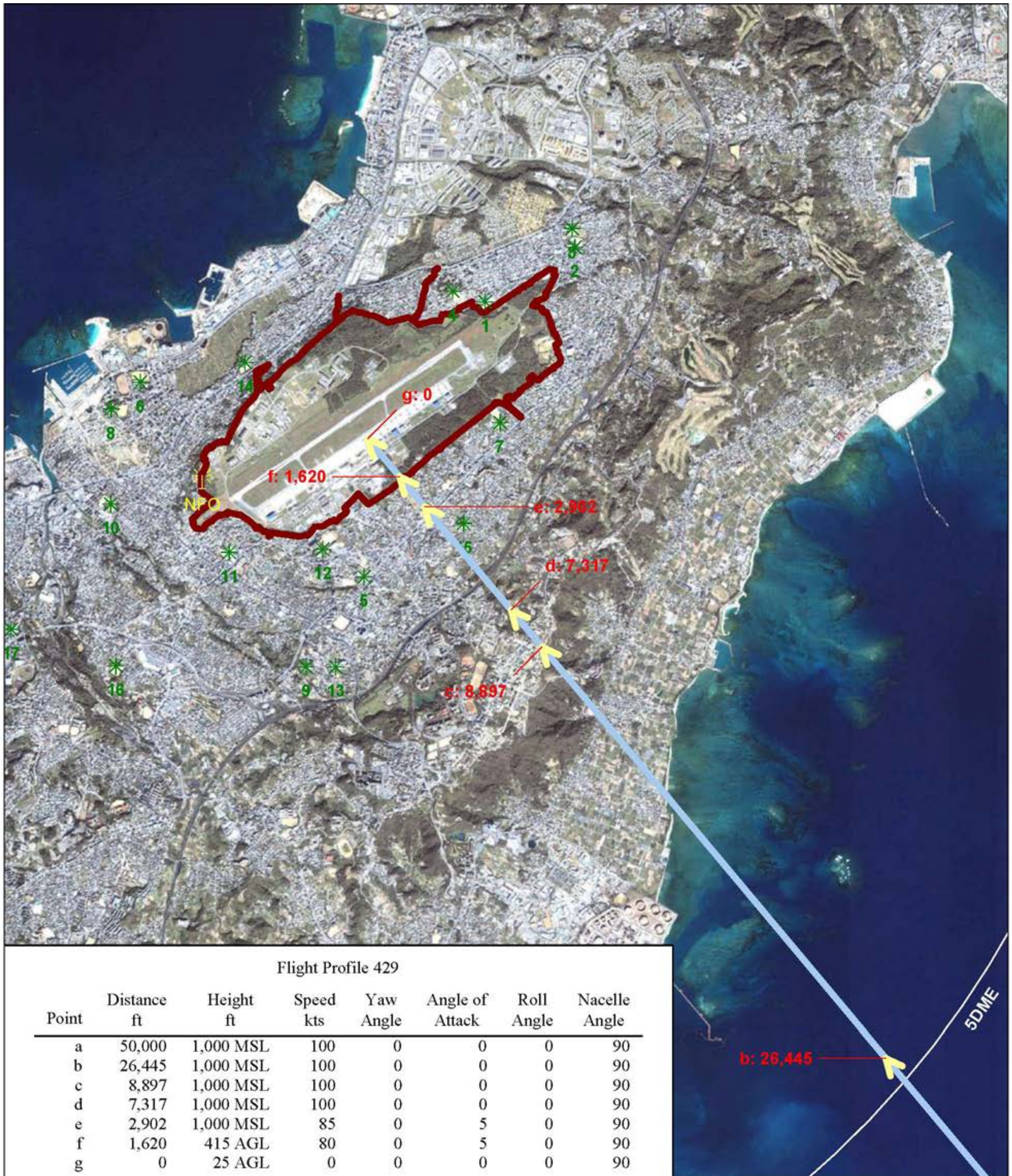
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	50,000	1,000 MSL	100	0	0	0	90
b	17,000	1,000 MSL	100	0	0	0	90
c	15,449	1,000 MSL	100	0	0	35	90
d	11,593	1,000 MSL	100	0	0	0	90
e	7,317	1,000 MSL	100	0	0	-35	90
f	2,902	1,000 MSL	85	0	5	-35	90
g	1,620	415 AGL	80	0	5	0	90
h	0	15 AGL	0	0	0	0	90

MCAS Futenma - Flight Profile 427 - Non break arrival
CH-46E
on Runway 24_mid, Flight Track 24A2

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000

Scale in Feet 1:51,100 (1 inch = 4,260 feet)

N



Flight Profile 429

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	50,000	1,000 MSL	100	0	0	0	90
b	26,445	1,000 MSL	100	0	0	0	90
c	8,897	1,000 MSL	100	0	0	0	90
d	7,317	1,000 MSL	100	0	0	0	90
e	2,902	1,000 MSL	85	0	5	0	90
f	1,620	415 AGL	80	0	5	0	90
g	0	25 AGL	0	0	0	0	90

MCAS Futenma - Flight Profile 429 - Arrival to Pad 2

CH-46E

on Runway Pad2, Flight Track PAD2A1

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000 20,000

Scale in Feet 1:60,800 (1 inch = 5,070 feet)

N

Flight Profile 451

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	15 AGL	0	0	0	0	90	
b	1,620	250 AGL	80	0	-5	0	90	
c	6,200	900 MSL	100	0	0	35	90	
d	8,000	1,000 MSL	100	0	0	35	90	
e	9,800	1,000 MSL	100	0	0	0	90	begin downwind
f	13,365	1,000 MSL	100	0	0	35	90	end downwind
g	15,319	450 AGL	100	0	5	35	90	
h	16,912	15 AGL	0	0	0	0	90	

MCAS Futenma - Flight Profile 451 - Touch and Go

CH-46E

on Runway 06, Flight Track 06T1

0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000 9,000

Scale in Feet 1:26,200 (1 inch = 2,190 feet)

N

Flight Profile 452

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	15 AGL	0	0	0	0	90	
b	1,620	250 AGL	80	0	-5	0	90	
c	3,800	750 MSL	100	0	0	35	90	
d	7,256	1,000 MSL	100	0	0	0	90	begin downwind
e	11,056	1,000 MSL	100	0	0	35	90	end downwind
f	12,919	450 AGL	100	0	5	35	90	
g	14,512	15 AGL	0	0	0	0	90	

MCAS Futenma - Flight Profile 452 - Touch and Go
CH-46E
on Runway 06CAL, Flight Track 06T2

Scale in Feet 1:28,300 (1 inch = 2,360 feet)

Flight Profile 461

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	15 AGL	0	0	0	0	90	
b	1,620	415 AGL	80	0	0	0	90	
c	9,000	850 MSL	100	0	0	0	90	
d	10,920	1,000 MSL	100	0	0	0	90	
e	20,595	1,578 MSL	100	0	0	-30	90	interpolated pt, begin turn
f	27,664	2,000 MSL	100	0	0	0	90	added pt, end turn
g	45,892	2,000 MSL	100	0	0	-30	90	added pt, begin turn
h	52,960	2,000 MSL	100	0	0	0	90	added pt, end turn
i	97,720	2,000 MSL	100	0	0	-30	90	added pt, begin turn
j	104,789	2,000 MSL	100	0	0	0	90	added pt, end turn
k	123,017	2,000 MSL	100	0	0	-30	90	added pt, begin turn
l	130,085	2,000 MSL	100	0	0	0	90	
m	145,933	1,000 MSL	100	0	5	0	90	
n	150,348	1,000 MSL	85	0	5	0	90	
o	151,630	415 AGL	80	0	5	0	90	
p	154,250	15 AGL	0	0	0	0	90	

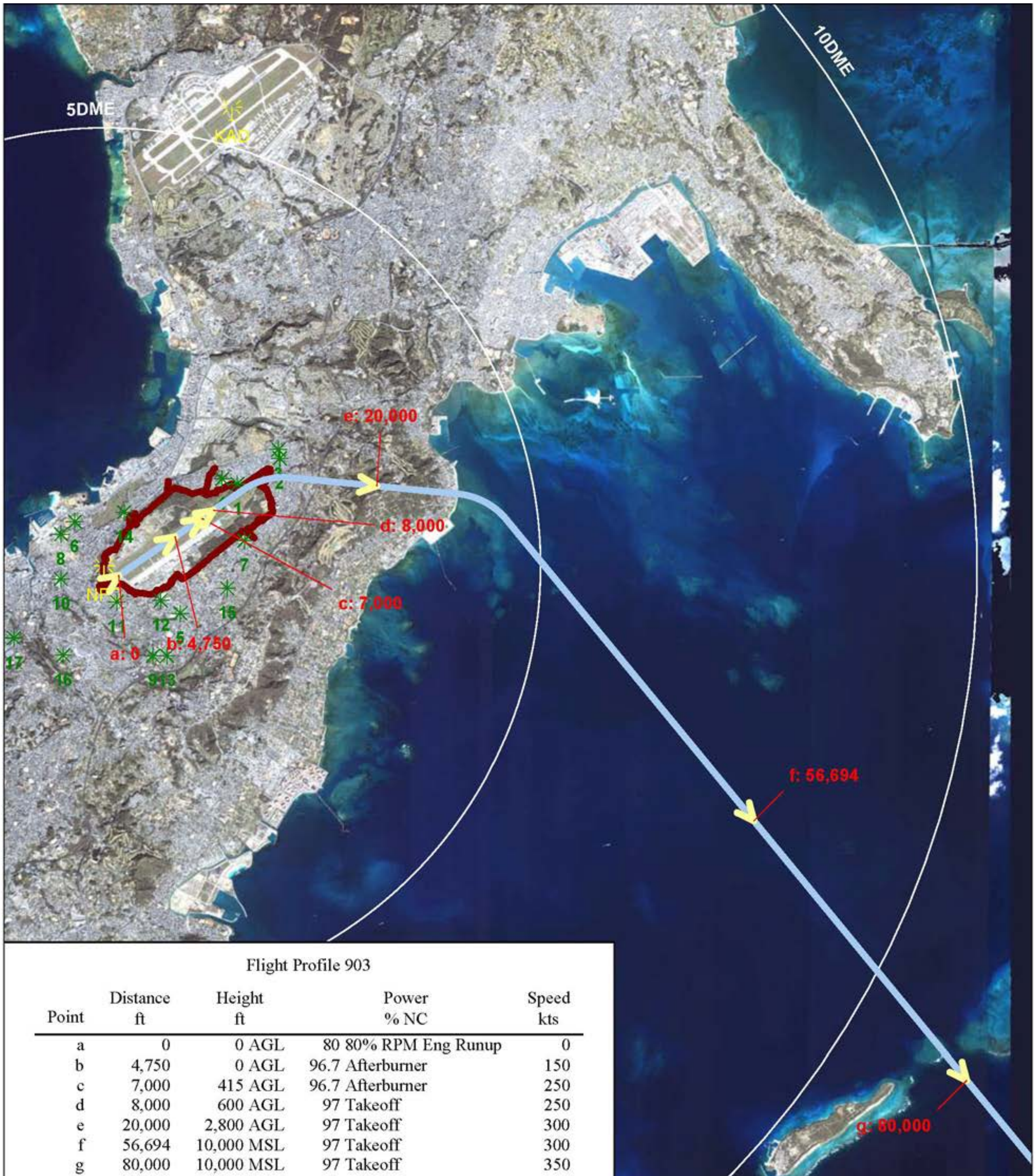
MCAS Futenma - Flight Profile 461 - GCA

CH-46E

on Runway 06, Flight Track 06G1

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000 44,000 48,000 52,000

Scale in Feet 1:147,000 (1 inch = 12,300 feet)



Flight Profile 903

Point	Distance ft	Height ft	Power % NC	Speed kts
a	0	0 AGL	80 80% RPM Eng Runup	0
b	4,750	0 AGL	96.7 Afterburner	150
c	7,000	415 AGL	96.7 Afterburner	250
d	8,000	600 AGL	97 Takeoff	250
e	20,000	2,800 AGL	97 Takeoff	300
f	56,694	10,000 MSL	97 Takeoff	300
g	80,000	10,000 MSL	97 Takeoff	350

Flight Profile 903 - Departure

FA-18C/D

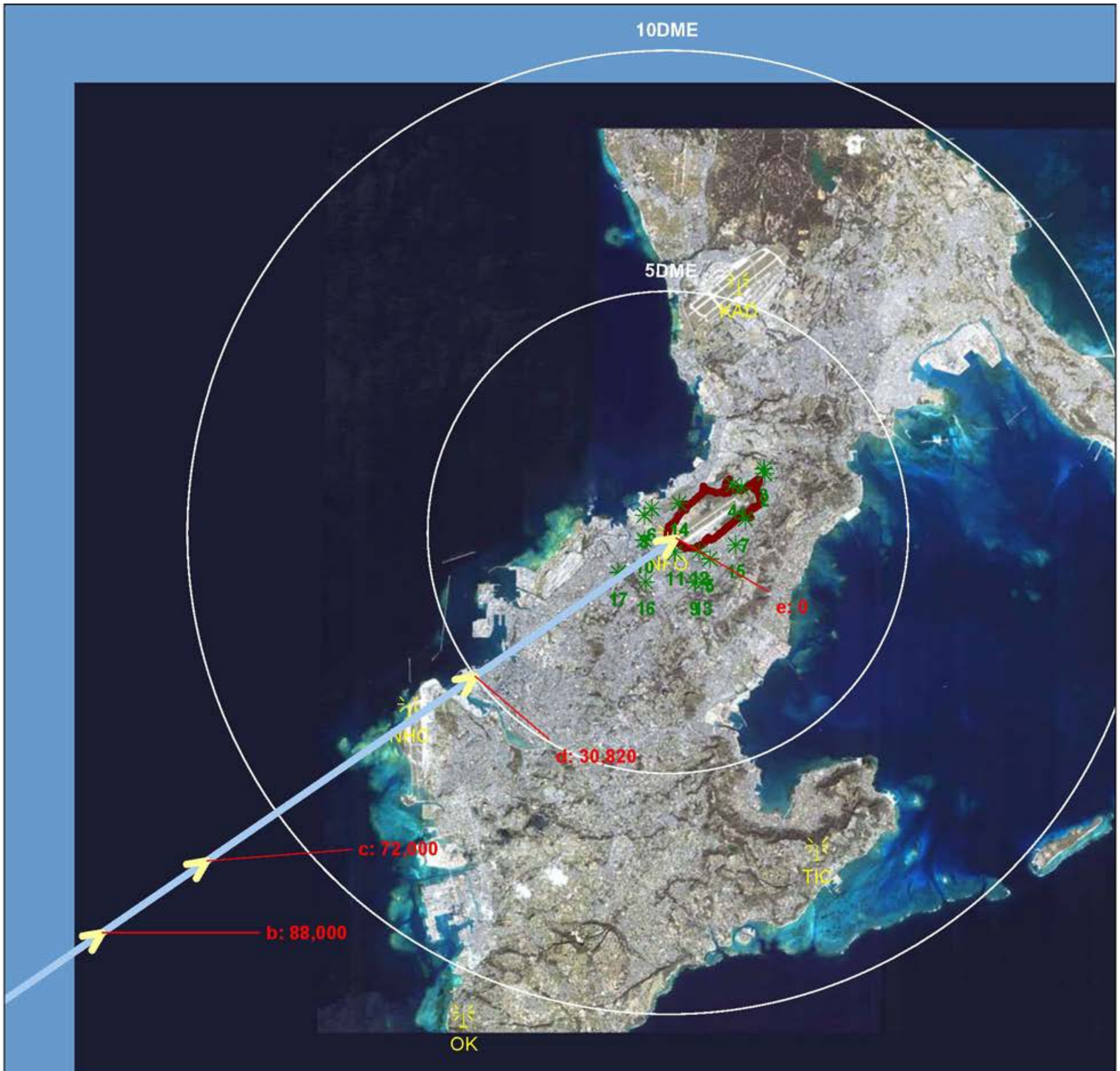
on Runway 06, Flight Track 06D5

Prior to brake release, aircraft sits at 80 % NC 80% RPM Eng Runup for 5 sec

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000 44,000

Scale in Feet 1:132,000 (1 inch = 11,000 feet)

N



Flight Profile 921

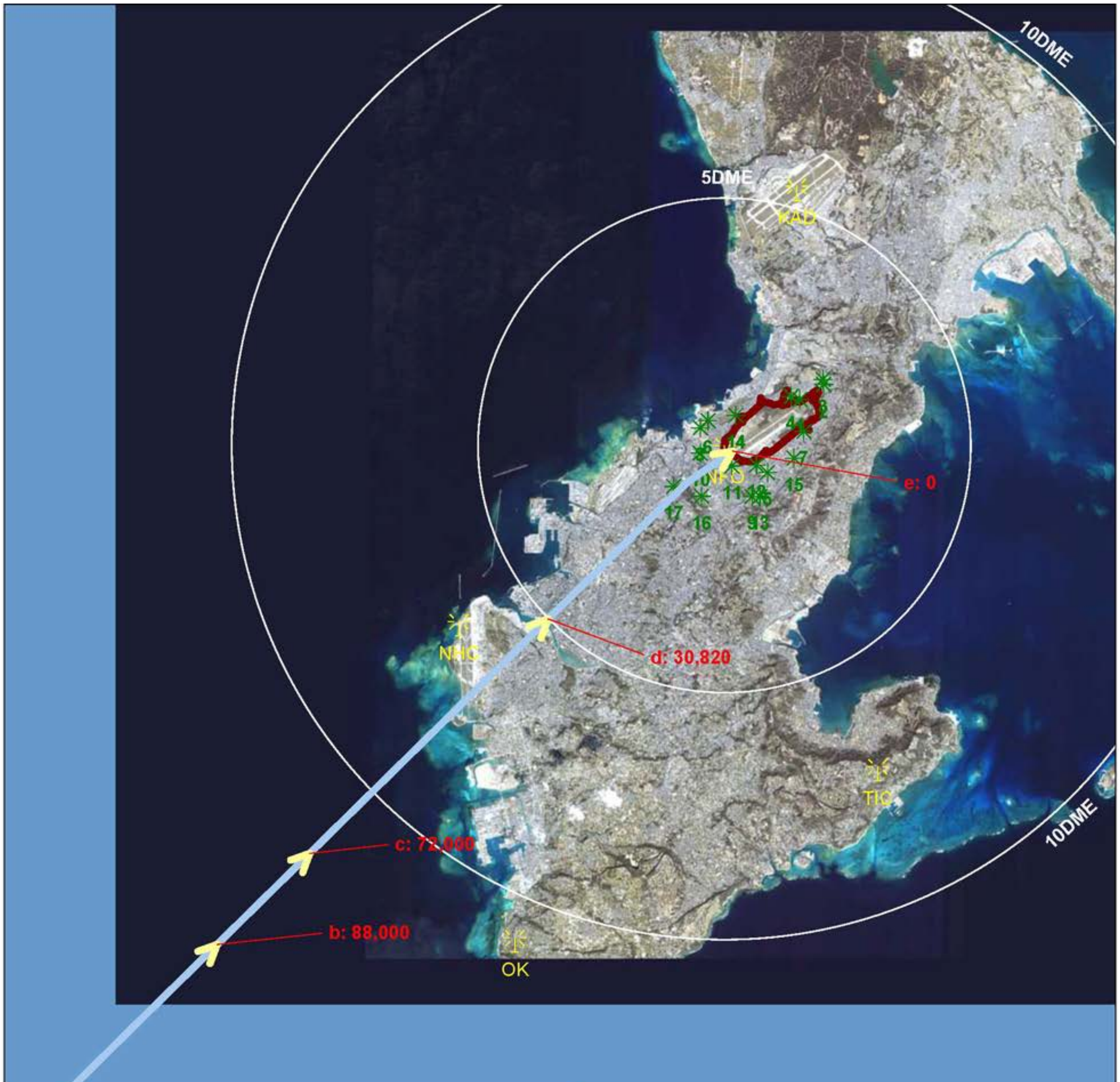
Point	Distance ft	Height ft	Power % NC	Speed kts
a	150,000	10,000 MSL	78 Intermediate	350
b	88,000	3,000 MSL	90 Cruise	300
c	72,000	2,000 MSL	86 Approach	250
d	30,820	2,000 MSL	86 Approach	135
e	0	50 AGL	86 Approach	135

Flight Profile 921 - Non Break Arrival
FA-18C/D
on Runway 06, Flight Track 06A4

0 10,000 20,000 30,000 40,000 50,000 60,000 70,000 80,000

Scale in Feet 1:259,000 (1 inch = 21,600 feet)

N



Flight Profile 931

Point	Distance ft	Height ft	Power % NC	Speed kts
a	150,000	10,000 MSL	78 Intermediate	350
b	88,000	3,000 MSL	90 Cruise	300
c	72,000	2,000 MSL	86 Approach	250
d	30,820	2,000 MSL	86 Approach	135
e	0	50 AGL	86 Approach	135

Flight Profile 931 - Non Break Arrival
FA-18C/D
on Runway 06, Flight Track 06A5

0 10,000 20,000 30,000 40,000 50,000 60,000 70,000 80,000

Scale in Feet 1:253,000 (1 inch = 21,100 feet)

