DRAFT

Replacement of CH-53E Heavy Lift Helicopter with CH-53K Heavy Lift Helicopter at Marine Corps Air Station Miramar

December 2025

Responsible Officer: Colonel Erik R. Herrmann, Commanding Officer
Marine Corps Air Station Miramar
San Diego, California

Prepared by: Department of the Navy/U.S. Marine Corps
In accordance with Marine Corps Order 5090.2,
July 31, 2022, pursuant to the
National Environmental Policy Act of 1969 (42 USC § 4321 et seq.)

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ABSTRACT

Designation	Environmental Assessment
Title of Proposed Action	Replacement of Heavy Lift Helicopter CH-53E with Heavy Lift Helicopter CH-53K
Project Location	Marine Corps Air Station (MCAS) Miramar
Lead Agency for the EA	U.S. Marine Corps
Affected Region	San Diego County, CA
Action Proponent	MCAS Miramar
Point of Contact	Christopher (Chris) Allen Director of Environmental Planning 6022 Shields Drive, San Diego, CA 92145 Email Address: christopher.allen@usmc.mil
Date	December 2025

The United States Marine Corps (USMC) has prepared this Environmental Assessment in accordance with the National Environmental Policy Act (NEPA), as implemented by the U.S. Department of Defense (DOD) NEPA Implementing Procedures, Marine Corps Order 5090.2 (MCO 5090.2), and Council on Environmental Quality (CEQ) guidance. The Proposed Action would replace the CH-53E heavy lift helicopter with the CH-53K heavy lift helicopter. The Proposed Action is a one-for-one replacement of all authorized CH-53E aircraft stationed at MCAS Miramar (16 aircraft per squadron, for a total of 64 aircraft). At this time, it is not anticipated that there would be any changes to personnel loading, operations, or training activities associated with replacing existing CH-53E with new CH-53K. Training and operations would mirror that of the existing CH-53E aircraft currently stationed at MCAS Miramar. This Environmental Assessment evaluates the potential for environmental impacts associated with the Proposed Action Alternative, as well as the No Action Alternative, to air quality resources and the noise environment of MCAS Miramar region of San Diego, California.

EXECUTIVE SUMMARY

ES.1 Proposed Action

The United States Marine Corps (USMC) has prepared this Environmental Assessment (EA) to identify and evaluate the potential environmental impacts associated with replacement of the CH-53E Super Stallion, a heavy lift helicopter, with the newer, modernized, and more capable CH-53K King Stallion heavy lift helicopter at Marine Corps Air Station (MCAS) Miramar in San Diego, California. MCAS Miramar currently operates 64 legacy CH-53E Super Stallion helicopters. This aircraft is at the end of its anticipated operational life span and cannot meet current or future heavy lift requirements.

ES.2 Purpose of and Need for Action

The United States Marine Corps currently operates 4 squadrons (64 aircraft) of CH-53E Super Stallion heavy lift helicopters at MCAS Miramar. The CH-53E model aircraft was first introduced to the USMC in 1981. The last CH-53E aircraft was delivered to the USMC in 2003. As such, MCAS Miramar's fleet of CH-53E aircraft have been in service for as long as 45-years. In 2018, Congress mandated that the USMC maintain a fleet of 200 CH-53E aircraft. However, due to aircraft mishaps, fatal accidents, and other aircraft losses, the USMC only has an inventory of 147 aircraft. To further exasperate the ability of Marines to safely achieve training, readiness, and lethality standards while flying the aging CH-53E, only an approximate 37% of the 147 aircraft fleet is available for operations at any given time. From September 2015 to December 2024, there were more than 10 total loss events recorded while operating the CH-53E. Unfortunately, several of these recent events have costs the lives of brave servicemen and servicewomen. Therefore, the purpose of the Proposed Action is to replace MCAS Miramar's 64 CH-53E heavy lift helicopters with the new CH-53K heavy lift helicopters, in accordance with the 2025 USMC Aviation Plan (USMC 2025). The need for replacing CH-53E aircraft with the CH-53K aircraft is to ensure that U.S. Marine Corps can continue to conduct heavy lift helicopter training necessary for mission and battlefield readiness, to maintain battlefield survivability and superiority, and to efficiently execute operational tasking.

ES.3 Alternatives Considered

The USMC is considering two action alternatives. Only one of the action alternatives considered meets the purpose of and need for the Proposed Action. This EA evaluates a No Action Alternative and a Preferred Action Alternative.

Under the Proposed Action Alternative, the CH-53E at MCAS Miramar would be replaced with the CH-53K. This represents a one-for-one replacement of all the CH-53E aircraft authorized at MCAS Miramar (four, 16-aircraft squadrons for a total of 64 aircraft). At this time, it is not anticipated that there would be any changes to personnel loading, operations, or training activities associated with the CH-53K. Training and operations would be significantly similar those of the existing CH-53E at MCAS Miramar.

Under the No Action Alternative, the Proposed Action would not occur. The existing CH-53E heavy lift helicopters at MCAS Miramar would not be replaced with the newer CH-53K heavy lift helicopters. The No Action Alternative would not meet the purpose and need for the Proposed Action; however, the No Action Alternative is carried forward to serve as a comparative baseline for environmental analysis.

ES.4 Summary of Environmental Resources Evaluated in the EA

Council on Environmental Quality (CEQ) guidance, National Environmental Policy Act (NEPA), U.S. Department of Defense (DOD) NEPA Implementing Procedures, and Marine Corps Order 5090.2 (MCO 5090.2) specify that EAs should address those resource areas potentially subject to impacts. In addition, the level of analysis should be commensurate with the anticipated level of environmental impact.

The following resource areas have been addressed in this EA: air quality and noise. The following resources were not carried forward in this EA because potential impacts were considered negligible or nonexistent: geological resources, hydrology, cultural resources, biological resources, hazardous, materials and hazardous waste, public health and safety, and socioeconomics.

ES.5 Summary of Potential Environmental Consequences of the Action Alternatives

Table ES-1 provides a tabular summary of the potential impacts to the resources associated with each of the alternative actions analyzed.

Table ES-1 Summary of Impacts

Resource Area	Proposed Action Alternative	No Action
Geological Resources	No Impacts	No Impacts
Hydrology	No Impacts	No Impacts
Air Quality	No Significant Impacts	No Impacts
Noise	No Significant Impacts	No Impacts
Hazardous Waste and Hazardous Materials	No Impacts	No Impacts
Biological Resources	No Impacts	No Impacts
Socioeconomics	No Impacts	No Impacts
Cultural Resources	No Impacts	No Impacts
Public Health and Safety	No Impacts	No Impacts

ES.6 Public Involvement

The USMC coordinated with Environmental Protection Agency (EPA), California Air Resources Board (CARB), San Diego Air Pollution Control District (SDAPCD), United States Fish and Wildlife Service (USFWS), and solicited comments from various agencies. A Clean Air Act General Conformity Determination will be provided to EPA, CARB, and SDAPCD (Appendix A). Concurrence will be received from the CARB and SDAPCD (Appendix A). A notice for public review of the Draft EA was published on relevant USMC public websites.

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Environmental Assessment for Replacement of CH-53E Heavy Lift Helicopter with CH-53K Heavy Lift Helicopter Marine Corps Air Station Miramar

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A

AAM
ADVANCED ACOUSTIC MODEL
AESO
NAVAL AIRCRAFT ENVIRONMENTAL SUPPORT OFFICE
APCD
AIR POLLUTION CONTROL DISTRICT

C

CAA
CLEAN AIR ACT
CAAQS
CALIFORNIA AMBIENT AIR QUALITY STANDARDS
CARB
CALIFORNIA AIR RESOURCES BOARD
CEPAM
CALIFORNIA EMISSIONS PROJECTION ANALYSIS MODEL
CEQ
COUNCIL ON ENVIRONMENTAL QUALITY
CH4
METHANE
CNEL
COMMUNITY NOISE EQUIVALENT LEVEL
CO
CARBON MONOXIDE
CO2
CARBON DIOXIDE
CWA
CLEAN WATER ACT
CY
CALENDAR YEAR

D

dB
DECIBEL
dBA
A-WEIGHTED DECIBEL
DNL
DAY-NIGHT AVERAGE SOUND LEVEL
DON
DEPARTMENT OF NAVY
DOT
DEPARTMENT OF TRANSPORTATION

E

EA
ENVIRONMENTAL ASSESSMENT
EIS
ENVIRONMENTAL IMPACT STATEMENT
EO
EXECUTIVE ORDER
ESA
ENDANGERED SPECIES ACT

F

FAA
FEDERAL AVIATION ADMINISTRATION
FONSI
FINDING OF NO SIGNIFICANT IMPACT

G

GCA
GROUND CONTROL APPROACH
GHG
GREENHOUSE GASES

H

HUD
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT.
HZ
HERTZ

I

INRMP
INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

L

LHD
LANDING HELICOPTER DECK
LMAX
MAXIMUM SOUND LEVEL

M

MAG
MARINE AIR GROUP

MBTA
Migratory Bird Treaty Act
MCAS
Marine Corps Air Station
MCO
Marine Corps Order
MEF
Marine Expeditionary Force
3rd MAW
3rd Marine Aircraft Wing

N

N2O
Nitrous Oxide
NAAQS
National Ambient Air Quality Standards
NAVFAC
Naval Facilities Engineering Command
NEPA
National Environmental Policy Act
NHPA
National Historic Preservation Act
NO2
Nitrogen Dioxide
NOx
Nitrogen Oxide

O

O3
Ozone

P

PM10 and PM2.5
Particulate Matter Less Than 10 Microns
ppm
Parts Per Million

R

ROD
Record of Decision
ROI
Region of Influence

S

SDAB
San Diego Air Basin
SDCAPCD
San Diego County Air Pollution Control District
SEL
Sound Exposure Level
SHPO
State Historic Preservation Officer
SIP
State Implementation Plan
SO2
Sulfur Dioxide
STOVL
Short Take Off and Vertical Landing

T

TGO
Touch-and-Go
tpy
tons per year

U

U.S.
United States
USC
U.S. Code
USEPA
U.S. Environmental Protection Agency
USMC
United States Marine Corps

V

VA
Veteran's Administration
VLP
Vertical Landing Pad
VOC
Volatile Organic Compounds

M

mg/m3
Micrograms Per Cubic Meter

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1.0 PURPOSE AND NEED

1.1 Introduction

The United States (U.S.) Marine Corps (USMC) has prepared this Environmental Assessment (EA) to evaluate the potential environmental impacts associated with replacing existing CH-53E heavy lift helicopters with new CH-53K heavy lift helicopters at Marine Corps Air Station (MCAS) Miramar San Diego, California. The Proposed Action is part of a Marine Corps wide process of replacing its aging fleet of heavy lift helicopters with modern more capable CH-53K aircraft. The CH-53E is at the end of its anticipated operational service life and cannot meet present or future heavy lift requirements.

1.2 Background

1.2.1 Location

MCAS Miramar is located approximately 13 miles north of downtown San Diego and 4 miles east of the Pacific Ocean (Figure 1-1). The Station is 23,065 acres in size and the southern and western boundaries are generally defined by State Route 52 (SR-52) and Interstate 805 (I-805). The communities of Mira Mesa and Scripps Ranch have been built up to the northern limits of the Station. The communities of Tierrasanta and Clairemont are located to the south of the Station. The community of University City is located to the west. The eastern boundary abuts the City of Santee and an unincorporated area of San Diego County. Main Station contains the airfield as well as commercial, administrative, and industrial uses; aviation support facilities; and housing areas. The City of San Diego leases land from the United States on which it operates a municipal landfill within the Air Station, just north of SR-52 in West Miramar. The East Miramar area is mostly undeveloped and used for training. The CH-53K would be stored and maintained at facilities along the runway flightline. The aircraft would be operated throughout MCAS Miramar and surrounding areas. The aircraft would also be maintained at Naval Base North Island, and conduct training operations at Marine Corps Base Camp Pendleton and other facilities and ranges where the CH-53E currently operates.

1.2.2 Mission

The mission of MCAS Miramar is to maintain and operate Air Station facilities and property while providing services, material support, and training venues that promote combat readiness and support the missions of 3rd Marine Aircraft Wing (3rd MAW) and other tenants aboard the installation. MCAS Miramar has two runways, a Landing Helicopter Deck (LHD) strip, five helicopter pads with associated support facilities, and two Vertical Landing Pads (VLP). The primary (24R/06L) and secondary (24L/06R) runways parallel to each other and are oriented in a southwest/northeast direction. The primary runway is 12,000 feet long, while the secondary runway is 8,000 feet long. Crossing these runways is Sierra Taxiway, which is approximately 2,800 feet long. Two helicopter landing pads are located within Sierra Taxiway for vertical landings by helicopter and tilt-rotor aircraft. The LHD strip, designated Runway 24S/06S, is 1,000 feet long and is used for helicopter pattern operations. It is located parallel to the primary and secondary runways to the south. The five helicopter pads are located northwest of the main runway. The two VLP's are located adjacent to the southern reach of Sierra Taxiway and are used for Short Take-Off and Vertical Landing (STOVL) capable fixed-wing aircraft.

The mix of Marine Corps aircraft squadrons assigned to MCAS Miramar is dynamic due to deployments, evolving missions, and replacement or upgrade of legacy aircraft platforms. The 2009 Record of Decision (ROD) for West Coast Basing of the MV-22 tilt-rotor aircraft assigned eight MV-22 Osprey operational squadrons to MCAS Miramar, replacing legacy CH-46 Sea Knight helicopter squadrons. The 2010 ROD for West Coast Basing of the F-35 Lightning II (Joint Strike Fighter), and Continuing Environmental Review Studies in 2018 and 2021, provide for the ongoing transition from legacy F/A-18 Hornet squadrons to two F-35C operational squadrons, three F-35B operational squadrons, and one F-35B fleet replacement squadron between 2020 and 2032. The 1996 ROD on the Realignment of Naval Air Station Miramar, and the 2002 Finding of No Significant Impact on the Introduction of the KC-130J to the Third Marine Aircraft Wing provide for the single KC-130J squadron based at MCAS Miramar. The four CH-53E squadrons that would be replaced under the Preferred Alternative are based at MCAS Miramar per the1996 ROD for the realignment of Naval Air Station Miramar.

Corporal Adam Henke/U.S. Marine Corps

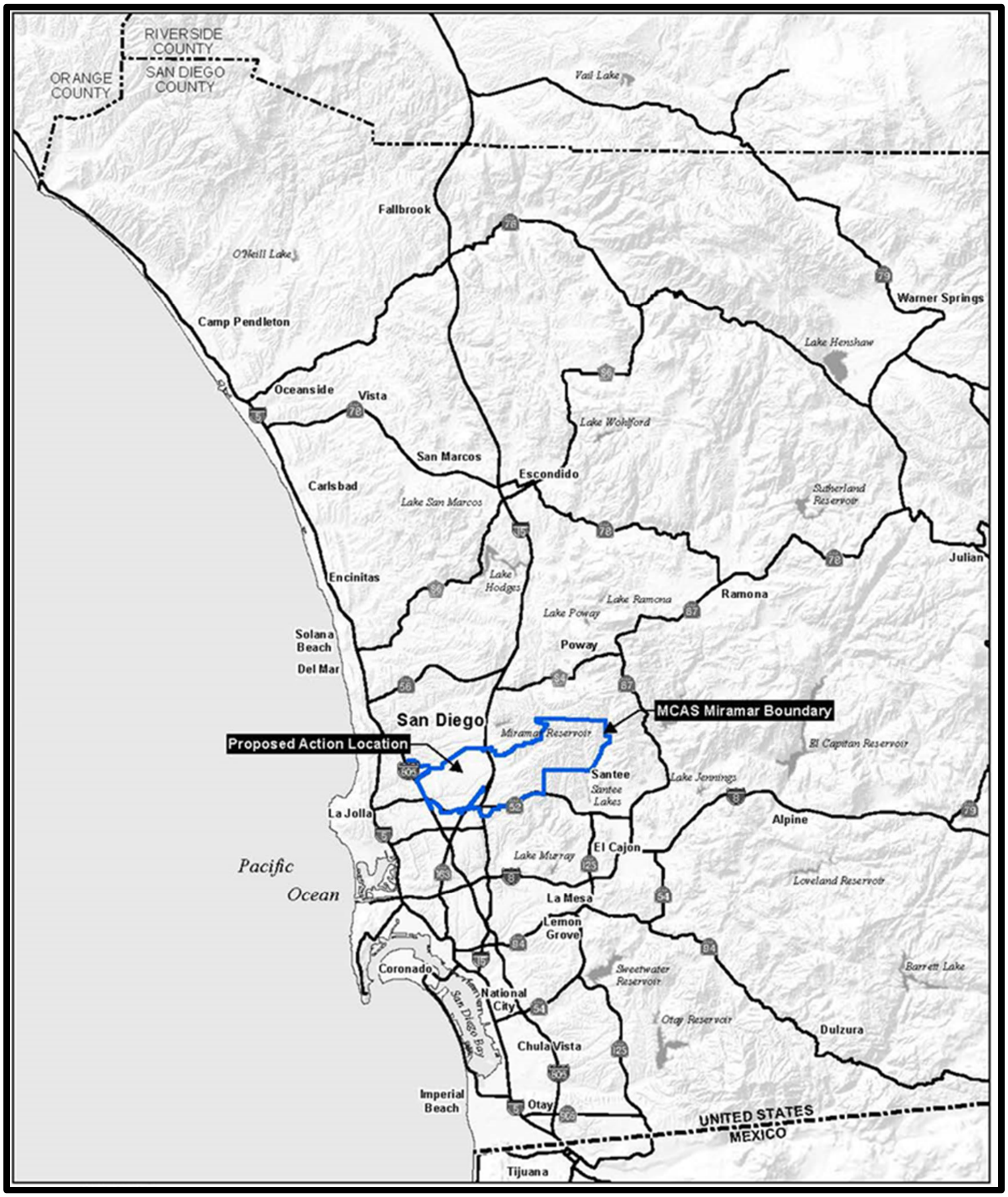

Figure 1.2-1. General Location and Overview of MCAS Miramar

1.2.2 CH-53E Super Stallion Aircraft

The CH-53E entered service in 1981 and is the only heavy lift helicopter in the USMC rotary-wing inventory. The CH-53E routinely transports loads in excess of 4.5 tons within a range of 540 nautical miles, and a combat radius of 110 nautical miles. Combat operations and humanitarian crises have validated the relevance of vertical heavy lift by both the Marine Air-Ground Task Force and joint force commanders. MCAS Miramar is home to four CH-53E squadrons, each designed and programmed for 16 CH-53E aircraft. This equates to 64 CH- 53E aircraft currently operating at MCAS Miramar. Aircraft inventory has been affected by aircraft being modified or receiving depot level maintenance and repairs, obsolescence issues, and supply issues associated with an aging airframe. These factors result in a lack of aircraft availability for tasking on the flightline. As such, the CH-53E Super Stallion is at the end of its anticipated operational service life and cannot meet present and future heavy lift requirements. Service life extension programs and additional aircraft modifications cannot provide the required capabilities and readiness.

1.2.3 CH-53K King Stallion Aircraft

The CH-53K would continue to fulfill the CH-53E mission, but with enhanced capabilities essential to meeting present and anticipated future operational requirements. The CH- 53K would have an increased payload (13.5 tons), nearly three times the capability of the CH-53E under similar flying conditions. Major system improvements include: fly-by-wire controls; a composite airframe; more capable and fuel efficient engines; a split torque gearbox to enable increased gross weight; advanced fourth-generation composite main rotor blades; modern interoperable glass cockpit; internal cargo handling systems compatible with U.S. Air Force 463L pallets; triple hook external cargo system allowing for disbursement of three separate loads at three separate locations per sortie (a sortie is an aircraft operation that includes a takeoff, mission, and return); and fourth-generation aircraft survivability equipment. The new aircraft would also have a larger, wider cabin that allows increased internal cargo capacity. The new aircraft has 57 percent more horsepower than the CH-53E and 63 percent fewer parts, increasing capability, reliability, and ease of maintenance. These elements all add to increased performance margins in degraded aeronautical environments. Additionally, the CH-53K would be supported by an upgraded software system that would facilitate condition-based maintenance.

Sergeant Damaris Arias/U.S. Marine Corps

1.3 Purpose of and Need for Action

The United States Marine Corps currently operates 4 squadrons (64 aircraft) of CH-53E Super Stallion heavy lift helicopters at MCAS Miramar. The CH-53E model aircraft was first introduced to the USMC in 1981. The last CH-53E aircraft was delivered to the USMC in 2003. As such, MCAS Miramar's fleet of CH-53E aircraft have been in service for as long as 45-years. In 2018, Congress mandated that the USMC maintain a fleet of 200 CH-53E aircraft. However, due to aircraft mishaps, fatal accidents, and other aircraft losses, the USMC only had an inventory of 147 aircraft. To further exasperate the ability of Marines to safely achieve training and readiness standards while flying the aging CH-53E, only an estimated 37% of the 147 aircraft fleet is available for operations at any given time. From September 2015 to December 2024, there were more than 10 total loss events recorded while operating the CH-53E. Unfortunately, several of these recent events have costs the lives brave servicemen and servicewomen. Therefore, the purpose of the Proposed Action is to replace MCAS Miramar's 64 CH-53E heavy lift helicopters with the new CH-53K heavy lift helicopters, in accordance with the 2025 USMC Aviation Plan (USMC 2025). The need for replacing CH-53E aircraft with the CH-53K aircraft is to ensure that U.S. Marine Corps can continue to conduct the heavy lift helicopter training necessary for mission and battlefield readiness, to maintain battlefield superiority, and to execute operational tasking.

3rd MAW's mandate is to efficiently and effectively maintain combat capability and mission readiness as it faces an increased demand to provide the mobility required to mass combat power anywhere in contested and distributed battlefield environments where surface connectors are not viable. To continue achieving their mission mandate, 3rd MAW must replace 4 operational squadrons of inefficient, aging, and difficult-to-maintain legacy heavy lift CH-53E aircraft and integrate 4 operational squadrons of more efficient, effective, reliable, and capable CH-53K heavy lift aircraft into the existing Marine Corps command, organizational structure, and physical facilities of MCAS Miramar. This action would ensure that the Marine Corps could employ the CH-53K's enhanced capability in support of increasing training and readiness requirements.

1.4 The Environmental Review Process

This section discusses applicable environmental review laws, regulations, and processes that were used to evaluate the Proposed Action.

1.4.1 The National Environmental Policy Act

NEPA requires Federal agencies to consider the environmental impacts of their actions before they are implemented, document these considerations, and involve the public in the review process. An EA is a concise public document that provides sufficient analysis for determining whether the potential environmental impacts of a proposed action are not significant, resulting in the preparation of a Finding of No Signification Impact (FONSI), or are significant, resulting in the preparation of an Environmental Impact Statement (EIS).

1.4.2 Key Documents

Key documents are sources of information incorporated into this EA. Documents are considered key because of similar actions, analyses, or impacts that may apply to this Proposed Action. CEQ guidance encourages incorporating documents by reference. Documents incorporated by reference in part or in whole include:

- Record of Decision to Realign Naval Air Station Miramar (DON 1996)
- Finding of No Significant Impact for the Introduction of the KC-130J to the 3rd MAW (USMC 2003)
- Record of Decision for the West Coast Basing of the MV-22 (USMC 2009)
- Record of Decision for the U.S. Marine Corps West Coast Basing of the F-35B Aircraft (USMC 2010)
- Finding of No Significant Impact for the West Coast Basing of the F-35 at MCAS Miramar (USMC 2017)
- Continuing Environmental Review Statement for West Coast Basing F-35C at MCAS Miramar (USMC 2021)
- Noise Study (Stantec 2025)
- Emissions Study (Stantec 2025)

1.4.3 Relevant Laws and Regulations

The Marine Corps has prepared this EA based upon Federal and state laws, statutes, regulations, and policies that are pertinent to the implementation of the Proposed Action, including the following:

- NEPA of 1969, as amended (42 USC sections 4321-4370h)
- CEQ guidance for Implementing the Procedural Provisions of NEPA
- Department of Defense NEPA Procedures
- MCO 5090.2, USMC Environmental Compliance and Protection Program, Volume 12
- Clean Air Act of 1963, as amended (CAA) (42 USC section 7401 et seq.)
- San Diego Air Pollution Control District, Conformity of Federal Actions, Rule 1501 (40 CFR Part 93 Subpart B)
- Clean Water Act of 1973, as amended (CWA) (33 USC section 1251 et seq.)
- Endangered Species Act (ESA) (16 USC section 1531 et seq.)
- Migratory Bird Treaty Act (MBTA) (16 USC section 703-712)
- Executive Order (EO) 11988, Floodplain Management
- EO 13834, Efficient Federal Operations

1.4.4 Public Involvement

Pursuant to NEPA, CEQ guidance, DOD NEPA Implementing Procedures, and the MCO 5090.2 the USMC is required to involve the public, State, Tribal, and local governments, relevant agencies, and any applicants, to the extent practicable in preparing EAs. Through the public involvement process, the USMC coordinated with relevant Federal, state, and local agencies and notified them and the public of the Proposed Action.

A notice of availability of the Draft EA for public review was published on relevant USMC public websites. The notice provides a 30-day opportunity to comment on the Draft EA. The Marine Corps will consider all public comments received, and the Final EA will reflect those considerations. In addition, the USMC will publish a Notice of Availability of a Draft Clean Air Act Conformity Determination in the San Diego Union Tribune and a Final Conformity Determination in the same newspaper.

1.4.5 Agency Coordination and Permit Requirements

The Marine Corps will deliver a Clean Air Act Conformity Determination to the County of San Diego Air Pollution Control District (APCD), the California Air Resources Board (CARB), and U.S. Environmental Protection Agency (USEPA) Region 9 (Appendix A). The Marine Corps will deliver a Final Clean Air Act Conformity Determination to the same agencies (Appendix A). In accordance with Section 106 of the National Historic Preservation Act (NHPA), 36 CFR 800.3(a)(1), the USMC has determined that the Proposed Action has no potential to cause effects to historic resources at MCAS Miramar. Therefore, consultation with the State Historic Preservation Officer (SHPO) was not necessary. This conclusion was based on internal agency coordination with MCAS Miramar's Cultural Resource Manager. In accordance with the Endangered Species Act (50 CFR 402), the USMC has determined that the Proposed Action will have no effect on federally listed Threatened or Endangered species within MCAS Miramar. This determination was made based on an official species list generated on February 14^{th}, 2025, from US Fish and Wildlife's Information for Planning and Consultation website (Consultation Code 2025-0057091) and internal agency coordination with MCAS Miramar's Natural Resource Management Division. Therefore, consultation with U. S. Fish and Wildlife Service is not required. The Draft EA document will be provided to the California State Clearinghouse for review and comment (Appendix D).

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2 PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action

The Marine Corps proposes the replacement of existing CH-53E Super Stallion heavy lift helicopter located at MCAS Miramar with the new CH-53K King Stallion heavy lift helicopter, in accordance with the 2025 USMC Aviation Plan (USMC 2025). The CH-53E Super Stallion is at the end of its anticipated operational service life and cannot meet present and future heavy lift requirements.