Flight Profile 942

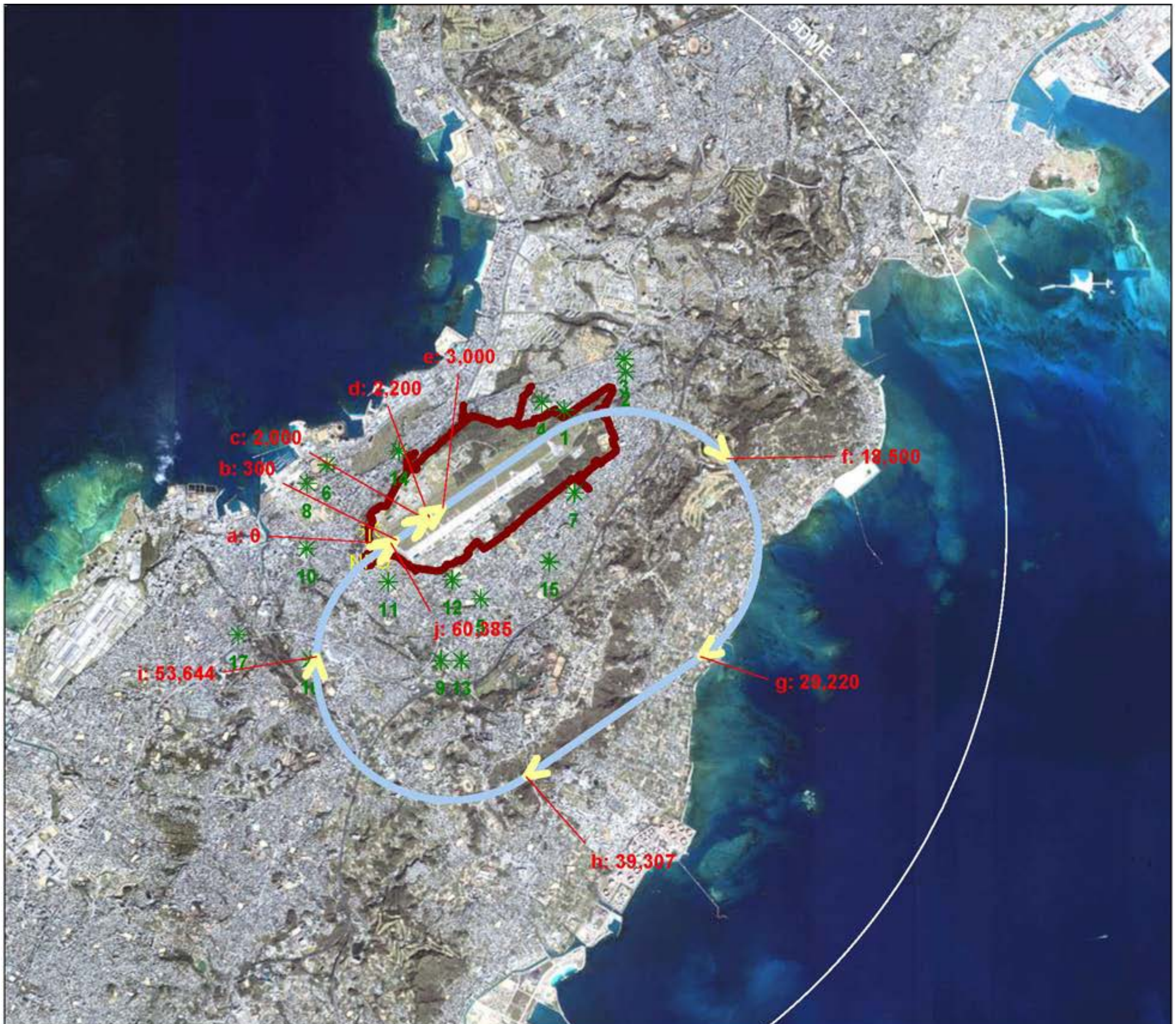
Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	200,000	10,000 MSL	85 Variable	300	
b	98,000	2,000 MSL	85 Variable	300	prior to crossing okinawa airport
c	43,445	2,000 MSL	73 Variable	350	At break; adjusted altitude up per course rule
d	29,811	1,500 MSL	73 Approach	150	Begin Downwind; adjusted altitude up per course rule
e	19,657	1,500 MSL	85 Approach	150	End Downwind; adjusted altitude up per course rule
f	4,230	311 AGL	85 Approach	135	
g	3,750	280 AGL	85 Approach	135	
h	0	50 AGL	85 Approach	135	

Flight Profile 942 - Break Arrival
FA-18C/D
on Runway 06, Flight Track 06O2A

0 10,000 20,000 30,000 40,000 50,000 60,000

Scale in Feet 1:188,000 (1 inch = 15,700 feet)

N



Flight Profile 951

Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	0	0 AGL	97 Takeoff	135	Using T/O vice approach due to extrapolation limits
b	300	0 AGL	97 Takeoff	137	Using T/O vice approach due to extrapolation limits
c	2,000	537 AGL	97 Takeoff	150	Using T/O vice approach due to extrapolation limits
d	2,200	600 AGL	85 Approach	150	
e	3,000	600 AGL	85 Approach	145	
f	18,500	1,000 MSL	85 Approach	145	
g	29,220	1,500 MSL	85 Approach	135	Begin Downwind
h	39,307	1,500 MSL	85 Approach	135	End Downwind
i	53,644	600 AGL	85 Approach	135	
j	60,385	50 AGL	85 Approach	135	

Flight Profile 951 - Touch and Go

FA-18C/D

on Runway 06, Flight Track 06T3

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000

Scale in Feet 1:103,000 (1 inch = 8,560 feet)

Flight Profile 501

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	20 AGL	5	0	0	0	87	5 knot start
b	3,000	188 AGL	71	0	0	0	77	
c	5,000	300 AGL	115	0	0	0	70	
d	9,614	756 AGL	145	0	0	-15	30	begin turn
e	13,992	1,000 AGL	170	0	7	0	0	2000 fpm climb; +7deg aoa for 2500 fpm climb; en
f	25,692	2,000 MSL	170	0	7	0	0	accel to 220 within 0.5nm; +7deg aoa for level crui
g	29,619	2,000 MSL	220	0	5	0	0	Hold 2K MSL until cleared by ATC; +5deg for lev
h	192,340	3,000 MSL	220	0	5	0	0	near end of track

MCAS Futenma - Flight Profile 501 - Departure
MV-22B
on Runway 06, Flight Track 06D1

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000

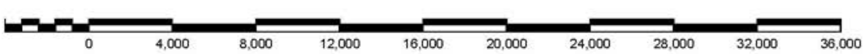
Scale in Feet 1:110,000 (1 inch = 9,190 feet)

N

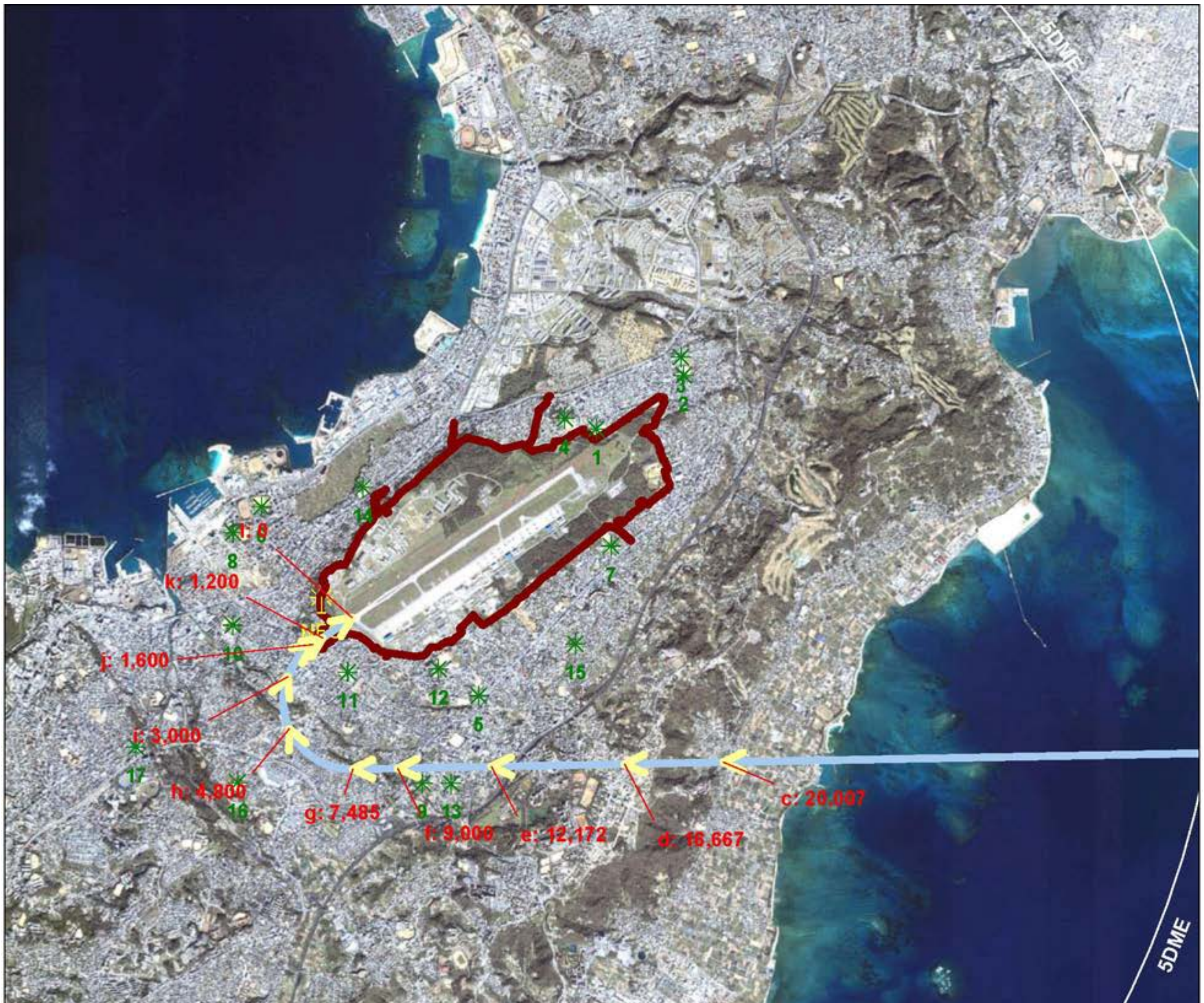
Flight Profile 505

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	20 AGL	5	0	0	0	87	5 knot start
b	3,000	188 AGL	71	0	0	0	77	
c	5,000	300 AGL	115	0	0	0	70	
d	9,614	756 AGL	145	0	0	0	30	
e	13,992	1,000 AGL	170	0	7	0	0	2000 fpm climb; +7deg aoa for 2500 fpm climb; en
f	25,692	2,000 MSL	170	0	7	-25	0	accel to 220 within 0.5nm; +7deg aoa for level crui
g	29,619	2,000 MSL	220	0	5	0	0	Hold 2K MSL until cleared by ATC; +5deg for lev
h	192,340	3,000 MSL	220	0	5	0	0	near end of track

MCAS Futenma - Flight Profile 505 - Departure
MV-22B
on Runway 06, Flight Track 06D5



Scale in Feet 1:110,000 (1 inch = 9,190 feet)



Flight Profile 521

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	120,000	7,000 MSL	220	0	5	0	0	+5deg aoa for level @220kts
b	95,488	7,000 MSL	220	0	5	0	0	
c	20,007	1,500 AGL	220	0	-1	0	0	begin 1800 fpm desc;
d	16,667	1,200 AGL	170	0	-1	0	10	700 fpm desc
e	12,172	1,000 AGL	150	0	-1	0	20	1800 fpm desc
f	9,000	500 AGL	80	0	0	0	79	400 fpm desc; 3deg gs
g	7,485	428 AGL	80	0	0	-25	80	begin turn
h	4,800	300 AGL	80	0	0	-25	80	
i	3,000	200 AGL	60	0	-1	-25	87	200 fpm desc; 2deg gs
j	1,600	161 AGL	52	0	5	0	90	end turn; 300 fpm desc; 6deg gs
k	1,200	150 AGL	50	0	5	0	90	
l	0	20 AGL	5	0	0	0	90	5 knot stop

MCAS Futenma - Flight Profile 521 - Non break arrival

MV-22B

on Runway 06, Flight Track 06A1

0 4,000 8,000 12,000 16,000 20,000 24,000

Scale in Feet 1:74,500 (1 inch = 6,210 feet)

N

Flight Profile 524

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	140,000	7,000 AGL	220	0	5	0	0	+5deg aoa for level @220kts
b	55,098	2,000 MSL	220	0	5	0	0	Hold 2K MSL over Naha airport
c	33,263	2,000 MSL	220	0	-1	0	0	At approx. 1 nm after NHC TACAN begin ~1800 f
d	16,667	1,200 AGL	170	0	-1	0	10	700 fpm desc
e	12,172	1,000 AGL	150	0	-1	0	20	1800 fpm desc
f	9,000	500 AGL	80	0	0	0	79	400 fpm desc; 3deg gs
g	4,800	300 AGL	80	0	0	0	80	400 fpm desc; 3deg gs
h	3,000	200 AGL	60	0	-1	0	87	200 fpm desc; 2deg gs
i	1,200	150 AGL	50	0	5	0	90	300 fpm desc; 6deg gs
j	0	20 AGL	5	0	0	0	90	5 knot stop

MCAS Futenma - Flight Profile 524 - Non break arrival
MV-22B
on Runway 06, Flight Track 06A4

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000

Scale in Feet 1:124,000 (1 inch = 10,300 feet)

N

Flight Profile 531

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	140,000	7,000 AGL	220	0	5	0	0	+5deg aoa for level @220kts
b	55,098	2,000 MSL	220	0	5	0	0	Hold 2K MSL over Naha airport
c	33,263	2,000 MSL	120	0	-1	0	60	At approx. 1 nm after NHC TACAN begin ~1800 f
d	16,667	1,200 AGL	120	0	-1	0	60	700 fpm desc
e	12,172	1,000 AGL	120	0	-1	0	60	1800 fpm desc
f	9,000	500 AGL	80	0	0	-20	79	begin turn; 400 fpm desc; 3deg gs
g	4,800	300 AGL	80	0	0	0	80	end turn; 400 fpm desc; 3deg gs
h	3,000	200 AGL	60	0	-1	0	87	200 fpm desc; 2deg gs
i	1,200	150 AGL	50	0	5	0	90	300 fpm desc; 6deg gs
j	0	20 AGL	5	0	0	0	90	5 knot stop

MCAS Futenma - Flight Profile 531 - TACAN

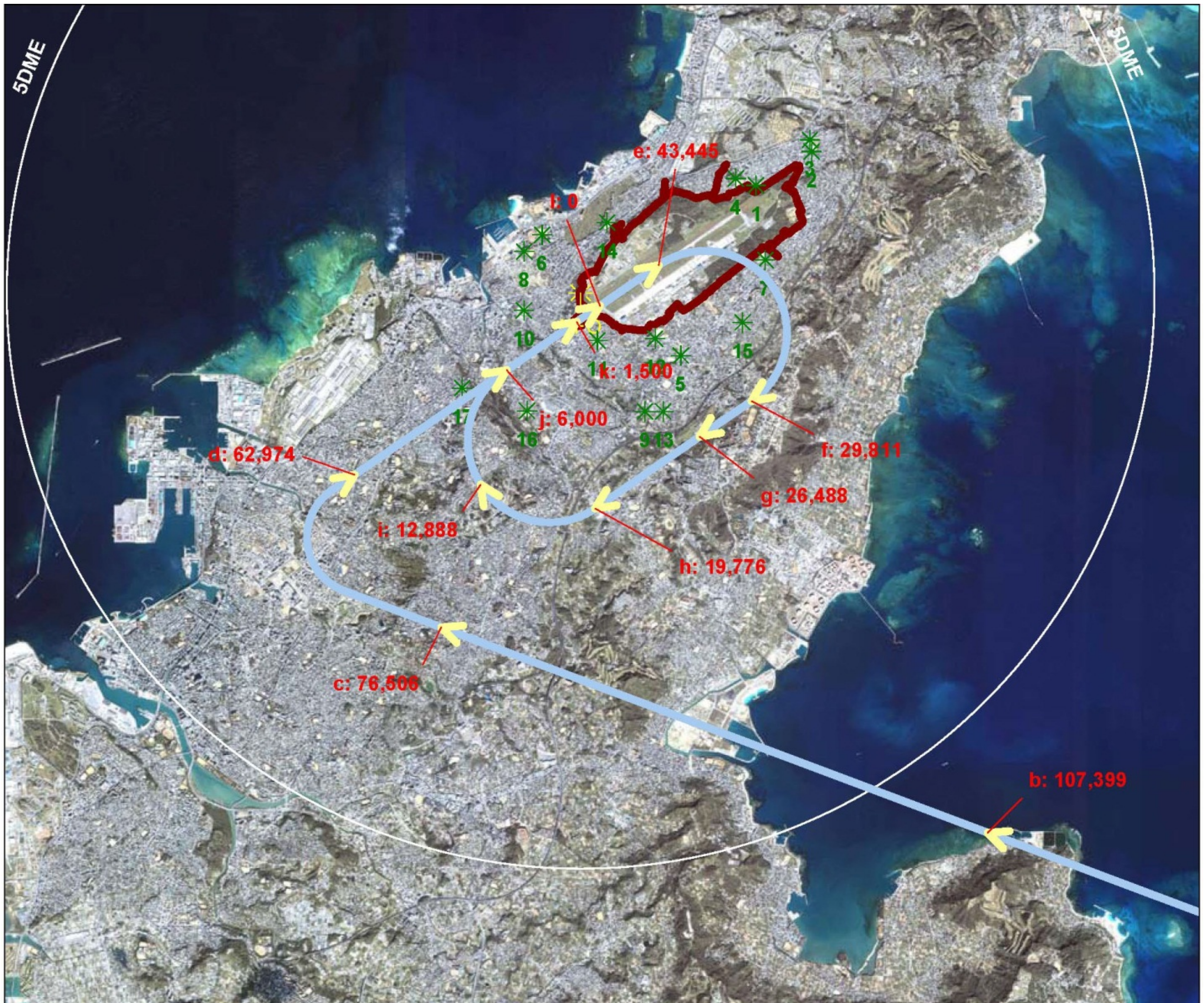
MV-22B

on Runway 06, Flight Track 06A5

0 10,000 20,000 30,000 40,000 50,000

Scale in Feet 1:165,000 (1 inch = 13,800 feet)

N



Flight Profile 542B

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	150,000	5,000 MSL	250	0	0	0	0	near end of track
b	107,399	2,000 MSL	250	0	0	0	0	2K MSL over Naha airport
c	76,506	2,000 MSL	250	0	0	0	0	
d	62,974	2,000 MSL	250	0	0	0	0	
e	43,445	2,000 MSL	250	0	0	-45	0	break
f	29,811	1,500 MSL	190	0	0	0	0	begin downwind
g	26,488	1,500 MSL	185	0	0	0	0	1/3 of downwind leg
h	19,776	1,500 MSL	170	0	0	-30	0	end of downwind
i	12,888	500 AGL	120	0	7	-30	60	90 deg
j	6,000	350 AGL	95	0	7	0	75	~1nm out
k	1,500	300 AGL	80	0	10	0	80	1500ft out
l	0	20 AGL	5	0	10	0	90	cross threshold

MCAS Futenma - Flight Profile 542B - Break arrival
MV-22B
on Runway 06, Flight Track 06O2B

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000

Scale in Feet 1:117,000 (1 inch = 9,730 feet)

N

Flight Profile 552

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	20 AGL	5	0	0	0	87	5 kt start
b	250	30 AGL	45	0	-6	0	75	
c	750	150 AGL	65	0	0	0	60	
d	2,000	300 AGL	115	0	3	0	60	
e	3,800	520 AGL	115	0	1	25	60	begin turn
f	5,000	1,000 MSL	115	0	10	25	60	reach pattern altitude
g	7,256	1,000 MSL	115	0	1	0	60	end turn; begin downwind
h	11,056	1,000 MSL	115	0	3	25	60	begin turn; end downwind
i	12,784	300 AGL	80	0	0	25	80	
j	13,400	200 AGL	50	0	0	25	89	Interpolated; end turn
k	14,512	20 AGL	5	0	0	0	90	

MCAS Futenma - Flight Profile 552 - Touch and Go
MV-22B
on Runway 06CAL, Flight Track 06T2

0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000 9,000

Scale in Feet 1:27,200 (1 inch = 2,270 feet)