2.2 Alternatives Development

CEQ guidance and the NEPA procedures contained in MCO 5090.2, dated 11 June 2022, Environmental Compliance and Protection Program, provide instructions on the consideration of project alternatives and promote the objective evaluation of reasonable alternatives. Reasonable alternatives must meet the stated purpose and need for the Proposed Action, which is to replace the aging CH-53E at MCAS Miramar.

Marine Aircraft Group (MAG) 16 has been continuously stationed at MCAS Miramar since 1997. The requirement of USMC is to continue the heavy lift helicopter presence at MCAS Miramar due to the location, which allows the squadrons to support regional training operations, as well as supporting the Aviation Combat Element of a Marine Expeditionary Unit. The command structure and aviation facilities required to support the CH-53E currently exist at MCAS Miramar and would likewise support the CH-53K platform. As such, no other locations were considered for CH-53K transition for this EA.

Lance Corporal Meshaq Hylton/U.S. Marine Corps

The existing CH-53E hangars at MCAS Miramar are serviceable and would meet the technical requirements for the proposed West Coast Basing of CH-53K. Hangar relocation or new construction would not be required to support the proposed basing of CH-53K at MCAS Miramar.

2.2.1 No Action Alternative

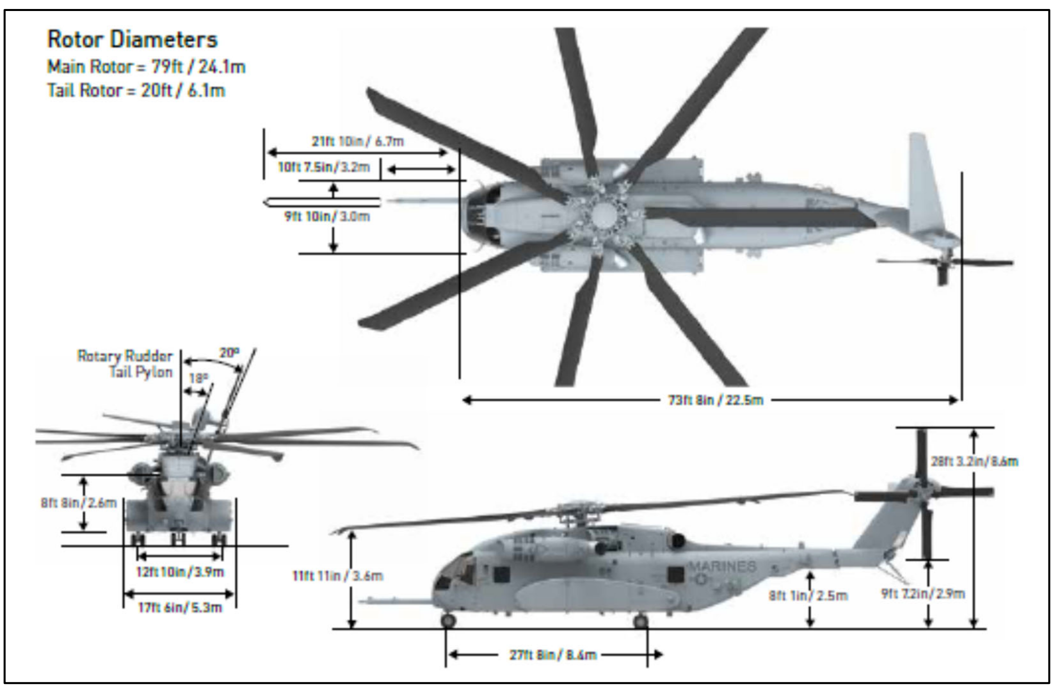
Under the No Action Alternative, the Proposed Action would not occur. The existing CH-53E heavy lift helicopters at MCAS Miramar would not be replaced with the CH-53K heavy lift helicopters. The No Action Alternative would not meet the purpose and need for the Proposed Action because the CH-53E is not sufficiently capable for current and future missions, and attrition and service life will diminish the number of available aircraft over time; however, the No Action Alternative is carried forward to serve as a comparative baseline for analysis.

2.2.2 Proposed Action (Preferred Alternative)

Under the Proposed Action, the existing CH-53E airframes at MCAS Miramar would be replaced with new CH-53K airframes. Figure 2.2-1 provides an overview of the new aircraft's dimensions. This would represent a one-for-one replacement of all the CH-53E aircraft authorized at MCAS Miramar (four 16-aircraft active squadrons totaling 64 aircraft).

In addition, demolition and construction of new facilities would not be necessary to facilitate basing the CH-53K at MCAS Miramar. At this time, it is not anticipated that there would be any changes to personnel loading, operations, or training activities associated with the CH-53K. Training and operations would be substantially the same as those of the existing CH-53E.

Figure 2.2-1. CH-53K King Stallion



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3 AFFECTED ENVIRONMENT

3.1 Definition of Affected Environment

Federal regulations implementing NEPA (42 USC § 4321 et seq.), CEQ guidance, DOD NEPA Implementing Procedures, and MCO 5090.2 instruct the USMC to include in EAs a succinct description of the areas that would be affected by the Proposed Action and any proposed alternatives. In accordance with CEQ guidance, this Affected Environment chapter:

> *"… shall succinctly describe the environment of the area(s) to be affected by the alternatives under consideration, including the reasonably foreseeable environmental trends and planned actions in the area(s)" (Former CEQ Regulation 40 CFR § 1502.15).*

This chapter provides a description of the affected environment, including existing environmental conditions. The information presented in this chapter will be used to inform the USMC's analysis of environmental consequences and mitigation measures presented in the following chapter.

3.2 Air Quality

This section describes existing air quality conditions found within the region affected by the Proposed Action and applicable regulations.

3.2.1 MCAS Miramar Region Weather

Precipitation averages just over 10 inches annually at MCAS Miramar, generally associated with low intensity storms in winter and spring. Frosts are light and infrequent, with the growing season ranging from 345 to 360 days. Winds are usually gentle and come from the west, especially during summer afternoons. The average annual temperature is about 63 degrees Fahrenheit. The average daily high is 71 degrees, and the low averages 53 degrees. Weather patterns are dominated by a subtropical ridge with a shallow marine layer and pronounced low-level inversion and moderating effects of the California current offshore. This Mediterranean climate creates a semi-arid condition, with warm, dry summers and mild winters. Weather data are available from the Marine Corps Meteorology and Oceanographic Command Detachment on MCAS Miramar and from the National Weather Service at Lindbergh Field, the commercial San Diego Airport.

Hazardous fire conditions occur during fall when there are very dry, warm winds and vegetation is dry. High erosion rates can result when intense storms follow a fire. Fire is a natural component of the southern California landscape, thus, the vegetation at MCAS Miramar is adapted to occasional fires. However, the risk of large-scale, disastrous fire has increased with urbanization and past fire suppression policies.

3.2.2 MCAS Miramar Air Quality Environment

Air quality in a given location is defined by pollutant concentrations in the atmosphere and is generally expressed in units of parts per million (ppm) or micrograms per cubic meter (µg/m3). The significance of a pollutant concentration is determined by comparing it to a national and/or state ambient air quality standard. These standards represent the maximum allowable atmospheric concentrations that may occur and still protect public health and welfare with a reasonable margin of safety. The national standards, established by the USEPA, are termed the National Ambient Air Quality Standards (NAAQS). The NAAQS are defined as the maximum acceptable ground-level concentrations that generally may not be exceeded more than once per year except for annual standards, which may never be exceeded. State standards, established by the California Air Resources Board, are termed the California Ambient Air Quality Standards (CAAQS). The CAAQS are at least as restrictive as the NAAQS and include pollutants for which there are no national standards. The national and California ambient air quality standards are shown in Appendix C.

The main pollutants of concern that are considered in this air quality analysis include volatile organic compounds (VOCs), ozone (O_3), carbon monoxide (CO), nitrogen oxides (NO_x), nitrogen dioxide (NO_2), and particulate matter less than 10 microns in diameter (PM_{10} and $PM_{2.5}$). Although VOCs or NO_x have no established ambient standards, they are important as precursors to O_3 formation.

3.2.3 Greenhouse Gases

Greenhouse Gas Emissions (GHGs) are gases that trap heat in the atmosphere. These emissions occur from natural processes and human activities. The accumulation of GHGs in the atmosphere plays a critical and important role in regulating the earth's temperature. Scientific evidence indicates a trend of increasing global temperature over the past century due to an increase in GHG emissions from human activities. This trend is predicted to produce negative environmental, economic, and social consequences across the globe. Predictions of long-term negative environmental impacts due to natural and human induced global GHG emission trends include sea level rise, changing weather patterns, loss of animal diversity, and reduced snowpack.

The most common type of GHGs emitted from natural processes and human activities include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Examples of GHGs created and emitted primarily through human activities include fluorinated gases (hydro-fluorocarbons and per-fluorocarbons) and sulfur hexafluoride.

Federal agencies are, on a national scale, addressing emissions of GHGs by reductions mandated in federal law and Executive Orders. Several states have promulgated laws as a means to reduce statewide levels of GHG emissions. In particular, the State of California has enacted laws to reduce statewide GHG emissions to 1990 levels by the year 2020.

In an effort to reduce energy consumption, reduce dependance on petroleum, and increase the use of renewable energy resources, the DoN and the USMC have implemented a number of renewable energy projects. The types of projects currently in operation within the Naval Facilities Engineering Command (NAVFAC) Southwest Region include thermal and photovoltaic solar systems, geothermal power plants, and wind generators. The military also purchases one-half of the biodiesel fuel sold in California. The DoN continues to promote and install new renewable energy projects within the NAVFAC Southwest region.

The potential effects of proposed GHG emissions are by nature global and cumulative impacts, as individual sources of GHG emissions are not large enough to have an appreciable effect on global temperature trends. Therefore, the Proposed Action's GHG emission impacts to the environment is discussed in the context of cumulative impacts in Chapter 5 of this EA.

3.2.4 Air Quality Regulations and Standards

Air quality regulations were first promulgated with the implementation of the federal Clean Air Act (CAA) of 1969. The CAA established the NAAQS and delegated the enforcement of air pollution control regulations to the states. In California, the CARB is responsible for enforcing air pollution regulations. The CARB has in turn delegated the responsibility of regulating stationary emission sources to local air agencies. In the San Diego Air Basin (SDAB), the local regulatory agency is the San Diego County Air Pollution Control District (SDCAPCD). The CAA Amendments of 1977 established air quality planning processes and required areas in nonattainment of a NAAQS to develop a State Implementation Plan (SIP) detailing how the state will attain the standards within mandated time frames. The Clean Air Act Amendments of 1990 revised the attainment planning process and identifies new emission reduction goals and compliance dates based upon the severity of the ambient air quality standard violation within a region.

The CAA requires EPA to set NAAQS (40 CFR part 50) for six principal pollutants ("criteria" air pollutants) which can be harmful to public health and the environment. The Clean Air Act identifies two types of national ambient air quality standards. Primary standards provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings (EPA 2024). The NAAQS are presented below in Table 3.2-1

Table 3.2-1 Ambient Air Quality Standards							
Pollutant	Averaging Time	California Standards		National Standards			
		Concentration	Method	Primary	Secondary	Method	
Ozone (O_3)	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry	
	8 Hour	0.070 ppm (137 µg/m^3)		0.070 ppm (137 µg/m^3)			
Respirable Particulate Matter (PM10)	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis	
	Annual Arithmetic Mean	20 µg/m^3		—			
Fine Particulate Matter (PM2.5)	24 Hour	—	—	35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis	
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	9.0 µg/m^3	15.0 µg/m^3		
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	—	Non-Dispersive Infrared Photometry (NDIR)	
	8 Hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	—		
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—		
Nitrogen Dioxide (NO_2)	1 Hour	0.18 ppm (339 µg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 µg/m^3)	—	Gas Phase Chemiluminescence	
	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)		53 ppb (100 µg/m^3)	Same as Primary Standard		
Sulfur Dioxide (SO_2)	1 Hour	0.25 ppm (655 µg/m^3)	Ultraviolet Fluorescence	75 ppb (196 µg/m^3)	—	Ultraviolet Fluorescence; Spectrophotometry (Pararosaniline Method)	
	3 Hour	—		—	0.5 ppm (1300 µg/m^3)		
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas)	—		
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)	—		
Lead	30 Day Average	1.5 µg/m^3	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption	
	Calendar Quarter	—		1.5 µg/m^3 (for certain areas)	Same as Primary Standard		
	Rolling 3-Month Average	—		0.15 µg/m^3			
Visibility Reducing Particles	8 Hour	-	Beta Attenuation and Transmittance through Filter Tape	**No National Standards**			
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography				
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence				
Vinyl Chloride	24 Hour	0.01 ppm 0.02 (26 µg/m^3)	Gas Chromatography				

3.2.4.1 Federal Regulations and the General Conformity Rule

Section 176(c) of the 1990 CAA contains the General Conformity Rule (40 CFR.850-860 and 40 CFR 93.150-160). The General Conformity Rule states that a federal agency cannot support an activity unless the activity conforms to the most recent USEPA-approved SIP within the region of a proposed action. This means that federally supported or funded activities will not (1) cause or contribute to a new air quality standard violation, (2) increase the frequency or severity of an existing standard violation, or (3) delay the timely attainment of any standard, interim emission reduction, or other milestone. Based on the present attainment status of the SDAB, a proposed action would conform to the most recent USEPA-approved SIP if its annual construction or operational emissions remain below 100 tons of CO or 25 tons of NO_x or VOCs.

As part of the general conformity process, a conformity analysis is required if a federal action satisfies one of the two conditions:

1. The action's direct and indirect emissions have the potential to emit one or more of the six criteria pollutants at or above emission rates shown in Table 3.2-2, *Emission Rates for Criteria Pollutants in Nonattainment Areas.*

Table 3.2-2. Emission Rate Thresholds for Criteria Pollutants in Nonattainment Areas (NAA)
40 CFR 93.153(b)(1)

Pollutant	Emission Rate Threshold tons/year
Ozone (VOC's or NOx):	
Serious NAA	50
Severe NAA	25
Extreme NAA	10
Other ozone NAA's outside an ozone transport region:	100
Other ozone NAA's inside an ozone transport region:	
VOC	50
NOx	100
Carbon Monoxide: All Maintenance areas	100
SO2 or NO2: All NAA's	100
PM10:	
Moderate NAA's	100
Serious NAA's	70
Pb: All NAA's	25

2. The action's direct and indirect emissions of any criteria pollutant represents 10 percent of a nonattainment or maintenance area's total emissions inventory for that pollutant as shown in Table 3.2-3, *Regional Emissions for the San Diego Air Basin*.

Table 3.2-3. 2017 Estimated Annual Average Emissions - San Diego Air Basin (TPD)						
Stationary Sources	**CO**	**NOx**	**SOx**	**PM**	**PM10**	**PM2.5**
Fuel Combustion	13.93	3.8	0.24	1.49	1.48	1.47
Waste Disposal	0.2	0.31	0.05	6.8	2.65	0.57
Cleaning and Surface Coatings	-	-	-	-	-	-
Petroleum Product and Marketing	0.01	0.01	-	-	-	-
Industrial Processes	0.29	0.26	0.02	9.51	4.65	0.92
Total Stationary Sources	14.44	4.39	0.31	17.79	8.78	2.95
Areawide Sources	CO	NOx	SOx	PM	PM10	PM2.5
Solvent Evaporation	-	-	-	0.01	0.01	0.01
Miscellaneous Processes	21.37	3.84	0.2	117.18	62.45	11.88
Total Areawide Sources	21.37	3.84	0.2	117.19	62.45	11.88
Mobile Sources	CO	NOx	SOx	PM	PM10	PM2.5
On-Road Motor Vehicles	169.77	40.1	0.38	5.32	5.22	2.46
Other Mobile Sources	177.47	29.83	0.48	3.14	3.02	2.79
Total Mobile Sources	347.24	69.92	0.86	8.46	8.24	5.26
Natural (Non-Anthropogenic) Sources	CO	NOx	SOx	PM	PM10	PM2.5
Total Natural Sources	6.53	1.27	0.2	1.08	1.04	0.88
Grand Total for San Diego Air Basin	389.57	79.43	1.57	144.52	80.5	20.97
10% Threshold	**39**	**8**	**0.157**	**15**	**8**	**2**
CARB 2017: https://ww2.arb.ca.gov/applications/emissions-air-basin						

If the total direct and indirect emissions associated with the Proposed Action are below the *de minimums* thresholds indicated in Table 3.2-2 and 10% of the region's total emission inventory indicated in Table 3.2-3, general conformity requirements would not apply. However, because the region is in nonattainment or maintenance for one or more criteria pollutants, a conformity analysis and agency coordination process must be completed prior to implementing the Proposed Action.

3.2.4.2 Local Regulations

The SDCAPCD is the local agency responsible for the administration and enforcement of air quality regulations for San Diego County. The SDCAPCD has developed air quality attainment plans designed to reduce emissions to a level that will bring the SDAB into attainment of the national and state ambient air quality standards. San Diego County is currently designated as a Serious Nonattainment Area for the 2008 ozone NAAQS (75 ppb), and a Moderate Nonattainment Area for the 2015 ozone NAAQS (70 ppb). Accordingly, the SDCAPCD must prepare and submit to the EPA, via CARB, two ozone SIPs identifying control measures and associated emissions reductions necessary to demonstrate attainment of the 75 ppb standard by July 20, 2021 (2020 attainment year) 2 and attainment of the 70 ppb standard by August 3, 2024 (2023 attainment year). This Attainment Plan addresses all requirements for both ozone standards. (SDCAPCD 2020).

3.2.5 Region of Influence

The area affected by the Proposed Action's emission sources would include the immediate region surrounding MCAS Miramar. Identifying the Region of Influence (ROI) for air quality requires knowledge of the pollutant type, source emission rates, the proximity of project emission sources to other emission sources, and local and regional meteorology. For inert pollutants (other than O_3 and its precursors), the ROI is generally limited to a few miles downwind from a source. The ROI for O_3 may extend much farther downwind than for inert pollutants. O_3 is formed in the atmosphere by photochemical reactions of previously emitted pollutants called precursors. O_3 precursors are mainly NO_x and photochemically reactive VOCs. In the presence of solar radiation, the maximum effect of precursor emissions on O_3 levels usually occurs several hours after they are emitted and, therefore, many miles from the source. Therefore, the Proposed Action's ROI for O_3 would include much of the SDAB, which includes all of San Diego County.

3.2.5.1 San Diego Air Basin

The USEPA designates all areas of the U.S. as having air quality that is better (attainment) or worse (nonattainment) than the NAAQS (Table 3.2-4). The criteria for nonattainment designation varies by pollutant: (1) an area is in nonattainment for O_3 if its NAAQS has been exceeded more than three discontinuous times in 3 years and (2) an area is in nonattainment for any other pollutant if its NAAQS has been exceeded more than once per year. Former nonattainment areas that have achieved attainment of the NAAQS are designated as maintenance areas. Presently, the SDAB is in attainment of the NAAQS for all pollutants except O_3. The USEPA designates the SDAB as a serious O_3 nonattainment area.

The western portion of the SDAB (the portion of the County generally west of the interior desert region) was historically in nonattainment of the NAAQS for CO. Due to a reduction in emissions from the implementation of national emission standards for new vehicles and a state vehicle emissions testing program, the region has attained the CO standards since 1991. As a result, the USEPA in June 1998 redesignated the region to attainment of the CO NAAQS and the region is now a maintenance area for CO.

The CARB also designates areas of the state that are in attainment or nonattainment of the CAAQS. An area is in nonattainment for a pollutant if its CAAQS has been exceeded more than once in 3 years. Presently, the SDAB is in attainment of the CAAQS for all air pollutants except O_3 and PM_{10}. San Diego County is considered a severe O_3 nonattainment area by the CARB. The severe designation is given to an area if the fourth highest pollutant concentration recorded in a 3-year period ranges between 0.16 and 0.20 ppm.

O_3 concentrations are generally the highest during the summer months and coincide with the period of maximum insolation. Maximum O_3 concentrations tend to be regionally distributed, since precursor emissions become homogeneously dispersed in the atmosphere. Inert pollutants, such as CO, tend to have the highest concentrations during the colder months of the year, when light winds and nighttime/early morning surface-based temperature inversions inhibit atmospheric dispersion. Maximum inert pollutant concentrations are usually found near an emission source.

Table 3.2-4. San Diego Air Basin Attainment Status		
Criteria Pollutant	**Federal Designation**	**State Designation**
Ozone (O_3) (8-Hour)	Nonattainment	Nonattainment
Ozone (O_3) (1-Hour)	Attainment	Nonattainment
Carbon Monoxide	Attainment	Attainment
PM_{10}	Unclassifiable	Nonattainment
$PM_{2.5}$	Attainment	Nonattainment
Nitrogen Dioxide	Attainment	Attainment
Sulfur Dioxide	Attainment	Attainment
Lead	Attainment	Attainment
Sulfates	No Federal Standard	Attainment
Hydrogen Sulfide	No Federal Standard	Unclassified

3.2.5.2 Clean Air Act Title V Program

The Title V Operating Permit Program consolidates all CAA requirements applicable to the operation of a source, including requirements from the SIP, preconstruction permits, and the air toxics program. It applies to stationary sources of air pollution that exceed the major stationary source emission thresholds, as well as other non-major sources specified in a particular regulation. The program includes a requirement for payment of permit fees to finance the operating permit program whether implemented by USEPA or a state or local regulator. USMC installations subject to Title V permitting shall comply with the requirements of the Title V Operating Permit Program, which are detailed in 40 CFR Part 70 and all specific requirements contained in their individual permits.

3.2.6 Ozone (O_3)

The following section provides a general overview of what ozone is and its relationship to human health. Ozone is also referred to throughout this document by its molecular formula, O_3.

3.2.6.1 What is Ozone?

According to the San Diego Air Pollution Control District, “Ozone is a reactive and corrosive gas composed of three oxygen atoms, that is found in two layers of the atmosphere. It occurs naturally in the stratosphere where it absorbs harmful ultraviolet (UV) radiation that is emitted by the sun, thusly partially shielding the public from its effects such as extreme sunburn and skin cancer. Ozone also exists in the troposphere. For the most part, this “ground-level” ozone is not naturally occurring (yet plants and wildfires do emit ozone forming compounds), but rather is the result of human activities that create air pollutants that react to form ozone. Ground level ozone is not emitted directly into the air but is formed by chemical reactions driven by heat and sunlight (UV radiation) that turn two common air pollutants into ozone: oxides of nitrogen (NO_x) and volatile organic compounds (VOC). NO_x is emitted by combustion processes such as motor vehicle engines, planes, ships, trains, and industrial processes that burn fuel. VOCs include paint thinner vapors, barbecue lighter fluid, gasoline vapors, fumes from paints and cleaners, and even propane gas" (SDAPCD 2020).

3.2.6.2 Ozone and Human Health Considerations

According to the San Diego Air Pollution Control District, "[E]xposure to unhealthful levels of ozone can cause lung and airway inflammation, significant decreases in lung function and capacity, and other respiratory symptoms such as coughing and pain when taking a deep breath. As with any health issues, some people are more sensitive to ozone than others and the severity of health effects can vary widely among individuals. Children, older adults, people with pre-existing disease and anyone working, exercising, or playing outdoors are at a greater risk of adverse health impacts from ozone exposure. Ozone also impacts the agricultural and forest industries, slowing plant growth, reducing crop yields, and increasing susceptibility to disease, pests, and harsh weather" (SDAPCD 2020).

3.2.7 Existing CH-53E Aircraft Emissions at MCAS Miramar

Table 3.2-5 presents the emissions associated with existing annual CH-53E model aircraft operations at MCAS Miramar. The CH-53E operations used to estimate annual emissions are based on CY 2021, CY 2022, and CY 2023. These data represent emissions for aircraft operations below 3,000 feet above ground level (AGL) in proximity to MCAS Miramar and include departure and arrival, touch and go (TGO), ground-controlled approach (GCA) box pattern, and engine maintenance and testing activities. Emission calculations for aircraft are generally limited to the first 3,000 feet of the atmosphere, as this is the average depth of the mixing layer where emissions released into this layer could affect ground-level pollutant concentrations. Emissions released above the mixing layer generally would not appreciably affect ground-level air quality. Factors for the three T64-GE-419 turboshaft engines and on-board auxiliary power units were used to estimate emissions for the CH-53E aircraft (Naval Aircraft Environmental Support Office [AESO] 2009a,b). The data in Table 3.2-4 show that the annual emissions due to existing CH-53E operations at MCAS Miramar were (1) 26.97 tons of VOC, (2) 48.79 tons of CO, (3) 25.68 tons of NO_x, (4) 9.57 tons of SO_2, and (5) 9.33 tons of $PM_{10/2.5}$. Appendix A provides the supporting air quality data used to estimate existing CH-53E aircraft emissions.

Table 3.2-5. Annual Emissions from Existing Operations of CH-53E Model Aircraft at MCAS Miramar

Pollutant	VOC	CO	NOx	SO_2	$PM_{10/2.5}$
Aircraft Operations					
CH-53E Flight	19.76	35.91	17.41	6.05	6.84
CH-53E Engine Testing	7.21	12.88	8.27	3.52	2.50
Total Emissions	**26.97**	**48.79**	**25.68**	**9.57**	**9.33**

3.3 Noise

Noise is considered to be unwanted sound that interferes with normal activities or otherwise diminishes the quality of the environment. It may be intermittent or continuous, steady or impulsive. It may be stationary or transient. Stationary sources are normally related to specific land uses (e.g., housing tracts or industrial plants). Transient noise sources move through the environment, either along established paths (e.g., highways, railroads, and aircraft flight tracks near airfields), or randomly. There is wide diversity in responses to noise. These responses not only vary according to the type of noise and the characteristics of the sound source, but also according to the sensitivity and expectations of the receptor, the time of day, and the distance between the noise source (e.g., an aircraft) and the receptor (e.g., a person or animal).

The physical characteristics of noise, or sound, include its intensity, frequency, and duration. Sound is created by acoustic energy, which produces minute pressure waves that travel through a medium, like air, and are sensed by the eardrum. This may be likened to the ripples in water that would be produced when a stone is dropped into it. As the acoustic energy increases, the intensity or amplitude of these pressure waves increases, and the ear senses louder noise. The loudest sounds the human ear can hear comfortably have one trillion (1,000,000,000,000) times the acoustic energy of sounds the ear can barely detect. Because of this wide range in intensity, noise is measured on a logarithmic scale, in units called decibels (dB). The logarithm, and its use, is nothing more than a mathematical tool that simplifies dealing with very large and very small numbers. For example, the logarithm of the number 1,000,000 is 6, and the logarithm of the number 0.000001 is -6 (minus 6). Obviously, as more zeros are added before or after the decimal point, converting these numbers to their logarithms greatly simplifies calculations that use these numbers.

The frequency of sound is measured in cycles per second, or hertz (Hz). This measurement reflects the number of times per second the air vibrates from the acoustic energy. Low frequency sounds are heard as rumbles or roars, and high frequency sounds are heard as screeches. Sound measurement is further refined through the use of "A-weighting." The normal human ear can detect sounds that range in frequency from about 20 Hz to 15,000 Hz. However, all sounds throughout this range are not heard equally well. Therefore, through internal electronic circuitry, some sound meters are calibrated to emphasize frequencies in the 1,000 to 4,000 Hz range. The human ear is most sensitive to frequencies in this range, and sounds measured with these instruments are termed "A-weighted," and are typically presented in terms of A-weighted decibels (dBA). All decibels presented in this EA are A-weighted. However, throughout this EA decibels are represented by the acronym "dB" for simplicity.

3.3.1 Noise Descriptors

The word "metric" is used to describe a standard of measurement. As used in environmental noise analysis, there are many different types of noise metrics. Each metric has a different physical meaning or interpretation and each was developed by researchers to represent the effects of environmental noise.

The metrics supporting the assessment of noise from aircraft operations are the maximum sound level (L_{max}), the Sound Exposure Level (SEL), and time-averaged cumulative noise metrics such as the Community Noise Equivalent Level (CNEL). Each metric represents a "tier" for quantifying the noise environment and is briefly discussed below.

Maximum Sound Level

The L_{max} metric is used to define peak noise levels. L_{max} is the highest sound level measured during a single noise event (e.g., an aircraft overflight), and is the sound actually heard by a person on the ground. For an observer, the noise level starts at the ambient noise level, rises up to the maximum level as the aircraft flies closest to the observer, and returns to the ambient level as the aircraft recedes into the distance. Maximum sound level is important in judging the interference caused by a noise event with conversation, sleep, or other common activities.

Sound Exposure Level

L_{max} alone may not represent how intrusive an aircraft noise event is because it does not consider the length of time that the noise persists. The SEL metric combines both of these characteristics into a single measure. It is important to note, however, that SEL does not directly represent the sound level heard at any given time, but rather provides a measure of the total exposure of the entire event. Its value represents all of the acoustic energy associated with the event, as though it was present for one second. Therefore, for sound events that last longer than one second, the SEL value will be higher than the L_{max} value. The SEL value is important because it is the value used to calculate other time-averaged noise metrics.

Community Noise Equivalent Level

The number of times aircraft noise events occur during given periods is also an important consideration. Therefore, a "cumulative" noise metric supports the analysis of multiple time varying aircraft events.

The CNEL metric sums the individual noise events and averages the resulting level over a specified length of time (24 hours). Thus, it is a composite metric representing the maximum noise levels, the duration of the events, the number of events that occur, and the time of day during which they occur. This metric adds approximately 5 dB to those events that occur between 7:00 P.M. and 10:00 P.M., and 10 dB to those events that occur between 10:00 P.M. and 7:00 A.M. to account for the increased intrusiveness of noise events occurring during the evening and at night when ambient noise levels are normally lower than during the daytime. This cumulative metric does not represent the variations in the sound level heard. Nevertheless, it does provide an excellent measure for comparing environmental noise exposures when there are multiple noise events to be considered. Cumulative metrics such as CNEL are the preferred noise metrics of the U.S. Department of Housing and Urban Development (HUD), the Department of Transportation

(DOT), the Federal Aviation Administration (FAA), the USEPA, and the Veteran's Administration (VA).

CNEL is calculated by the following formula:

$$CNEL = (SEL + (10 \times \log_{10}(N_D + 3N_E + 10N_N))) - 49.4$$

Where: CNEL = Community Noise Equivalent Level
SEL = Sound Exposure Level of the Given Event
N_D = Number of Day Noise Events
N_E = Number of Evening Noise Events
N_N = Number of Night Noise Events

Ignoring the evening and night penalties for the moment, CNEL may be thought of as the continuous or cumulative A-weighted sound level that would be present if all of the variations in sound level that occurred over the given period were smoothed out so as to contain the same total sound energy. While CNEL does provide a single measure of overall noise impact, it is fully recognized that it does not provide specific information on the number of noise events or the specific individual sound levels that do occur. For example, a CNEL of 65 dB could result from a very few noisy events, or a large number of quieter events. Although it does not represent the sound level heard at a particular time, it does represent the total sound exposure. Scientific studies and social surveys have found cumulative, time-averaged metrics to be the best measure to assess levels of community annoyance associated with all types of environmental noise. Therefore, these metrics are endorsed by the scientific community and governmental agencies (ANSI 2020; USEPA 1974; FICUN 1980; FICON 1992), and have been adopted for use throughout this EA to evaluate the potential environmental consequences of implementing the Proposed Action at MCAS Miramar.

Noise Regulations and Standards

Based on numerous sociological surveys and recommendations of federal interagency councils, the most common benchmark referred to is a Day-Night Average Sound Level of 65 dB. This threshold is often used to determine residential land use compatibility around airports or highways. By extension, it is often used as a criterion in airspace planning. Two other average noise levels are also useful:

- A Day-Night Average Noise Level of 55 dB was identified by the USEPA as a level ". . . requisite to protect the public health and welfare with an adequate margin of safety" (USEPA 1974). Noise may be heard, but there is no risk to public health or welfare.

- A Day-Night Average Noise Level of 75 dB is a threshold above which effects other than annoyance may occur. It is 10 to 15 dB below levels at which hearing damage is a known risk (OSHA 1983). However, it is also a level above which some adverse health effects cannot be categorically discounted.

The State of California's standard for the acceptable level of aircraft noise for persons living in the vicinity of airports is a CNEL of 65. As stated in the Code, "This level has been chosen for reasonable persons residing in urban residential areas where houses are of typical California construction and may have windows partially open. It has been selected with reference to speech, sleep, and community reaction." (California, California Code, Title 21, §5012).

California also defines "noise impact areas" as those areas exposed to elevated noise levels, which render some land uses incompatible with such exposure. Incompatible land uses include the following:

- Residences, unless the airport proprietor has acquired an "avigation" easement, owns the residences, or has made a genuine effort to acoustically treat residences exposed to an exterior CNEL less than 80 dB (or 75 dB if the residence has a backyard, patio, or balcony); and
- Schools, hospitals, convalescent homes, and places of worship that do not have soundproofing to ensure an interior CNEL of 45 dB or less due to aircraft noise, or for which the airport proprietor has not acquired an avigation easement (California, California Code, Title 21).

Overall, public annoyance is the most common complaint associated with exposure to elevated noise levels. When subjected to average sound levels of 65 dB, approximately 12% of persons so exposed will be "highly annoyed" by the noise. At levels below 55 dB, the percentage of annoyance is correspondingly lower (less than 3%). The percentage of people annoyed by noise never drops to zero but at levels below 55 dB it is reduced enough to be essentially negligible.

3.3.2 MCAS Miramar Noise Environment

Near an airfield, aircraft operations are categorized as departures, arrivals, or closed patterns (which includes activities referred to as touch-and-go's and GCA Box patterns). Each departure or arrival constitutes one operation. A closed pattern occurs when the pilot of the aircraft approaches the runway as though planning to land, but then applies power to the aircraft and continues to fly as though taking off again. The pilot then flies a circular or rectangular track around the airfield, and again approaches for arrival. In some cases, the pilot may actually land on the runway before applying power, or in other cases the pilot simply approaches very close to the ground. In either event, because a closed pattern operation essentially consists of a departure and an arrival, it is considered two operations.

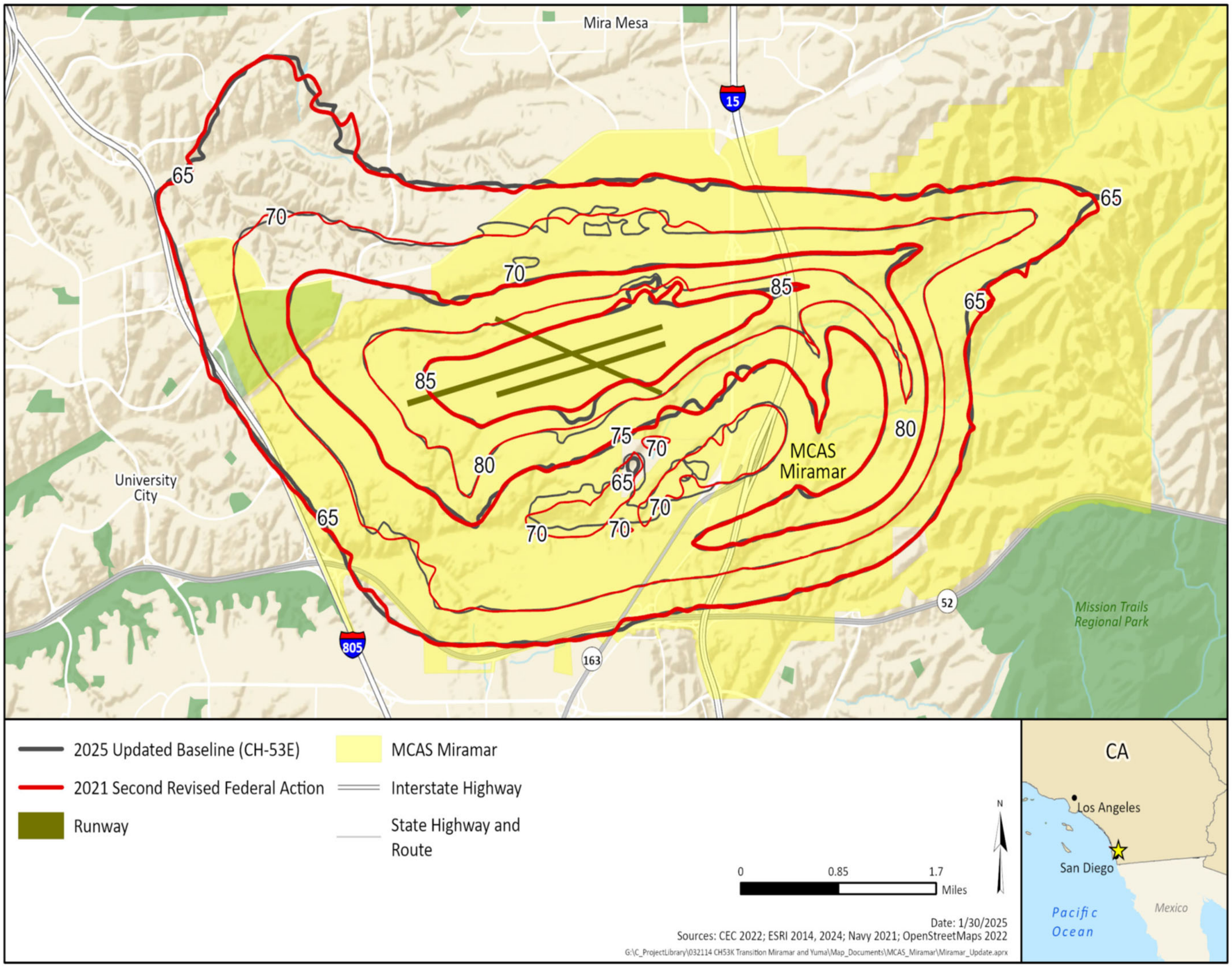
During calendar year (CY) 2021, MCAS Miramar supported a total of 118,842 fixed-wing and rotary-wing aircraft operations. Operations include aircraft departures, arrivals, touch-and-go's, ground-controlled-approaches, and other similar types of operations. Across CY 2021, 2022, and 2023 the average operational tempo of 3rd MAW's CH-53E model aircraft was 12,168 (Table3.2-

4). The operational tempo of CH-53E's accounts for approximately 10% of total annual aircraft operations at MCAS Miramar.

Table 3.3-1. CH-53E Operations at MCAS Miramar

Squadron	FY 2021		FY 2022		FY 2023		3-Year Average	
	Sorties	Operations	Sorties	Operations	Sorties	Operations	Sorties	Operations
HMH-361	1,787	3,574	1,632	3,264	1,478	2,956	1,632	3,264
HMH-462	1,348	2,696	1,405	2,810	1,221	2,442	1,325	2,650
HMH-465	1,654	3,308	1,768	3,536	1,269	2,538	1,564	3,128
HMH-466	1,768	3,536	1,424	2,848	1,497	2,994	1,563	3,126
Total	6,557	13,114	6,229	12,458	5,465	10,930	6,084	12,168

Figure 3.3-1. Existing CH-53E Operations and Noise Environment at MCAS Miramar



4 ENVIRONMENTAL CONSEQUENCES

4.1 Air Quality

This section discusses the potential air quality impacts that would result from the proposed replacement of CH-53E aircraft with CH-53K aircraft. The analysis focused on the net change in emissions between the existing CH-53E model aircraft and the proposed CH-53K model aircraft, as these are the only emissions sources that would be affected by the Proposed Action.

4.1.1 Proposed Action

It is expected that the annual operations and activities for the CH-53K model aircraft would be the same as those performed by the existing CH-53E model aircraft at MCAS Miramar. This would include the modes of operations associated with departure, arrival, and touch-and-go activities. CH-53K engine maintenance, engine testing, and the use of ground support equipment would also follow substantially similar routines as the existing CH-53E model aircraft. Therefore, changes in emissions between the existing and future scenarios would be primarily due to the different engines employed by the CH-53E and the CH-53K aircraft. Factors for the three CH-53K engines, designated as the T408 by Aircraft Environmental Support Office, and on-board auxiliary power units were used to estimate emissions for the CH-53K aircraft (AESO 2015a,b).

Table 4.1-1 presents the annual emissions associated with the proposed CH-53K aircraft replacement action at MCAS Miramar. The data in Table 4.1-1 show that the proposed CH-53K operations would result in an overall 24.91-tpy decrease in annual emission for VOC's. Annual emissions of CO would decrease overall by 30.86-tpy. In addition, annual emissions of PM_{10}, and $PM_{2.5}$ would decrease 8.68-tpy. The data also show that the proposed transition would result in an overall increase of SO_2 and NO_x by 4.71-tpy and 45.66-tpy respectively.

Table 4.1-1. Annual Emissions CH-53E to CH-53K at MCAS Miramar Tons per Year

Aircraft Operations	VOC	CO	NO_x	SO_2	$PM_{10/2.5}$
Existing Operations (2010)					
CH-53E Flight	19.76	35.91	17.41	6.05	6.84
CH-53E Engine Testing	7.21	12.88	8.27	3.52	2.5
Total Operations (2010)	26.97	48.79	25.68	9.57	9.33
Proposed Operations					
CH-53K Flight	1.61	13.77	51.75	9.72	0.41
CH-53K Engine Testing	0.45	4.16	19.59	4.57	0.24
Total Proposed Operations	2.06	17.94	71.33	14.28	0.65
Net Change	-24.91	-30.86	45.66	4.71	-8.68
de minimis	25	N/A	25	N/A	N/A
Exceedance?	**No**		**Yes**		

" - " indicates a decrease in emissions
"N/A" indicates Not Applicable (SDAB "Attainment" status)

Military Emissions Growth Budget

The federal general conformity regulation and corresponding District Rule 1501 (Conformity of General Federal Actions), require federal agencies proposing major actions to make a determination that the actions will conform to the California SIP. A method for demonstrating conformity is forecasting and accounting for reasonably anticipated emissions from future actions by federal agencies in the SIP. The DoN and USMC developed updated projections of future emissions from anticipated military actions in San Diego County through 2037. Further information can be found in the *Letter to the District from the Department of the Navy and U.S. Marine Corps*, dated February 29, 2016, which includes preliminary schedules for implementation of the planned military projects through 2037.

For the purposes of analyzing the potential impact of these projects on regionwide attainment of the 2008 and 2015 O_3 NAAQS, total emissions from full implementation of these projects were conservatively assumed to occur in 2018. CARB incorporated this growth increment into the 2019 CARB California Emissions Projection Analysis Model (CEPAM) emissions inventory (Version 1.00) in June 2019; therefore, a total growth projection of 8.34 tons per day of NO_x emissions has been incorporated into this Attainment Plan and air quality modeling conducted by CARB. The modeling analysis indicates that military project-related emissions are not expected to cause additional O_3 violations.

4.1.2 Air Quality Analysis Findings

The Proposed Action would result in an annual decrease of VOC, CO, and $PM_{10/2.5}$ emissions. Annual emissions of SO_2 and NO_x would increase. However, the SDAB is in attainment for SO_2 emissions. As discussed above, implementation of the Proposed Action would increase net operational emission of SO_2 by 4.71-tpy. This increase is below the conformity *de minimis* levels for criteria pollutants in nonattainment areas. For example, SO_2 emissions resulting from a federal action within a nonattainment area are subject to a 100-tpy *de minimis* threshold (40 CFR 93.153[b][1], Figure 3.2-2). As such, annual emissions of SO_2 resulting from the Proposed Action would not be significant. The SDAB is currently classified as severe nonattainment for NO_x. Implementation of the Proposed Action would increase net operational emission of NO_x by 45.66-tpy. This increase represents an exceedance of the conformity *de minimis* threshold for criteria pollutants in severe nonattainment areas. Therefore, to properly evaluate the magnitude of impacts associated with an exceedance of the *de minimis* threshold standard for NO_x in, the USMC is required to conduct additional analysis and coordination with CARB. As such, a conformity analysis and conformity determination were prepared by the USMC. The USMC's conformity analysis and conformity determination were coordinated with CARB. As a result, CARB concurred with the USMC's conformity analysis and conformity determination for the Proposed Action.

The 2020 "*Plan for Attaining the National Ambient Air Quality Standards for Ozone in San Diego County*", (SIP) dated October 2020, specifically identifies and accounts for a Military Growth Increment in anticipation of potential action at Navy and Marine Corps facilities in San Diego County of the next decade that could require conformity determinations. The Military Growth Increment includes 3,044-tpy of NO_x until the year 2037. Emissions associated with the transition of legacy CH-53E aircraft to new CH-53K aircraft at MCAS Miramar would produce a maximum net change in annual NO_x emissions of 45.66-tpy. Furthermore, the emissions associated with the Proposed Action are specifically identified and accounted for in the applicable SIP (APCD 2020). Therefore, NO_x emissions associated with the proposed transition alternative would conform with the SIP and would produce less than significant impacts to ambient O_3 levels and less than significant impacts to regional air quality.

4.1.2 No-Action Alternative

Under the No-Action Alternative, legacy CH-53E aircraft would continue to operate at MCAS Miramar. As a result, existing elevated emissions of VOC, CO, and $PM_{10/2.5}$ would impact local air quality. In addition, emissions of SO_2 and NO_x would remain the same as the existing conditions described in section 3.2, Air Quality.

4.2 Noise

This section describes the potential impacts on the noise environment at MCAS Miramar that would result from the proposed replacement of CH-53E aircraft with CH-53K aircraft. The analysis compares existing noise environmental characteristics at MCAS Miramar in the context of ongoing CH-53E operations (i.e., No Action Alternative) to expected noise environmental characteristic at MCAS Miramar with a fully implemented transition to the CH-53K model aircraft. The analysis relied on computer generated data modeling and focused on the magnitude and location of net noise generation change between the existing CH-53E model aircraft operations and the proposed CH-53K model aircraft operation (i.e., Preferred Transition Alternative), as these are the only sources of noise that would be affected by the Proposed Action.

4.2.1 Proposed Action

Under the Proposed Action, new CH-53K model aircraft would replace existing CH-53E model aircraft at MCAS Miramar. For each new aircraft delivered to MCAS Miramar, a corresponding legacy aircraft would no longer operate as a part of MCAS Miramar's fleet of Heavy Lift Helicopters.

It is expected that the annual operations and training activities for the CH-53K model aircraft would be the same as those performed by the existing CH-53E model aircraft at MCAS Miramar. This would include the modes of operations associated with departure, flight paths, and arrival. CH-53K engine maintenance, engine testing, and the use of ground support equipment would also follow substantially similar routines as the existing CH-53E model aircraft. Therefore, any changes observed in noise environment at MCAS Miramar resulting from the Proposed Action would be due to differences in the structural characteristics (e.g., weight, engine types, material make-up) between the existing CH-53E and the CH-53K aircraft.

4.2.2 Noise Analysis

The following section summarizes the noise analysis methodologies and metrics used in this Environmental Assessment to measure the potential environmental consequences of implementing the Proposed Action.

4.2.2.1 Noise Modeling Software and Noise Metrics

The DoD prescribes use of the NOISEMAP suite of computer programs (Wyle 1998; Wesmer Consulting 2006) containing the core computational programs called “NMAP”, version 7.3. For this noise study, the NOISEMAP suite of programs refers to BASEOPS as the input module, NOISEMAP as the noise model for predicting noise exposure in the airfield environment from fixed wing aircraft and the Advanced Acoustic Model (AAM) for rotary-wing and tilt-rotor aircraft (Department of Transportation 2020).

Normally, the AAM computer model would be used in conjunction with rotary aircraft model specific (i.e., CH-53K) noise profile data to assess noise impacts resulting from a proposed action and to develop CNEL contours for both pre- and post-project conditions. These data would then be compared to determine noise levels and severity of noise impacts. However, this is not entirely possible at this time. The CH-53K is a new variant of H-53 rotary aircraft. As such, aircraft model specific noise profile and contour data does not yet exist for the CH-53K.

This EA resolves the unavailable noise profile data discrepancy discussed above using a 2-step process.

Step 1: CEQ Guidance on Incomplete or Unavailable Information

CEQ guidance for implementing NEPA recognize that such a situation may occur. Guidance on “Incomplete or Unavailable Information”, provides the following:

> When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an EIS and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking.
>
> (a) If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall cost of obtaining it are not exorbitant, the agency shall include the information in the EIS.
>
> (b) If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall cost of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the EIS the following:
>
> 1. A statement that such information is incomplete or unavailable;
>
> 2. A statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human

environment;

3. A summary of existing credible scientific evidence which is relevant to evaluation the reasonably foreseeable significant adverse impact of the human environment; and

4. The agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this section, "reasonably foreseeable" includes impacts that have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason

The noise analysis conducted for this EA adopts the *procedural approach* discussed in the CEQ guidance above. The CEQ guidance identifies, and we adopt, the procedural approach that provides a method for assessing potential impacts of a proposed action for which specific aircraft model noise profile data are unavailable. However, by adopting the CEQ guidance *procedural approach* we do not imply, nor do we expect the Proposed Action to have the potential of resulting in significant adverse environmental impacts to the noise environment as MCAS Miramar.

Step 2: Alternative Method of Estimating Aircraft Noise

Although CH-53K model aircraft noise profile data is unavailable at this time, an alternative method of estimating the aircrafts noise, based on generally accepted scientific data collection and analysis principles, has been used in substantially similar studies (New River 2019). The alternative method of estimation was adopted for use in this EA to evaluate the Proposed Action's potential for impacts to MCAS Miramar's noise environment.

Using the alternative method of estimating aircraft noise, a noise study was conducted by contract in February 2025 to evaluate the Proposed Action's impacts on MCAS Miramar's noise environment (Stantec 2025). According to the contract noise study, the alternative method of estimating aircraft noise was developed using the following rationale:

> "Consultation with National Aeronautical and Space Administration Langley Research Center indicated that the standard used in Federal Aviation Regulations part 36, subpart H, dealing with helicopter noise is that the noise difference between two helicopters is logarithmically proportional to the weight ratio of the two, or roughly:
>
> $\Delta \sim 10*\log10(\text{Weight ratio})$
>
> Using information from CH-53E subject matter experts about typical takeoff and landing weights in regular use at MCAS New River and determining CH-53K values for equivalent aircraft conditions (fuel, crew, loading, etc.), an adjustment from CH-53E to CH-53K was developed (USMC 2019). This adjustment (to DNL) is about 0.64 dB… Under the Proposed Action modeling scenario, this adjustment was applied to the portion of the noise contribution from CH-53E in the Baseline/No Action to estimate the noise produced from

the CH-53K in the Proposed Action. Application of this dB adjustment based on the increased weight of the CH-53K variant was applied to the CH-53E operations in the Proposed Action to develop an estimation of noise contributed from the CH-53K. When added to the rest of the modeled noise from other aircraft at the Air Station, it represented the total noise represented in the Proposed Action (Stephenson 2018)." (Stantec 2025)

For detailed information regarding the methods used to calculate noise metrics and a full evaluation of noise related impacts resulting from the Proposed Action at MCAS Miramar, please reference Appendix C for a detailed acoustic analysis and technical report.

4.2.3 Noise Analysis Findings

MCAS Miramar hosts approximately 118,842 aircraft operations per year. Currently, CH-53E aircraft at MCAS Miramar conduct an average 12,168 annual operations. This represents only 10% of total aircraft operations at MCAS Miramar. Almost 90% of annual aircraft operations are conducted by F/A-18, F-35B/C, MV-22B, and other aircraft types. Due to the significantly louder noise associated with the F/A-18 and F-35B/C aircraft, these platforms dominate noise calculations, and the much quieter CH-53-type aircraft have only a limited effect on the CNEL contours associated with MCAS Miramar.

Rotary aircraft noise impacts would be considered potentially significant if the increase in CNEL to an affected population relative to the Baseline/ No Action conditions is at least 1.5 dB within the Proposed Action's 65 dB CNEL contour (FICON 1992).

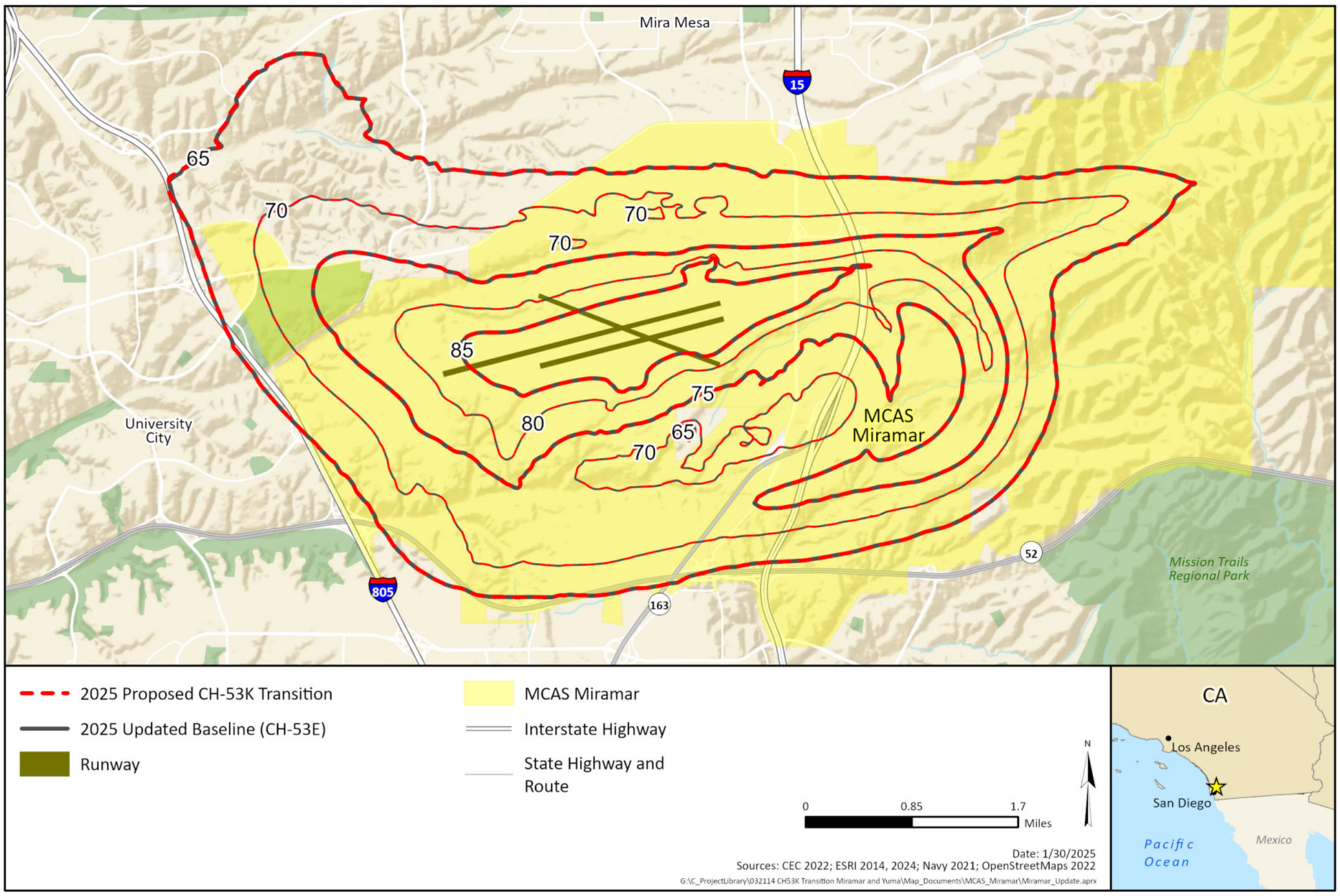
Using the data described above and in Appendix C, the NOISEMAP and AAM computer models were used to calculate and plot the CNEL contours, in 5 dB increments, for annual average daily aircraft operations. Figure 4.2-1 shows the 60 to 85 dB CNEL contours, in 5 dB increments, for the Proposed Action. As shown below, the Proposed Action alternative's contours are nearly identical in shape and size to the existing conditions contours, with only subtle insignificant differences.