N

Flight Profile 553

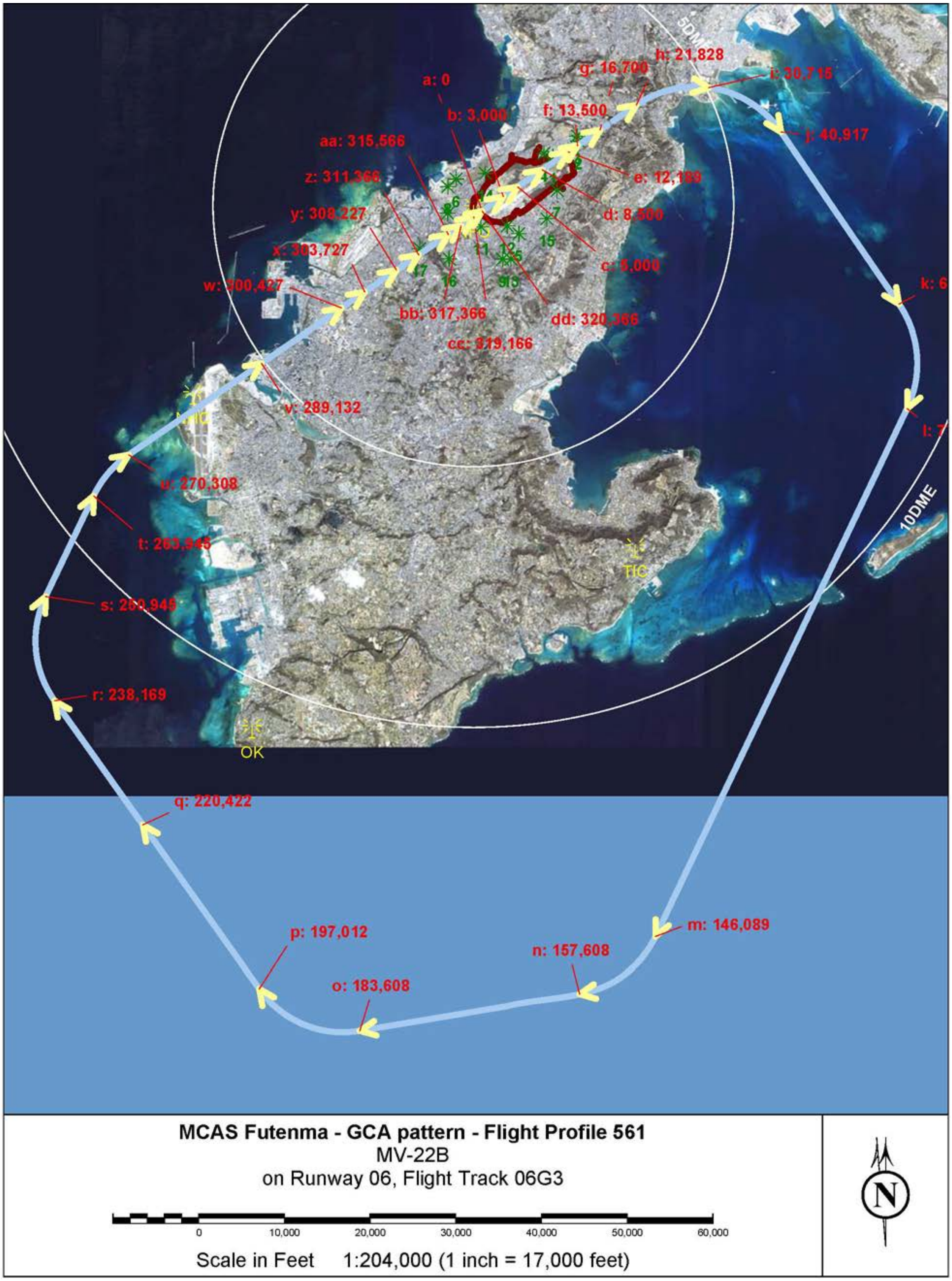
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	20 AGL	5	0	0	0	84	5 kt start
b	250	30 AGL	45	0	-6	0	75	
c	750	150 AGL	65	0	0	0	60	
d	2,000	450 AGL	110	0	3	0	30	
e	9,114	1,000 MSL	150	0	7	-25	0	begin turn to downwind
f	29,220	1,500 MSL	150	0	7	0	0	end turn; begin downwind
g	39,307	1,500 MSL	150	0	3	-25	0	begin turn; end downwind
h	44,333	750 AGL	150	0	3	-25	30	1/4 thru turn
i	49,360	500 AGL	135	0	0	-25	60	1/2 thru turn
j	54,425	300 AGL	60	0	0	-25	87	3/4 thru turn
k	58,811	150 AGL	50	0	0	0	90	end turn
l	60,385	20 AGL	5	0	0	0	90	

MCAS Futenma - Flight Profile 553 - Touch and Go
MV-22B
on Runway 06, Flight Track 06T3

0 4,000 8,000 12,000 16,000 20,000 24,000

Scale in Feet 1:78,800 (1 inch = 6,570 feet)

N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b: 3,000
c: 5,000
d: 8,500
e: 12,189
f: 13,500
g: 16,700
h: 21,828
i: 30,716
j: 40,917
m: 146,089
n: 157,608
o: 183,608
p: 197,012
q: 220,422
r: 238,169
s: 250,945
t: 263,945
u: 270,308
v: 289,132
w: 300,427
x: 303,727
y: 308,227
z: 311,366
aa: 315,566
bb: 317,366
cc: 319,166
dd: 320,366
5DME
10DME
TIC
OK
MCAS Futenma - GCA pattern - Flight Profile 561
MV-22B
on Runway 06, Flight Track 06G3
0
10,000
20,000
30,000
40,000
50,000
60,000
Scale in Feet 1:204,000 (1 inch = 17,000 feet)
N

Flight Profile Summary

Profile Segments

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	20 AGL	5	0	0	0	87	5 knot start
b	3,000	188 AGL	71	0	0	0	77	
c	5,000	300 AGL	115	0	0	0	70	
d	8,500	550 AGL	140	0	0	0	60	begin turn to crosswind leg; interpolate
e	12,189	860 AGL	162	0	0	0	11	
f	13,500	1,000 AGL	170	0	6	0	0	2000 fpm climb; +7deg aoa for 2500 fpm climb
g	16,700	1,536 AGL	170	0	6	0	0	
h	21,828	2,000 MSL	170	0	6	-20	0	begin turn
i	30,715	3,000 MSL	220	0	5	-20	0	
j	40,917	3,000 MSL	220	0	5	0	0	end turn
k	65,221	3,000 MSL	220	0	5	-20	0	begin turn to downwind
l	77,947	3,000 MSL	220	0	5	0	0	end turn; Begin downwind
m	146,089	3,000 MSL	220	0	5	-20	0	begin turn
n	157,608	3,000 MSL	220	0	5	0	0	end turn
o	183,608	3,000 MSL	220	0	5	-20	0	begin turn
p	197,012	3,000 MSL	220	0	5	0	0	end turn
q	220,422	3,000 MSL	220	0	5	0	0	begin descent down to 2000 ft MSL
r	238,169	2,000 MSL	220	0	5	-20	0	begin turn
s	250,945	2,000 MSL	220	0	5	0	0	end turn
t	263,945	2,000 MSL	220	0	5	-20	0	begin turn
u	270,308	2,000 MSL	220	0	5	0	0	end turn
v	289,132	2,000 MSL	220	0	-1	0	0	begin descent
w	300,427	1,500 AGL	220	0	-1	0	0	continue 1800 fpm desc; 20kft out
x	303,727	1,200 AGL	170	0	-1	0	10	700 fpm desc; 16600 ft out
y	308,227	1,000 AGL	150	0	-1	0	20	1800 fpm desc; 2nm out
z	311,366	500 AGL	80	0	0	0	79	400 fpm desc; 3 deg gs; 9kft out
aa	315,566	300 AGL	80	0	0	0	80	400 fpm desc; 3 deg gs; 4800 ft out
bb	317,366	200 AGL	60	0	-1	0	87	200 fpm desc; 2deg gs; 3kft out
cc	319,166	150 AGL	50	0	5	0	90	300 fpm desc; 6deg gs; 1200 ft out
dd	320,366	20 AGL	5	0	0	0	90	5 kt stop; end of track

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Appendix B-2: Ie Shima Training Facility

Flight Profile AH1A1

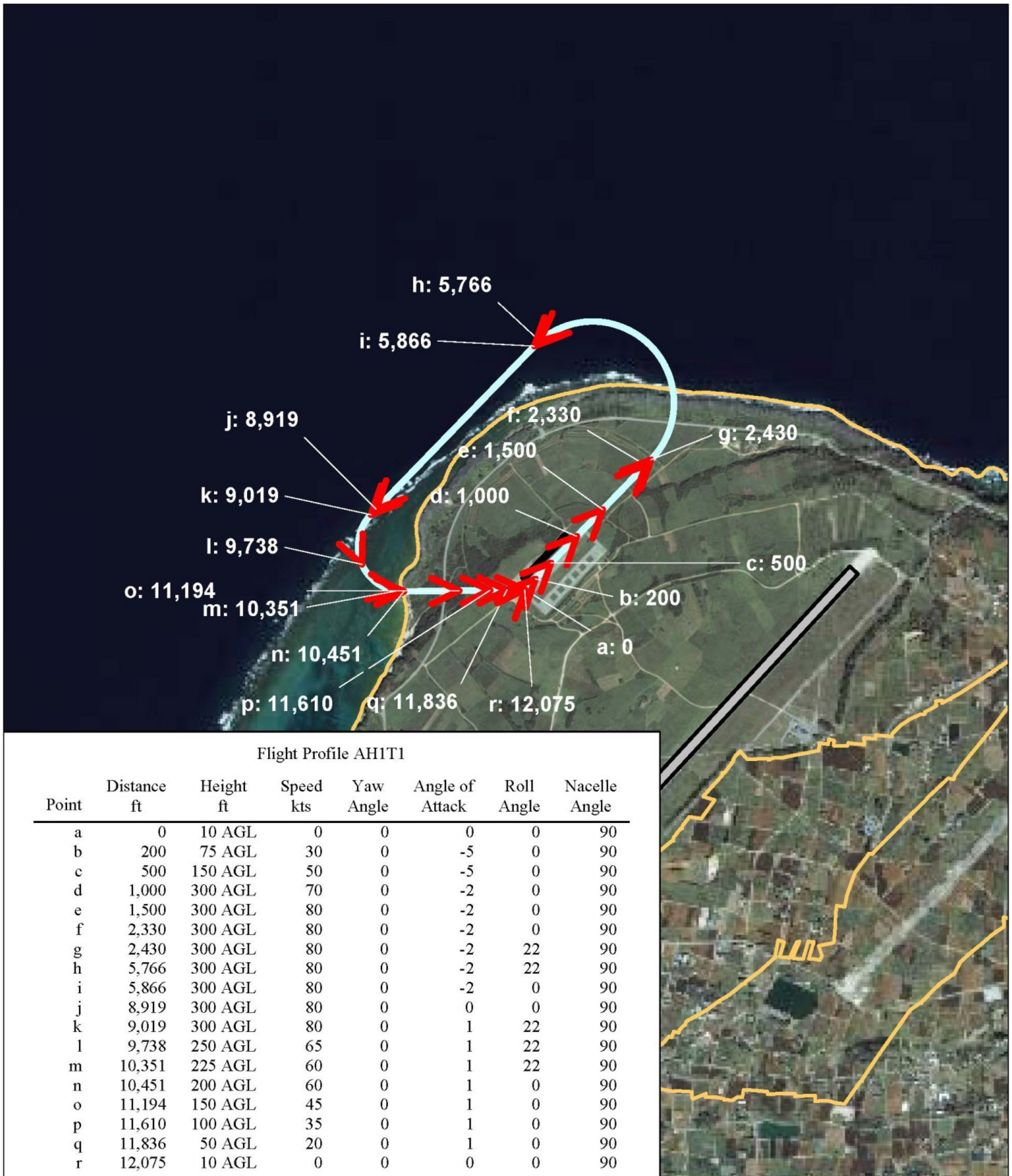
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	40,000	500 MSL	100	0	0	0	90	
b	16,665	500 MSL	100	0	-2	0	90	begin roll
c	16,565	500 MSL	100	0	-2	25	90	begin turn left
d	14,148	500 MSL	100	0	-2	25	90	end turn; begin roll right
e	14,048	500 MSL	100	0	-2	-20	90	begin turn right to follow coast
f	8,160	500 MSL	100	0	-2	-25	90	begin tighter right turn
g	3,300	500 MSL	91	0	-1	-25	90	begin to roll out
h	3,200	500 MSL	90	0	-1	0	90	
i	2,000	465 MSL	80	0	-1	25	90	
j	500	365 AGL	60	0	0	25	90	
k	400	315 AGL	50	0	0	0	90	end turn; begin final
l	300	265 AGL	40	0	0	0	90	
m	120	215 MSL	20	0	2	0	90	
n	60	190 MSL	10	0	0	0	90	
o	0	180 MSL	0	0	0	0	90	

Ie Shima - Flight Profile AH1A1 - Non-Break Arrival
Based AH-1W
on Runway 05, Flight Track 05A1

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000

Scale in Feet 1:45,800 (1 inch = 3,820 feet)

N



Flight Profile AH1T1

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	0	10 AGL	0	0	0	0	90
b	200	75 AGL	30	0	-5	0	90
c	500	150 AGL	50	0	-5	0	90
d	1,000	300 AGL	70	0	-2	0	90
e	1,500	300 AGL	80	0	-2	0	90
f	2,330	300 AGL	80	0	-2	0	90
g	2,430	300 AGL	80	0	-2	22	90
h	5,766	300 AGL	80	0	-2	22	90
i	5,866	300 AGL	80	0	-2	0	90
j	8,919	300 AGL	80	0	0	0	90
k	9,019	300 AGL	80	0	1	22	90
l	9,738	250 AGL	65	0	1	22	90
m	10,351	225 AGL	60	0	1	22	90
n	10,451	200 AGL	60	0	1	0	90
o	11,194	150 AGL	45	0	1	0	90
p	11,610	100 AGL	35	0	1	0	90
q	11,836	50 AGL	20	0	1	0	90
r	12,075	10 AGL	0	0	0	0	90

Ie Shima - Flight Profile AH1T1 - LHA T&G
Based AH-1W
on Runway 05LHA, Flight Track 05LH - LH Boat

0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000

Scale in Feet 1:24,900 (1 inch = 2,080 feet)

N

Flight Profile AH1D1

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	170 MSL	0	0	0	0	90	
b	500	190 MSL	50	0	-5	0	90	
c	1,000	225 MSL	70	0	-5	0	90	
d	3,000	500 MSL	80	0	-5	0	90	
e	6,900	500 MSL	120	0	0	0	90	begin roll to left
f	7,000	500 MSL	120	0	0	25	90	begin left turn
g	10,840	500 MSL	120	0	0	20	90	continue left turn and follow coast
h	32,260	500 MSL	120	0	0	20	90	begin to roll right
i	32,360	500 MSL	120	0	0	-25	90	begin right turn
j	34,703	500 MSL	120	0	0	-25	90	begin to roll level
k	34,803	500 MSL	120	0	0	0	90	wings level; end turn
l	50,000	500 MSL	120	0	0	0	90	

Ie Shima - Flight Profile AH1D1 - Departure
Based AH-1W
on Runway 05, Flight Track 05D1

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000

Scale in Feet 1:50,000 (1 inch = 4,170 feet)

Flight Profile CH46A1

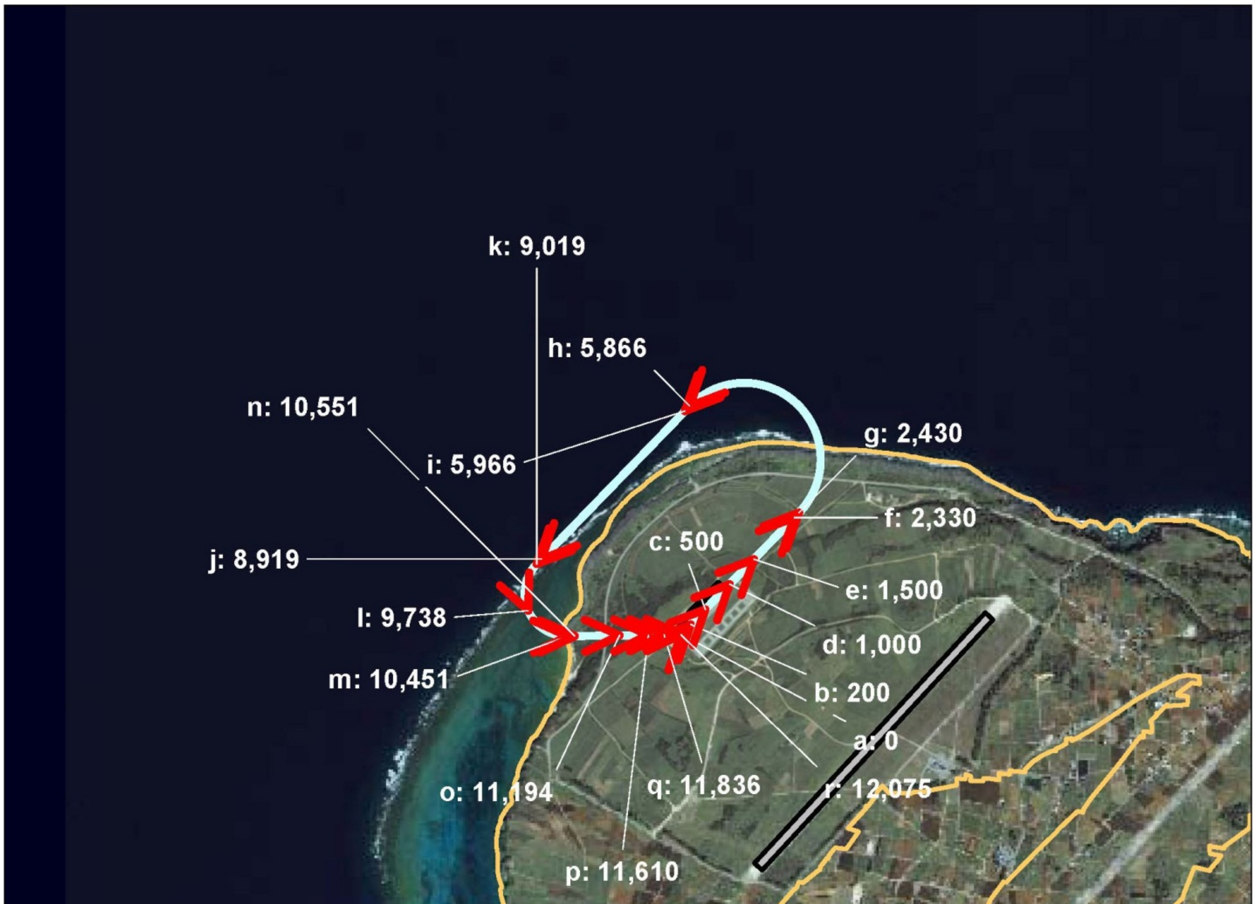
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	40,000	500 MSL	110	0	0	0	90	
b	16,765	500 MSL	110	0	0	0	90	begin rol left
c	16,665	500 MSL	110	0	0	25	90	begin turn left
d	14,148	500 MSL	110	0	0	25	90	roll out and roll right
e	14,048	500 MSL	110	0	0	-20	90	begin turn to follow the coast
f	8,660	500 MSL	110	0	0	-25	90	roll tighter
g	4,157	500 MSL	110	0	0	-25	90	end turn; roll out
h	2,783	375 MSL	110	0	0	0	90	begin roll left
i	2,683	365 MSL	110	0	0	25	90	begin turn left
j	1,000	265 MSL	60	0	5	25	90	
k	410	245 MSL	41	0	0	25	90	begin roll level
l	400	245 MSL	40	0	0	0	90	begin final
m	0	185 MSL	5	0	0	0	90	

Ie Shima - Flight Profile CH46A1 - Non-Break Arrival

Based CH46E

on Runway 05, Flight Track 05A1

Scale in Feet 1:37,700 (1 inch = 3,140 feet)



Flight Profile CH46T1

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	10 AGL	0	0	0	0	90	Deleted Hover @ 20ft
b	200	75 AGL	30	0	-5	0	90	
c	500	150 AGL	50	0	-5	0	90	
d	1,000	300 AGL	70	0	0	0	90	
e	1,500	300 AGL	80	0	0	0	90	
f	2,330	300 AGL	80	0	5	0	90	
g	2,430	300 AGL	80	0	5	25	90	
h	5,866	300 AGL	80	0	5	25	90	
i	5,966	300 AGL	80	0	5	0	90	
j	8,919	300 AGL	80	0	5	0	90	
k	9,019	300 AGL	80	0	5	25	90	
l	9,738	250 AGL	65	0	8	25	90	
m	10,451	225 AGL	60	0	9	25	90	
n	10,551	200 AGL	60	0	9	0	90	
o	11,194	150 AGL	45	0	9	0	90	
p	11,610	100 AGL	35	0	9	0	90	
q	11,836	50 AGL	20	0	9	0	90	
r	12,075	10 AGL	0	0	0	0	90	Deleted Hover @ 10ft

Ie Shima - Flight Profile CH46T1 - LHA T&G

Based CH46E

on Runway 05LHA, Flight Track 05LH - LH Boat

0 2,000 4,000 6,000 8,000 10,000

Scale in Feet 1:33,000 (1 inch = 2,750 feet)

N

Flight Profile CH46D1

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	170 MSL	0	0	0	0	90	
b	200	185 MSL	20	0	-5	0	90	
c	2,000	265 MSL	105	0	-5	0	90	
d	6,900	500 MSL	110	0	0	0	90	begin roll left
e	7,000	500 MSL	110	0	0	25	90	begin turn
f	10,840	500 MSL	110	0	0	20	90	follow coast
g	32,360	500 MSL	110	0	0	20	90	begin to roll out
h	32,460	500 MSL	110	0	0	-25	90	begin turn
i	34,803	500 MSL	110	0	0	-25	90	begin to roll out
j	34,903	500 MSL	110	0	0	0	90	wing level; end turn
k	50,000	500 MSL	110	0	0	0	90	

Ie Shima - Flight Profile CH46D1 - Departure
Based CH46E
on Runway 05, Flight Track 05D1

Scale in Feet 1:58,000 (1 inch = 4,830 feet)