In conclusion, the Proposed Action would not cause an increase of at least 1.5 dB within MCAS Miramar's existing 65 dB CNEL contour. Therefore, no significant impacts to the noise environment are expected to occur as a result of replacing legacy CH-53E Heavy Lift Helicopters with new CH-53K Heavy Lift Helicopters at MCAS Miramar.

4.2.3 No Action Alternative

Under the No-Action Alternative, legacy CH-53E aircraft would not be replaced with CH-53K aircraft. As a result, the existing noise conditions in the vicinity of MCAS Miramar would remain as described in section 3.3, Noise. Therefore, no impacts to the noise environment are expected to occur as a result of the No Action Alternative.

Figure 4.2-1. CH-53E to CH-53K Transition Noise Impacts



5 CUMULATIVE EFFECTS

5.1 Definition of Cumulative Effects

Federal regulations implementing NEPA (42 USC 4321 *et seq.*), DOD NEPA Implementing Procedures, and the MCO 5090.2, describe when the cumulative effects of a proposed action should be evaluated. Former CEQ regulations for implementing the procedural provisions of NEPA defined cumulative effects as:

> *"Effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time." (Former CEQ Regulation 40 CFR 1508).*

CEQ's guidance for considering cumulative effects states that NEPA documents "should compare the cumulative effects of multiple actions with appropriate national, regional, state, or community goals to determine whether the total effect is significant" (CEQ 1997).

Identifying past, present, and future actions is critical to establishing appropriate geographic and temporal boundaries for a cumulative effects analysis. To determine which actions to include in this cumulative effects analysis, the location of the Proposed Action, environmental resources, other facilities (existing or planned), human communities, and disturbed areas was considered. The decisive factor to include or exclude actions in this cumulative analysis was not merely based on proximity to the Proposed Action. Rather, the decisive factor to include or exclude an action from this analysis was based on the presence or absence of an actions influence on the resources effected by the Proposed Action. The following section includes a discussion and analysis of the cumulative effects of past, present, and reasonably foreseeable future actions.

5.2 Geographic Scope of Analysis

When analyzing cumulative environmental effects of the Proposed Action, a geographic boundary of analysis must be identified for which effects of the Proposed Action and other past, proposed, and reasonably foreseeable actions would be cumulatively recorded or experienced. Determining the geographic extent of this analysis is dependent on the nature of the impacted resources. As such, this section presents a cumulative effects analysis organized by resource type. This analysis considers effects arising from the Proposed Action and the additional effects of other known past, present, and reasonably foreseeable future actions within a geographic scope consisting of MCAS Miramar and the San Diego Air Basin. Past, present, and reasonably foreseeable future actions within the geographical scope of analysis are briefly described below.

5.3 Temporal Scope of Analysis

According to CEQ guidance, the time frame of the Proposed Action should also be evaluated to determine its applicability to a cumulative effects analysis. In determining an appropriate time frame to evaluate, an analysis should consider the duration of the Proposed Action as a decisive factor. The Proposed Action would base new heavy lift helicopters at MCAS Miramar for the duration of the aircraft's useful service life. The CH-53K service life is estimated to be 50 years. Therefore, the temporal scope of this cumulative impacts analysis is 50 years.

5.3.1 Past Actions

The following section briefly discusses actions which have been implemented within the geographic region of MCAS Miramar.

Energy Security Microgrid (P-906) for Critical Facilities

The Energy Security Microgrid for Critical Facilities (P-906) EA addresses construction and operation of an electrical energy security microgrid, including up to 3 megawatts of electricity from continuous rated natural gas-fired generation and up to 4 megawatts of electricity from prime rated diesel-fired generation, networked to an installation-wide electrical control system that provides capability for emergency use, generation based demand response, cost-based prime/continuous use of natural gas generation capability, maintenance, testing, and demonstration. The energy security microgrid incorporates the existing power sources for the installation into its monitoring and control operations including the power obtained from the existing electrical grid, renewable power generation from on-site landfill gas collection (3.2 megawatts; refer to Cumulative Project 4, below), and photovoltaic solar power panels (1.3 megawatts). The energy security microgrid is designed to address current critical energy needs (often referred to as critical electrical loads) for the installation such as flight operations, fire protection, police, security, and communication systems. It has the ability to power 100% of the flight line and support facilities. Energy Resiliency assets designed as back-up power in microgrid island mode are multi-purposed for macro-grid support and cost savings when connected to the grid.

Landfill Gas Power Purchase Agreement

The Landfill Gas Power Purchase Agreement EA analyzes the environmental consequences resulting from the purchase of extra power generated by Fortistar Corporation on the City of San Diego's Miramar Landfill from the excess landfill gas, and execution of the Power Purchase Agreement. Fortistar (now Opal) generates additional power by reclaiming the excess methane gas from the City's Miramar Landfill. MCAS Miramar purchases this extra power through a Power Purchase Agreement. The USMC neither constructed nor operates the generation facility that produces the power; Fortistar undertook those actions. The SEA, however, examined impacts from construction and operation of the generation facility to the extent they may result from the USMC's execution of the Power Purchase Agreement.

Army Reserve Center

The U.S. Army constructed and now operates a U.S. Army Reserve Center on 15 acres within MCAS Miramar, replacing two leased facilities (CA178 and CA188) within the northern part of the City of San Diego, San Diego County, California. The facility includes an approximately

78,000-square foot administrative and training building, a 5,250-square foot Organizational Maintenance Shop, and a 6,250-square foot unheated storage facility. Supporting facilities would include approximately 63,000 square feet of privately owned vehicles parking, 81,000 square feet of military equipment parking, a military vehicle wash rack with oil/water separator, and other site improvements. Up to 600 Army Reserve personnel can be stationed at the new Center. Administration functions typically occur on weekdays, resulting in approximately 40 full-time Army Reserve personnel working at the Army Reserve Center during the week. Army Reserve soldiers assigned to the new Army Reserve Center receive administrative support from the fulltime personnel and report to the Army Reserve Center at least one weekend per month for training.

Wildland Fire Management Plan Implementation

MCAS Miramar prepared and implemented the Wildland Fire Management Plan to guide wildland fire management and planning decisions on MCAS Miramar. It provides a comprehensive vegetation and fire management program for MCAS Miramar. The MCAS Miramar Fire Department has the responsibility of fire prevention and fire suppression on the Station. The fire prevention and suppression measures described in this Wildland Fire Management Plan serve to prevent and/or control the frequency, size, distribution, and intensity of wildfires. Furthermore, these measures are intended to protect high-value areas on- (e.g., military assets and sensitive natural and cultural resources) and off-Station (e.g., residential and commercial areas that border MCAS Miramar).

5.3.2 Present and Reasonably Foreseeable Actions

The following section briefly discusses relevant actions which are currently being implemented and relevant actions that are likely to be untaken in the future at MCAS Miramar.

West Coast Basing KC-130J

The DoN proposed the basing of the KC-130J model aircraft at MCAS Miramar in a 2002 EA. The introduction of KC-130J aircraft to 3rd MAW in the Western U.S. was part of an agency wide initiative to relocate existing KC-130F and KC-130R model aircraft to other USMC squadrons. The Action included: (1) basing 14 KC-130J model aircraft at MCAS Miramar and (2) redistributing 14 KC-130F and R model aircraft to other USMC squadrons, and (3) training aircrew personnel on the new platform’s avionics, engines, propeller assemblies, and etc. The Action did not require construction of new aircraft hangars or support facilities. There would be no increase in personnel as a result of the basing decision. In addition, there would be no change to the type or tempo of flight operations at MCAS Miramar, as the training and mission requirements of existing aircraft platform would be substantially similar to the new aircraft platform.

West Coast Basing MV-22

The DoN proposed basing the MV-22 Osprey tilt-rotor (MV-22) aircraft in the Western U.S. in a 2009 EIS. The introduction of MV-22 aircraft to the Western U.S. was part of a USMC-wide process of replacing its aging fleet of medium lift helicopters with more advanced, operationally capable aircraft. The replacement of CH-46E helicopters with MV-22 aircraft modernized the

USMC medium lift fleet and improved the operational capabilities of the Third and Fourth Marine Aircraft Wing (3rd and 4th MAW) squadrons. The Action included: (1) basing of up to eight MV-22 squadrons for employment by the 3rd MAW to provide medium lift capability to I Marine Expeditionary Force (I MEF); (2) basing of up to two 4th MAW MV-22 squadrons to provide a West Coast reserve component medium lift capability; (3) construction and/or renovation of airfield facilities necessary to accommodate and maintain the MV-22 squadrons; and (4) conducting MV-22 readiness and training operations and special exercise operations to attain and maintain proficiency in the operational employment of the MV-22.

P-236 Sewer Equalization Tank

MCAS Miramar proposes to upgrade its existing sewer system to reduce the effluent flow into the City of San Diego's sewer system to less than the permitted limit of 1.6 million gallons per day. The Proposed Action involves construction and operation of an underground storage tank with a holding capacity sufficient to temporarily retain excess sewage flow generated by a nominal 10-year 24-hour storm event (1.5 million gallons); an active flow control system to regulate the discharge flow; and associated piping, pumps, conduits, and access points. Additional supporting improvements include site access and utility infrastructure upgrades. Site improvements would include grading and clearing, demolition and repaving of the existing road surface and culverts, and restoration of disturbed areas, including Diegan Coastal Sage Scrub and the ephemeral streambed, to preconstruction conditions. Construction would occur over a 15-month period. Operation and maintenance of the facility would entail annual cleaning and inspection of the storage tank.

West Coast Basing F-35 Joint Strike Fighter

Based on the findings of an EIS completed in 2010, the Department of the Navy finalized a decision to assign up to 96 F-35B aircraft to MCAS Miramar, in six operational squadrons. New ground facilities and infrastructure are being constructed to support the basing action. In 2017, a supplemental Environmental Assessment was prepared to analyze the environmental impacts of 10 specific construction projects needed to facilitate the basing action, including new aircraft maintenance hangar and parking apron, engine repair, landing pad, ammunition storage, security fence, communication, and training facilities. In 2018 the basing plan was revised to incorporate two 10-plane F-35C squadrons in lieu of two 16-plane F-35B squadrons. A 2021 revision to the basing plan continues with two 10-plane F-35C squadrons but reduces the number of F-35B operational squadrons from four to three, reduces the F-35B aircraft complement from 16 to 10 per squadron, and adds a 25-plane F-35B Fleet Replacement Squadron.

Corporal Meshaq Hylton/U.S. Marine Corp

5.4 Cumulative Effects Analysis

The Proposed Action would not result in an increase or decrease in the type, tempo, or intensity of aircraft operations at MCAS Miramar. In addition, aircraft operations would occur within existing established flight corridors. Implementation of the Proposed Action would involve no change in the station population and would not involve the relocation of military personnel. In addition, no new construction would be required to accommodate the CH-53K Heavy Lift Helicopter at MCAS Miramar. Implementation of the Proposed Action would not result in significant impacts to any sensitive noise receptors within the geographic or temporal scope of analysis. The Proposed Action would reduce emissions from existing operations at MCAS Miramar for all criteria pollutants except SO_2 and NO_x. However, the SDAB is currently listed as in attainment for SO_2 emissions. If the SDAB were listed as nonattainment for SO_2, the Proposed Actions anticipated increase in SO_2 emission would be below the *de minimis* threshold. In addition, NO_x emissions from the Proposed Action would be intermittent, spread over a large geographic region surrounding MCAS Miramar, would not be substantial enough to contribute to an exceedance of a NAAQS at any location, and are accounted for in the applicable State Implementation Plan. Therefore, cumulative effects from the Proposed Action, in conjunction with other past, present, and reasonably foreseeable future projects, would not be significant.

5.4.1 Air Quality

The geographic scope of analysis for air quality resources, is the San Diego Air Basin (Figure 4.3).

The SDAB is in attainment for CO, VOC, SO_2, and $PM_{2.5}$, PM_{10}. However, SDAB is in severe nonattainment for O_3, including its precursor NO_x. As a result of the Proposed Action, anticipated emissions would not result in a violation of any NAAQS or otherwise result in long-term degradation of local air quality. The overall level of NO_x from military operations may increase, but at a level that would generate few discernable impacts. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects, would not result in significant impacts within the geographic or temporal scope of analysis.

5.4.1.1 Greenhouse Gases

The potential effects of proposed GHG emissions are by nature global and cumulative impacts, as individual sources of GHG emissions are not large enough to have an appreciable effect on global temperature trends. Therefore, an appreciable impact on global climate trends would only occur when proposed GHG emissions combine with GHG emissions from other man-made activities on a global scale.

Currently, there are no formally adopted or published NEPA thresholds of significance for GHG emissions. Formulating such thresholds is problematic, as it is difficult to determine what level of proposed emissions would substantially contribute to a change in global climate trends. Therefore, in the absence of an adopted or science-based NEPA significance threshold for GHGs, this EA compares GHG emissions that would occur form the Preferred Alternative to three relevant geographic bounds: (1) inventory of U.S. GHG emissions; (2) inventory of the State of California GHG emissions; and (3) inventory of the County of San Diego GHG emissions. These three data inventories were selected from year 2022 and are included in this assessment to objectively evaluate the relative increase in GHG emissions that would result from implementation of the Preferred Alternative.

Table 5.4-1 summarizes the annual GHG emissions associated with implementation of the Preferred Alternative in year 2028. The data show that the ratio of annual CO_2 equivalent (CO_{2e}) emissions for the Preferred Alternative to CO2e emissions generated from all sources in the U.S. in 2022 is approximately 0.005/6,991-million tons (USEPA 2022). As a result, CO_{2e} emissions associated with the Preferred Alternative would amount to approximately 0.0000007% of the total CO_{2e} emissions generated by the U.S. Likewise, in 2022 emissions from GHG emitting activities in the State of California were 0.005/371.1-million metric tons of CO_2e (CARB 2024). As such, the corresponding CO2e emissions associated with the Preferred Alternative would amount to approximately 0.00001% of the total CO_2e emissions generated by the State of California. Lastly, in 2022 emission from GHG emitting activities in the County of San Diego were 0.005/8.6-million metric tons of CO_2e. The cumulative CO_2e emissions associated with the Preferred Alternative would amount to approximately 0.0005% of the total CO_2e emissions generated by the County of San Diego. Therefore, implementation of the Preferred Alternative would not result in significant cumulative impacts to San Diego County, State of California, or U.S. annual GHG emissions.

Table 5.4-1.
Annual GHG Emissions - CH-53K

	CO_{2e} (TPY)
CH-53E Existing Operations (2010)	15,196
CH-53K Proposed Operations (2028)	20,370
Net Change	5,174
Inventory of U.S. Greenhouse Gas Emissions (2022)	6,991,960,645
Net Change as a % of U.S. Emissions	0.0000007

5.4.2 Noise

The geographic scope of analysis for acoustic resources includes MCAS Miramar and all areas within the 65 dB CNEL noise contours (Figure 4).

All of the past, present, and future actions within the temporal scope of this cumulative effects analysis contribute to the overall acoustic environment at MCAS Miramar. The introduction of the MV-22 and F-35 JSF to MCAS Miramar have had long-term impacts to noise resources from the normal training and operational tempo of these aircraft. Although the introduction of the CH-53K will similarly be a long-term basing decision, the aircraft's noise profile is not expected to perceptibly differ from that of the existing CH-53E noise profile. As such, these impacts would remain well within the noise levels used for DoD land use planning guidelines (65 CNEL). The replacement of the CH-53E with the CH-53K showed less than significant impacts when compared to No Action conditions at MCAS Miramar. These modeled noise results also take into account the operation of the MV-22 and F-35 JSF at MCAS Miramar. Therefore, there would be no significant cumulative impacts to MCAS Miramar's noise environment from the implementation of the Proposed Action.

6 OTHER CONSIDERATIONS REQUIRED BY NEPA

6.1 Consistency with Other Federal, State, and Local Laws, Plans, Policies, and Regulations

A thorough analysis of the environmental consequences of a proposed federal action includes a discussion of possible conflicts between a proposed action and the objectives of federal, regional, state and local land use plans, policies, and controls. Table 6.1-1 identifies the principal federal and state laws and regulations that are applicable to the Proposed Action and describes briefly how compliance with these laws and regulations would be accomplished.

Table 6.1-1. Principal Federal and State Laws Applicable to the Proposed Action

Federal, State, and Local Laws, Regulations, and Policies	Status of Compliance
National Environmental Policy Act; CEQ NEPA guidance; and Department of Navy procedures for Implementing NEPA	This EA has been prepared in accordance with NEPA, CEQ guidance, DOD NEPA Implementing Procedures, and Marine Corps Order (MCO 5090) implementing procedures.
Clean Air Act	The Proposed Action would be implemented in accordance with the CAA. The General Conformity Rule applies to the Proposed Action because the area is in nonattainment for several NAAQS pollutants. MCAS Miramar demonstrated Conformity in connection with this federal Action, based on the emissions growth incorporated into the applicable State Implementation Plan for the CH-53K. MCAS Miramar would operate in adherence to its Title V permit.
Clean Water Act	The Proposed Action does not occur within regulated Waters of the U.S. or any other regulated aquatic resource. As such, coordination with the U.S. Army Corps of Engineers or the Regional Water Quality Control Board is not required.
National Historic Preservation Act	There are no historic properties located within the area of potential effects of the Proposed Action. The Proposed Action is consistent with the 2010 MCAS Miramar Programmatic National Historic Preservation Act Agreement. As such, no Historic Properties would be adversely effected by the Proposed Action and no coordination with the State Historic Preservation Officer is required.
Endangered Species Act	The Proposed Action involves replacing an existing helicopter platform. As such, the Proposed Action does would have no effect on ESA listed species or designated critical habitat. The Proposed Action complies with the procedural requirements of the ESA.
Migratory Bird Treaty Act	The Proposed Action complies with all provisions of the MBTA.
Comprehensive Environmental Response and Liability Act	The Proposed Action would comply with all CERCLA regulations.
Emergency Planning and Community Right-to-Know Act	The Proposed Action would comply with all EPCRA regulations and requirements.
Resource Conservation and Recovery Act	The Proposed Action would comply with this Act.
Toxic Substances Control Act	The Proposed Action would comply with this Act.

Table 6.4-1. Principal Federal and State Laws Applicable to the Proposed Action

Federal, State, Local, and Regional Land Use Plans, Policies, and Controls	Status of Compliance
EO 11988, Floodplain Management	The Proposed Action would not occur within the 100-year floodplain. The Proposed Action would comply with this EO.
EO 13045, Protection of Children from Environmental Health Risks and Safety Risks	The Proposed Action would comply with this EO.
EO 13834, Efficient Federal Operations	The Proposed Action would comply with this EO

6.2 Irreversible or Irretrievable Commitments of Resources

Resources that are irreversibly or irretrievably committed to a project are those that are used on a long- term or permanent basis. This includes the use of non-renewable resources such as metal and fuel, and natural or cultural resources. These resources are irretrievable in that they would be used for this project when they could have been used for other purposes. Human labor is also considered an irretrievable resource. Another impact that falls under this category is the unavoidable destruction of natural resources that could limit the range of potential uses of that particular environment.

Implementation of the Proposed Action would involve human labor; the consumption of fuel, oil, and lubricants for aircraft operation and support vehicles. However, implementing the Proposed Action would not result in significant irreversible or irretrievable commitment of resources.

6.3 Unavoidable Adverse Impacts

This EA has determined that the Proposed Action would not result in any significant environmental impacts. The Proposed Action occurs within a highly urbanized and industrial developed area. The Proposed Action area consists of existing airfield, hangars, roadways, and administrative office building infrastructure. Through incorporation and implementation of the appropriate permit required mitigations and Best Management Practices, no significant environmental impacts would result from the Proposed Action; therefore, there would be no unavoidable adverse effects.

6.4 Relationship between Short-Term Use of the Environment and Long-Term Productivity

NEPA requires an analysis of the relationship between a project's short-term impacts on the environment and the effects that these impacts may have on the maintenance and enhancement of the long-term productivity of the affected environment. Impacts that narrow the range of beneficial uses of the environment are of particular concern. This refers to the possibility that choosing one development site reduces future flexibility in pursuing other options, or that using a parcel of land or other resources often eliminates the possibility of other uses at that site.

In the short-term, the Proposed Action would not result in any construction related effects to the human environment. It is anticipated that air quality and the noise environment would be subject to short duration impacts that are substantially similar to the existing conditions. In the long-term, the environmental conditions of MCAS Miramar would remain substantially similar with the incorporation of CH-53K operation and training activities. The operation of CH53K would not significantly impact the long-term productivity of the area. The Proposed Action would not result in any impacts that would significantly reduce environmental productivity or permanently narrow the range of beneficial uses of the environment.

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Appendix A: Federal Conformity Determination

CONFORMITY DETERMINATION

REPLACING CH-53E WITH

CH-54K HEAVY LIFT HELICOPTER

MARINE CORPS AIR STATION MIRAMAR

SAN DIEGO COUNTY, CALIFORNIA

EXECUTIVE SUMMARY

This report presents the Clean Air Act general conformity determination for replacing CH-53E Heavy Lift Helicopters with the CH-53K Heavy Lift Helicopter at Marine Corps Air Station (MCAS) Miramar, San Diego County, California, as proposed by the Department of Navy (DON) in the *Environmental Assessment for Replacing the CH-53E Heavy Lift Helicopter with the CH-53K Heavy Lift Helicopter* (USMC 2025a). The San Diego Air Basin (SDAB) is in non-attainment of the National Ambient Air Quality Standards (NAAQS) for ozone (O_3), and the western portion of the SDAB is a maintenance area for carbon monoxide (CO). CO emissions associated with the Proposed Action would be less than the existing baseline and less than established *de minimis* thresholds for CO. As such, a conformity determination for CO is not required for the Proposed Action. In addition, volatile organic compound (VOC) emissions associated with the Proposed Action would be less than the existing baseline and less than *de minimis* thresholds established for VOCs. As such, a conformity determination for VOC emissions is not required for the Proposed Action. This general conformity determination is required for the Proposed Actions emission of nitrogen oxides, a precursor of O_3, as the Proposed Action would exceed the annual conformity *de minimis* threshold of 25-tons per year of nitrogen oxides (NOx) within the SDAB, as defined in the San Diego County Air Pollution Control District (SDAPCD) Rule 1501, Section 1551.853(b).

Within the SDAB, the proposed action would replace four CH-53E active-duty squadrons (64 aircraft) with four CH-53K squadrons (64 aircraft). Each of the four existing active-duty CH-53E squadrons are based at MCAS Miramar. Likewise, each of the four-replacement active-duty CH-53K squadrons would be based at MCAS Miramar. The region of influence of the proposed action are the immediate vicinity of MCAS Miramar and San Diego County. The action would not result in any new construction activities, population growth, or tactical ground support equipment operations.

Existing and proposed emissions were calculated using modern generally accepted scientific methodologies and were based upon activity data derived from the DON, DON Aircraft Environmental Support Office (AESO), U.S. Marine Corps (USMC), U.S. Environmental Protection Agency, and California Air Resources Board (CARB). The net emissions analysis presented in Attachment 1 to this report includes all supporting conformity-related emission calculations.

Table ES-1 summarizes the net change in conformity-related emissions that would occur from the proposed replacement of CH-53E helicopters with CH-53K helicopters within the SDAB. These data indicate that the proposed action within the SDAB would exceed the NOx conformity *de minimis* threshold beginning in 2030 and reach a build-out maximum of 45.66-tons of additional annual emissions of NOx in 2032 upon completion of the CH-53K replacement action. The most recent federally approved O_3 State Implementation Plan (SIP) for the SDAB includes a Military Growth Increment budget for 3,044.1-tons per year of additional NOx emissions from mobile sources associated with new military federal actions between 2018 and 2037 (SDAPCD 2020). Furthermore, 2020 SIP Military Growth Increment budget for the SDAB specifically accounts for the NOx emissions associated with the planned replacement of CH-53E helicopters with CH-53K helicopters. CARBs 2020 SIP modeling analysis indicates that military project-related emissions, specifically including those resulting from the proposed replacement of CH-53E with CH-53K heavy lift helicopters at MCAS Miramar, are “not expected to cause additional ozone violations” (SDAPCD 2020). Therefore, NOx emissions from the proposed action, in combination with all other emissions in the SDAB, would not exceed the NOx emissions budget in the SIP. Pursuant to Section 1551.858(a)(1), the proposed action within the SDAB would conform with the applicable SDAPCD 2020 SIP.

Table ES-1. Summary of the Net Change in Conformity-Related Emissions within the SDAB due to the Proposed Replacement of CH-53E with the CH-53K Heavy Lift Helicopter

ES-1. Annual Emissions CH-53E to CH-53K at MCAS Miramar (Tons per Year)					
Aircraft Operations	VOC	CO	NO_X	SO_2	$PM_{10/2.5}$
Existing Operations					
CH-53E Flight	19.76	35.91	17.41	6.05	6.84
CH-53E Engine Testing	7.21	12.88	8.27	3.52	2.5
Total Operations	26.97	48.79	25.68	9.57	9.33
Proposed Operations					
CH-53K Flight	1.61	13.77	51.75	9.72	0.41
CH-53K Engine Testing	0.45	4.16	19.59	4.57	0.24
Total Proposed Operations	2.06	17.94	71.33	14.28	0.65
Net Change	-24.91	-30.86	45.66	4.71	-8.68
de minimis	25	100	25	N/A	N/A
Exceedance?	**No**	**No**	**Yes**	**No**	**No**

“ - ” indicates a decrease in emissions
“N/A” indicates Not Applicable (SDAB “Attainment” status)

1.0 INTRODUCTION

This report presents the draft Clean Air Act general conformity determination for the replacement of existing CH-53E Heavy Lift Helicopters with new CH-53K Heavy Lift Helicopters at MCAS Miramar, San Diego County, California. The action is proposed by the Department of the Navy in the Environmental Assessment for *Replacing CH-53E Heavy Lift Helicopters with CH-53K Heavy Lift Helicopters at Marine Corps Air Station Miramar* (USMC 2025a). This report includes (1) a discussion of the Clean Air Act general conformity requirements promulgated by the U.S. Environmental Protection Agency (EPA) and implemented by San Diego County Air Pollution Control District (APCD) Rule 1501 and how they relate to the proposed action within the San Diego Air Basin (SDAB), (2) the conformity applicability analysis for the proposed action, and (3) the conformity determination for the proposed action within the SDAB.

2.0 CLEAN AIR ACT CONFORMITY REQUIREMENTS

2.1 Introduction

The Clean Air Act (CAA) required the EPA to establish a list of air pollutants that "may reasonably be anticipated to endanger public health and welfare" and to set National Ambient Air Quality Standards (NAAQS) to protect public health. The EPA listed the following as criteria pollutants: sulfur dioxide (SO_2), respirable and fine particulate matter (PM_{10} and $PM_{2.5}$), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), and lead (Pb). The EPA was also charged with designating geographic areas where the air quality fails to meet the NAAQS for one or more of these criteria pollutants. These geographic areas are known as nonattainment areas. Each State that has a nonattainment area or areas must develop a plan, a State Implementation Plan (SIP), to demonstrate how it will achieve and maintain the NAAQS. Once a nonattainment area has achieved compliance with the NAAQS, its designation is changed to that of a maintenance area and is then subject to an air quality maintenance plan.

In 1993, the EPA promulgated the General Conformity Rule to implement a 1990 amendment to the CAA. Specifically, the Conformity Rule requires that "[n]o department, agency, or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license to permit, or approve any activity that does not conform to an applicable implementation plan" (40 CFR §§ 51.850(a), 93.150). The Rule divides the air conformity process into two distinct phases: applicability and determination. It is the responsibility of the federal agency proposing the action to engage in this process to determine conformity to the applicable SIP before the proposed action is taken (40 CFR § 51.850(b).

2.2 Purpose of the General Conformity Rule

The EPA General Conformity Rule requires federal agencies to analyze proposed actions according to standardized procedures and to provide a public review and comment process. The conformity determination process is intended to demonstrate that the proposed federal action will not cause or contribute to new violations of a NAAQS; will not increase the frequency or severity of existing violations of any standard; and will not delay the timely attainment of any standard.

2.3 Applicability of the General Conformity in the San Diego Air Basin

In accordance with EPA regulations, the APCD promulgated Rule 1501 to establish conformity criteria and procedures governing the "Conformity of General Federal Actions". Rule 1501 applies to federal actions proposed within the SDAB. A federal agency proposing an action in the SDAB must determine the rule's applicability by conducting a conformity applicability analysis (Rule 1501, § 1551.850[b]). This analysis must calculate the total of direct and indirect emissions from all non-exempt sources, including mobile, area, and non-permitted stationary sources that are not subject to New Source Review or Prevention of Significant Deterioration regulations (Rule 1501, 1551.853[b] & [d][1]). Depending upon the results of the analysis, the inquiry either ends with the conformity applicability analysis or proceeds to a conformity determination.

A conformity determination is not required if total net direct and indirect emissions associated with the proposed action do not equal or exceed the applicable *de minimis* thresholds and are not "regionally significant." Additionally, a conformity determination is not required for actions listed in Rule 1501 "which would result in no emissions or an increase in emissions that are clearly *de minimis*" (Rule 1501, § 1551.853[c][2]).

The Proposed Action includes CH-53K operations within the SDAB in the vicinity of MCAS Miramar. The SDAB is designated a nonattainment area for the 8-hour ozone NAAQS. Additionally, the western portion of the SDAB (the portion of San Diego County generally west of the interior desert region) is a maintenance area for the CO NAAQS. Therefore, a conformity applicability analysis is required for emissions of VOC, NOx, and CO associated with the proposed action in the SDAB. The *de minimis* threshold for VOC and NOx emissions is 25-tons per year for each pollutant. In addition, the *de minimis* threshold for CO emissions is 100-tons per year.

2.4 Conformity Determination Process

If the total net direct and indirect emissions associated with the proposed action equal or exceed the applicable *de minimis* threshold or are "regionally significant" the federal agency must make a conformity determination (Rule 1501 § 1551.853[b] & [i]). In other words, the federal agency must demonstrate that the proposed action conforms to the applicable SIP. The applicable ozone SIP for the SDAB is the *2020 Plan for Attaining the National Ambient Air Quality Standards for Ozone in San Diego County*, which is the most recent federally approved O_3 SIP for the SDAB (APCD 2020).

The federal agency undertaking the action is responsible for preparing and issuing the conformity determination under the EPA conformity rules. Other federal, state, and local agencies have review and comment responsibility, but no agency has approval/denial authority over the conformity determination.

The demonstration of conformity is accomplished through a public process following the criteria and procedures outlined in Rule 1501, specifically §§ 1551.856, 1551.858, and 1551.859. This process must result in a "positive" conformity determination before the proposed federal action may be implemented (Rule 1501 § 1551.860). The federal agency's conformity determination must demonstrate conformity for (1) the Clean Air Act mandated attainment year, or if applicable, the farthest year for which emissions are projected in a maintenance plan; (2) the year when the total annual emissions from the proposed action are the greatest; and (3) any year for which the applicable SIP specifies an annual emissions budget. For the proposed action, the years of analysis are Year 2032, when total annual emissions from the proposed action are greatest; and Year 2020, when the most recent federally approved SIP for the SDAB specifies annual emissions budgets.

The federal agency provides a copy of its draft conformity determination to the applicable EPA Region, State and local air quality regulators, impacted federal land managers, and the relevant metropolitan planning organization. These agencies have 30 days to review and comment. The draft is made available for public review (30-day review period). The comment period may be concurrent with the review and comment period for a related environmental analysis under the National Environmental Policy Act (NEPA).

2.5 Demonstrating Conformity

APCD Rule 1501 provides several methods by which a federal agency may demonstrate Clean Air Act conformity for actions in the SDAB.

a. Conformity is presumed if direct and indirect emissions from the activity are specifically identified and accounted for in the attainment or maintenance demonstration of a SIP approved after 1990 (Section 1551.858[a][1]).

b. Conformity is demonstrated if direct and indirect emissions from the action are fully offset through compensating emission reductions implemented through a federally enforceable mechanism (Sections 1551.858[a][2] and 1551.858[a][5][iii]).

c. Conformity also can be demonstrated if the agency responsible for SIP preparation provides documentation that direct and indirect emissions associated with the federal agency action are accommodated within the emission forecasts contained in an approved SIP (Section 1551.858[a][5][i][A]).

d. If conformity cannot be demonstrated through one of the procedures noted above, conformity may be determined if the SDAPCD notifies EPA that appropriate changes will be made in the applicable SIP documents. The SDAPCD would have to commit to a schedule for preparing an acceptable SIP amendment that accommodates the net increase in direct and indirect emissions from the federal action without causing any delay in the schedule for attaining the relevant NAAQS (Section 1551.858[a][5][i][B]).

All conformity determinations must also demonstrate that total direct and indirect emissions are consistent with all relevant requirements and milestones in the applicable SIP including reasonable further progress schedules; assumptions specified in the attainment or maintenance demonstration; and SIP prohibitions, numerical emission limits, and work practice requirements.

3.0 CONFORMITY DETERMINATION FOR THE PROPOSED ACTION WITHIN THE SAN DIEGO AIR BASIN

The proposed action would replace four CH-53E active-duty squadrons (64 aircraft) with four CH-53K active-duty squadrons (64 aircraft). The four-replacement active-duty squadrons would remain based out of MCAS Miramar. The areas of proposed activities within the SDAB include only the vicinities of MCAS Miramar, as described in section 3.2.5 of the proposed actions EA

NEPA document. There would be no construction of new facilities associated with the proposed action.

The proposed action would result in a net change in emissions within the SDAB. The EPA considers the SDAB to be in nonattainment of the O_3 standard and in maintenance of the CO standard. The applicable conformity *de minimis* thresholds for VOC and NOx emissions within the SDAB is 25-tons per year for each pollutant. The applicable conformity *de minimis* threshold for CO emissions within the SDAB is 100-tons per year. The air quality analysis in this section estimates that net emissions of VOC and CO would decrease in all years (2028 through 2032). Net emissions of NOx would exceed the *de minimis* threshold beginning in year 2030. The discussion below demonstrates conformity of the proposed action based on Section 1551.858(a)(1): "The total of direct and indirect emissions from the action are specifically identified and accounted for in the applicable SIP's attainment or maintenance demonstration."

3.1 Emission Estimates

The following presents the methods used to estimate conformity-related emissions generated by the proposed action within the SDAB. The net emissions analysis presented in Attachment 1 to this report includes all supporting conformity-related emission calculations.

Operations

The net change in emissions associated with the proposed action within the SDAB was estimated by subtracting baseline CH-53E emissions from those associated with the CH-53K. Existing and proposed sources affected by the proposed action would include (1) operations and engine maintenance/testing of CH-53E and CH-53K aircraft. The following sources would not be affected as a result of implementing the proposed action (1) personal and government-owned vehicles (POVs and GOVs), (2) ground/tactical support equipment (G/TSE), (3) routine construction, and (6) non-permitted stationary and other sources. The proposed action does not require new or additional personnel, POVs, GOVs, G/TSEs, construction of supporting facilities or structures, or operation of non-permitted stationary sources. Therefore, these sources are not carried forward in this analysis. Annual emissions are estimated for 2028, when the first CH-53K squadrons begin operating in the SDAB, through 2032 when all four CH-53K squadrons are based and operating in the SDAB.

Emissions associated with existing CH-53E operations at MCAS Miramar were obtained from the air quality analysis and CH-53E operational conditions detailed in Alternative 1 of the 2010 *United States Marine Corps F-35B West Coast Basing Environmental Impact Statement* (EIS) that was adopted in a 2010 EIS Record of Decision (ROD). The 2010 operational conditions and air quality analysis form the basis of this general conformity applicability analysis. The 2010 analysis relied upon comparing flight profiles of engine power and mode to corresponding emissions factors available at the time of the 2010 ROD. In addition, this general conformity applicability analysis relies on the 2025 air quality study performed in support of the proposed action (Stantec 2025). The 2025 study utilized the 2010 ROD operational conditions but used the latest emission estimates for the CH-53E provided by the AESO (AESO 2009a,b). Emissions data for static engine run-ups in the AESO documents describe the emissions rates for a year of maintenance operations per aircraft active during the year. Table 3-2 summarizes the conformity-related emissions associated with existing CH-53E operations within the SDAB.

Table 3-2. Annual Conformity-Related Emissions within the SDAB Associated with Existing CH-53E Operation at MCAS Miramar					
Pollutant	**VOC**	**CO**	**NOx**	**SO_2**	**$PM_{10/2.5}$**
Aircraft Operations					
CH-53E Flight	19.76	35.91	17.41	6.05	6.84
CH-53E Engine Testing	7.21	12.88	8.27	3.52	2.50
Total Emissions	**26.97**	**48.79**	**25.68**	**9.57**	**9.33**

Operational data used to calculate CH-53K aircraft emissions within the SDAB were obtained from the proposed actions emissions study, completed in year 2025 (Stantec 2025). In the 2025 emissions study, factors used to calculate combustive emissions for the CH-53K aircraft were obtained from the DON AESO (AESO 2015a,b). Table 3-3 summarizes the total proposed operational emissions resulting from implementation of the Proposed Action at full build-out, year 2032.

Table 3-3. Annual Conformity-Related Emissions within the SDAB due to Implementation of the Proposed Action – Full Build-out Year 2032 (Tons per Year)					
Pollutant	**VOC**	**CO**	**NOX**	**SO2**	**PM10/2.5**
Aircraft Operations					
CH-53K Flight	1.61	13.77	51.75	9.72	0.41
CH-53K Engine Testing	0.45	4.16	19.59	4.57	0.24
Total Proposed Operations	**2.06**	**17.94**	**71.33**	**14.28**	**0.65**

Table 3-4 summarizes the net change in annual conformity-related emissions that would occur from the proposed replacement of the CH-53E with CH-53K heavy lift helicopters within the SDAB, including (1) the first year of operational emissions (2028), (2) the year when the proposed action first would exceed the 25-tons per year NOx *de minimis* threshold (2030), and (3) the maximum year of emissions that would occur upon completion of the CH-53E to CH-53K replacement action (2032). These data show that net NOx emissions from the proposed action within the SDAB would exceed the NOx conformity *de minimis* threshold beginning in 2030 and would peak at the completion of the proposed action in 2032. Therefore, pursuant to Section 1551.853(b) of SDAPCD Rule 1501, the DON must perform a conformity determination to demonstrate how proposed NOx emissions will conform to the applicable SIP. Table 3-4 also shows that conformity-related emissions of VOC and CO from the proposed action would not exceed the *de minimis* thresholds. Additionally, all conformity-related emissions would be well below 10 percent of the SDAB emission inventories for these pollutants. Consequently, emissions of VOC and CO from the proposed action within the SDAB would be exempt from the conformity determination requirements of Section 1551.853(c)(1).

3.2 Conformity Analysis

The conformity applicability analysis for the proposed action identifies that net NOx emissions within the SDAB would exceed the *de minimis* threshold beginning in 2030. Therefore, Section 1551.853(b) of SDAPCD Rule 1501 requires the DON to demonstrate that NOx emissions from the proposed action conform to the applicable SIP.

Section 1551.858(a)(1) provides that a conformity demonstration may be presumed if direct and indirect emissions from the activity are specifically identified and accounted for in the applicable

SIP. Section 1551.852 defines the applicable SIP as the most recent SIP approved by the U.S. Environmental Protection Agency. The applicable SIP for the SDAB is the October 2020 *Plan for Attaining the National Ambient Air Quality Standards for Ozone in San Diego County* (SDAPCD 2020).

The federal general conformity regulation and corresponding District Rule 1501 (Conformity of General Federal Actions), require federal agencies proposing major actions to make a determination that the actions will conform to the SIP. A method for demonstrating conformity is forecasting and accounting for reasonably anticipated emissions from future actions by federal agencies in the SIP. The Department of Navy (DON) and United States Marine Corps (USMC) developed updated projections of future emissions from anticipated military actions in San Diego County through 2037. Section 2.1.3.1 of the 2020 SIP specifically identifies and accounts for a Military Growth Increment in anticipation of "potential actions at Navy and Marine Corps facilities in San Diego County over the next decade that could require conformity determinations" (APCD 2020). For the purposes of analyzing the potential impact of these projects on regionwide attainment of the 2008 and 2015 ozone NAAQS, total emissions from full implementation of these projects were conservatively assumed to occur in 2018. CARB incorporated this growth increment into the 2019 CARB California Emissions Projection Analysis Model (CEPAM) emissions inventory (Version 1.00) in June 2019; therefore, a total growth projection of 8.34-tons per day of NOx or 3,044.1-tons of NOx per year has been incorporated into the 2020 SIP attainment plan and air quality modeling conducted by CARB (APCD 2020). CARBs 2020 SIP modeling analysis indicates that military project-related emissions, including specifically those resulting from the proposed replacement of CH-53E with CH-53K heavy lift helicopters at MCAS Miramar, are not expected to cause additional ozone violations.

Table 3-4 presents the net NOx emissions associated with first year implementation of the proposed action within the SDAB (2028), the first-year net emissions exceed the de minimis threshold for NOx within the SDAB (2030), the furthest year of the applicable SIP's maintenance plan (2032), and the proposed actions year of greatest emissions (2032).

Table 3-4. Net Change in Annual Conformity-Related Emissions within the SDAB due to Replacing CH-53E HMH with CH-53K HMH at MCAS Miramar
(Tons per Year)

Year/Operation	VOC	CO	NOX	SO2	PM10/2.5
Year 2028-2029					
(-1) CH-53E Squadron	(-)6.74	(-)12.19	(-)6.42	(-)2.39	(-)2.33
(+1) CH-53K Squadron	0.51	4.48	17.83	3.57	0.16
Net Emissions 2028-29	**(-)6.23**	**(-)7.78**	**11.83**	**1.18**	**(-)2.17**
Year 2029-2030					
(-2) CH-53E Squadron	(-)13.48	(-)24.39	(-)12.84	(-)4.78	(-)4.66
(+2) CH-53K Squadron	1.03	8.97	35.66	7.14	0.32
Net Emissions 2029-2030	**(-)12.45**	**(-)15.42**	**22.82**	**2.36**	**(-)4.34**
Year 2030-2031					
(-3) CH-53E Squadron	(-)20.22	(-)36.56	(-)19.26	(-)7.17	(-)6.99
(+3) CH-53K Squadron	1.54	13.45	53.49	10.71	0.48
Net Emissions 2030-2031	**(-)18.64**	**(-)23.11**	**34.23***	**3.54**	**(-)6.51**
Year 2031-2032					
(-4) CH-53E Squadron	(-)26.97	(-)48.79	(-)25.68	(-)9.57	(-)9.33
(+4) CH-53E Squadron	2.06	17.94	71.33	14.28	0.65
Net Emissions 2031-2032	**(-)24.91**	**(-)30.86**	**45.66**	**4.71**	**(-)8.68**
SDAB Conformity Thresholds	**25**	**100**	**25**	**N/A**	**N/A**

(-) indicates a decrease in emissions; “N/A” indicates Not Applicable (SDAB “Attainment” status); * First year of NOx emissions exceedance

Figure 3-1 presents the net change in annual emissions associated with implementation of the proposed action. The proposed action would be implemented over a period of 4-years. As a result, Figure 3-1 demonstrates that NOx emissions would increase in year 2029 through year 2032. Peak annual NOx emission conditions are expected to be observed in 2032. However, as demonstrated throughout this document the applicable SIP for the SDAB specifically identified and accounted for the proposed actions NOx emission increases.

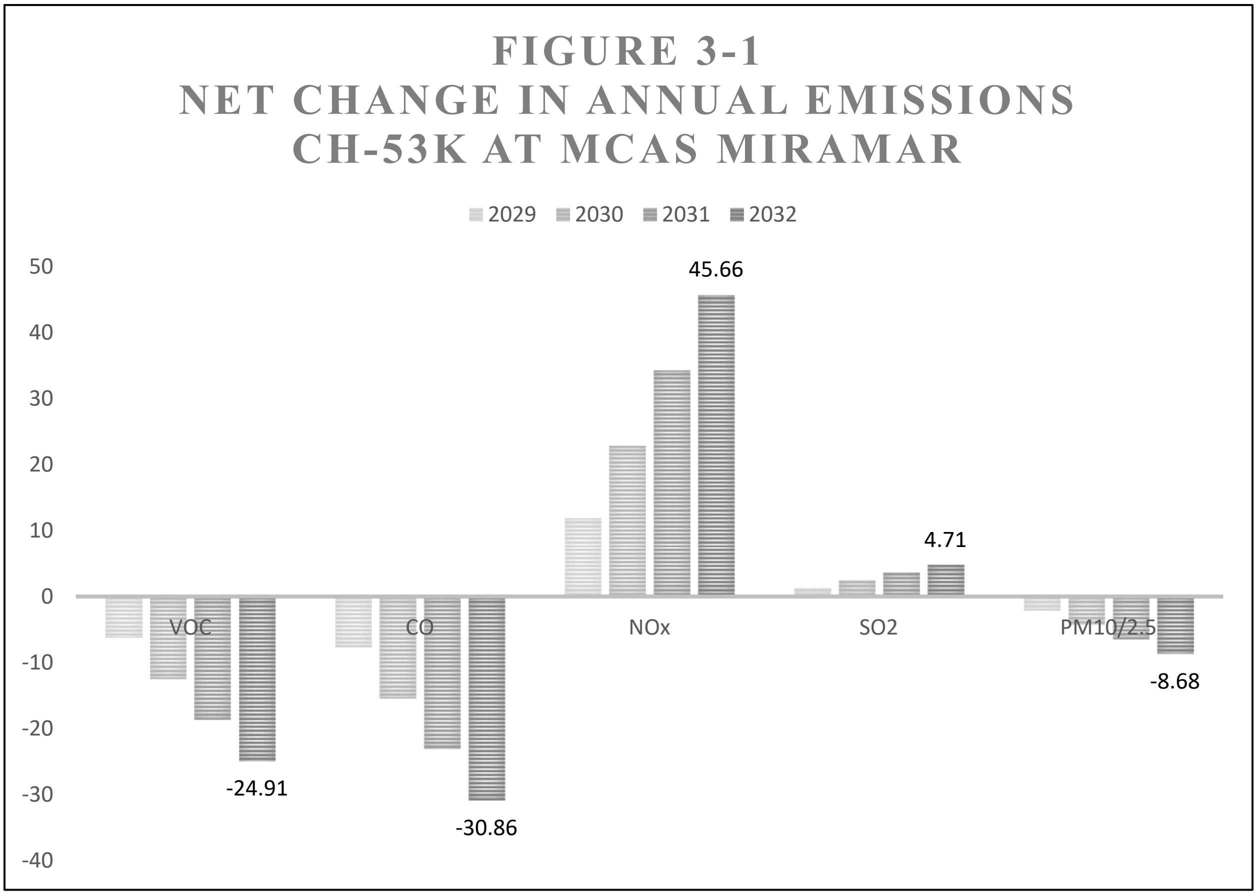

Table 3-5 identifies NOx emissions associated with other DON actions that have been undertaken within the SDAB during the period covered by the applicable SIP and its Military Growth Increment. Table 3-5 also demonstrates that 1,413.65-tons of annual NOx emissions growth remains available to date. The remaining emissions growth increment value was calculated by considering all planned and undertaken DON actions that resulted in NOx emissions between years 2018 through 2025, as described in the *Department of the Navy 2017 Mobile Source Baseline and Emissions Growth Increment Request* (DON 2018). The proposed actions NOx emissions are included in the 2017 DON report in years 2022 and 2023. As such, in order to ensure accurate computation in Table 3-5, the emissions resulting from the proposed action during these 2-years were removed from the cumulative calculation of NOx emissions resulting from other DON actions. As shown in Table 3-5, the remaining Military Growth Increment is more than sufficient to cover the net NOx emissions associated with the proposed CH-53K action.

Table 3-5. NOx Emissions from DON Actions in San Diego County (Year 2018 - 2025)	
Conformity Analysis and Determination Category	**Total NOx (TPY)**
Cumulative NOx Emissions from DON Actions in San Diego County (Years 2018 - 2025) (DON 2018) *	**1,630.56**
Total Military Growth Increment in Applicable SIP (Year 2018 - 2032) (2020 APCD)	**3,044.21**
Military Growth Increment Available for Proposed Action	**1,413.65**
Year of Maximum Net NOx Emissions from Proposed Action (Year 2032) (Stantec 2025)	**45.66**
Cumulative NOx Emissions During the Proposed Action Implementation Period (Year 2028 - 2032) (USMC 2025)	**114.54**
Conforms Based on Section 1551.858(a)(1)?	**Yes**
*Source: DON "*2017 Mobile Source Baseline and Emissions Growth Increment Request", less the proposed actions 2022-2023 emissions*	

3.3 Conformity Determination

Applying section 1551.858(a)(1), we have determined that the proposed CH-53E to CH-53K replacement action conforms to the SIP because the net NOx emissions are covered by the Military Growth Increment that is specifically identified and accounted for in the 2020 SIP.

4.0 REFERENCES

AESO. 2009a. *Aircraft Emission Estimates: H-53 Mission Operations Using JP-5*. November.

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DON. 2018. *Department of Navy 2017 Mobile Source Baseline and Emissions Growth Increment Request*. December.

USMC. 2025a. *Replacement of CH-53E Heavy Lift Helicopter with CH-53K Heavy Lift Helicopter at Marine Corps Air Station Miramar*. October.

USMC. 2025b. *Marine Aviation Plan.* January.

San Diego Air Pollution Control District (SDAPCD). 2020. *Plan for Attaining the National Ambient Air Quality Standards for Ozone in San Diego County.* October.
Stantec 2025.

Appendix B: Noise and Air Quality Study

FINAL NOISE AND AIR QUALITY STUDY

IN SUPPORT OF THE ENVIRONMENTAL ASSESSMENT FOR THE REPLACEMENT OF THE CH-53E WITH THE CH-53K AIRCRAFT

AT

MARINE CORPS AIR STATION (MCAS) MIRAMAR

PREPARED FOR:

NAVAL FACILITIES ENGINEERING COMMAND, SOUTHWEST
1200 PACIFIC HIGHWAY
SAN DIEGO, CA 93132

&

MARINE CORPS INSTALLATIONS COMMAND
300 MARINE CORPS PENTAGON
WASHINGTON, DC 20350

JANUARY 2025

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ACRONYMS AND ABBREVIATIONS

%	percent
AAM	Advanced Acoustic Model
AESO	Aircraft Environmental Support Office
dB	Decibel
dBA	A-weighted decibel
DNL	Day-Night Average Sound Level
DoD	Department of Defense
kPa-s/m^2	kilopascal-seconds per square meter
MCAS	Marine Corps Air Station
NO_x	Nitrogen Oxides
ROD	Record of Decision
SCC	Social Cost of Carbon
U.S.	United States
USGS	United States Geological Survey
USMC	U.S. Marine Corps

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1.0 INTRODUCTION

1.1 Background

This Noise Study considers the replacement of the CH-53E with the CH-53K aircraft at Marine Corps Air Station (MCAS) Miramar to assess the potential for noise and air quality impacts. MCAS Miramar is located approximately 11 miles north of downtown San Diego and 4 miles east of the Pacific Ocean. As depicted in Figure 1-1, the MCAS Miramar property is about 12 miles long from east to west and about 4 miles long from north to south—encompassing 23,065 acres. State Route 52 and I-805 form the installation's southern and western boundaries. I-15, State Route 163, and Kearny Villa Road bisect the Station into east and west.

1.2 Airfield Configuration

MCAS Miramar includes two bi-directional runways. Both runways are parallel to each other oriented approximately southwest to northeast with the longer 12,000 foot runway (6L/24R) on the northern side and the shorter 8,001 foot runway (6R/24L) on the southern side. Figure 1-2 depicts these runways along with five Helicopter Landing Pads, and a 1,000 foot by 100 foot paved Landing Helicopter Dock landing strip.

1.3 Document Structure

Section 1.0 introduces this study, Section 2.0 contains the noise analysis, Section 3.0 the air quality analysis, and Section 5.0 provides the references.