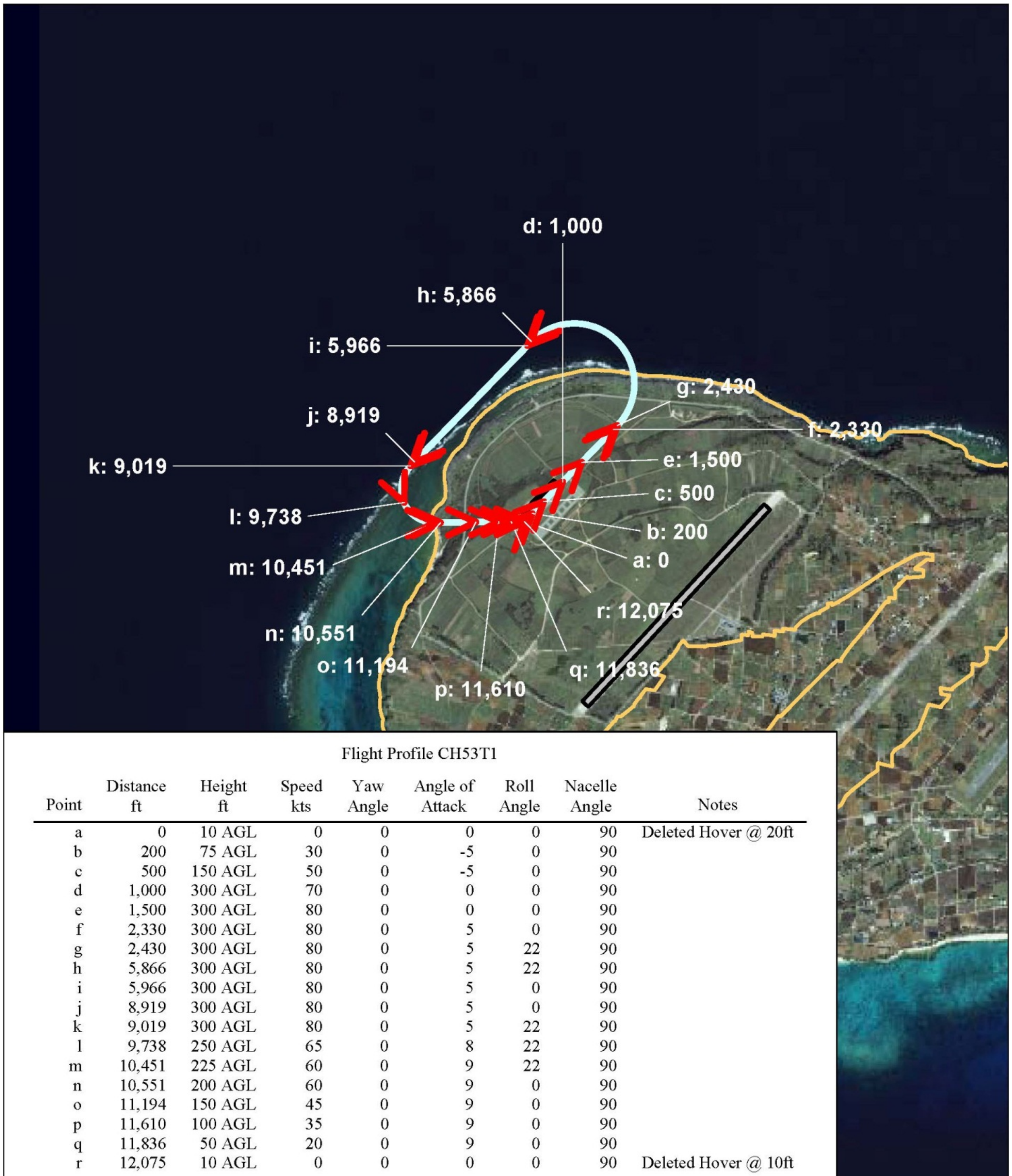
Flight Profile CH53A1

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	40,000	500 MSL	150	0	0	0	90	
b	16,765	500 MSL	150	0	0	0	90	begin roll
c	16,665	500 MSL	150	0	0	25	90	begin turn
d	14,140	500 MSL	150	0	0	25	90	end turn; roll level
e	14,048	500 MSL	80	0	5	-20	90	begin right turn to follow coast
f	8,660	500 MSL	80	0	5	-25	90	turn tighter
g	4,257	500 MSL	80	0	5	-25	90	roll level
h	4,157	500 MSL	80	0	5	0	90	wings level
i	2,783	445 MSL	60	0	5	0	90	begin roll left
j	2,683	435 MSL	60	0	5	25	90	begin turn
k	1,000	265 MSL	60	0	5	25	90	
l	500	240 MSL	60	0	5	25	90	begin to roll out
m	400	235 MSL	60	0	5	0	90	wings level
n	0	185 MSL	0	0	0	0	90	

Ie Shima - Flight Profile CH53A1 - Non-Break Arrival
Based CH53E
on Runway 05, Flight Track 05A1

0 2,000 4,000 6,000 8,000 10,000

Scale in Feet 1:32,600 (1 inch = 2,720 feet)



Flight Profile CH53T1

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	10 AGL	0	0	0	0	90	Deleted Hover @ 20ft
b	200	75 AGL	30	0	-5	0	90	
c	500	150 AGL	50	0	-5	0	90	
d	1,000	300 AGL	70	0	0	0	90	
e	1,500	300 AGL	80	0	0	0	90	
f	2,330	300 AGL	80	0	5	0	90	
g	2,430	300 AGL	80	0	5	22	90	
h	5,866	300 AGL	80	0	5	22	90	
i	5,966	300 AGL	80	0	5	0	90	
j	8,919	300 AGL	80	0	5	0	90	
k	9,019	300 AGL	80	0	5	22	90	
l	9,738	250 AGL	65	0	8	22	90	
m	10,451	225 AGL	60	0	9	22	90	
n	10,551	200 AGL	60	0	9	0	90	
o	11,194	150 AGL	45	0	9	0	90	
p	11,610	100 AGL	35	0	9	0	90	
q	11,836	50 AGL	20	0	9	0	90	
r	12,075	10 AGL	0	0	0	0	90	Deleted Hover @ 10ft

Ie Shima - Flight Profile CH53T1 - LHA T&G
Based CH53E
on Runway 05LHA, Flight Track 05LH - LH Boat

Scale in Feet 1:33,800 (1 inch = 2,820 feet)

Flight Profile CH53D1

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	170 MSL	0	0	0	0	90	
b	200	185 MSL	20	0	-5	0	90	
c	2,000	365 MSL	105	0	-5	0	90	
d	6,900	500 MSL	110	0	-5	0	90	begin roll
e	7,000	500 MSL	110	0	-5	25	90	begin turn
f	10,840	500 MSL	120	0	0	25	90	follow coast
g	32,260	500 MSL	120	0	0	20	90	begin roll out
h	32,360	500 MSL	120	0	0	-25	90	begin right turn
i	34,703	500 MSL	120	0	0	-25	90	begin to roll level
j	34,803	500 MSL	120	0	0	0	90	wings level
k	50,000	500 MSL	120	0	0	0	90	

Ie Shima - Flight Profile CH53D1 - Departure

Based CH53E

on Runway 05, Flight Track 05D1

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000

Scale in Feet 1:45,400 (1 inch = 3,790 feet)

N

Flight Profile UH1A1

Point	Distance ft	Height ft	Power % RPM	Notes
a	40,000	500 MSL	Flt at 80 kts	
b	30,000	500 MSL	Flt at 80 kts	
c	10,000	500 MSL	Flt at 80 kts	begin descent
d	1,000	365 MSL	Flt at 80 kts	
e	0	185 MSL	Flt at 80 kts	

Ie Shima - Flight Profile UH1A1 - Non-Break Arrival
Based UH-1N
on Runway 05, Flight Track 05A1

0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000

Scale in Feet 1:24,500 (1 inch = 2,040 feet)

Flight Profile UH1T1

Point	Distance ft	Height ft	Power % RPM	Notes
a	0	10 AGL	Flt at 80 kts	Deleted Hover @ 5ft.
b	200	50 AGL	Flt at 80 kts	
c	500	150 AGL	Flt at 80 kts	
d	1,000	300 AGL	Flt at 80 kts	
e	1,500	300 AGL	Flt at 80 kts	
f	2,430	300 AGL	Flt at 80 kts	
g	5,866	300 AGL	Flt at 80 kts	
h	9,019	300 AGL	Flt at 80 kts	
i	9,738	250 AGL	Flt at 80 kts	
j	10,451	200 AGL	Flt at 80 kts	
k	11,194	125 AGL	Flt at 80 kts	
l	11,601	50 AGL	Flt at 80 kts	
m	12,075	10 AGL	Flt at 80 kts	Deleted Hover @ 10ft.

Ie Shima - Flight Profile UH1T1 - LHA T&G
Based UH-1N
on Runway 05LHA, Flight Track 05LH - LH Boat

0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000

Scale in Feet 1:23,800 (1 inch = 1,980 feet)

N

Flight Profile UH1D1

Point	Distance ft	Height ft	Power % RPM	Notes
a	0	0 AGL	Flt at 80 kts	
b	200	185 MSL	Flt at 80 kts	
c	2,000	365 MSL	Flt at 80 kts	
d	7,000	500 MSL	Flt at 80 kts	level off at 500ft MSL
e	50,000	500 MSL	Flt at 80 kts	

Ie Shima - Flight Profile UH1D1 - Departure
Based UH-1N
on Runway 05, Flight Track 05D1

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000

Scale in Feet 1:42,600 (1 inch = 3,550 feet)

Flight Profile V22A1

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	40,000	1,000 MSL	220	0	5	0	0	
b	16,765	1,000 MSL	220	0	5	0	0	begin roll left
c	16,665	1,000 MSL	220	0	5	30	0	begin turn
d	14,140	1,000 MSL	220	0	-1	30	0	begin roll right
e	14,048	1,000 MSL	170	0	-1	-20	10	begin turn to follow coast
f	12,172	1,000 MSL	150	0	-1	-20	20	1800 fpm desc
g	8,660	500 MSL	80	0	0	-35	79	400 fpm desc; 3deg gs
h	4,257	438 MSL	75	0	0	-35	80	begin roll level
i	4,157	430 MSL	74	0	0	0	80	
j	2,783	345 MSL	58	0	1	0	87	begin roll left
k	2,683	345 MSL	57	0	1	40	88	
l	1,200	315 MSL	50	0	5	40	90	300 fpm desc; 6deg gs
m	500	235 MSL	25	0	5	40	90	begin roll level
n	400	225 MSL	20	0	5	0	90	wings level
o	0	185 MSL	5	0	0	0	90	5 knot stop

Ie Shima - Flight Profile V22A1 - Non-Break Arrival

Based MV22B

on Runway 05, Flight Track 05A1

Scale in Feet 1:32,300 (1 inch = 2,690 feet)

Flight Profile V22T1

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	54 AGL	30	0	0	0	85	
b	500	100 AGL	30	0	0	0	75	
c	2,330	195 AGL	80	0	0	0	75	begin roll
d	2,430	200 AGL	80	0	0	25	75	reach roll angle of ~25 deg; begin turn
e	4,149	300 AGL	80	0	0	25	75	crosswind; reach pattern altitude
f	5,766	300 AGL	80	0	0	25	75	begin roll to wings level
g	5,866	300 AGL	80	0	0	0	75	wings level; begin downwind
h	8,919	300 AGL	80	0	0	0	75	begin roll
i	9,019	300 AGL	80	0	0	25	75	End downwind; reach roll angle of ~25 deg and begi
j	9,735	200 AGL	60	0	0	25	80	
k	10,351	157 AGL	50	0	0	25	85	begin to roll to wings level
l	10,451	150 AGL	50	0	0	0	85	wings level; begin final
m	12,075	10 AGL	0	0	0	0	90	

Ie Shima - Flight Profile V22T1 - LHA T&G

Based MV22B

on Runway 05LHA, Flight Track 05LH - LH Boat

0 1,000 2,000 3,000 4,000 5,000 6,000

Scale in Feet 1:18,700 (1 inch = 1,560 feet)

N

Flight Profile V22D1

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	170 MSL	5	0	0	0	87	5 knot start
b	3,000	353 MSL	71	0	0	0	77	
c	5,000	465 MSL	115	0	0	0	70	
d	6,900	670 MSL	129	0	0	0	41	begin roll
e	7,000	675 MSL	130	0	0	25	40	begin turn
f	10,840	1,000 MSL	170	0	7	25	0	2000 fpm climb; +7deg aoa for 2500 fpm climb
g	23,800	2,000 MSL	170	0	7	25	0	accel to 220 within 0.5nm; +7deg aoa for level crui
h	30,715	2,000 MSL	220	0	5	25	0	
i	32,260	2,000 MSL	220	0	5	25	0	begin roll level then right
j	32,360	2,000 MSL	220	0	5	-25	0	begin right turn
k	34,703	2,000 MSL	220	0	5	-25	0	begin to roll level
l	34,803	2,000 MSL	220	0	5	0	0	wings level
m	50,000	2,000 MSL	220	0	5	0	0	

Ie Shima - Flight Profile V22D1 - Departure
Based MV22B
on Runway 05, Flight Track 05D1

Scale in Feet 1:55,300 (1 inch = 4,610 feet)

Flight Profile AV8BA1

Point	Distance ft	Height ft	Power % RPM	Speed kts	Notes
a	60,000	1,000 AGL	85 Variable	350	
b	36,600	800 AGL	85 Variable	350	cross ship at break speed and altitude
c	32,161	800 AGL	85 Variable	350	break at 350kts, 800 ft AGL
d	22,736	800 AGL	85 Variable	200	begin downwind; descend from break altitude to 600 ft and slo
e	18,089	600 AGL	95 STOL Approach 60deg	120	Abeam of intended landing point; nozzles 50-60 degrees
f	9,118	450 AGL	95 STOL Approach 60deg	110	@90 descend thru 450 ft
g	4,500	350 AGL	107 STOL Approach 75deg	80	begin final
h	3,300	300 AGL	107 STOL Approach 75deg	70	Groove, intercept 3 deg glide slope, continue slowing
i	0	120 AGL	111 T/O 81dg&Stol	10	100 ft abeam of landing point, level cross

Ie Shima - Flight Profile AV8BA1 - Overhead Break
Based AV-8B
on Runway 05VL, Flight Track 05LHA1 - Break Arrival to LHA

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000

Scale in Feet 1:42,200 (1 inch = 3,520 feet)

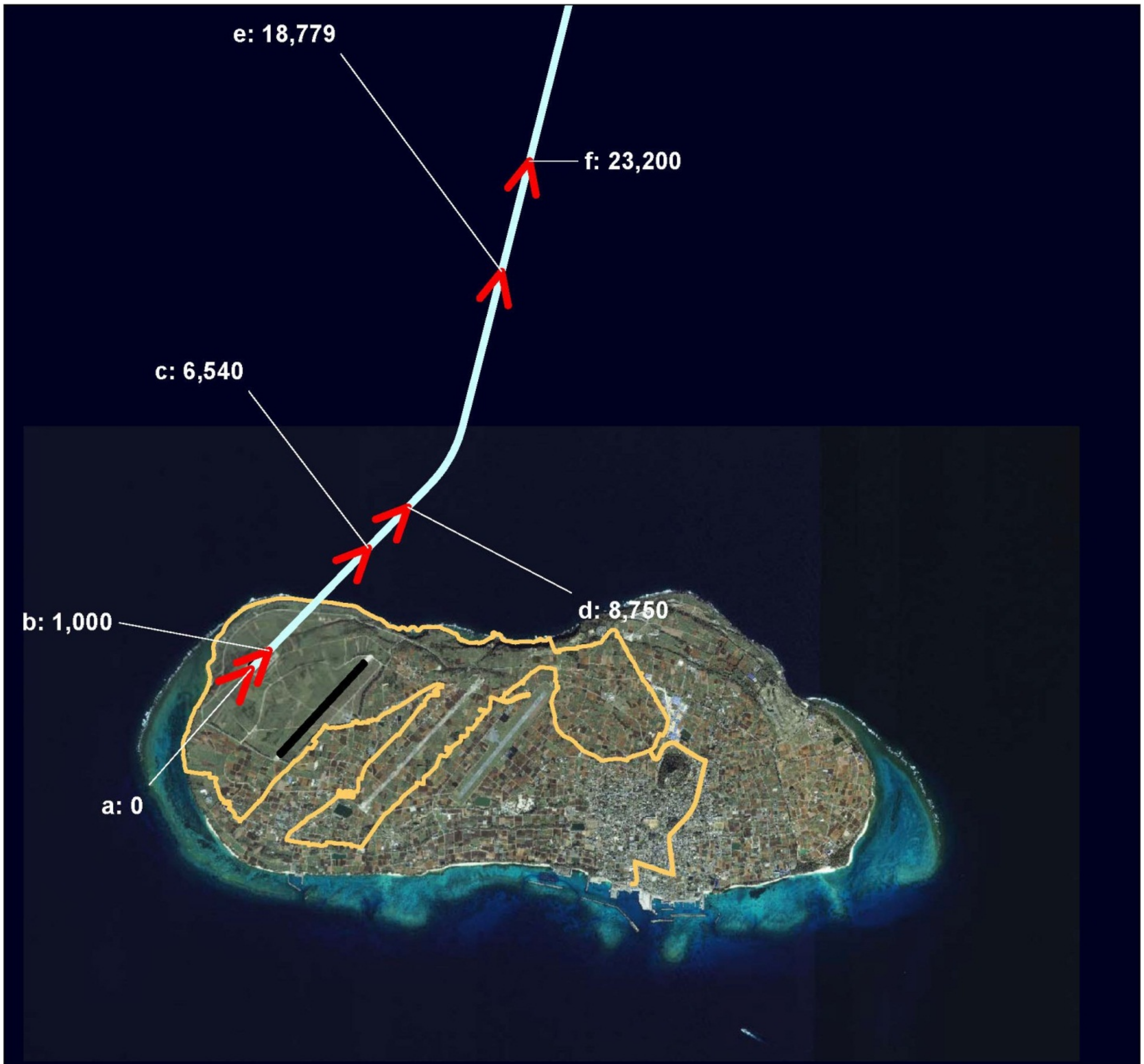
N

Flight Profile AV8BT1

Point	Distance ft	Height ft	Power % RPM	Speed kts	Notes
a	0	0 AGL	111 Variable	0	takeoff
b	4,600	300 AGL	111 Variable	100	reach 300 ft AGL prior to start of turn
c	9,313	450 AGL	111 Variable	120	climb thru 450 ft
d	14,025	600 AGL	88 Variable	120	begin downwind; pattern altitude of 600 ft AGL
e	18,751	600 AGL	95 STOL Approach 60deg	120	Abeam of intended landing point; nozzles 50-60 degrees
f	27,643	450 AGL	95 STOL Approach 60deg	110	@90 descend thru 450 ft
g	32,261	350 AGL	107 STOL Approach 75deg	80	begin final
h	33,300	300 AGL	107 STOL Approach 75deg	70	Groove, intercept 3 deg glide slope, continue slowing
i	36,761	120 AGL	111 T/O 81dg&Stol	10	100 ft abeam of landing point, level cross

Ie Shima - Flight Profile AV8BT1 - FCLP
Based AV-8B
on Runway 05LHA, Flight Track 05LHF

Scale in Feet 1:57,900 (1 inch = 4,820 feet)



Flight Profile AV8BD1

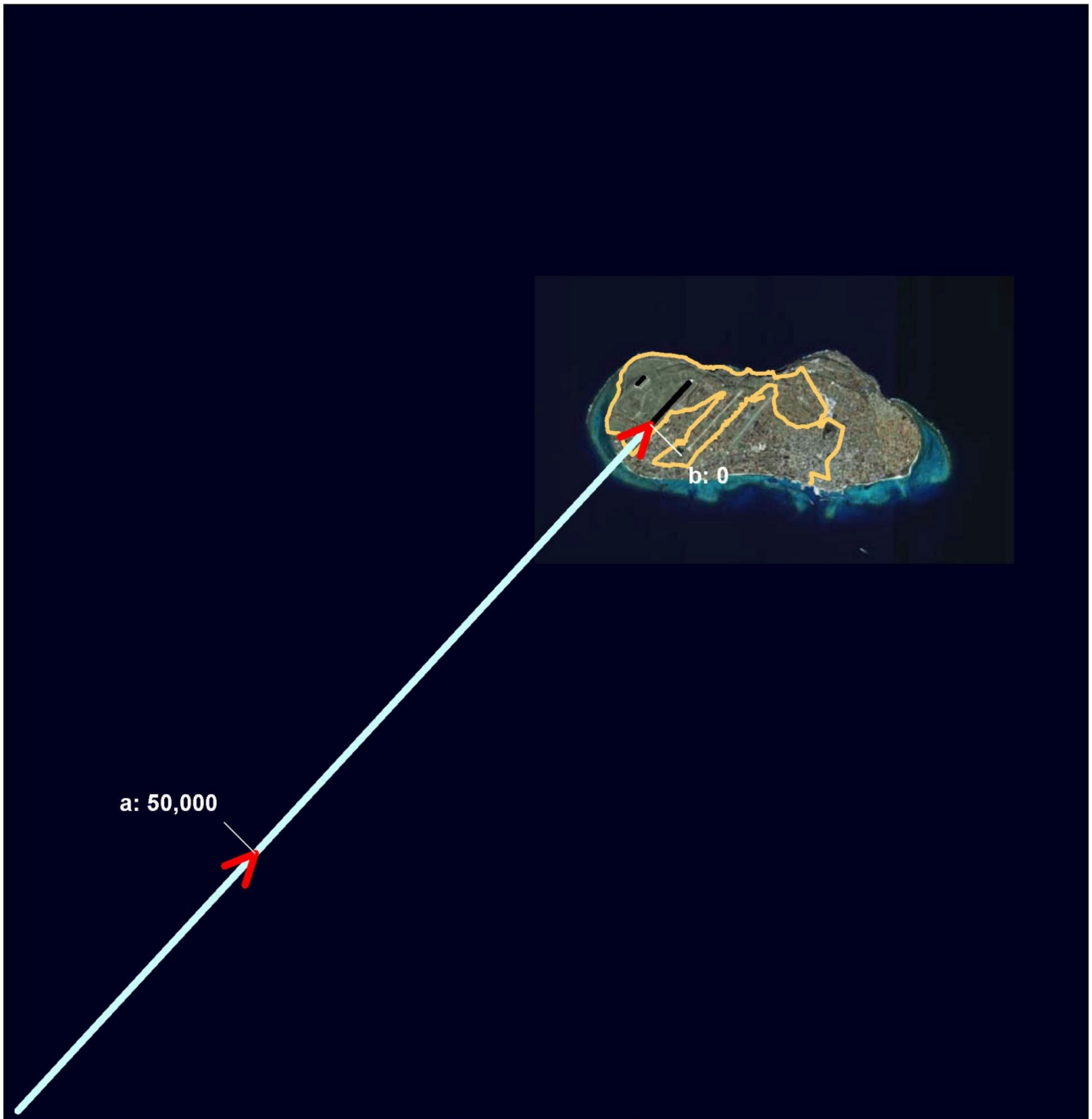
Point	Distance ft	Height ft	Power % RPM	Speed kts	Notes
a	0	0 AGL	111 Variable	0	supposed to be at 60 deg nozzle
b	1,000	0 AGL	111 T/O 72dg&Stol	75	supposed to be at 60 deg nozzle; rotation
c	6,540	500 AGL	110 Takeoff	250	
d	8,750	500 AGL	110 Takeoff	300	
e	18,779	500 AGL	110 Takeoff	350	8000 fpm to 15000' @ 300
f	23,200	1,500 AGL	110 Takeoff	300	
g	42,300	6,000 AGL	110 Takeoff	300	