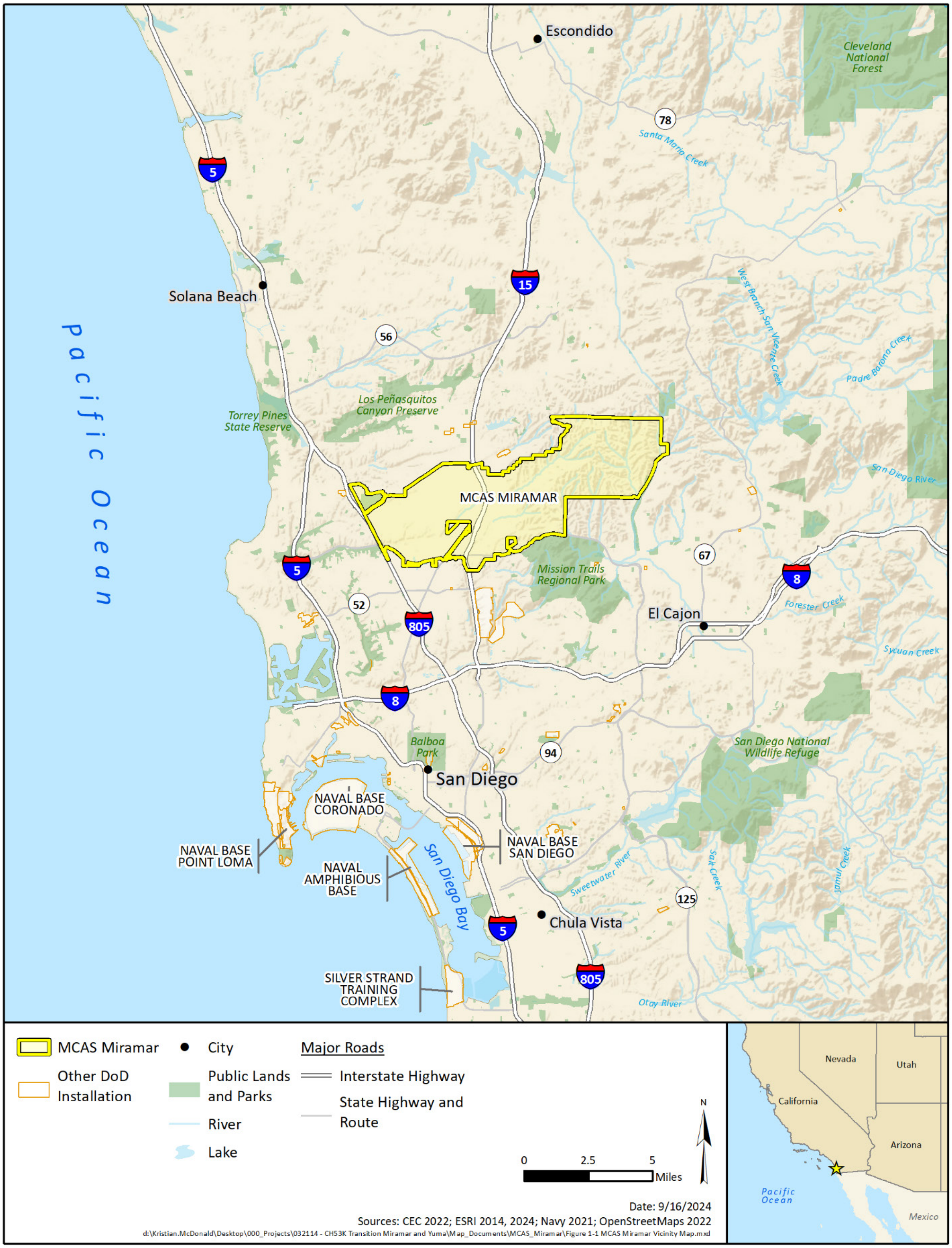

Figure 1-1 Location of MCAS Miramar

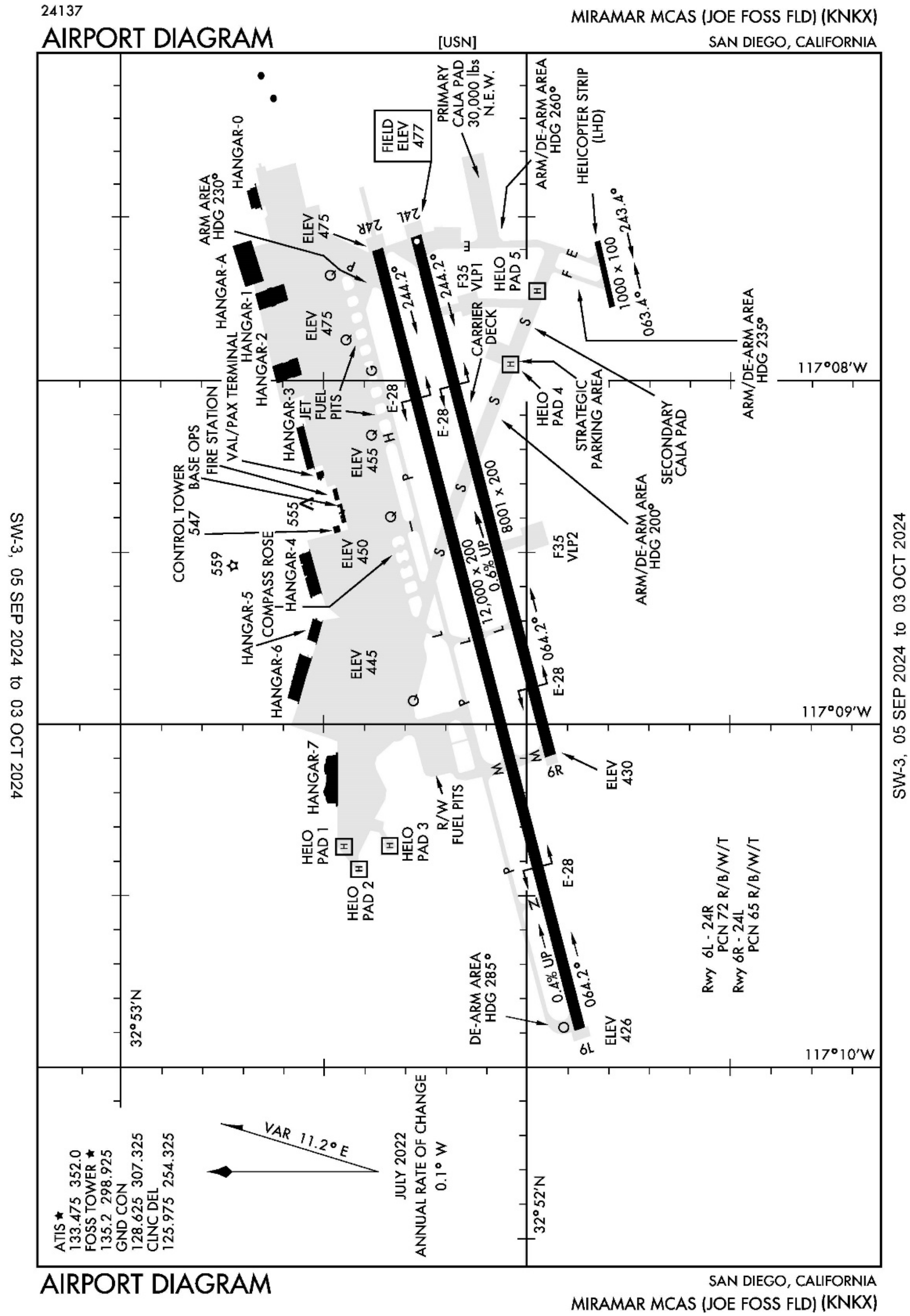

Figure 1-2 MCAS Miramar Runways, Helicopter Landing Pads, and LHD

2.0 NOISE ANALYSIS

The following subsections summarize noise analysis methodologies, software modeling programs, and metrics followed by the Baseline and Proposed noise conditions for MCAS Miramar.

2.1 Background, Noise Modeling Software, and Noise Metrics

The Department of Defense (DoD) and the Federal Interagency Committee on Noise (1978) outline the types of metrics to describe noise exposure for environmental impact assessment, while the Defense Noise Working Group provides guidance on military noise modeling methodology. The following discussion describe these noise metrics, the applicable software, and noise modeling methodology.

The DoD prescribes use of the Noisemap suite of computer programs (Wyle 1998; Wasmer Consulting 2006) containing the core computational programs called "NMAP," version 7.3. For this Noise Study, the Noisemap suite of programs refers to BASEOPS as the input module, Noisemap as the noise model for predicting noise exposure in the airfield environment from fixed wing aircraft and the Advanced Acoustic Model (AAM) for rotary-wing and tilt-rotor (Department of Transportation 2020). AAM is the replacement to the Rotorcraft Noise Model, which was used for noise analysis of helicopters and tilt-rotor aircraft prior to February 2023 (DoD 2022). Without the appropriate AAM noise data required to model all fixed wing aircraft operating at MCAS Miramar, this study retains the NMAP modeling from prior studies for fixed wing aircraft. Table 2-1 summarizes these noise modeling parameters along with noise modeling grid spacing, elevation and impedance inputs, and weather conditions used in the noise modeling.

Human hearing sensitivity to differing sound pitch, measured in cycles per second or hertz, varies by frequency. To account for this effect, sound measured for environmental analysis utilizes A-weighting, which emphasizes sound roughly within the range of typical speech and de-emphasizes very low and very high frequency sounds. All decibels (dB) presented in this study utilize A-weighted (dBA or dB[A]) but are presented as dB for brevity.

Table 2-1 Noise Modeling Parameters

Software	*Analysis*	*Version*
NMAP	Fixed Wing Aircraft	7.3
AAM	CH-53 and MV-22	3
Parameter	*Description*	
Receiver Grid Spacing	500 ft in x and y	
Metrics	CNEL	
Basis	AAD Operations	
Topography		
Elevation Data Source	USGS 30m NED	
Elevation Grid Spacing	500 ft in x and y	
Impedance Data Source	USGS Hydrography DLG	
Impedance Grid spacing	500 ft in x and y	
Flow Resistivity of Ground (soft/hard)	225 kPa-s/m^2 / 100,000 kPa-s/m^2	
Noise Study Grid		
Grid spacing	250 ft in x and y	
Military Modeled Weather (Monthly Averages 2018-2023; April selected)		
Temperature	63°F	
Relative Humidity	45%	
Barometric Pressure	30.05 in Hg	

Legend: °F = degrees Fahrenheit; % = percent; AAD = Average Annual Day; DLG = Digital Line Graph; CNEL = Community Noise Equivalent Level; ft = feet; in Hg = inches Mercury; kPa-s/m^2 = kilopascal-seconds per square meter; m = meters; NA = Number of Events at or above a specified threshold; NED = National Elevation Dataset; SEL = Sound Exposure Level; USGS = United States Geological Survey.

Noisemap's ability to account for the effects of sound propagation includes consideration of varying terrain elevation, taken from the United States (U.S.) Geological Survey (USGS) National Elevation Dataset, and ground impedance conditions, taken from USGS Hydrography data. In this case, "soft ground" (e.g., grass-covered ground) is modeled with a flow resistivity of 225 kilopascal-seconds per square meter (kPa-s/m^2) and "hard ground" (in this case, water) is modeled with a flow resistivity of 100,000 kPa-s/m^2. For ambient temperature, humidity, and pressure, each month was assigned a temperature, relative humidity, and barometric pressure from data available for that month for the years 2020 through 2023. Noisemap then determined and used the month with the weather values that produced the median results in terms of noise propagation effect, which in this case was the month of November (with the values noted in Table 2-1).

The primary noise metric utilized in the U.S. for noise impacts is the Day-Night Average Sound Level (L_{dn}, also written as DNL), which is A-weighted applicable for subsonic aircraft operations and identified in the DoD Noise Program Policy (DoD Instruction 4715.13, 28 January 2020). DNL is a cumulative metric that includes all noise events occurring in a 24-hour period with a nighttime noise penalty applied to events occurring after 10 p.m. (2200) and before 7 a.m. (0700). The daytime period is defined as 7 a.m. (0700) to 10 p.m. (2200). An adjustment (penalty) of 10 dB, equivalent to ten times the number of noise events, is added to events occurring during the nighttime period to account for the added intrusiveness while people are most likely to be relaxing at home or sleeping and while background noise levels would typically be lower. The Community Noise Equivalent Level (CNEL) noise metric, specified by the State of California for environmental noise analysis, such as airport operations, mirrors DNL with the same energy-averaged sound level measured over a 24-hour period and 10 dB penalty for events occurring between 10 p.m. and 7 a.m. (2200 and 0700). However, CNEL adds an evening penalty by multiplying evening events by 3 (equivalent to 4.77 dB penalty) if occurring between 7 p.m. and 10 p.m. (1900 and 2200). Note that these periods of the day are often different from the "day" and "night" used commonly in military aviation, which are directly related to the times of sunrise and sunset applicable for military training in dark conditions. These times vary latitudinally, and throughout the year with the seasonal changes. Because CNEL always results in decibel levels equal to or greater than DNL, CNEL is accepted by DoD in leu of DNL for DoD actions occurring within the State of California. Both DNL and CNEL, as well as the CNEL analysis in this study, consider average daily events calculated by dividing the annual operations by 365 days.

Modeling of noise using the Noisemap software suite (including both the Noisemap and AAM components) is accomplished by defining each aircraft's flight tracks (paths over the ground) and flight profiles, which includes altitude, airspeed, power settings, and other flight conditions. The modeling data for this study relies upon the most recent noise analysis as described in the *Final Noise and Air Quality Analysis for 2021 Second Revised Federal Action - F-35 Basing at MCAS Miramar* as the basis of the modeling data (Cardno 2021). Through a data collection process, operators and subject matter experts at MCAS Miramar reviewed these details with a focus on existing CH-53E inputs and updated to reflect the most current conditions, which is documented in a Data Validation Package (United States Marine Corps [USMC] 2024). The appendix provides much of the modeling information from the data package used in this analysis.

Most aircraft in the DoD inventory have been measured for noise in various conditions so that the results can be used in subsequent modeling. Depending on aircraft type, this data will be either "noisefile" or "NC file" data. Because the CH-53K is a newer variant, it has not been measured for "noisefile" or "NC file" representation in the modeling software. Therefore, an alternate method of estimation was used to represent the CH-53K variant in the noise model calculations. Consultation with National Aeronautical and Space Administration Langley Research Center indicated that the standard used in Federal Aviation Regulations part 36, subpart H, dealing with helicopter noise is that the noise difference between two helicopters is logarithmically proportional to the weight ratio of the two, or roughly:

$$\Delta \sim 10 * \log10(\text{Weight ratio})$$

Using information from CH-53E subject matter experts about typical takeoff and landing weights in regular use at MCAS New River and determining CH-53K values for equivalent aircraft conditions (fuel, crew, loading, etc.), an adjustment from CH-53E to CH-53K was developed (USMC 2019). This adjustment (to DNL) is about 0.64 dBA, which corresponds to an equivalent increase in operations of about 16 percent. Under the Proposed Action modeling scenario, this adjustment was applied to the portion of the noise contribution from CH-53E in the Baseline/No Action to estimate the noise produced from the CH-53K in the Proposed Action. Application of this dB adjustment based on the increased weight of the CH-53K variant was applied to the CH-53E operations in the Proposed Action to develop an estimation of noise contributed from the CH-53K. When added to the rest of the modeled noise from other aircraft at the Air Station, it represented the total noise represented in the Proposed Action (Stephenson 2018).

The results of the DoD's Noisemap and AAM modeling were combined for all aircraft activity for both Baseline/No Action and the Proposed Action. The combined noise exposure is presented in terms of contours, i.e., which are lines of equal DNL value. DNL contours of 65 to 85 dB, presented in 5-dB increments, provide a graphical depiction of the aircraft noise environment in the vicinity of the airfield.

2.2 Baseline and No Action

2.2.1 Noise Modeling Data

As mentioned in Chapter 2, the most recent noise and air quality analysis for MCAS Miramar aircraft operations pertinent to this study occurred in 2021 that addressed modifications to F-35 basing referred to as the *Final Noise and Air Quality Analysis for 2021 Second Revised Federal Action - F-35 Basing at MCAS Miramar* (Cardno 2021). Table 2-2 presents the end state annual MCAS Miramar airfield operations of that study, which comprised 13,353 annual based CH-53E operations and 118,842 total airfield operations.

The Navy collects airfield flight operations annually through their Air Traffic Activity Analyzer. Table 2-3 summarizes the resulting operations for 2021, 2022, and 2023 provided by MCAS Miramar that reflects a high of approximately 20,000 annual helicopter operations for 2022 (USMC 2024). This total is consistent with the combined CH-53E and transient helicopters operations documented in the 2021 Second Revised Federal Action. However, the Air Traffic Activity Analyzer did not differentiate between helicopter types to accurately count CH-53E operations so the NEPA team coordinated with the four based CH-53E squadrons to collect additional data. Table 2-4 summarizes the resulting annual sorties provided by each squadron along with the calculated annual flight operations at MCAS Miramar. In recent years, annual operations for the four CH-53E squadrons ranged from a low of approximately 10,000 to a high of slightly above 13,000, which is also consistent with the 2021 Second Revised Federal Action that modeled 13,353 operations. Therefore, no substantial changes have occurred to annual CH-53E flight operations at MCAS since the 2021 noise study so the 2021 airfield operations, as detailed in Table 2-2, become the baseline for comparison to the proposed CH-53K and are modeled on an average annual day basis.

Table 2-2 2021 Second Revised Federal Action (CERS) - Annual Aircraft Flight Operations at MCAS Miramar

	Squadron Name	Notes	Aircraft Type	Departure				Departure to EAF				Arrival from EAF				Instrument Straight-In Arrival			
				Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total
Based	F-35B - 3 Sqns (10 A/C each)		F-35B	5,193	648	60	5,901	105	15	-	120	105	15	-	120	261	33	3	297
Based	F-35B FRS - 1 Sqn (25 A/C)		F-35B	4,918	1,168	61	6,147	108	15	-	123	108	15	-	123	231	74	3	308
Based	F-35C	1	F-35C	3,531	442	39	4,012	-	-	-	-	-	-	-	-	173	22	2	197
Based	KC-130		KC-130J	663	51	7	721	-	-	-	-	-	-	-	-	22	5	14	41
Based	Station C-12	2	C-12	259	-	-	259	-	-	-	-	-	-	-	-	175	59	24	258
Based	CH-53E		CH-53E	2,532	392	91	3,015	-	-	-	-	-	-	-	-	-	-	-	-
Based	MV-22		MV-22B	9,658	5,361	1,181	16,200	76	39	12	127	76	39	12	127	877	487	107	1,471
Transient	Air Carrier	2	UC-35 etc.	891	81	30	1,002	-	-	-	-	-	-	-	-	891	89	24	1,004
Transient	Heavy Transport	4	KC-135R	22	1	1	24	-	-	-	-	-	-	-	-	22	1	1	24
Transient	Mil Fixed-Wing (F-16, F-18 etc)		FA-18EF	2,546	247	77	2,870	-	-	-	-	-	-	-	-	512	48	13	573
Transient	F-35B		F-35B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient	F-35C		F-35C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient	Military Rotary-Wing	3	H-60 etc.	270	76	51	397	-	-	-	-	-	-	-	-	-	-	-	-
Based				26,754	8,062	1,439	36,255	289	69	12	370	289	69	12	370	1,739	680	153	2,572
Civil				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient				3,729	405	159	4,293	-	-	-	-	-	-	-	-	1,425	138	38	1,601
TOTAL				30,483	8,467	1,598	40,548	289	69	12	370	289	69	12	370	3,164	818	191	4,173

	Squadron Name	Notes	Aircraft Type	Overhead Break Arrival to RUNWAY				Overhead Break Arrival to PADS				Non-Break Visual Arrival to RUNWAY				Non-Break Visual Arrival to PADS			
				Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total
Based	F-35B - 3 Sqns (10 A/C each)		F-35B	3,549	72	36	3,657	348	6	-	354	945	486	45	1,476	78	39	-	117
Based	F-35B FRS - 1 Sqn (25 A/C)		F-35B	3,240	457	114	3,811	523	74	18	615	676	516	37	1,229	101	77	6	184
Based	F-35C	1	F-35C	2,665	74	3	2,742	-	-	-	-	692	346	35	1,073	-	-	-	-
Based	KC-130		KC-130J	522	65	-	587	-	-	-	-	52	10	32	94	-	-	-	-
Based	Station C-12	2	C-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Based	CH-53E		CH-53E	-	-	-	-	-	-	-	-	954	157	96	1,207	1,430	235	145	1,810
Based	MV-22		MV-22B	7,884	4,374	970	13,228	-	-	-	-	-	-	-	-	897	501	107	1,505
Transient	Air Carrier	2	UC-35 etc.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient	Heavy Transport	4	KC-135R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient	Mil Fixed-Wing (F-16, F-18 etc)		FA-18EF	2,050	193	54	2,297	-	-	-	-	-	-	-	-	-	-	-	-
Transient	F-35B		F-35B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient	F-35C		F-35C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient	Military Rotary-Wing	3	H-60 etc.	-	-	-	-	-	-	-	-	108	30	20	158	162	46	31	239
Based				17,860	5,042	1,123	24,025	871	80	18	969	3,319	1,515	245	5,079	2,506	852	258	3,616
Civil				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient				2,050	193	54	2,297	-	-	-	-	108	30	20	158	162	46	31	239
TOTAL				19,910	5,235	1,177	26,322	871	80	18	969	3,427	1,545	265	5,237	2,668	898	289	3,855

Note 1) F-35C modeled with A variant acoustical data and C variant flight profiles
2) C-12 and UC-35 operations not modeled
3) H-60 and other helos modeled as CH-53E
4) Heavy Transport modeled as C-17

Table 2-2 2021 Second Revised Federal Action (CERS) - Annual Aircraft Flight Operations at MCAS Miramar (Concluded)

	Squadron Name	Notes	Aircraft Type	Visual Touch and Go (Conventional)*				Visual Touch & Go (Non-conventional)*				FCLP at NKX*				GCA Box*			
				Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total
Based	F-35B - 3 Sqns (10 A/C each)		F-35B	261	36	-	297	570	78	-	648	561	561	-	1,122	237	-	-	237
Based	F-35B FRS - 1 Sqn (25 A/C)		F-35B	246	61	-	307	541	135	-	676	584	584	-	1,168	246	-	-	246
Based	F-35C	1	F-35C	554	76	-	630	-	-	-	-	2,083	1,285	78	3,446	156	-	-	156
Based	KC-130		KC-130J	4,920	1,836	587	7,343	-	-	-	-	-	-	-	-	245	18	-	263
Based	Station C-12	2	C-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Based	CH-53E		CH-53E	5,536	911	561	7,008	-	-	-	-	-	-	-	-	257	53	3	313
Based	MV-22		MV-22B	2,713	302	-	3,015	-	-	-	-	-	-	-	-	3,392	377	-	3,769
Transient	Air Carrier	2	UC-35 etc.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient	Heavy Transport	4	KC-135R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient	Mil Fixed-Wing (F-16, F-18 etc)		FA-18EF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient	F-35B		F-35B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient	F-35C		F-35C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient	Military Rotary-Wing	3	H-60 etc.	4,552	1,236	566	6,354	-	-	-	-	-	-	-	-	-	-	-	-
Based				14,230	3,222	1,148	18,600	1,111	213	-	1,324	3,228	2,430	78	5,736	4,533	448	3	4,984
Civil				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transient				4,552	1,236	566	6,354	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL				18,782	4,458	1,714	24,954	1,111	213	-	1,324	3,228	2,430	78	5,736	4,533	448	3	4,984

	Squadron Name	Notes	Aircraft Type	TOTAL			
				Day	Eve	Night	Total
Based	F-35B - 3 Sqns (10 A/C each)		F-35B	12,213	1,989	144	14,346
Based	F-35B FRS - 1 Sqn (25 A/C)		F-35B	11,522	3,176	239	14,937
Based	F-35C	1	F-35C	9,854	2,245	157	12,256
Based	KC-130		KC-130J	6,424	1,985	640	9,049
Based	Station C-12	2	C-12	434	59	24	517
Based	CH-53E		CH-53E	10,709	1,748	896	13,353
Based	MV-22		MV-22B	25,573	11,480	2,389	39,442
Transient	Air Carrier	2	UC-35 etc.	1,782	170	54	2,006
Transient	Heavy Transport	4	KC-135R	44	2	2	48
Transient	Mil Fixed-Wing (F-16, F-18 etc)		FA-18EF	5,108	488	144	5,740
Transient	F-35B		F-35B	-	-	-	-
Transient	F-35C		F-35C	-	-	-	-
Transient	Military Rotary-Wing	3	H-60 etc.	5,092	1,388	668	7,148
Based				76,729	22,682	4,489	103,900
Civil				-	-	-	-
Transient				12,026	2,048	868	14,942
TOTAL				**88,755**	**24,730**	**5,357**	**118,842**

Note 1) F-35C modeled with A variant acoustical data and C variant flight profiles
2) C-12 and UC-35 operations not modeled
3) H-60 and other helos modeled as CH-53E
4) Heavy Transport modeled as C-17

Table 2-3 Annual MCAS Miramar Air Traffic Activity Analyzer Data for All Helicopters

Category	2021 NEPA	2021	2022	2023	3 Year Avg
06L IFR		24	7	1	11
06L VFR		112	31	6	50
06R IFR		-	-	-	-
06R VFR		-	4	8	4
24L IFR		-	299	653	317
24L VFR		-	510	1,273	594
24R IFR		1,561	2,845	1,626	2,011
24R VFR		3,284	3,052	1,192	2,509
Helo Pads		6,124	4,385	4,165	4,891
LHD		5,532	8,858	7,274	7,221
Total	**13,353**	**16,637**	**19,991**	**16,198**	**17,609**

Source: USMC 2024a

Table 2-4 Average Annual MCAS Miramar CH-53E Sorties and Flight Operations

Squadron	FY 2021		FY 2022		FY 2023		3-year Average	
	Sorties	Operations	Sorties	Operations	Sorties	Operations	Sorties	Operations
HMH-361	1,787	3,574	1,632	3,264	1,478	2,956	1,632	3,264
HMH-462	1,348	2,696	1,405	2,810	1,221	2,442	1,325	2,650
HMH-465	1,654	3,308	1,768	3,536	1,269	2,538	1,564	3,128
HMH-466	1,768	3,536	1,424	2,848	1,497	2,994	1,563	3,126
Total	**6,557**	**13,114**	**6,229**	**12,458**	**5,465**	**10,930**	**6,084**	**12,168**

Source: USMC 2024b

In addition to flight operations, the analysis considers static operations where aircraft engines are operated while aircraft are parked on the ground. Figure 2-1 depicts the modeled static run-up profile locations. Consistent with the flight operations, maintenance run-up activities were modeled on an Average Annual Day basis. Table 2-5 presents existing CH-53E annual maintenance engine runs broken out by the type of test, which are assumed to continue at similar rates under the No Action scenario.

As part of the data collection efforts, the NEPA team met with CH-53E pilots to review the modeled flight tracks and flight profiles, which resulted in several modifications to the modeling to best represent current conditions. The appendix presents maps depicting the resulting updated flight tracks and flight profiles for the CH-53E, which were also documented in the data validation package (USMC 2024a).

Figure 2-1 Modeled Baseline and No Action Run-up Locations at MCAS Miramar

Table 2-5 CH-53E Annual Maintenance Engine Runs

Description of Test	Runup Location	Aircraft Heading	Number of Engines	Power	Duration	Annual Events			
						Day Events (0700-1900)	Eve Events (1900-2200)	Night Events (2200-0700)	Total
Collective Bias	CH53 FL	240	3	Gnd Idle	30 mins	108	12	0	120
Track and Balance			3	Gnd Idle	3 mins	360	0	0	360

2.2.2 Noise Exposure

Figure 2-2 shows the CNEL noise contours from 65 to 85 dB in 5-dB increments for the updated 2025 Baseline and No Action compared to the 2021 Second Revised Federal Action - F-35 Basing study. In general, the CNEL contours remain similar in size and shape to the 2021 conditions with just subtle differences due primarily to the updates to CH-53E flight tracks and profiles. Another difference in the modeling is the DoD software policy change to shift from the Rotorcraft Noise Model (RNM) used in 2021 to the Advanced Acoustic Model (AAM) noise model. In this case that change affected both the MV-22 and CH-53E modeling but both software models operate in the same manner for rotorcraft type aircraft, so this reflects a minor software version update with minimal effects on the noise results.