Ie Shima - Flight Profile AV8BD1 - Departure

Based AV-8B

on Runway 05LHA, Flight Track 05LHD1

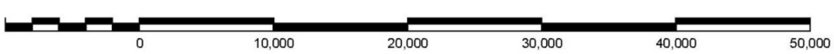
Scale in Feet 1:81,500 (1 inch = 6,790 feet)



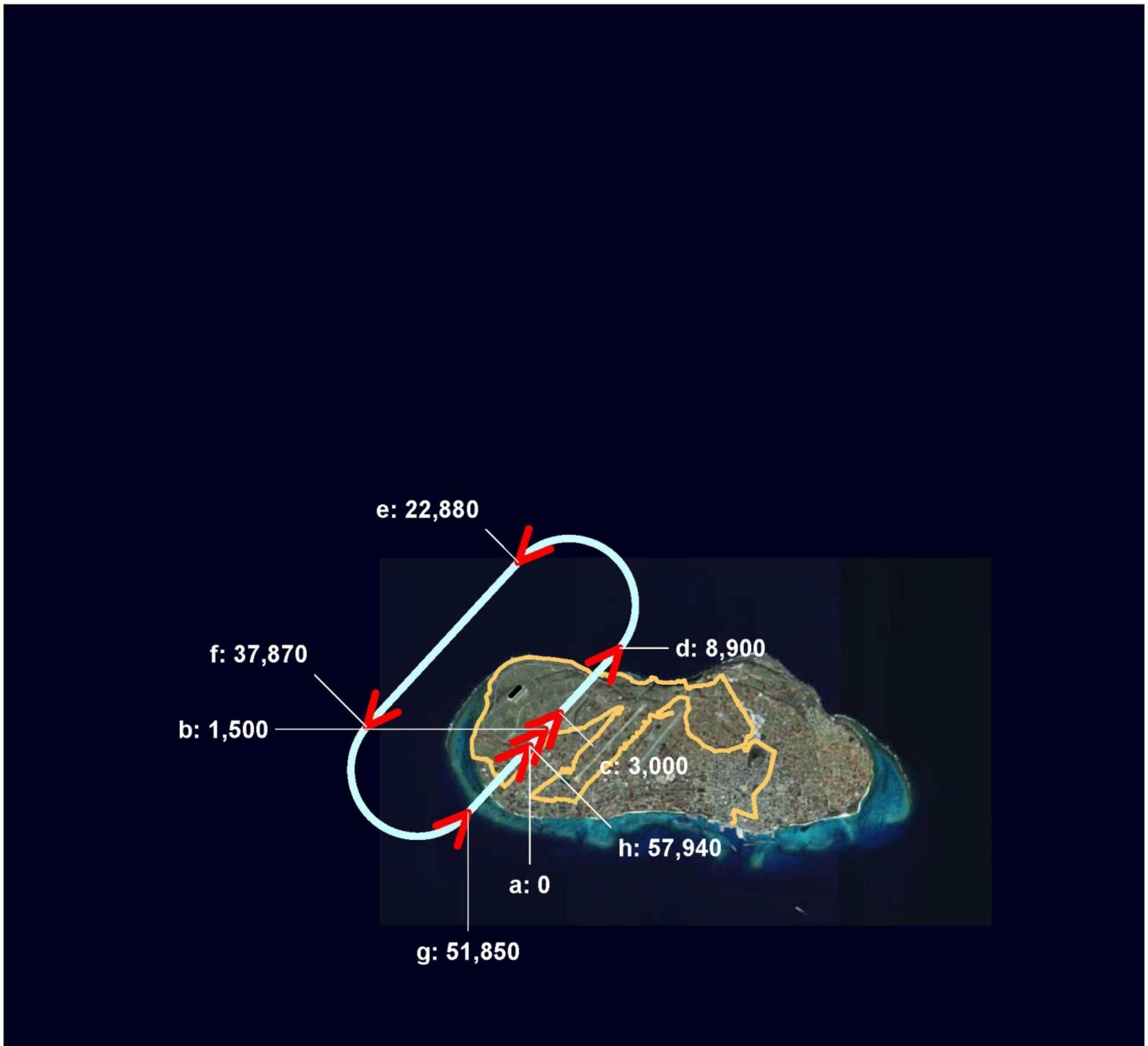
Flight Profile C130A1

Point	Distance ft	Height ft	Power HP	Speed kts	Notes
a	50,000	2,400 AGL	1400 Parallel	140	gear down
b	0	0 AGL	1400 Parallel	115	

Ie Shima - Flight Profile C130A1 - Non-Break Arrival
Based KC-130J
on Runway 05, Flight Track 05A2



Scale in Feet 1:172,000 (1 inch = 14,300 feet)



Flight Profile C130T1

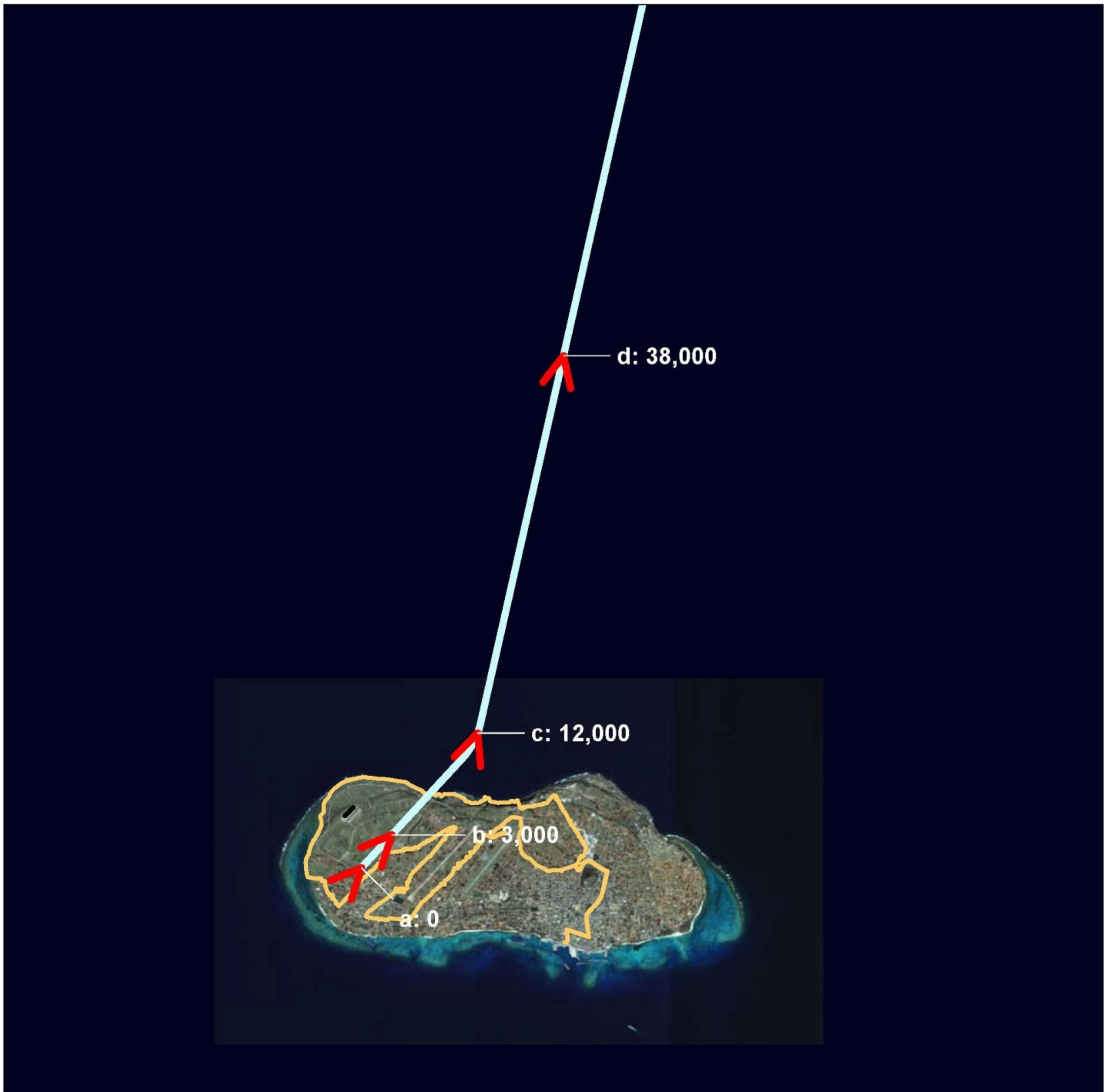
Point	Distance ft	Height ft	Power HP	Speed kts	Notes
a	0	50 AGL	1400 Parallel	110	threshold crossing
b	1,500	0 AGL	6400 Parallel	100	touchdown
c	3,000	0 AGL	6400 Parallel	120	rotate
d	8,900	500 AGL	4000 Variable	135	begin turn
e	22,880	1,000 AGL	1800 Variable	150	begin downwind
f	37,870	1,000 AGL	1600 Parallel	150	end downwind
g	51,850	300 AGL	1400 Parallel	130	begin final
h	57,940	50 AGL	1400 Parallel	110	

Ie Shima - Flight Profile C130T1 - T&G
Based KC-130J
on Runway 05, Flight Track 05T1

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000 44,000 48,000

Scale in Feet 1:141,000 (1 inch = 11,800 feet)

N



Flight Profile C130D1

Point	Distance ft	Height ft	Power HP	Speed kts	Notes
a	0	0 AGL	6400 Takeoff	0	
b	3,000	0 AGL	6400 Takeoff	115	rotate
c	12,000	400 AGL	6400 Takeoff	155	
d	38,000	4,000 AGL	6400 Takeoff	180	

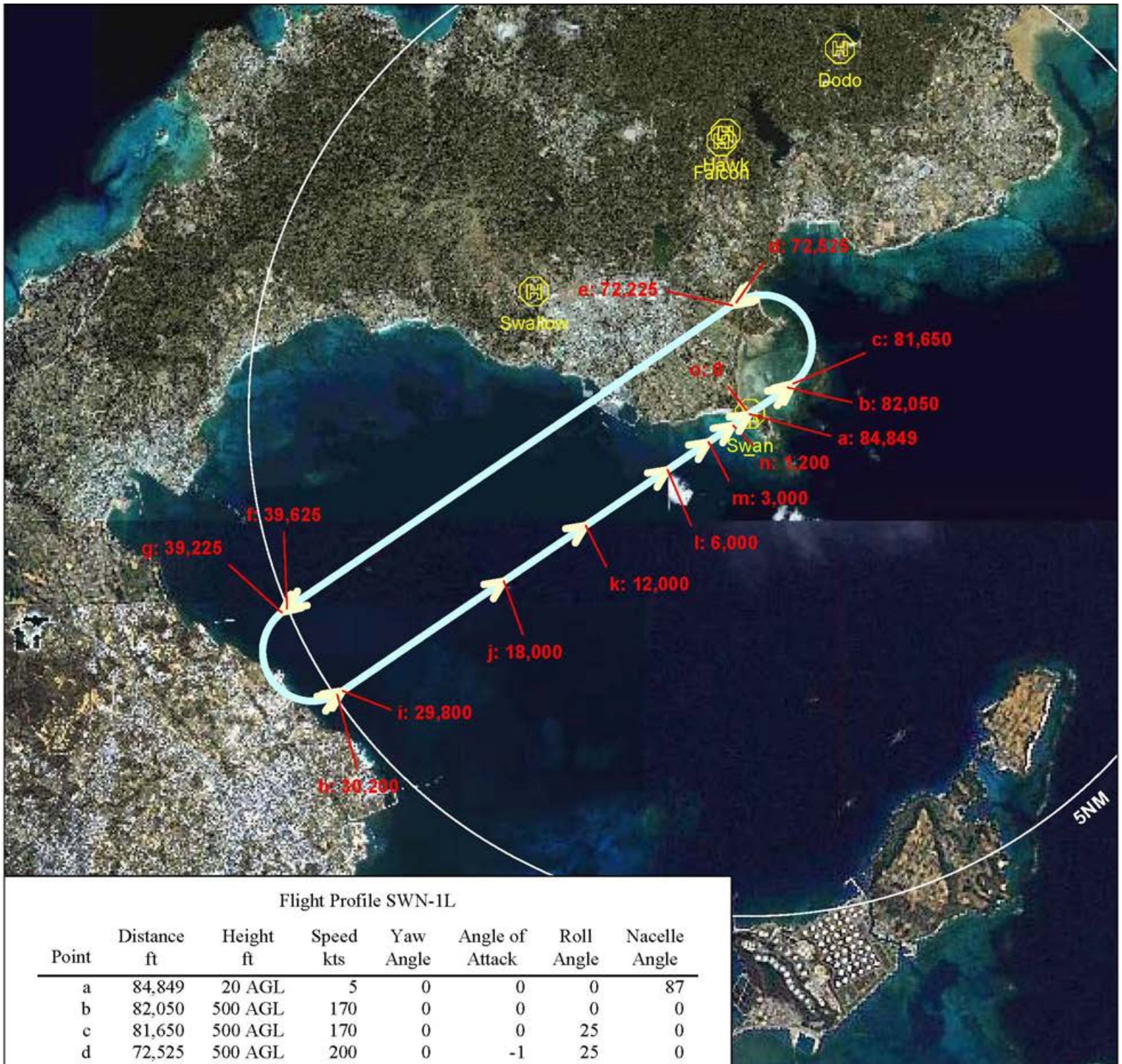
Ie Shima - Flight Profile C130D1 - Departure
Based KC-130J
on Runway 05, Flight Track 05D2

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000 44,000 48,000

Scale in Feet 1:137,000 (1 inch = 11,400 feet)

N

Appendix B-4: Associated Airspace



Flight Profile SWN-1L

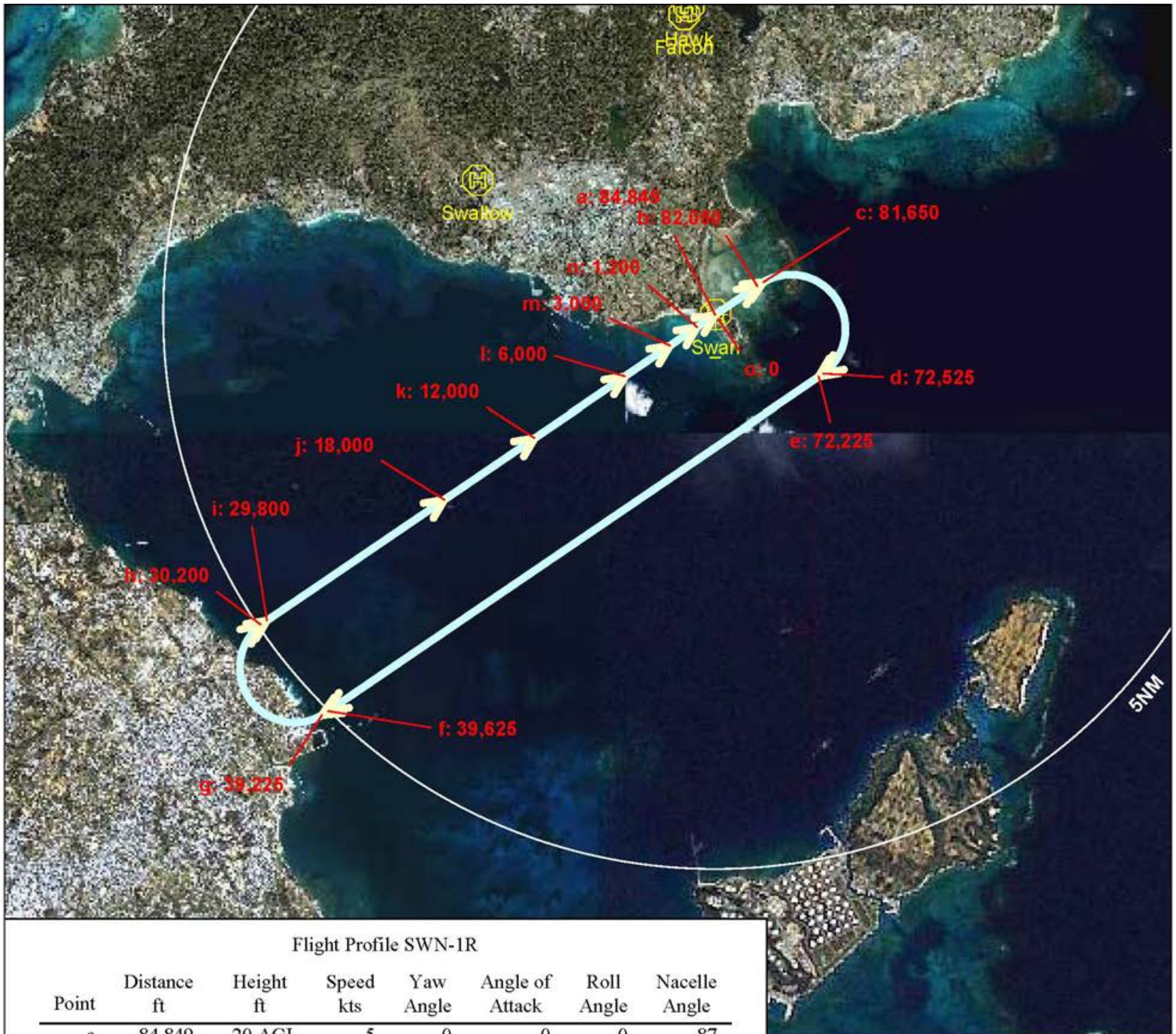
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	84,849	20 AGL	5	0	0	0	87
b	82,050	500 AGL	170	0	0	0	0
c	81,650	500 AGL	170	0	0	25	0
d	72,525	500 AGL	200	0	-1	25	0
e	72,225	500 AGL	200	0	-1	0	0
f	39,625	500 AGL	200	0	-1	0	0
g	39,225	500 AGL	200	0	-1	25	0
h	30,200	500 AGL	200	0	-1	25	0
i	29,800	500 AGL	200	0	-1	0	0
j	18,000	300 AGL	220	0	-1	0	0
k	12,000	300 AGL	200	0	-1	0	0
l	6,000	300 AGL	100	0	-1	0	65
m	3,000	200 AGL	80	0	-1	0	85
n	1,200	150 AGL	50	0	5	0	90
o	0	20 AGL	5	0	0	0	90

Central Training Area - Flight Profile SWN-1L -
Based MV22B
at LZ Swan [Elevation 17 ft MSL]

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000

Scale in Feet 1:125,000 (1 inch = 10,400 feet)