Figure 2-3 depicts a close-up view of the 65 dB and greater CNEL noise contours overlaid on the future land use in the areas off-station nearest to noise sensitive areas. Most of the off-station areas exposed to 65 dB CNEL or greater are industrial or commercial that are considered compatible with those levels. The nearest noise sensitive areas, in this case residential, remain outside of the 65 dB CNEL.

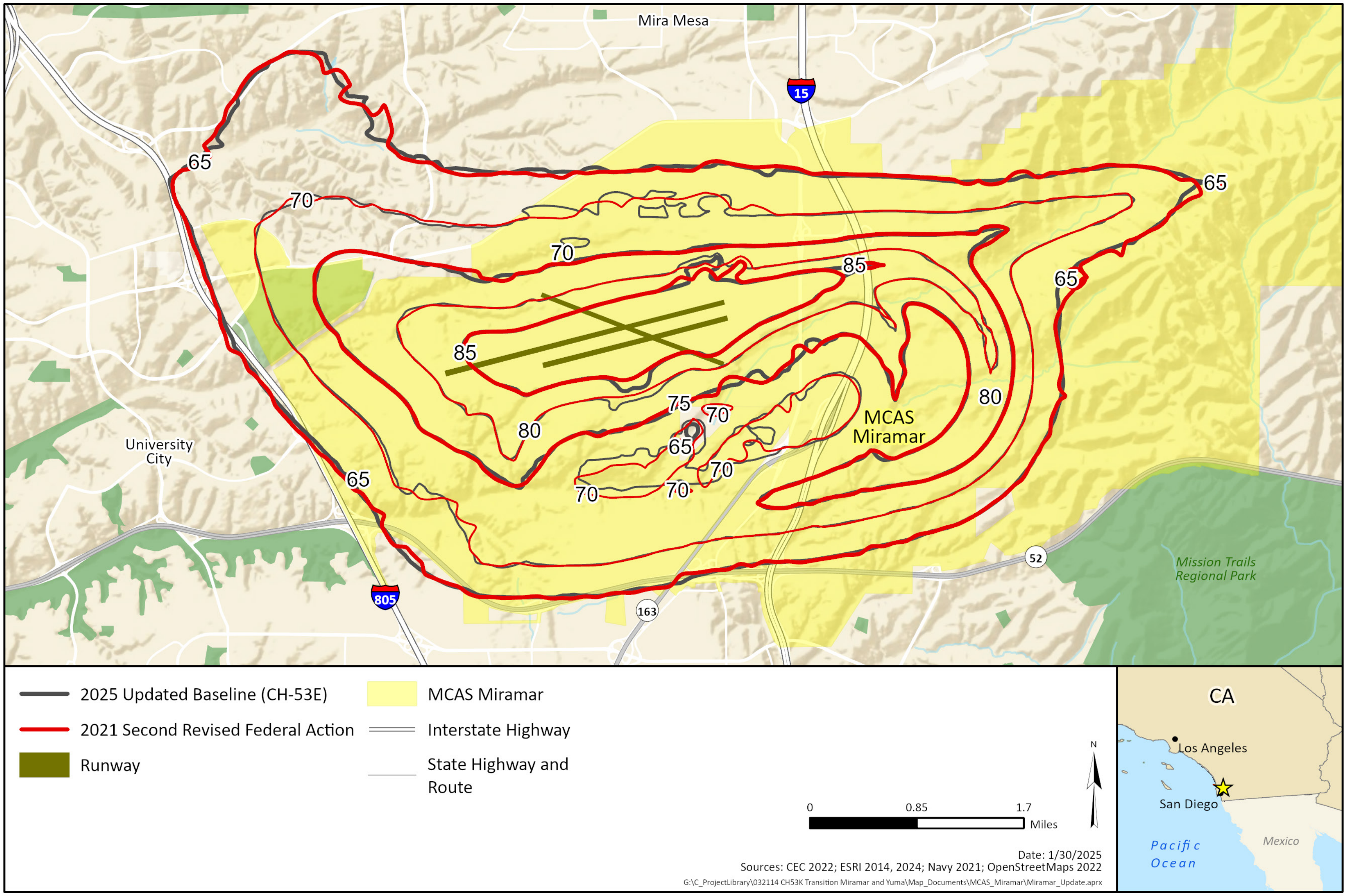

Figure 2-2 Comparison of Updated Baseline/No Action to 2021 Second Revised Federal Action

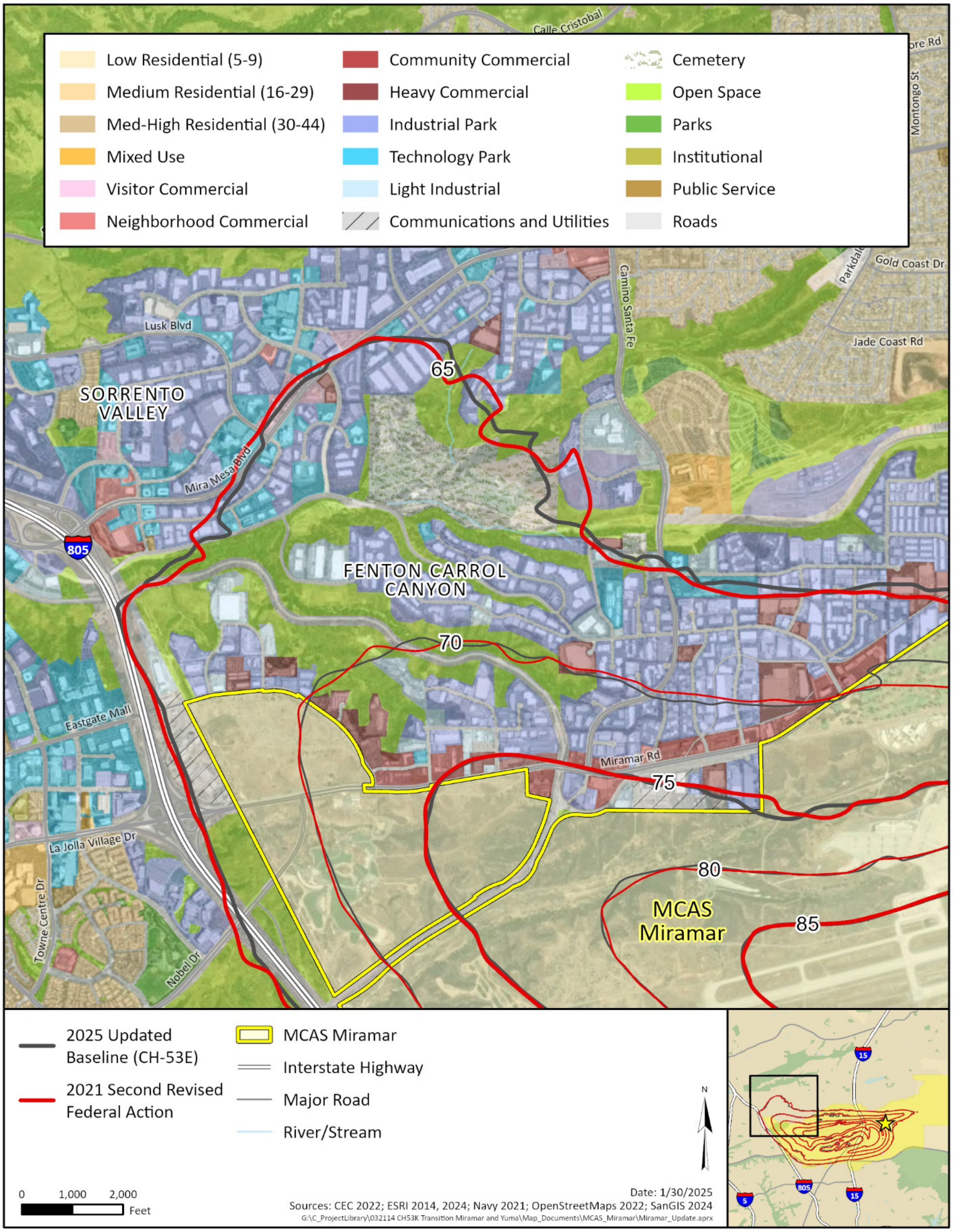

Figure 2-3 Future Land use and Comparison of Updated Baseline/No Action to 2021 Second Revised Federal Action

2.3 Proposed Action Alternative

The following section details the modeling data and the resultant noise exposure for the proposed replacement of CH-53E with CH-53K. All other aircraft operations from Baseline/No Action would remain unchanged from those described in Section 2.2, *Baseline and No Action*.

2.3.1 Modeling Data

The Proposed Action would replace the existing CH-53E operations by CH-53K on a one-for-one basis, so there would be no change to total air operations by the CH-53K resulting in the same annual operations at MCAS Miramar of 13,353, as presented in Table 2-2. Other aircraft types operating at MCAS Miramar, the frequency of aircraft operations occurring among the CNEL periods of the day, runway utilization, and flight tracks are anticipated to remain the same as Baseline/No Action.

2.3.2 Noise Exposure

Figure 2-4 shows the CNEL noise contours from 60 to 85 dB in 5-dB increments for the Proposed Action that would replace the CH-53E with the CH-53K compared to the updated Baseline/No action. The 65 dB CNEL contour under the Proposed Action would be similar to the updated Baseline/No action in both size and shape while reflecting no perceptible change in many areas. For instance, to the southwest, south, southeast, and north, the change to the 65 dB CNEL or greater contours would be on the order of only a few feet, which would be a negligible difference. In both the northwest and east, the Proposed Action would result in an increase in CNEL of several hundred feet, which is less than 1 dB CNEL. This increase would be due to replacement of the CH-53E with the CH-53K, which is calculated to be approximately 0.64 dB greater in terms of single-event noise levels (Stephenson. 2018, USMC 2019).

Figure 2-5 depicts the same proposed noise contour comparison but overlaid on future land use with an aerial background. Figure 2-5 zooms to the northwest side of MCAS Miramar where the noise contours extend off-station to developed land and nearest to noise sensitive areas. Consistent with Baseline/No Action, the Proposed CH-53K 65 dB or greater CNEL noise contours would not impact noise-sensitive future land use, such as residential, and the increase in the 65 dB would be negligible. Only industrial or commercial future land uses would be exposed to 65 dB CNEL or greater, which are considered compatible.

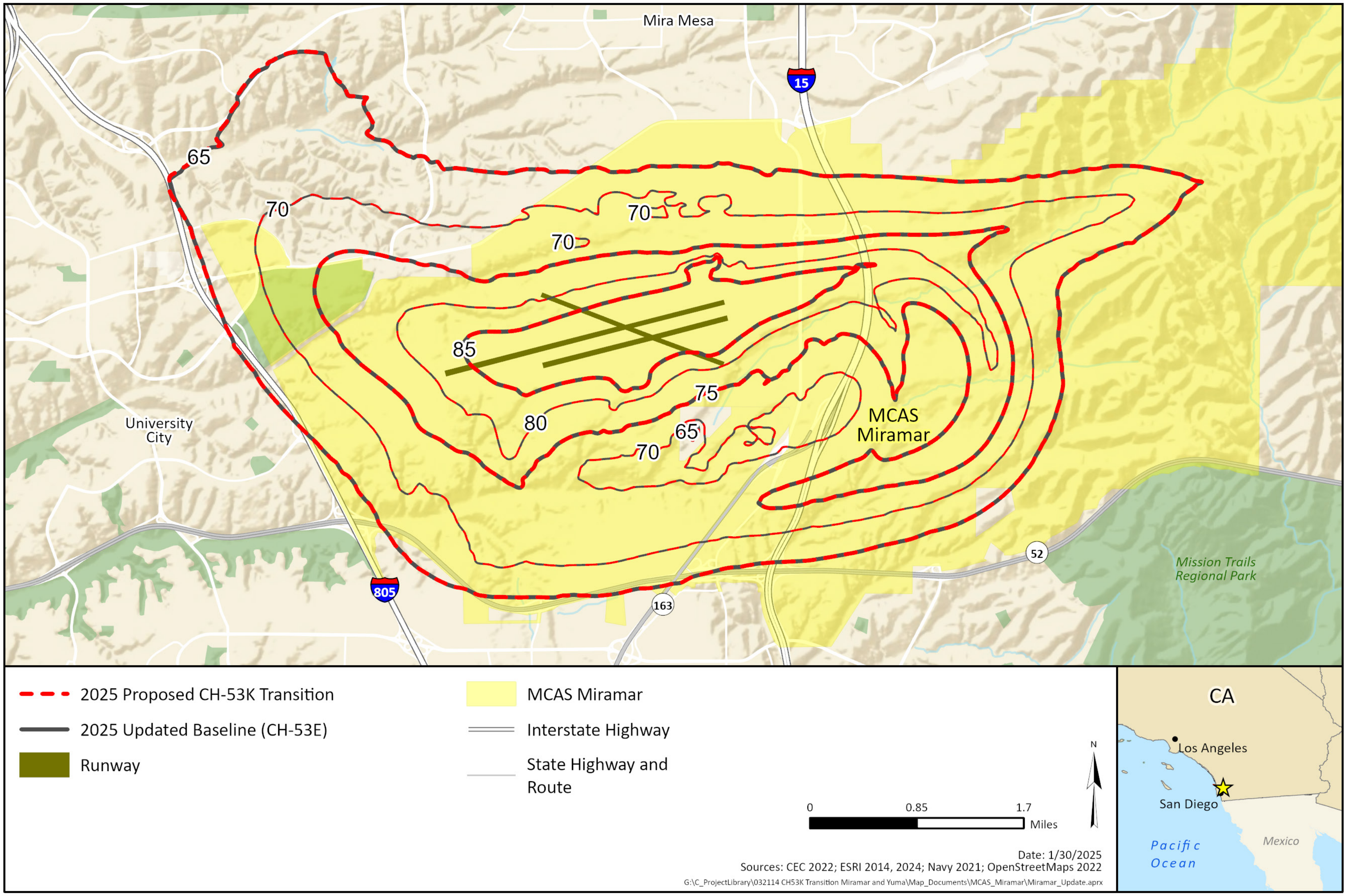

Figure 2-4 Comparison of Proposed Action to Baseline/No Action DNL Contours

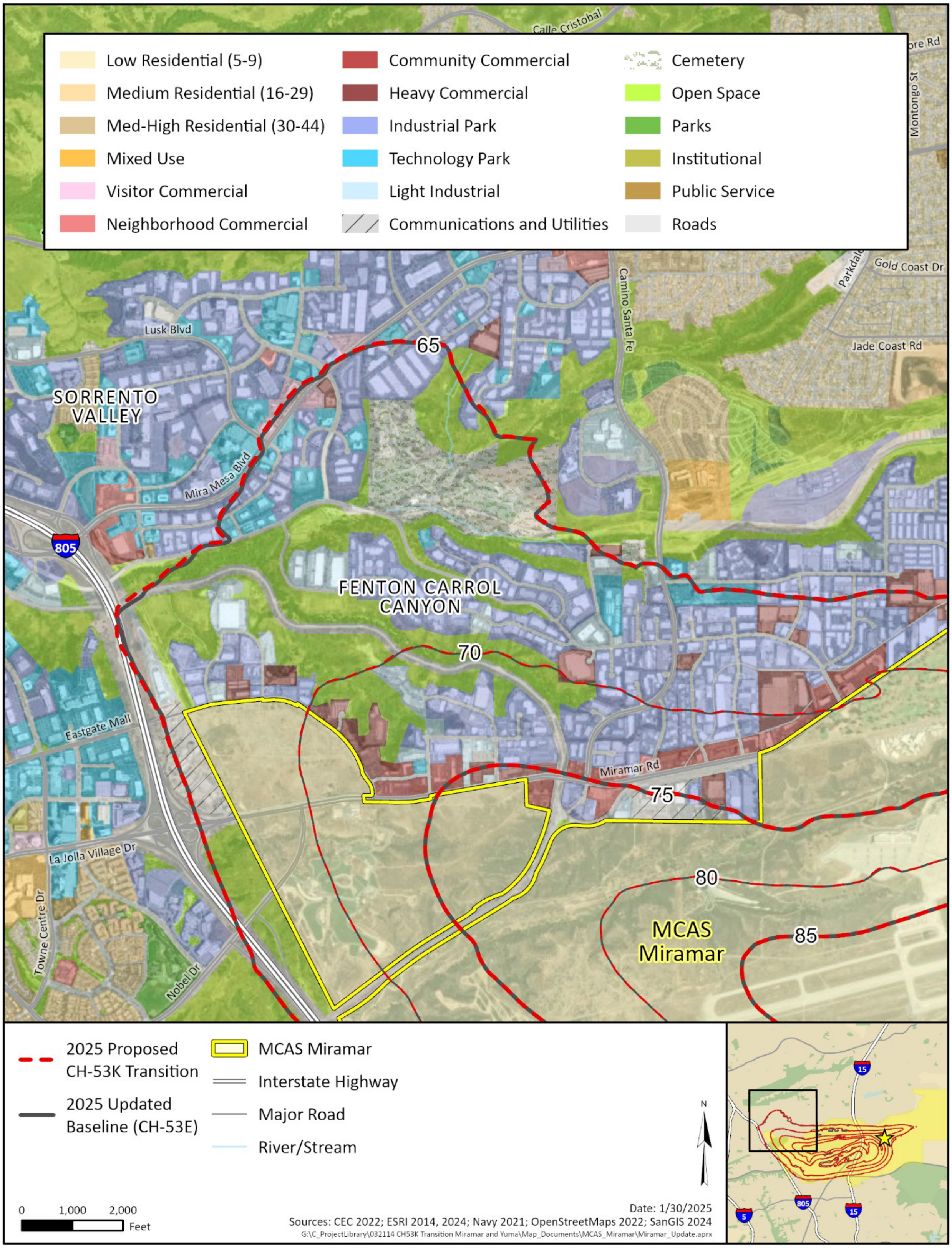

Figure 2-5 Future Land use and Comparison of Proposed to Update Baseline/No Action

3.0 AIR QUALITY ANALYSIS

3.1 Background

Air quality is defined by ambient air concentrations of specific pollutants that are of concern with respect to the health and welfare of the public by the USEPA. Ambient air quality refers to the atmospheric concentration of a specific compound that occurs at a particular geographic location. The ambient air quality levels measured at a particular location are determined by the interactions of emissions, meteorology, and chemistry. Meteorological factors that affect air quality include wind and precipitation patterns that can affect the distribution, dilution, and removal of pollutant emissions from the atmosphere. Furthermore, chemical reactions in the atmosphere can transform pollutant emissions into other chemical substances.

The Federal Clean Air Act (CAA) of 1970 and its subsequent amendments establish air quality regulations and the National Ambient Air Quality Standards (NAAQS) and delegate the enforcement of these standards to the states. In California, the California Air Resources Board (CARB) is responsible for enforcing air pollution regulations. The CAA establishes air quality planning processes and requires areas in nonattainment of a NAAQS to develop a State Implementation Plan (SIP) that details how the state will attain the standard within mandated time frames. The requirements and compliance dates for attainment are based on the severity of the nonattainment classification of the area.

Pollutant emissions typically refer to the amount of pollutants or pollutant precursors introduced into the atmosphere by a source or group of sources. Pollutants are defined as two general types: (1) criteria pollutants and (2) toxic compounds. Criteria pollutants have national and/or state ambient air quality standards. Pollutant emissions contribute to the ambient air concentrations of criteria pollutants, either by directly affecting the pollutant concentrations measured in the ambient air or by interacting in the atmosphere to form criteria pollutants. Primary pollutants, such as carbon monoxide (CO), sulfur dioxide (SO2), lead (Pb), and some particulates, are emitted directly into the atmosphere from emission sources.

Secondary pollutants, such as ozone (O3), nitrogen dioxide (NO2), and some particulates, are formed through atmospheric chemical reactions that are influenced by meteorology, ultraviolet light, and other atmospheric processes. Suspended particulate matter less than or equal to 10 microns in size (PM_{10}) and less than or equal to 2.5 microns in size ($PM_{2.5}$) are generated as primary pollutants by various mechanical processes (for example, abrasion, erosion, mixing, or atomization) or combustion processes. However, PM_{10} and $PM_{2.5}$ can also be formed as secondary pollutants through chemical reactions or by gaseous pollutants that condense into fine aerosols.

Mixing height is another factor affecting the concentration of various pollutants in ambient air. Emissions released above the mixing height are typically restricted from affecting ground level ambient air quality in the region, while emissions of pollutants released below the mixing height may affect ground level concentrations. The portion of the atmosphere that is completely mixed begins at ground level and may extend up to heights of a few thousand feet. Mixing height varies from region to region based on daily temperature changes, amount of sunlight, and other climatic factors. The USEPA has defined a default mixing height as 3,000 feet AGL. A more refined mixing height may be used based on regional parameters.

The region of influence includes MCAS Miramar and areas nearby where MCAS Miramar aircraft transit the local airspace. The region of influence falls entirely within the San Diego Air Basin (SDAB) that lies in the southwest corner of California and comprises the entire San Diego region. The air basin covers 4,260 square miles, includes about eight percent of the state's population, and produces about seven percent of the state's criteria pollutant emissions. The City of San Diego covers approximately 330 square miles, or eight percent, of the SDAB. Currently the SDAB is in attainment with Federal Clean Air Act National Ambient Air Quality Standards (NAAQS) for all criteria pollutants except ozone (O3). The U.S. Environmental Protection Agency designated the SDAB a severe nonattainment area for O3 (EPA 2024). The General Conformity Rule (40 CFR 93 Subpart B) states that a federal agency shall not engage in, support, or approve an activity that does not conform to an applicable SIP. Proposed actions must not: (1) cause or contribute to any new violation of a NAAQS; (2) increase the frequency or severity of any existing violation; or (3) delay the timely attainment of any standard, interim emission reduction, or other milestone. The General Conformity Rule applies in federal nonattainment and maintenance areas.

3.2 Baseline and No Action

3.2.1 Local Climate

The weather of the San Diego region, influenced by the Pacific Ocean and its semi-permanent high-pressure systems, results in dry, warm summers and mild, occasionally wet winters. The average temperature ranges from the mid-40s to the high 90s while most of the county's precipitation falls from November to April, with infrequent (approximately ten percent) precipitation during the summer. The historic average seasonal precipitation along the coast is approximately ten inches and the amount increases with elevation as moist air is lifted over the mountains (University of California 1970). The interaction of ocean, land, and the Pacific High Pressure Zone maintains clear skies for much of the year and drives the prevailing winds. Local terrain is often the dominant factor inland, and winds in inland mountainous areas tend to blow through the valleys during the day and down the hills and valleys at night.

3.2.2 Modeling Data

Unlike the noise analysis that defines the Baseline/No Action in terms of the most recent study performed in 2021 (Cardno 2021), the air quality analysis instead must rely upon the CH-53E operational conditions detailed in Alternative 1 of the 2010 Environmental Impact Study that was adopted in the 2010 ROD, because that forms the basis for the general conformity applicability analysis. That prior analysis relied upon comparing flight profiles of engine power and mode to corresponding emissions factors available at the time of the 2010 ROD. This study utilizes the 2010 ROD operational conditions but uses the latest emission estimates for the CH-53E provided by the Aircraft Environmental Support Office (AESO) (AESO 2009a,b;). Emissions data for static engine run-ups in the AESO documents describe the emissions rates for a year of maintenance operations per aircraft active during the year.

3.2.3 Emission Results

The existing conditions for air quality consider MCAS Miramar aircraft operations within existing local airspace occurring below 3,000 feet AGL. Table 3-1 provides the resulting emission details broken out between operation type while Table 3-2 summarizes the results for CH-53E aircraft operations currently at MCAS Miramar.

Table 3-1 Details of Baseline CH-53E MCAS Miramar Annual Emissions – 2010 ROD Operations

CH-53E Flight Operation	Total Number of Operations	Fuel used lb	Emissions (lb) from single operation						Total Tons per Year					
			HC	CO	NOx	SO2	$PM_{10/2.5}$	CO2	VOC	CO	NOx	SO2	$PM_{10/2.5}$	CO2e
Departure:	3,015	805	4.35	9.30	4.67	1.79	1.71	2,572	7.54	14.02	7.04	2.69	2.58	3,877
Arrival:	3,015	941	6.89	13.55	4.19	2.09	2.05	3,004	11.95	20.43	6.32	3.15	3.09	4,529
								LTO Total:	**19.48**	**34.45**	**13.36**	**5.84**	**5.67**	**8,405**
Patterns:														
Touch and Go	3,504	274	0.13	0.77	2.11	0.11	0.61	882	0.26	1.35	3.70	0.19	1.07	1,545
GCA Box	157	565	0.19	1.44	4.44	0.23	1.25	1,821	0.02	0.11	0.35	0.02	0.10	142
								Patterns Total:	**0.28**	**1.46**	**4.04**	**0.21**	**1.17**	**1,687**
								Total Annual Flight Emissions for CH-53E:	**19.76**	**35.91**	**17.41**	**6.05**	**6.84**	**10,093**

Legend: CO_2 = carbon dioxide; CO = carbon monoxide; HC = hydrocarbons; SO_2 = sulfur dioxide; $PM_{2.5}$ = particles with diameter less than 2.5 micrometers; PM_{10} = particles with diameter less than 10 micrometers; NO_x = nitrogen oxides; VOCs = volatile organic compounds; NO_x and VOCs are ozone precursors.

Source: AESO. 2009. Aircraft Emission Estimates: H-53 Landing and Takeoff Cycle and In-Frame, Maintenance Testing Using JP-5. November.; AESO. 2009. Aircraft Emission Estimates: H-53 Mission Operations Using JP-5. November.

CH-53E Static Operations Engine Testing	# aircraft	Fuel used lb/ac	lb per year/aircraft						Annual Tons per Year					
			HC	CO	NOx	SO2	$PM_{10/2.5}$	CO2	VOC	CO	NOx	SO2	$PM_{10/2.5}$	CO2e
Maintenance Testing	64	49,973	195.9	402.6	258.4	109.9	78.0	159,485	**7.21**	**12.88**	**8.27**	**3.52**	**2.50**	**5,104**

Legend: CO_2 = carbon dioxide; CO = carbon monoxide; HC = hydrocarbons; SO_2 = sulfur dioxide; $PM_{2.5}$ = particles with diameter less than 2.5 micrometers; PM_{10} = particles with diameter less than 10 micrometers; NO_x = nitrogen oxides; VOCs = volatile organic compounds; NO_x and VOCs are ozone precursors.

Source: AESO. 2009. Aircraft Emission Estimates: H-53 Landing and Takeoff Cycle and In-Frame, Maintenance Testing Using JP-5. November.