N



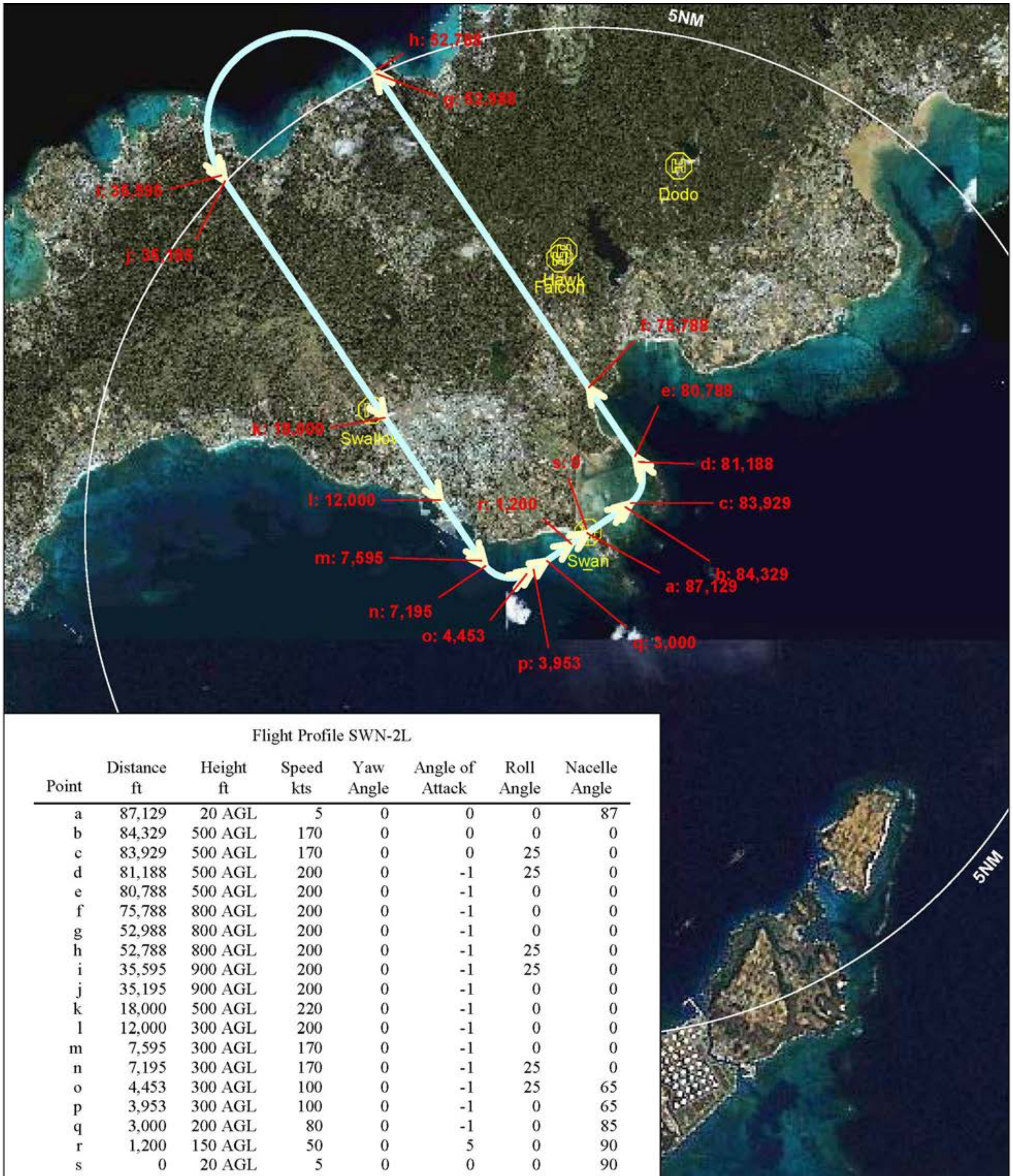
Flight Profile SWN-1R

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	84,849	20 AGL	5	0	0	0	87
b	82,050	500 AGL	170	0	0	0	0
c	81,650	500 AGL	170	0	0	-25	0
d	72,525	500 AGL	200	0	-1	-25	0
e	72,225	500 AGL	200	0	-1	0	0
f	39,625	500 AGL	200	0	-1	0	0
g	39,225	500 AGL	200	0	-1	-25	0
h	30,200	500 AGL	200	0	-1	-25	0
i	29,800	500 AGL	200	0	-1	0	0
j	18,000	300 AGL	220	0	-1	0	0
k	12,000	300 AGL	200	0	-1	0	0
l	6,000	300 AGL	100	0	-1	0	65
m	3,000	200 AGL	80	0	-1	0	85
n	1,200	150 AGL	50	0	5	0	90
o	0	20 AGL	5	0	0	0	90

Central Training Area - Flight Profile SWN-1R -
Based MV22B
at LZ Swan [Elevation 17 ft MSL]

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000

Scale in Feet 1:118,000 (1 inch = 9,870 feet)



Flight Profile SWN-2L

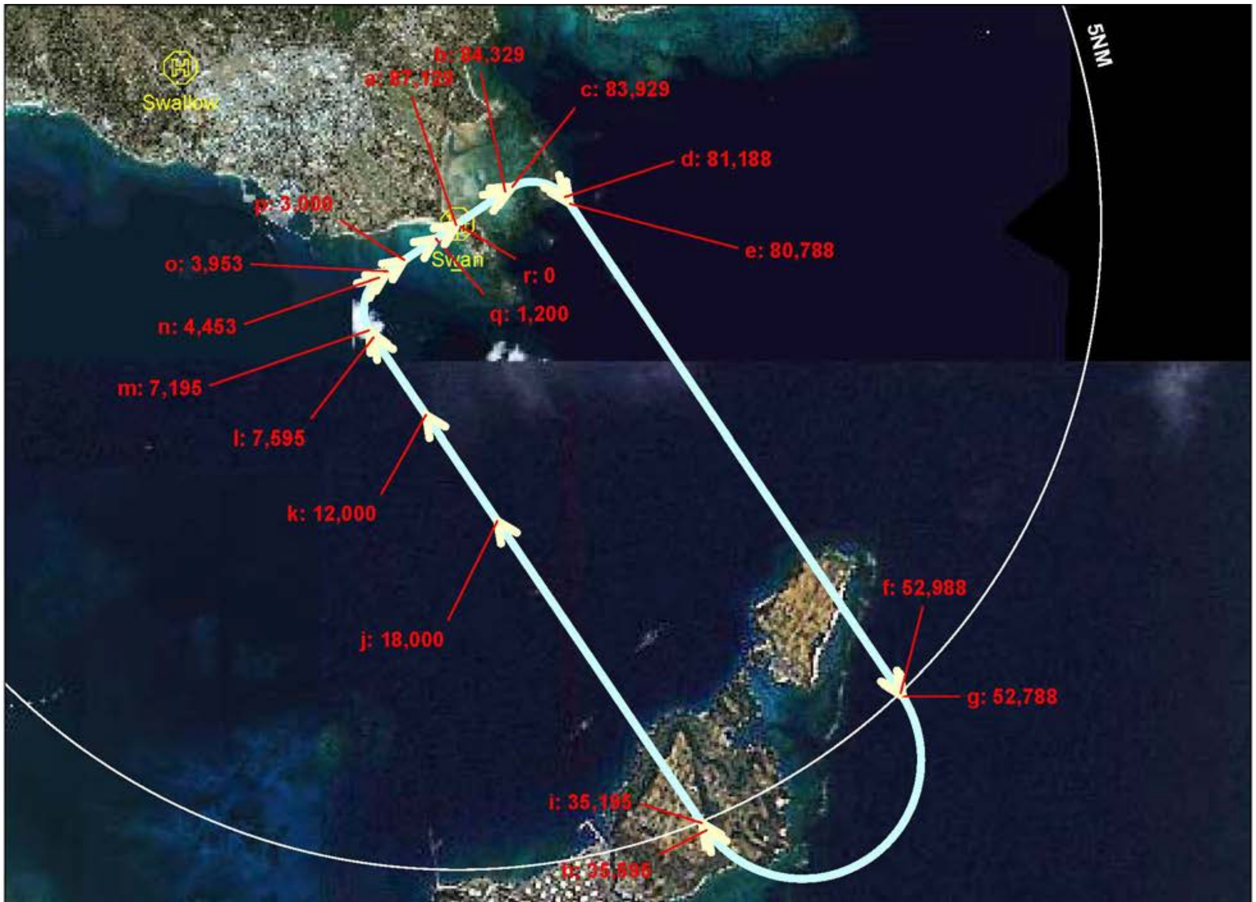
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	87,129	20 AGL	5	0	0	0	87
b	84,329	500 AGL	170	0	0	0	0
c	83,929	500 AGL	170	0	0	25	0
d	81,188	500 AGL	200	0	-1	25	0
e	80,788	500 AGL	200	0	-1	0	0
f	75,788	800 AGL	200	0	-1	0	0
g	52,988	800 AGL	200	0	-1	0	0
h	52,788	800 AGL	200	0	-1	25	0
i	35,595	900 AGL	200	0	-1	25	0
j	35,195	900 AGL	200	0	-1	0	0
k	18,000	500 AGL	220	0	-1	0	0
l	12,000	300 AGL	200	0	-1	0	0
m	7,595	300 AGL	170	0	-1	0	0
n	7,195	300 AGL	170	0	-1	25	0
o	4,453	300 AGL	100	0	-1	25	65
p	3,953	300 AGL	100	0	-1	0	65
q	3,000	200 AGL	80	0	-1	0	85
r	1,200	150 AGL	50	0	5	0	90
s	0	20 AGL	5	0	0	0	90

Central Training Area - Flight Profile SWN-2L -
Based MV22B
at LZ Swan [Elevation 17 ft MSL]

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000

Scale in Feet 1:112,000 (1 inch = 9,340 feet)

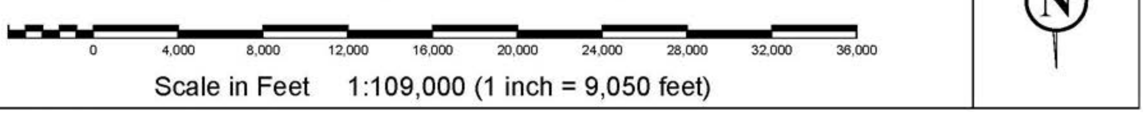
N



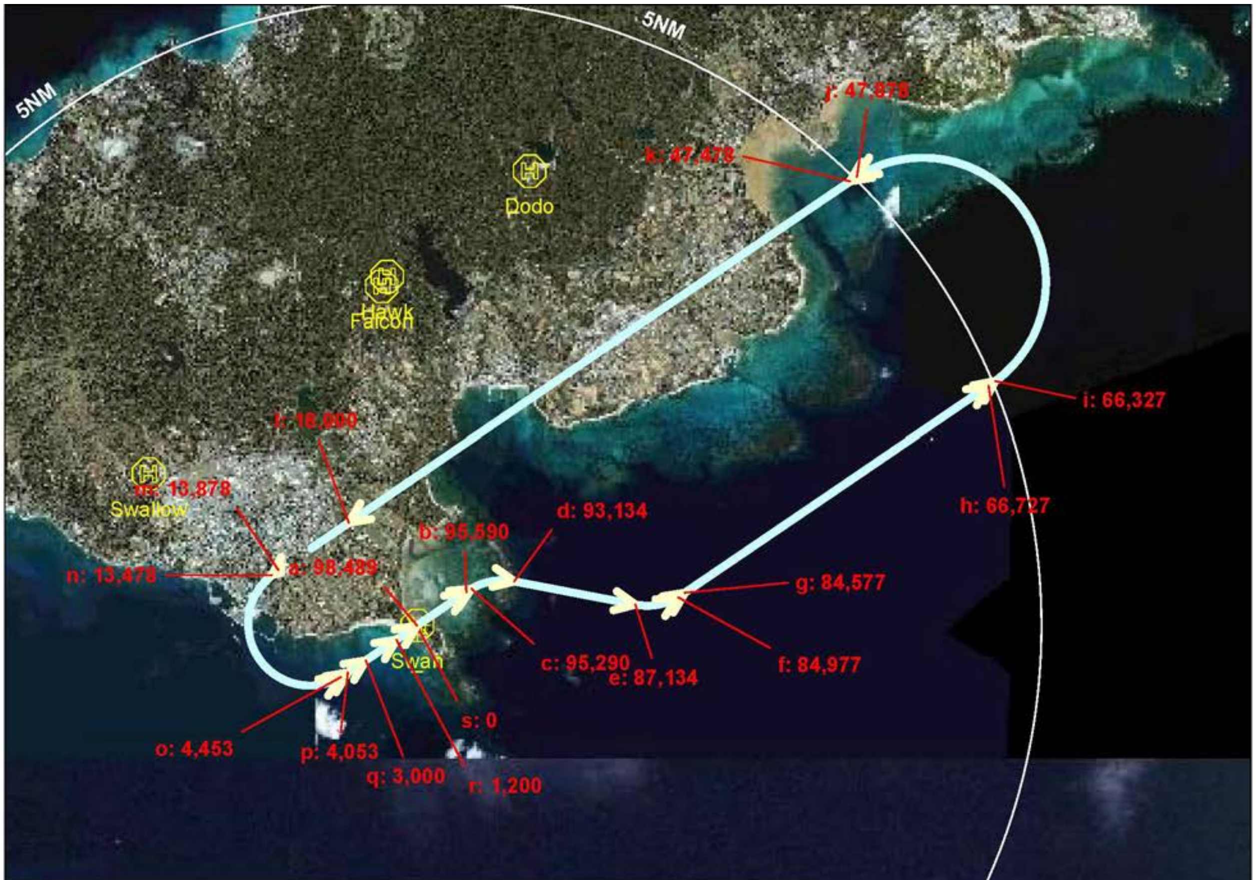
Flight Profile SWN-2R

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	87,129	20 AGL	5	0	0	0	87
b	84,329	500 AGL	170	0	0	0	0
c	83,929	500 AGL	170	0	0	-25	0
d	81,188	500 AGL	200	0	-1	-25	0
e	80,788	500 AGL	200	0	-1	0	0
f	52,988	500 AGL	200	0	-1	0	0
g	52,788	500 AGL	200	0	-1	-25	0
h	35,595	700 AGL	200	0	-1	-25	0
i	35,195	700 AGL	200	0	-1	0	0
j	18,000	300 AGL	220	0	-1	0	0
k	12,000	300 AGL	200	0	-1	0	0
l	7,595	300 AGL	170	0	-1	0	0
m	7,195	300 AGL	170	0	-1	-25	0
n	4,453	300 AGL	100	0	-1	-25	65
o	3,953	300 AGL	100	0	-1	0	65
p	3,000	200 AGL	80	0	-1	0	85
q	1,200	150 AGL	50	0	5	0	90
r	0	20 AGL	5	0	0	0	90

Central Training Area - Flight Profile SWN-2R -
Based MV22B
at LZ Swan [Elevation 17 ft MSL]



Scale in Feet 1:109,000 (1 inch = 9,050 feet)



Flight Profile SWN-3L

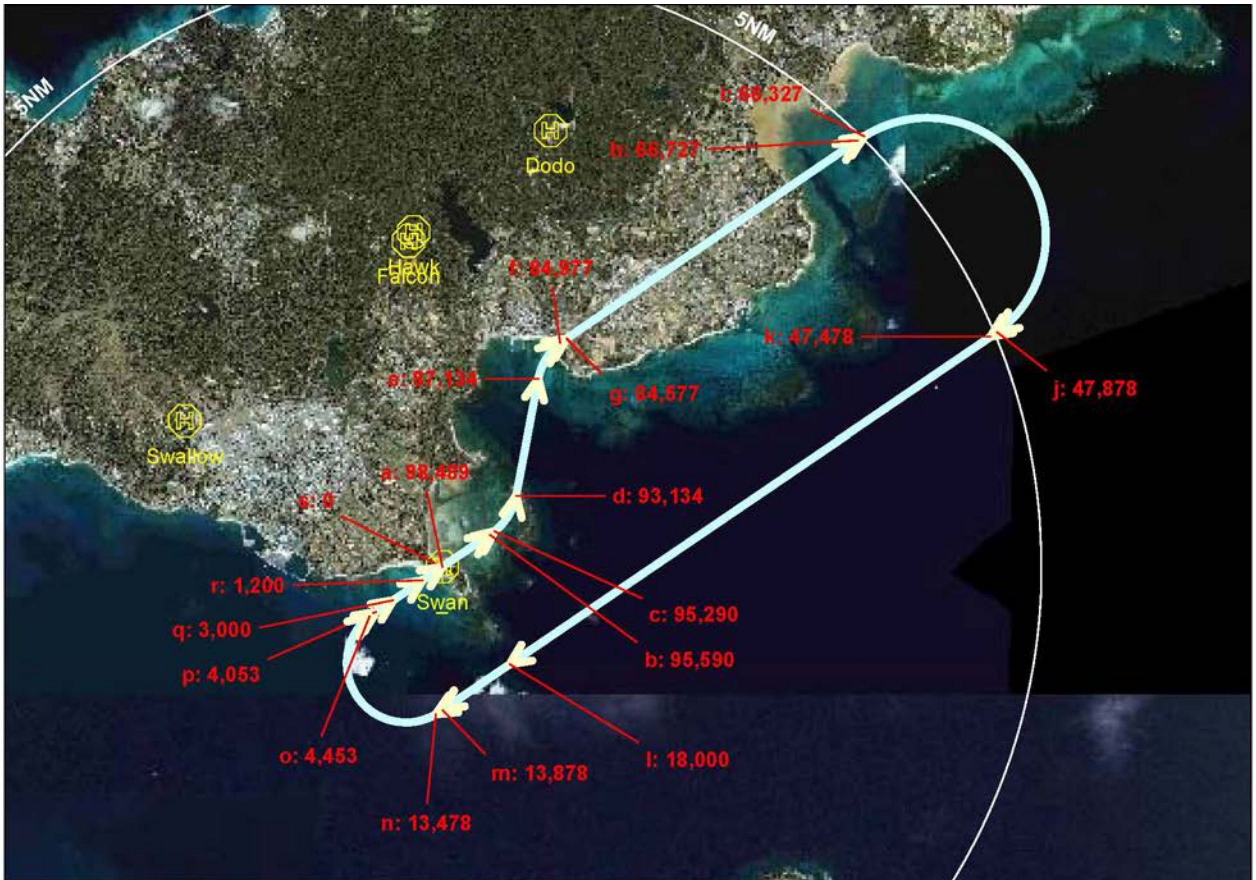
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	98,489	20 AGL	5	0	0	0	87
b	95,590	500 AGL	170	0	0	0	0
c	95,290	500 AGL	170	0	0	-25	0
d	93,134	500 AGL	170	0	0	-25	0
e	87,134	500 AGL	170	0	0	25	0
f	84,977	500 AGL	200	0	-1	25	0
g	84,577	500 AGL	200	0	-1	0	0
h	66,727	500 AGL	200	0	-1	0	0
i	66,327	500 AGL	200	0	-1	25	0
j	47,878	500 AGL	200	0	-1	25	0
k	47,478	500 AGL	200	0	-1	0	0
l	18,000	300 AGL	220	0	-1	0	0
m	13,878	300 AGL	170	0	-1	0	0
n	13,478	300 AGL	170	0	-1	25	0
o	4,453	300 AGL	100	0	-1	25	65
p	4,053	300 AGL	100	0	-1	0	65
q	3,000	200 AGL	80	0	-1	0	85
r	1,200	150 AGL	50	0	5	0	90
s	0	20 AGL	5	0	0	0	90

Central Training Area - Flight Profile SWN-3L -
Based MV22B
at LZ Swan [Elevation 17 ft MSL]

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000

Scale in Feet 1:112,000 (1 inch = 9,330 feet)

N



Flight Profile SWN-3R

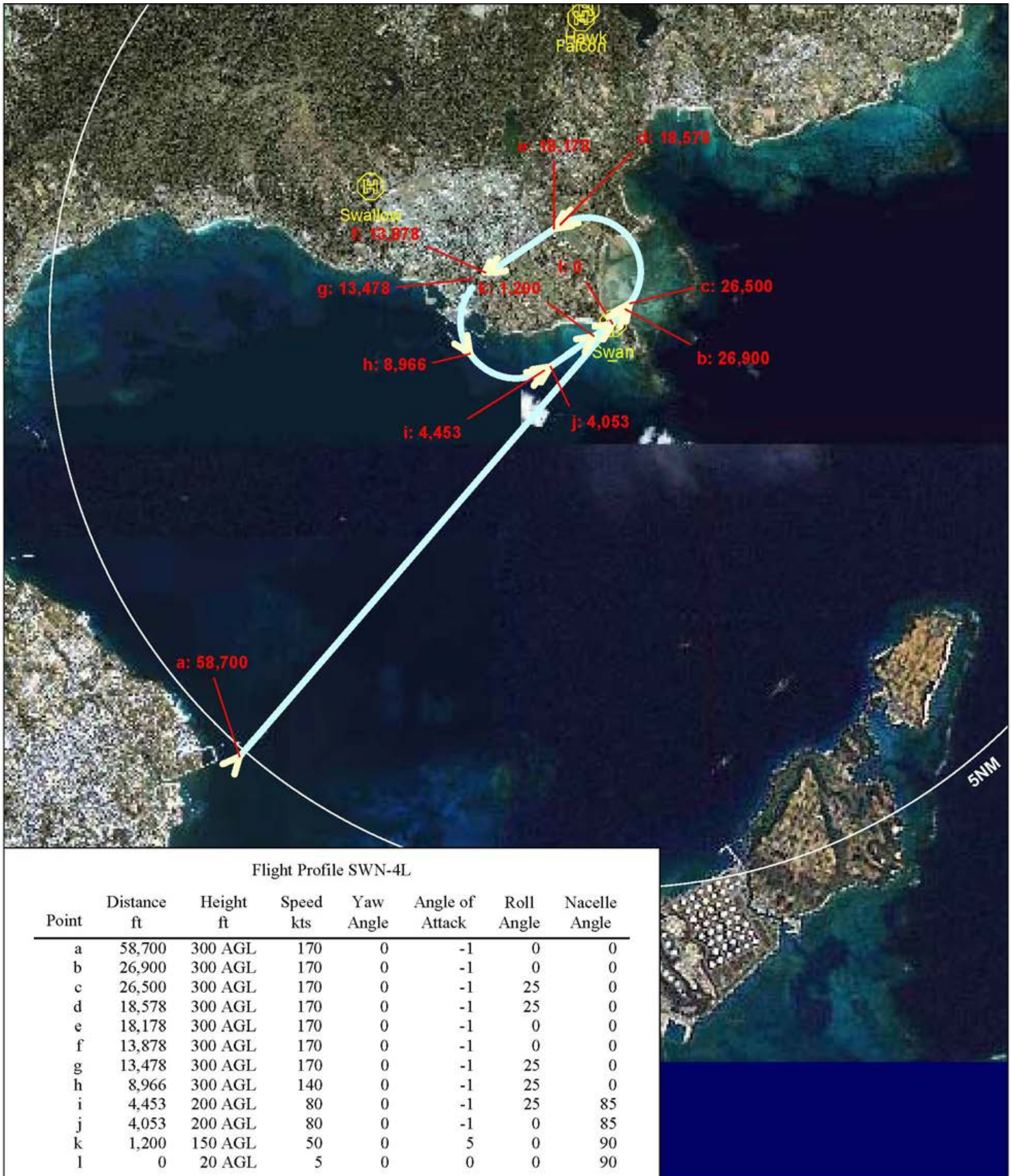
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	98,489	20 AGL	5	0	0	0	87
b	95,590	500 AGL	170	0	0	0	0
c	95,290	500 AGL	170	0	0	25	0
d	93,134	500 AGL	170	0	0	25	0
e	87,134	500 AGL	170	0	0	-25	0
f	84,977	500 AGL	200	0	-1	-25	0
g	84,577	500 AGL	200	0	-1	0	0
h	66,727	500 AGL	200	0	-1	0	0
i	66,327	500 AGL	200	0	-1	-25	0
j	47,878	500 AGL	200	0	-1	-25	0
k	47,478	500 AGL	200	0	-1	0	0
l	18,000	300 AGL	220	0	-1	0	0
m	13,878	300 AGL	170	0	-1	0	0
n	13,478	300 AGL	170	0	-1	-25	0
o	4,453	300 AGL	100	0	-1	-25	65
p	4,053	300 AGL	100	0	-1	0	65
q	3,000	200 AGL	80	0	-1	0	85
r	1,200	150 AGL	50	0	5	0	90
s	0	20 AGL	5	0	0	0	90

Central Training Area - Flight Profile SWN-3R -
Based MV22B
at LZ Swan [Elevation 17 ft MSL]

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000

Scale in Feet 1:117,000 (1 inch = 9,730 feet)

N



Flight Profile SWN-4L

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	58,700	300 AGL	170	0	-1	0	0
b	26,900	300 AGL	170	0	-1	0	0
c	26,500	300 AGL	170	0	-1	25	0
d	18,578	300 AGL	170	0	-1	25	0
e	18,178	300 AGL	170	0	-1	0	0
f	13,878	300 AGL	170	0	-1	0	0
g	13,478	300 AGL	170	0	-1	25	0
h	8,966	300 AGL	140	0	-1	25	0
i	4,453	200 AGL	80	0	-1	25	85
j	4,053	200 AGL	80	0	-1	0	85
k	1,200	150 AGL	50	0	5	0	90
l	0	20 AGL	5	0	0	0	90

Central Training Area - Flight Profile SWN-4L -
Based MV22B
at LZ Swan [Elevation 17 ft MSL]

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000

Scale in Feet 1:100,000 (1 inch = 8,330 feet)

N

Flight Profile SWN-4R

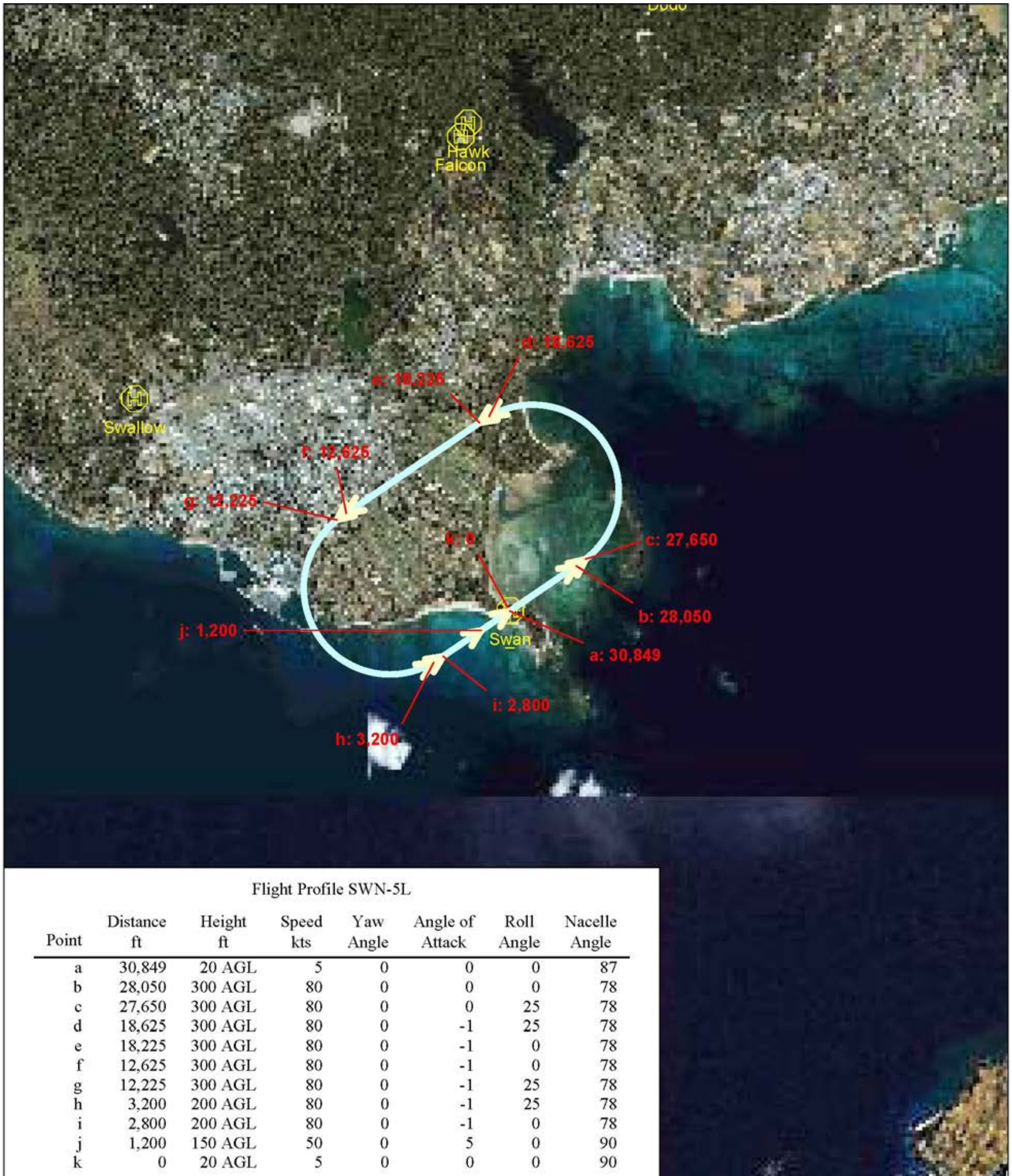
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	58,700	300 AGL	170	0	-1	0	0
b	26,900	300 AGL	170	0	-1	0	0
c	26,500	300 AGL	170	0	-1	-25	0
d	18,578	300 AGL	170	0	-1	-25	0
e	18,178	300 AGL	170	0	-1	0	0
f	13,878	300 AGL	170	0	-1	0	0
g	13,478	300 AGL	170	0	-1	-25	0
h	8,966	300 AGL	140	0	-1	-25	0
i	4,453	200 AGL	80	0	-1	-25	85
j	4,053	200 AGL	80	0	-1	0	85
k	1,200	150 AGL	50	0	5	0	90
l	0	20 AGL	5	0	0	0	90

Central Training Area - Flight Profile SWN-4R -
Based MV22B
at LZ Swan [Elevation 17 ft MSL]

0 4,000 8,000 12,000 16,000 20,000 24,000

Scale in Feet 1:74,900 (1 inch = 6,240 feet)

N



Flight Profile SWN-5L

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	30,849	20 AGL	5	0	0	0	87
b	28,050	300 AGL	80	0	0	0	78
c	27,650	300 AGL	80	0	0	25	78
d	18,625	300 AGL	80	0	-1	25	78
e	18,225	300 AGL	80	0	-1	0	78
f	12,625	300 AGL	80	0	-1	0	78
g	12,225	300 AGL	80	0	-1	25	78
h	3,200	200 AGL	80	0	-1	25	78
i	2,800	200 AGL	80	0	-1	0	78
j	1,200	150 AGL	50	0	5	0	90
k	0	20 AGL	5	0	0	0	90

Central Training Area - Flight Profile SWN-5L -
Based MV22B
at LZ Swan [Elevation 17 ft MSL]

0 4,000 8,000 12,000 16,000 20,000

Scale in Feet 1:64,500 (1 inch = 5,380 feet)

N

Flight Profile SWN-5R

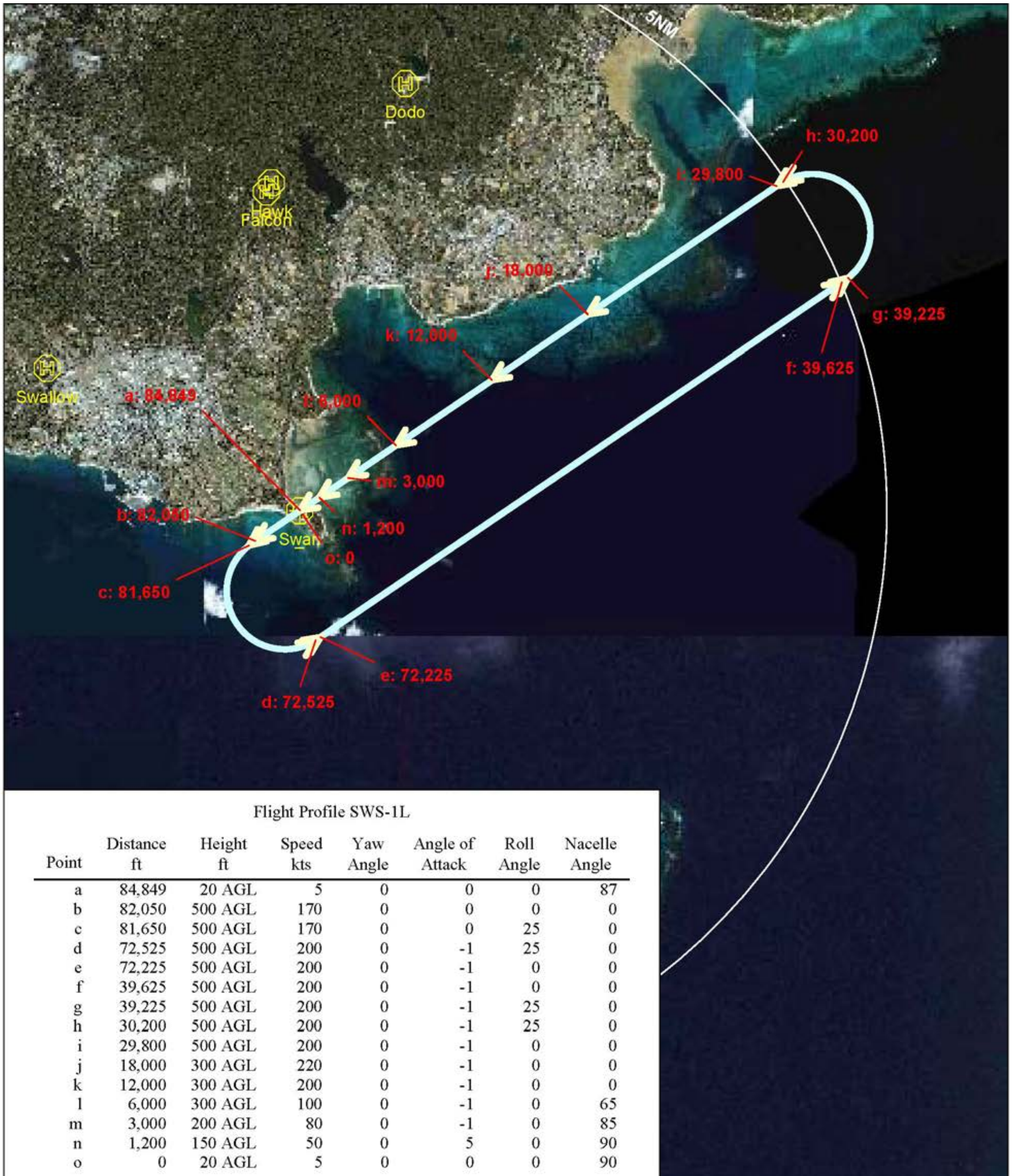
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	30,849	20 AGL	5	0	0	0	87
b	28,050	300 AGL	80	0	0	0	78
c	27,650	300 AGL	80	0	0	-25	78
d	18,625	300 AGL	80	0	-1	-25	78
e	18,225	300 AGL	80	0	-1	0	78
f	12,625	300 AGL	80	0	-1	0	78
g	12,225	300 AGL	80	0	-1	-25	78
h	3,200	200 AGL	80	0	-1	-25	78
i	2,800	200 AGL	80	0	-1	0	78
j	1,200	150 AGL	50	0	5	0	90
k	0	20 AGL	5	0	0	0	90

Central Training Area - Flight Profile SWN-5R -
Based MV22B
at LZ Swan [Elevation 17 ft MSL]

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000

Scale in Feet 1:48,900 (1 inch = 4,070 feet)

N

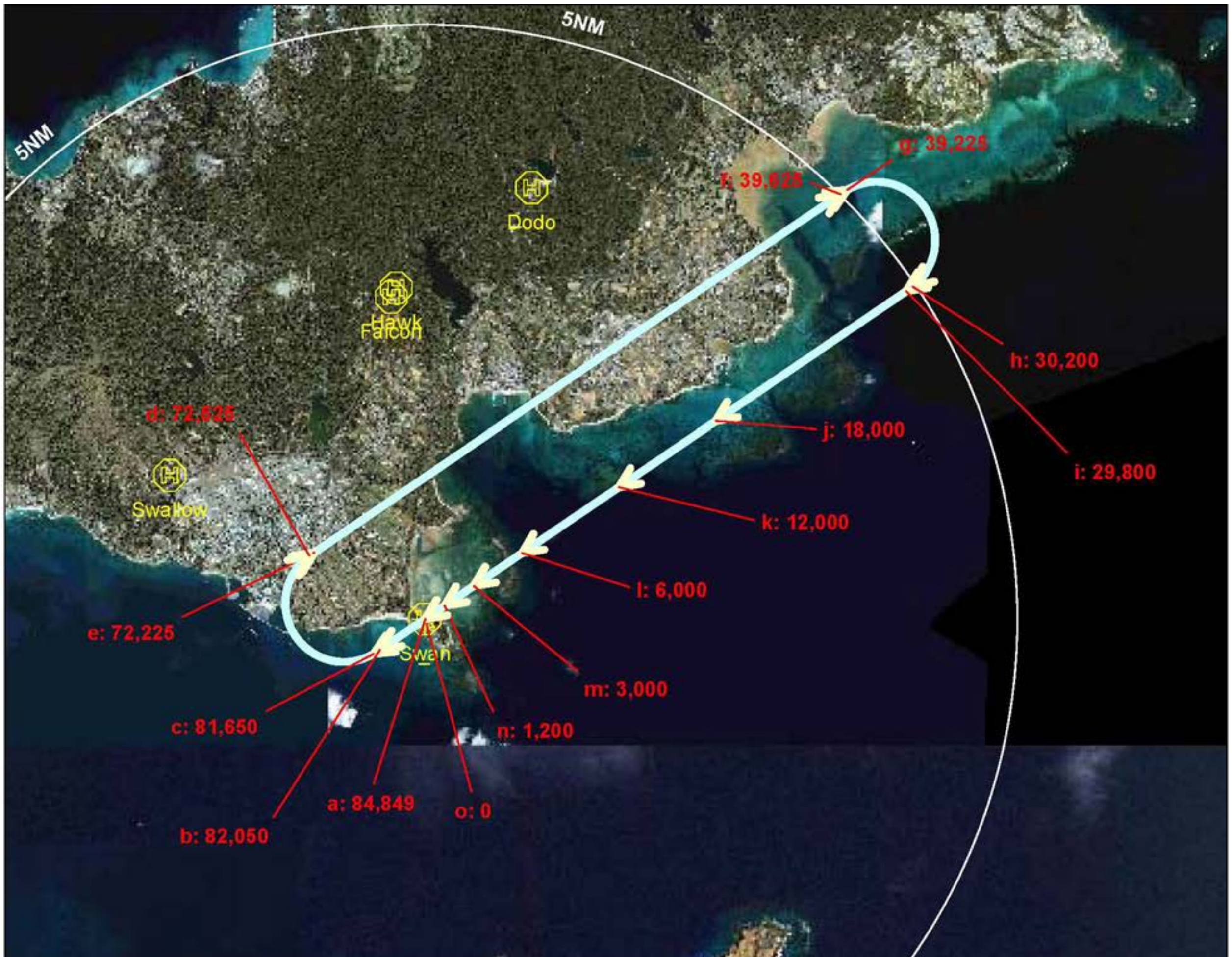


Flight Profile SWS-1L

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	84,849	20 AGL	5	0	0	0	87
b	82,050	500 AGL	170	0	0	0	0
c	81,650	500 AGL	170	0	0	25	0
d	72,525	500 AGL	200	0	-1	25	0
e	72,225	500 AGL	200	0	-1	0	0
f	39,625	500 AGL	200	0	-1	0	0
g	39,225	500 AGL	200	0	-1	25	0
h	30,200	500 AGL	200	0	-1	25	0
i	29,800	500 AGL	200	0	-1	0	0
j	18,000	300 AGL	220	0	-1	0	0
k	12,000	300 AGL	200	0	-1	0	0
l	6,000	300 AGL	100	0	-1	0	65
m	3,000	200 AGL	80	0	-1	0	85
n	1,200	150 AGL	50	0	5	0	90
o	0	20 AGL	5	0	0	0	90

Central Training Area - Flight Profile SWS-1L -
Based MV22B
at LZ Swan [Elevation 17 ft MSL]

Scale in Feet 1:95,900 (1 inch = 7,990 feet)



Flight Profile SWS-1R

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	84,849	20 AGL	5	0	0	0	87
b	82,050	500 AGL	170	0	0	0	0
c	81,650	500 AGL	170	0	0	-25	0
d	72,525	500 AGL	200	0	-1	-25	0
e	72,225	500 AGL	200	0	-1	0	0
f	39,625	500 AGL	200	0	-1	0	0
g	39,225	500 AGL	200	0	-1	-25	0
h	30,200	500 AGL	200	0	-1	-25	0
i	29,800	500 AGL	200	0	-1	0	0
j	18,000	300 AGL	220	0	-1	0	0
k	12,000	300 AGL	200	0	-1	0	0
l	6,000	300 AGL	100	0	-1	0	65
m	3,000	200 AGL	80	0	-1	0	85
n	1,200	150 AGL	50	0	5	0	90
o	0	20 AGL	5	0	0	0	90

Central Training Area - Flight Profile SWS-1R -
Based MV22B
at LZ Swan [Elevation 17 ft MSL]

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000

Scale in Feet 1:116,000 (1 inch = 9,640 feet)

N

Flight Profile SWS-2L

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	87,129	20 AGL	5	0	0	0	87
b	84,329	500 AGL	170	0	0	0	0
c	83,929	500 AGL	170	0	0	25	0
d	81,188	500 AGL	200	0	-1	25	0
e	80,788	500 AGL	200	0	-1	0	0
f	52,988	700 AGL	200	0	-1	0	0
g	52,788	700 AGL	200	0	-1	25	0
h	35,595	500 AGL	200	0	-1	25	0
i	35,195	500 AGL	200	0	-1	0	0
j	18,000	300 AGL	220	0	-1	0	0
k	12,000	300 AGL	200	0	-1	0	0
l	7,595	300 AGL	170	0	-1	0	0
m	7,195	300 AGL	170	0	-1	25	0
n	4,453	300 AGL	100	0	-1	25	65
o	3,953	300 AGL	100	0	-1	0	65
p	3,000	200 AGL	80	0	-1	0	85
q	1,200	150 AGL	50	0	5	0	90
r	0	20 AGL	5	0	0	0	90

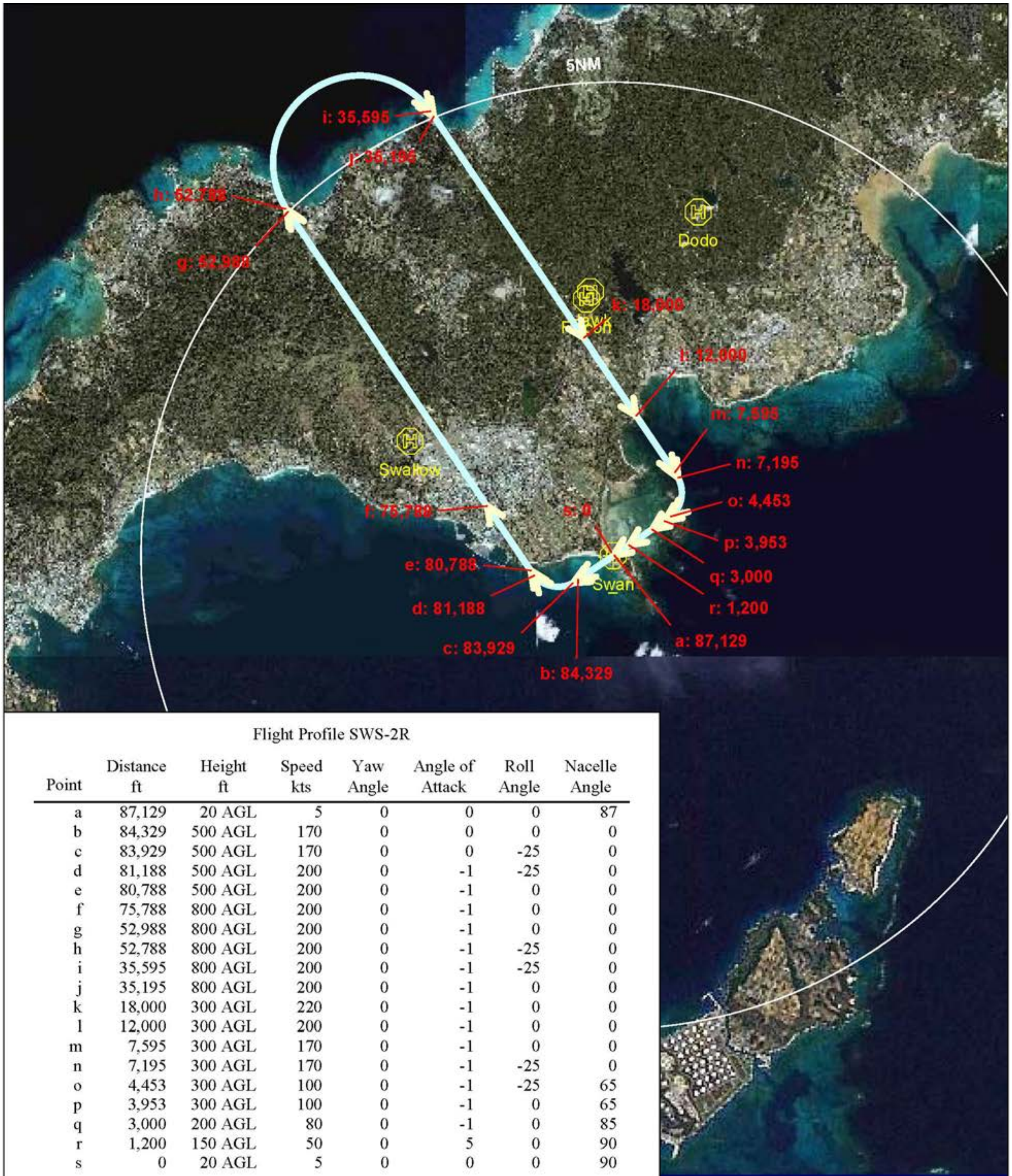
Central Training Area - Flight Profile SWS-2L -
Based MV22B
at LZ Swan [Elevation 17 ft MSL]

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000

Scale in Feet 1:108,000 (1 inch = 9,010 feet)

N

wyle



Flight Profile SWS-2R

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	87,129	20 AGL	5	0	0	0	87
b	84,329	500 AGL	170	0	0	0	0
c	83,929	500 AGL	170	0	0	-25	0
d	81,188	500 AGL	200	0	-1	-25	0
e	80,788	500 AGL	200	0	-1	0	0
f	75,788	800 AGL	200	0	-1	0	0
g	52,988	800 AGL	200	0	-1	0	0
h	52,788	800 AGL	200	0	-1	-25	0
i	35,595	800 AGL	200	0	-1	-25	0
j	35,195	800 AGL	200	0	-1	0	0
k	18,000	300 AGL	220	0	-1	0	0
l	12,000	300 AGL	200	0	-1	0	0
m	7,595	300 AGL	170	0	-1	0	0
n	7,195	300 AGL	170	0	-1	-25	0
o	4,453	300 AGL	100	0	-1	-25	65
p	3,953	300 AGL	100	0	-1	0	65
q	3,000	200 AGL	80	0	-1	0	85
r	1,200	150 AGL	50	0	5	0	90
s	0	20 AGL	5	0	0	0	90

Central Training Area - Flight Profile SWS-2R - Based MV22B at LZ Swan [Elevation 17 ft MSL]

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000

Scale in Feet 1:119,000 (1 inch = 9,940 feet)

N

Flight Profile SWS-3L

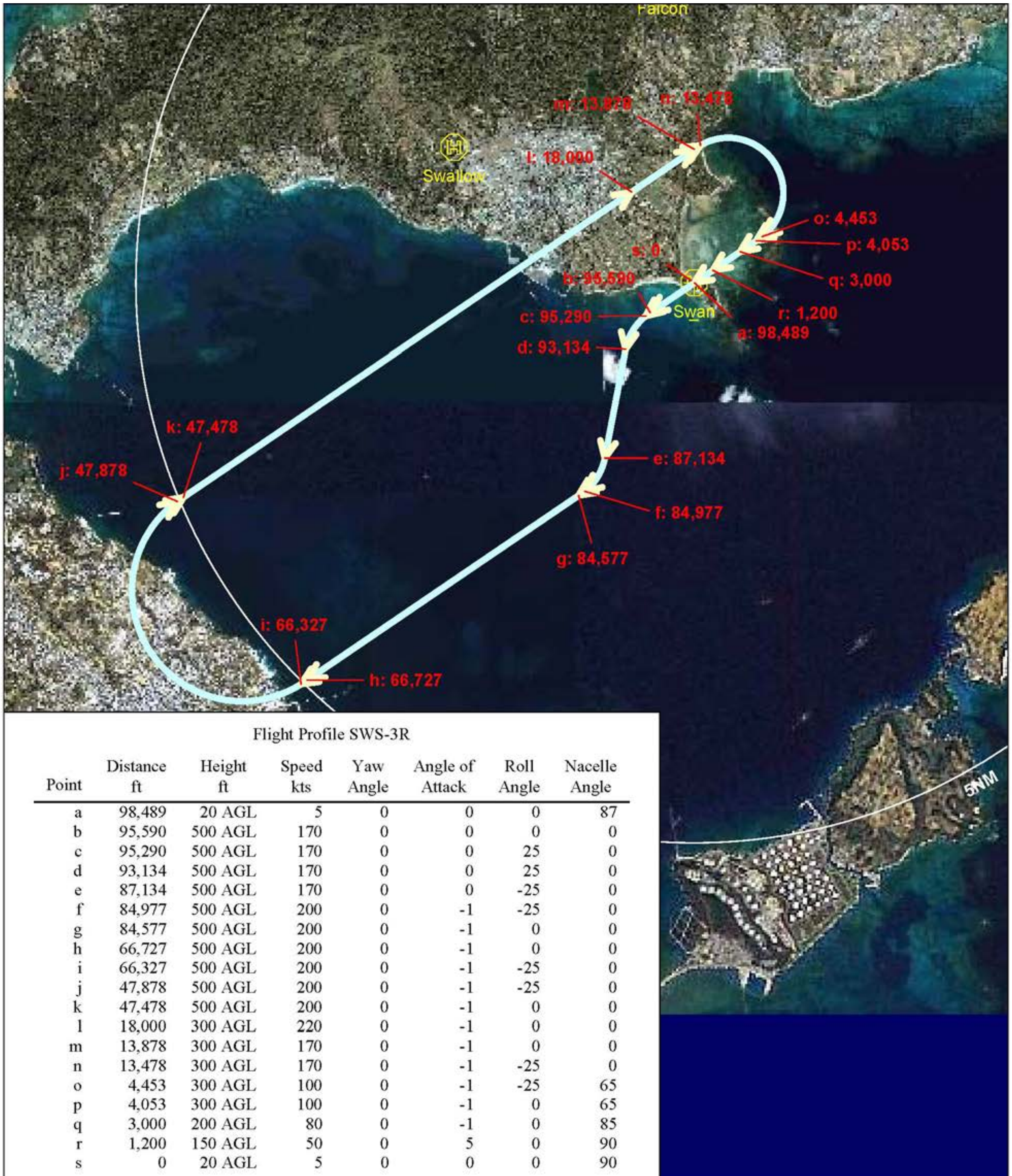
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	98,489	20 AGL	5	0	0	0	87
b	95,590	500 AGL	170	0	0	0	0
c	95,290	500 AGL	170	0	0	-25	0
d	93,134	500 AGL	170	0	0	-25	0
e	87,134	500 AGL	170	0	0	25	0
f	84,977	500 AGL	200	0	-1	25	0
g	84,577	500 AGL	200	0	-1	0	0
h	66,727	500 AGL	200	0	-1	0	0
i	66,327	500 AGL	200	0	-1	25	0
j	47,878	500 AGL	200	0	-1	25	0
k	47,478	500 AGL	200	0	-1	0	0
l	18,000	300 AGL	220	0	-1	0	0
m	13,878	300 AGL	170	0	-1	0	0
n	13,478	300 AGL	170	0	-1	25	0
o	4,453	300 AGL	100	0	-1	25	65
p	4,053	300 AGL	100	0	-1	0	65
q	3,000	200 AGL	80	0	-1	0	85
r	1,200	150 AGL	50	0	5	0	90
s	0	20 AGL	5	0	0	0	90

Central Training Area - Flight Profile SWS-3L -
Based MV22B
at LZ Swan [Elevation 17 ft MSL]

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000

Scale in Feet 1:97,600 (1 inch = 8,140 feet)

N



Flight Profile SWS-3R

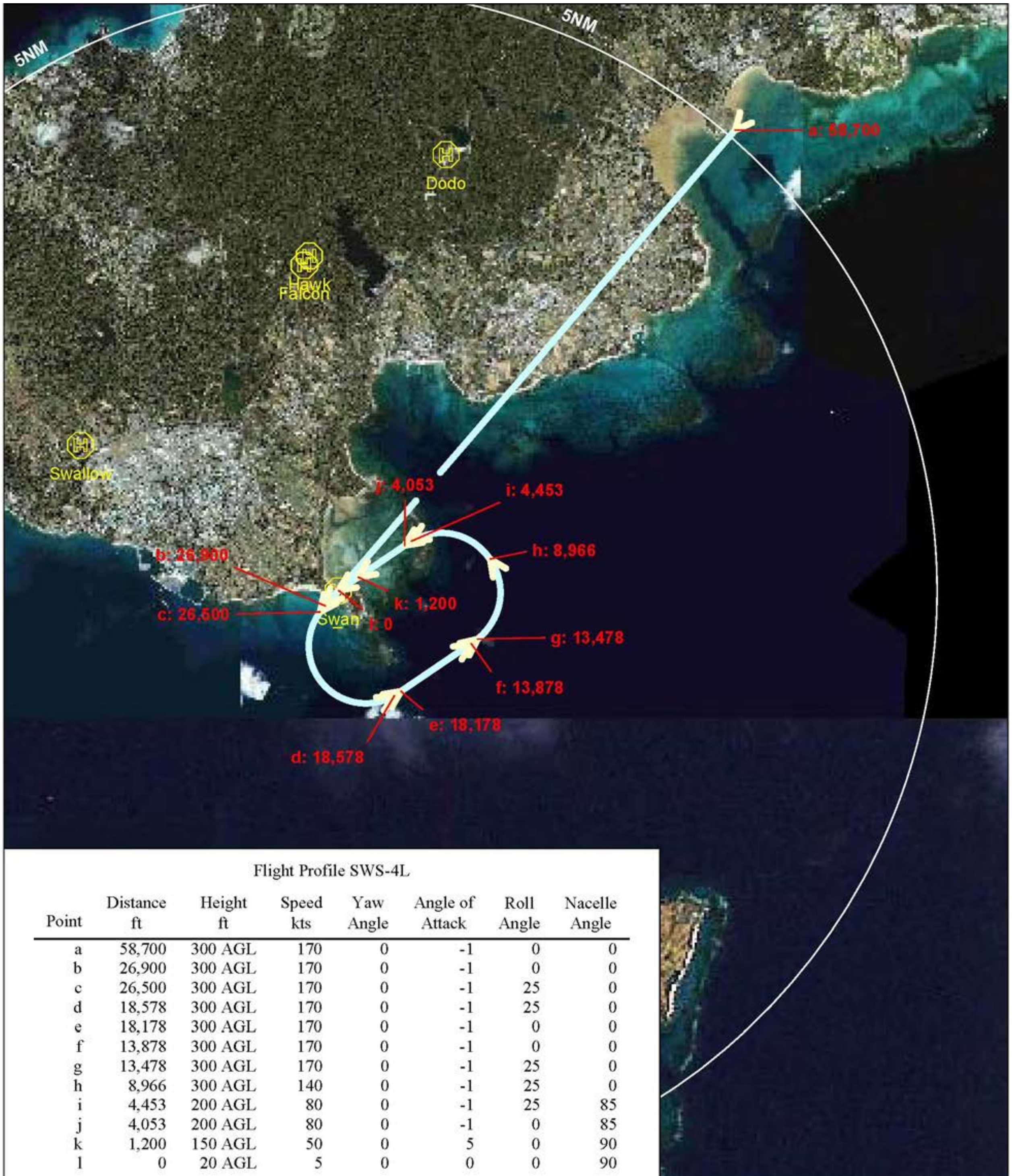
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	98,489	20 AGL	5	0	0	0	87
b	95,590	500 AGL	170	0	0	0	0
c	95,290	500 AGL	170	0	0	25	0
d	93,134	500 AGL	170	0	0	25	0
e	87,134	500 AGL	170	0	0	-25	0
f	84,977	500 AGL	200	0	-1	-25	0
g	84,577	500 AGL	200	0	-1	0	0
h	66,727	500 AGL	200	0	-1	0	0
i	66,327	500 AGL	200	0	-1	-25	0
j	47,878	500 AGL	200	0	-1	-25	0
k	47,478	500 AGL	200	0	-1	0	0
l	18,000	300 AGL	220	0	-1	0	0
m	13,878	300 AGL	170	0	-1	0	0
n	13,478	300 AGL	170	0	-1	-25	0
o	4,453	300 AGL	100	0	-1	-25	65
p	4,053	300 AGL	100	0	-1	0	65
q	3,000	200 AGL	80	0	-1	0	85
r	1,200	150 AGL	50	0	5	0	90
s	0	20 AGL	5	0	0	0	90

Central Training Area - Flight Profile SWS-3R -
Based MV22B
at LZ Swan [Elevation 17 ft MSL]

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000

Scale in Feet 1:101,000 (1 inch = 8,410 feet)

N



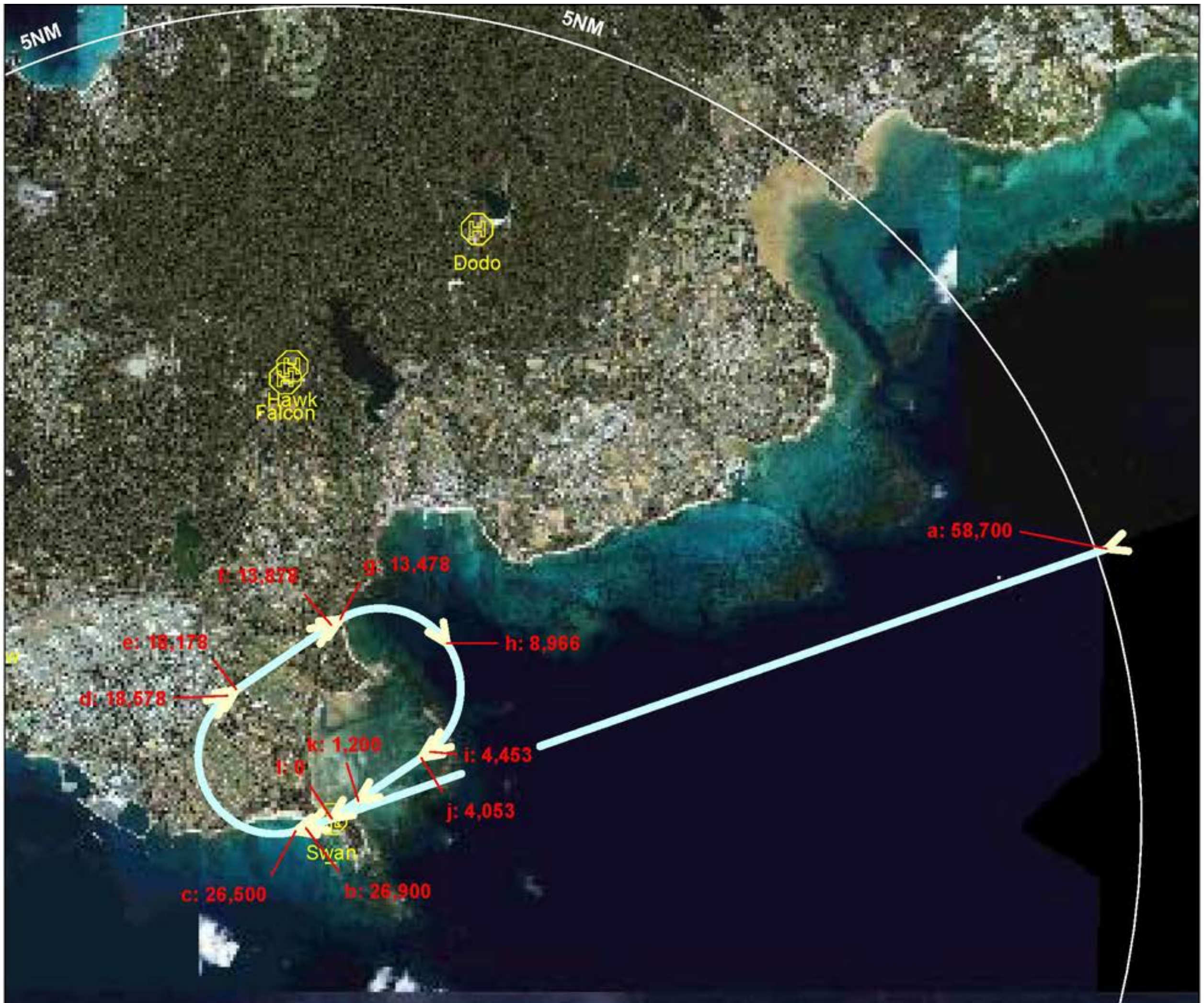
Flight Profile SWS-4L

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	58,700	300 AGL	170	0	-1	0	0
b	26,900	300 AGL	170	0	-1	0	0
c	26,500	300 AGL	170	0	-1	25	0
d	18,578	300 AGL	170	0	-1	25	0
e	18,178	300 AGL	170	0	-1	0	0
f	13,878	300 AGL	170	0	-1	0	0
g	13,478	300 AGL	170	0	-1	25	0
h	8,966	300 AGL	140	0	-1	25	0
i	4,453	200 AGL	80	0	-1	25	85
j	4,053	200 AGL	80	0	-1	0	85
k	1,200	150 AGL	50	0	5	0	90
l	0	20 AGL	5	0	0	0	90

Central Training Area - Flight Profile SWS-4L -
Based MV22B
at LZ Swan [Elevation 17 ft MSL]

Scale in Feet 1:94,100 (1 inch = 7,840 feet)

N



Flight Profile SWS-4R

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	58,700	300 AGL	170	0	-1	0	0
b	26,900	300 AGL	170	0	-1	0	0
c	26,500	300 AGL	170	0	-1	-25	0
d	18,578	300 AGL	170	0	-1	-25	0
e	18,178	300 AGL	170	0	-1	0	0
f	13,878	300 AGL	170	0	-1	0	0
g	13,478	300 AGL	170	0	-1	-25	0
h	8,966	300 AGL	140	0	-1	-25	0
i	4,453	200 AGL	80	0	-1	-25	85
j	4,053	200 AGL	80	0	-1	0	85
k	1,200	150 AGL	50	0	5	0	90
l	0	20 AGL	5	0	0	0	90

Central Training Area - Flight Profile SWS-4R -
Based MV22B
at LZ Swan [Elevation 17 ft MSL]

0 4,000 8,000 12,000 16,000 20,000 24,000

Scale in Feet 1:82,700 (1 inch = 6,890 feet)

N

Flight Profile SWS-5L

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	30,849	20 AGL	5	0	0	0	87
b	28,050	300 AGL	80	0	0	0	78
c	27,650	300 AGL	80	0	0	25	78
d	18,625	300 AGL	80	0	-1	25	78
e	18,225	300 AGL	80	0	-1	0	78
f	12,625	300 AGL	80	0	-1	0	78
g	12,225	300 AGL	80	0	-1	25	78
h	3,200	200 AGL	80	0	-1	25	78
i	2,800	200 AGL	80	0	-1	0	78
j	1,200	150 AGL	50	0	5	0	90
k	0	20 AGL	5	0	0	0	90

Central Training Area - Flight Profile SWS-5L -
Based MV22B
at LZ Swan [Elevation 17 ft MSL]

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000

Scale in Feet 1:55,100 (1 inch = 4,590 feet)

N

Flight Profile SWS-5R

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	30,849	20 AGL	5	0	0	0	87
b	28,050	300 AGL	80	0	0	0	78
c	27,650	300 AGL	80	0	0	-25	78
d	18,625	300 AGL	80	0	-1	-25	78
e	18,225	300 AGL	80	0	-1	0	78
f	12,625	300 AGL	80	0	-1	0	78
g	12,225	300 AGL	80	0	-1	-25	78
h	3,200	200 AGL	80	0	-1	-25	78
i	2,800	200 AGL	80	0	-1	0	78
j	1,200	150 AGL	50	0	5	0	90
k	0	20 AGL	5	0	0	0	90

Central Training Area - Flight Profile SWS-5R -
Based MV22B
at LZ Swan [Elevation 17 ft MSL]

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000

Scale in Feet 1:47,300 (1 inch = 3,940 feet)

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