Table 3-2 Summary of Baseline CH-53E MCAS Miramar Annual Emissions – 2010 ROD

	Annual Tons per Year					
Aircraft Operation	**VOC**	**CO**	**NOx**	**SO2**	**$PM_{10/2.5}$**	**CO2e**
2010 Operations						
CH-53E Flight	19.76	35.91	17.41	6.05	6.84	10,093
CH-53E Engine Testing	7.21	12.88	8.27	3.52	2.50	5,104
Total 2010 Operations	**26.97**	**48.79**	**25.68**	**9.57**	**9.33**	**15,196**

Legend: CO_2 = carbon dioxide; CO = carbon monoxide; SO_2 = sulfur dioxide; $PM_{2.5}$ = particles with diameter less than 2.5 micrometers; PM_{10} = particles with diameter less than 10 micrometers; NO_x = nitrogen oxides; VOCs = volatile organic compounds; NO_x and VOCs are ozone precursors.

3.3 Proposed Action

3.3.1 Modeling Data

Air emissions associated with CH-53 aircraft based at MCAS Miramar were examined to identify the net emissions resulting from implementing of the proposed transition from the CH-53E model to the CH-53K. The carbon dioxide emission calculations were updated using the Aircraft Environmental Support Office (AESO) 2009 memorandum for the CH-53E and CH-53K helicopter (AESO 2009a,b and AESO 2015a,b) while all other emission factors remained the same in that update. The no action alternative is assumed to be the same as the baseline because no changes are anticipated to occur to CH-53E operations at MCAS Miramar if the Proposed Action does not occur.

3.3.2 Emissions Results

Table 3-3 details the resulting emissions estimates for the proposed CH-53K transition compared to the CH-53E emissions as listed in the 2010 ROD broken out by operation type with CO_2 emission values updated using the 2009 AESO memo.

Table 3-4 summarizes the emission estimates by pollutant showing that CO, VOCs, PM_{10}, and $PM_{2.5}$ emissions would decrease, Nitrogen oxide (NO_x) emissions would increase by 62.19 TPY, and sulfur dioxide (SO_2) emissions would increase by 7.82 TPY. CO_2 emissions would increase by 9,586 TPY relative to the 2010 ROD. Table 3-4 also compares each pollutant to the de minimis threshold of 25 TPY, which would be exceeded by NO_x so a general conformity analysis would be required.

Table 3-3 Comparison of Proposed CH-53K Transition to Baseline 2010 ROD CH-53E MCAS Miramar Emissions

CH-53K Flight Operation	Total Number of Operations	Fuel used lb	Emissions (lb) from single operation HC	CO	NOx	SO2	$PM_{10/2.5}$	CO2	Total Tons per Year VOC	CO	NOx	SO2	$PM_{10/2.5}$	CO2e
LTO:	3,015	2,448	0.89	8.39	27.26	5.44	0.22	7,718	1.54	12.648	41.094	8.194	0.332	11,635
Patterns:														
Touch and Go	3,504	362	0.03	0.59	5.56	0.80	0.04	1,141	0.06	1.03	9.74	1.40	0.07	2,000
GCA Box	157	744	0.05	1.19	11.64	1.64	0.08	2,346	0.00	0.09	0.91	0.13	0.01	184
								Patterns Total:	**0.06**	**1.13**	**10.65**	**1.52**	**0.08**	**2,183**
								Total Annual Flight Emissions for CH-53K:	**1.61**	**13.77**	**51.75**	**9.72**	**0.41**	**13,818**

Legend: CO_2 = carbon dioxide; CO = carbon monoxide; SO_2 = sulfur dioxide; $PM_{2.5}$ = particles with diameter less than 2.5 micrometers; PM_{10} = particles with diameter less than 10 micrometers; NO_x = nitrogen oxides; VOCs = volatile organic compounds; NO_x and VOCs are ozone precursors.

Source: AESO. 2015. Aircraft Emission Estimates: CH-53K Landing and Takeoff Cycle, One Hour Cruise, and In-Frame Maintenance Testing Using JP-5. September.; AESO. 2015. Aircraft Emission Estimates: CH-53K Mission Operations Using JP-5. September.

CH-53K Static Operations Engine Testing	# aircraft	Fuel used lb/ac	lb/1000 lb of fuel HC	CO	NOx	SO2	$PM_{10/2.5}$	CO2	Annual Tons per Year VOC	CO	NOx	SO2	$PM_{10/2.5}$	CO2e
Maintenance Testing	64	64,868	12.23	130.1	612.1	142.71	7.54	204,747	**0.45**	**4.16**	**19.59**	**4.57**	**0.24**	**6,552**

Legend: CO_2 = carbon dioxide; CO = carbon monoxide; SO_2 = sulfur dioxide; $PM_{2.5}$ = particles with diameter less than 2.5 micrometers; PM_{10} = particles with diameter less than 10 micrometers; NO_x = nitrogen oxides; VOCs = volatile organic compounds; NO_x and VOCs are ozone precursors.

Source: AESO. 2015. Aircraft Emission Estimates: CH-53K Landing and Takeoff Cycle, One Hour Cruise, and In-Frame Maintenance Testing Using JP-5. September.

Table 3-4 Summary of Emissions for Proposed CH-53K Transition at MCAS Miramar

	Annual Tons per Year					
Aircraft Operation	**VOC**	**CO**	**NOx**	**SO2**	**$PM_{10/2.5}$**	**CO2e**
2010 Operations						
CH-53E Flight	19.76	35.91	17.41	6.05	6.84	10,093
CH-53E Engine Testing	7.21	12.88	8.27	3.52	2.50	5,104
Total 2010 Operations	**26.97**	**48.79**	**25.68**	**9.57**	**9.33**	**15,196**
Proposed Action Operations						
CH-53K Flight	1.61	13.77	51.75	9.72	0.41	13,818
CH-53K Engine Testing	0.45	4.16	19.59	4.57	0.24	6,552
Total Proposed Action	**2.06**	**17.94**	**71.33**	**14.28**	**0.65**	**20,370**
Net Change	**-24.91**	**-30.86**	**45.66**	**4.71**	**-8.68**	**5,173**
de minimis	25	NA	25	NA	NA	NA
Exceed? Yes/No	**No**	**-**	**Yes**	**-**	**-**	**-**

The social cost of carbon (SCC) is the monetary value of the net harm to society from emitting a metric ton of CO_2 into the atmosphere in a given year. In principle, the SCC is a comprehensive metric that includes the value of all future climate change impacts (both negative and positive), including changes in net agricultural productivity, human health effects, property damage from increased flood risk, changes in the frequency and severity of natural disasters, disruption of energy systems, risk of conflict, environmental migration, and the value of ecosystem services (EPA 2023).

Table 3-5 identifies the SCC estimates for the increase of 5,173 TPY (4,693 metric tons) of CO_2, which uses the latest figures adopted by the US EPA at a 2.5 percent rate (EPA 2023).A 20-year horizon is used for aircraft operational emissions, and costs are totaled for years 2025 through 2044. Table 4-2 shows that annual SCC estimates would range from $610,119 in 2025 to $872,940 in 2044. Over the 20-year horizon, costs would total approximately $14,755,505.

Table 3-5 20-Year Social Cost of CO_2 for CH-53K Transition

Year	Tons Per Year		
	CO_2 Metric Tons Per Year	Annual SC CO_2 per Metric Ton 2020 $ – 2.5% average discount	SC-GHG Emissions 2020$ – 2.5% average discount, average damages for individual year
2025	**4,693**	$130	**$610,119**
2026	**4,693**	$133	**$624,199**
2027	**4,693**	$136	**$638,279**
2028	**4,693**	$139	**$652,359**
2029	**4,693**	$141	**$661,745**
2030	**4,693**	$144	**$675,825**
2031	**4,693**	$147	**$689,904**
2032	**4,693**	$150	**$703,984**
2033	**4,693**	$153	**$718,064**
2034	**4,693**	$155	**$727,450**
2035	**4,693**	$158	**$741,530**
2036	**4,693**	$161	**$755,609**
2037	**4,693**	$164	**$769,689**
2038	**4,693**	$167	**$783,769**
2039	**4,693**	$170	**$797,849**
2040	**4,693**	$173	**$811,928**
2041	**4,693**	$176	**$826,008**
2042	**4,693**	$179	**$840,088**
2043	**4,693**	$182	**$854,167**
2044	**4,693**	$186	**$872,940**
Total			**$14,755,505**

Notes: CO_2 = carbon dioxide; SC CO_2 = social cost of carbon dioxide
Source: [1] EPA 2023

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Appendix A

Aircraft Modeling Details

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Maps of Modeled Flight Tracks

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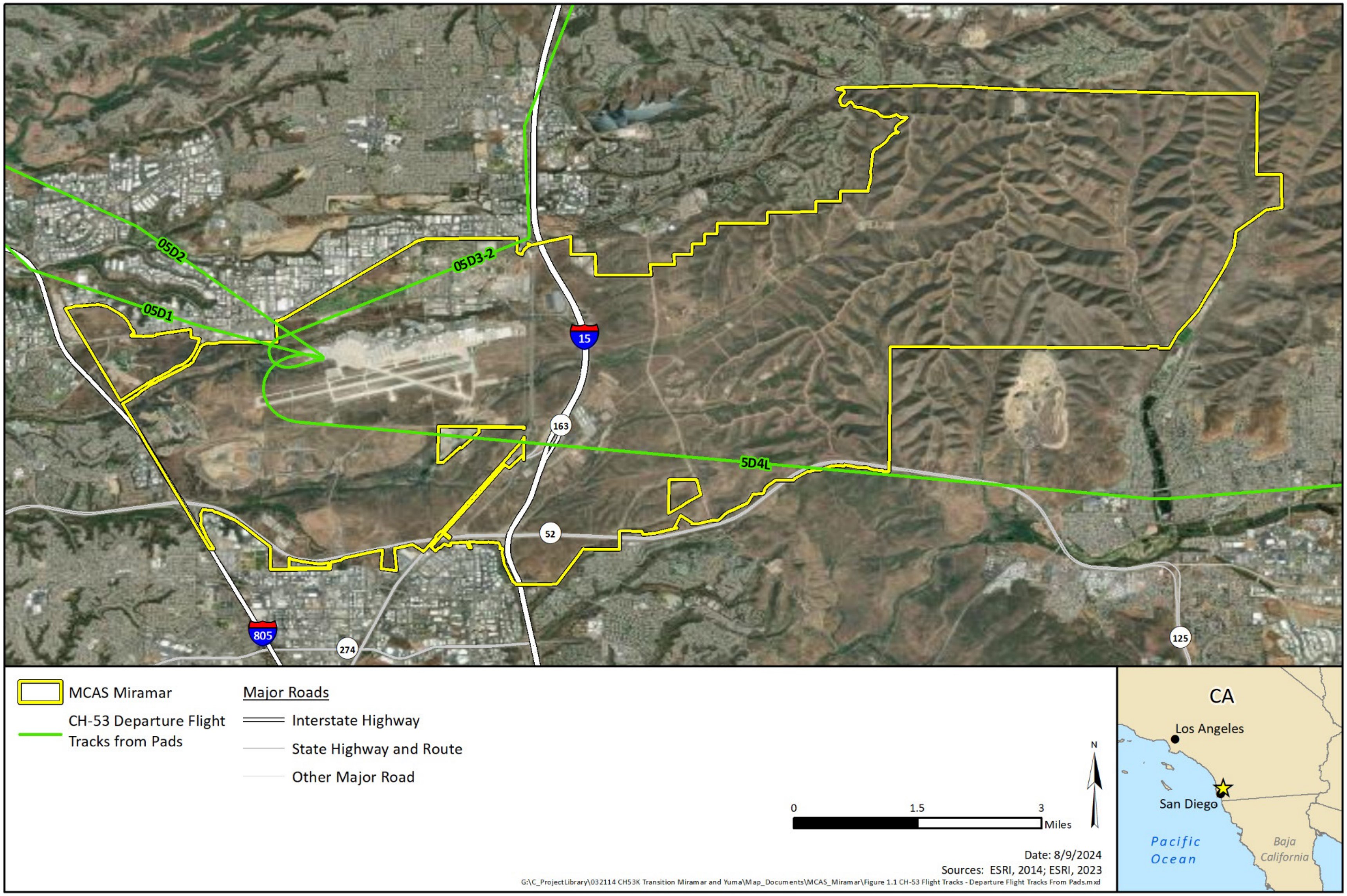
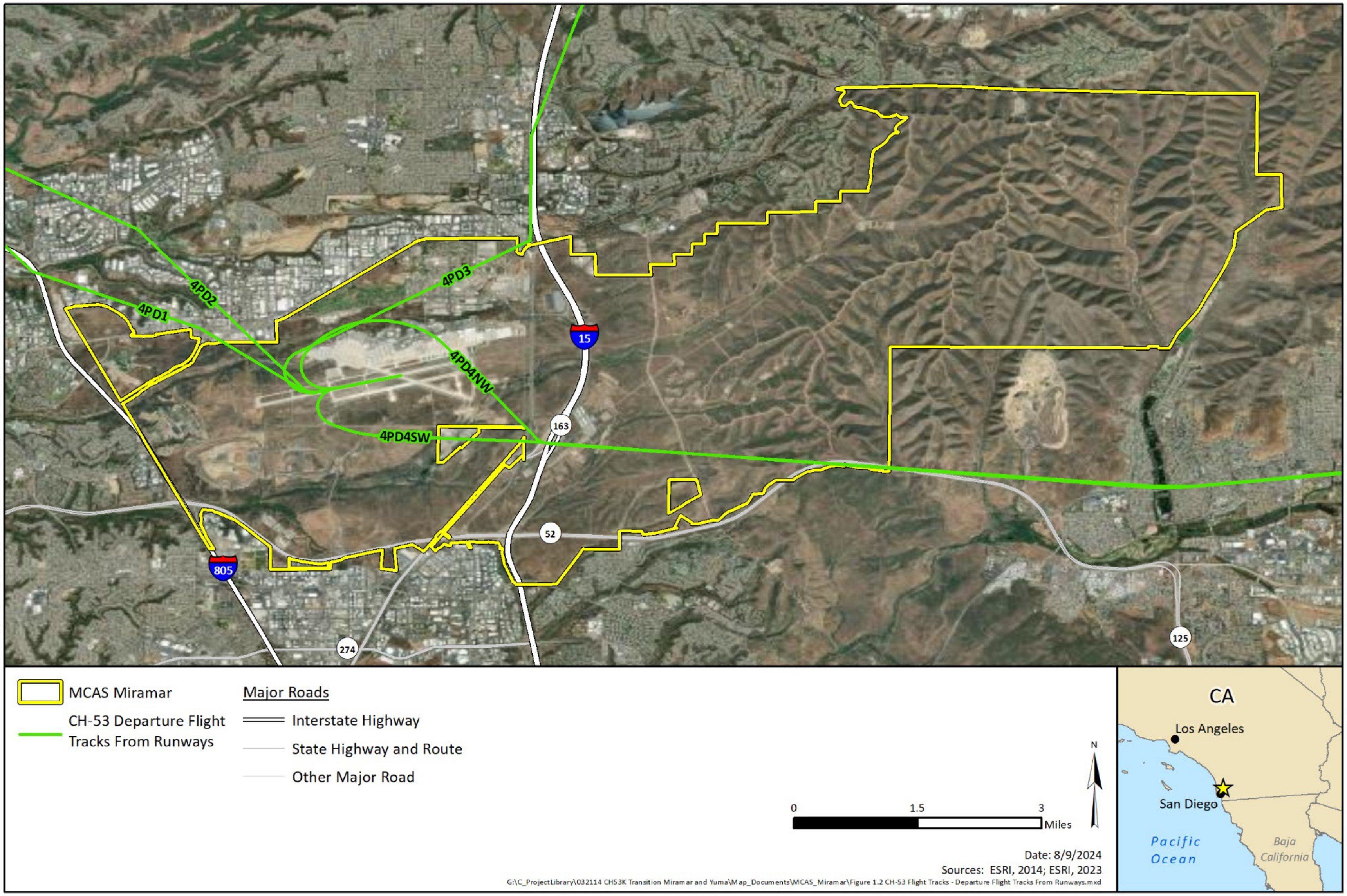
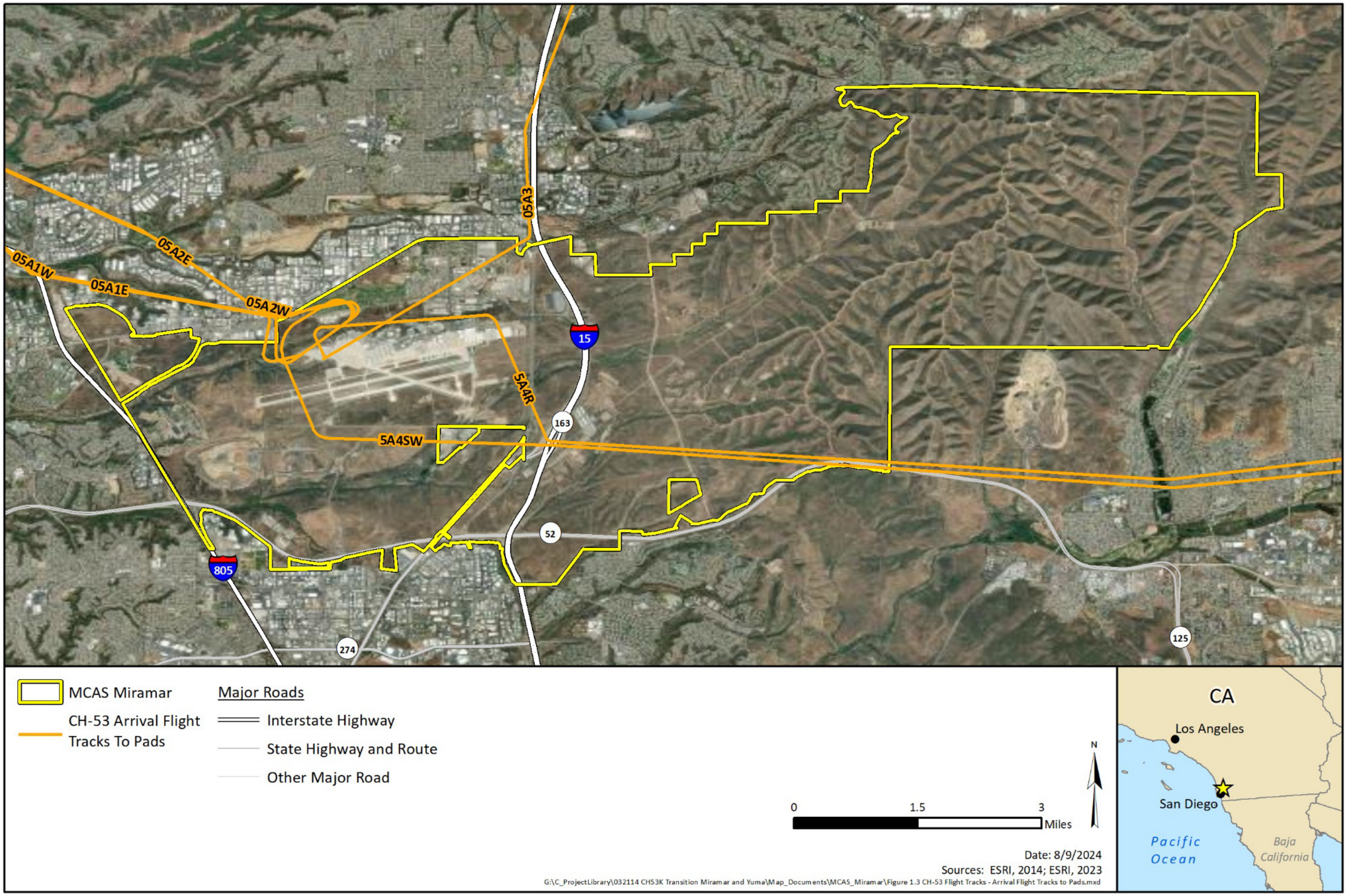
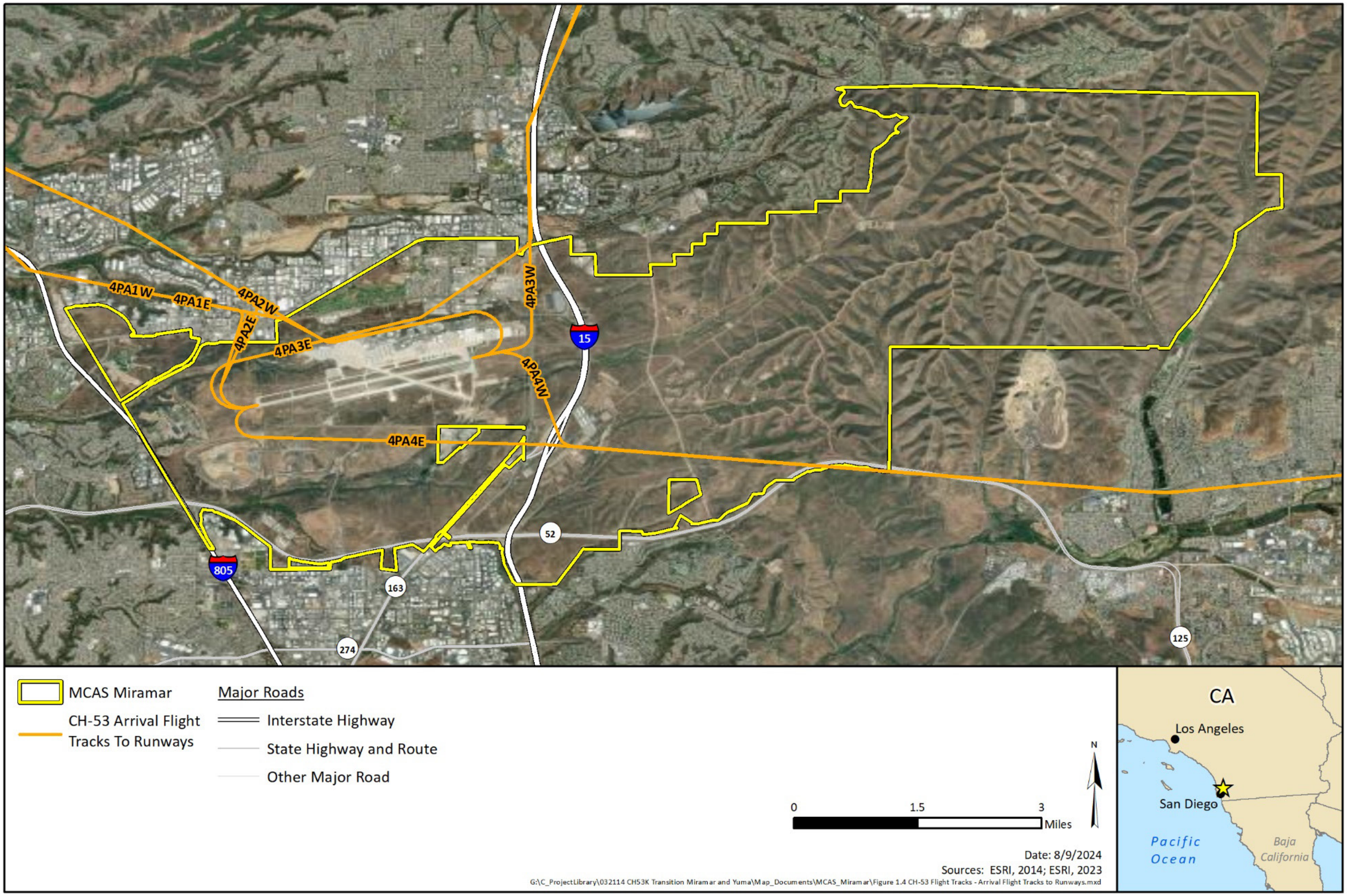
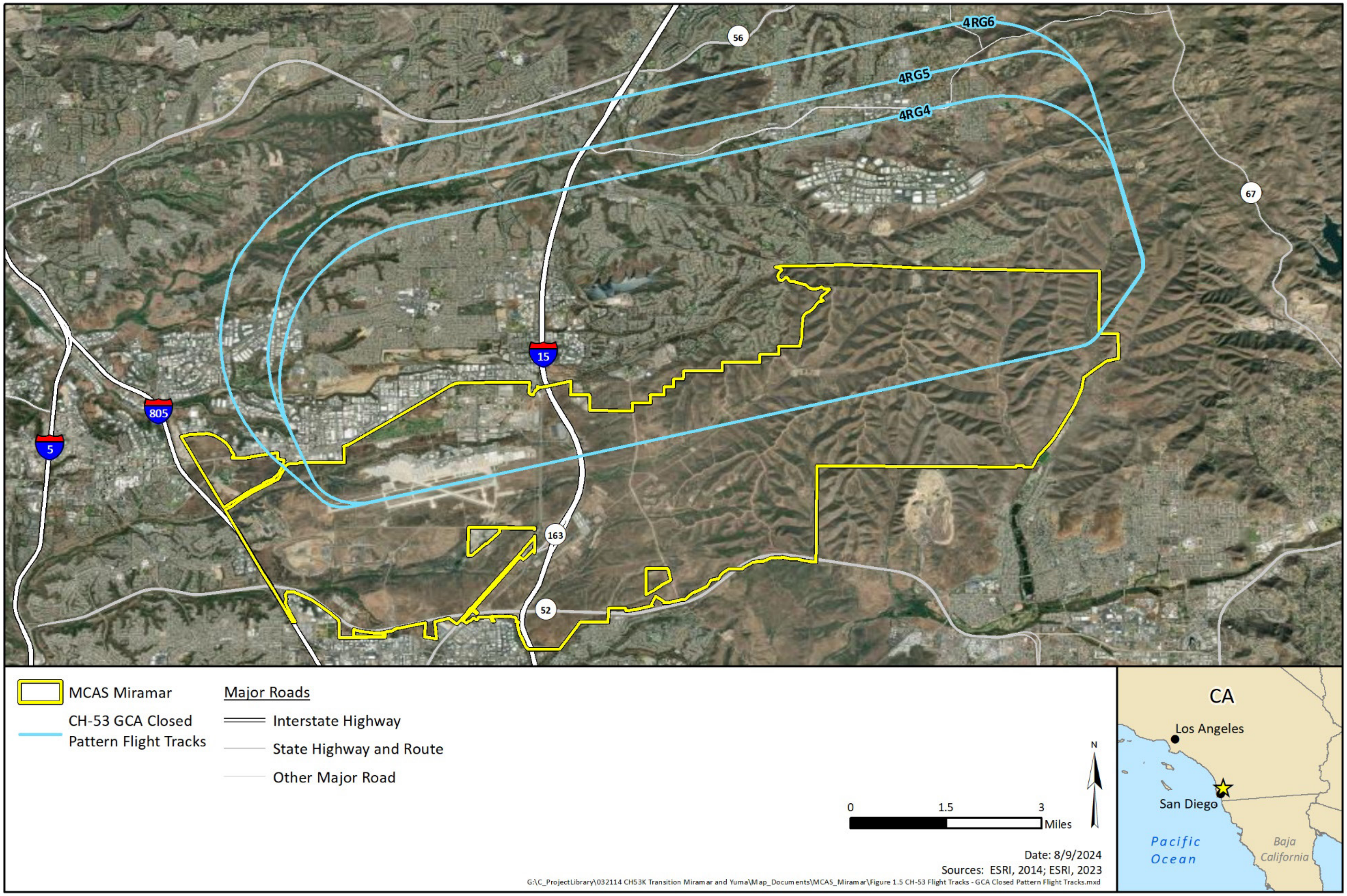
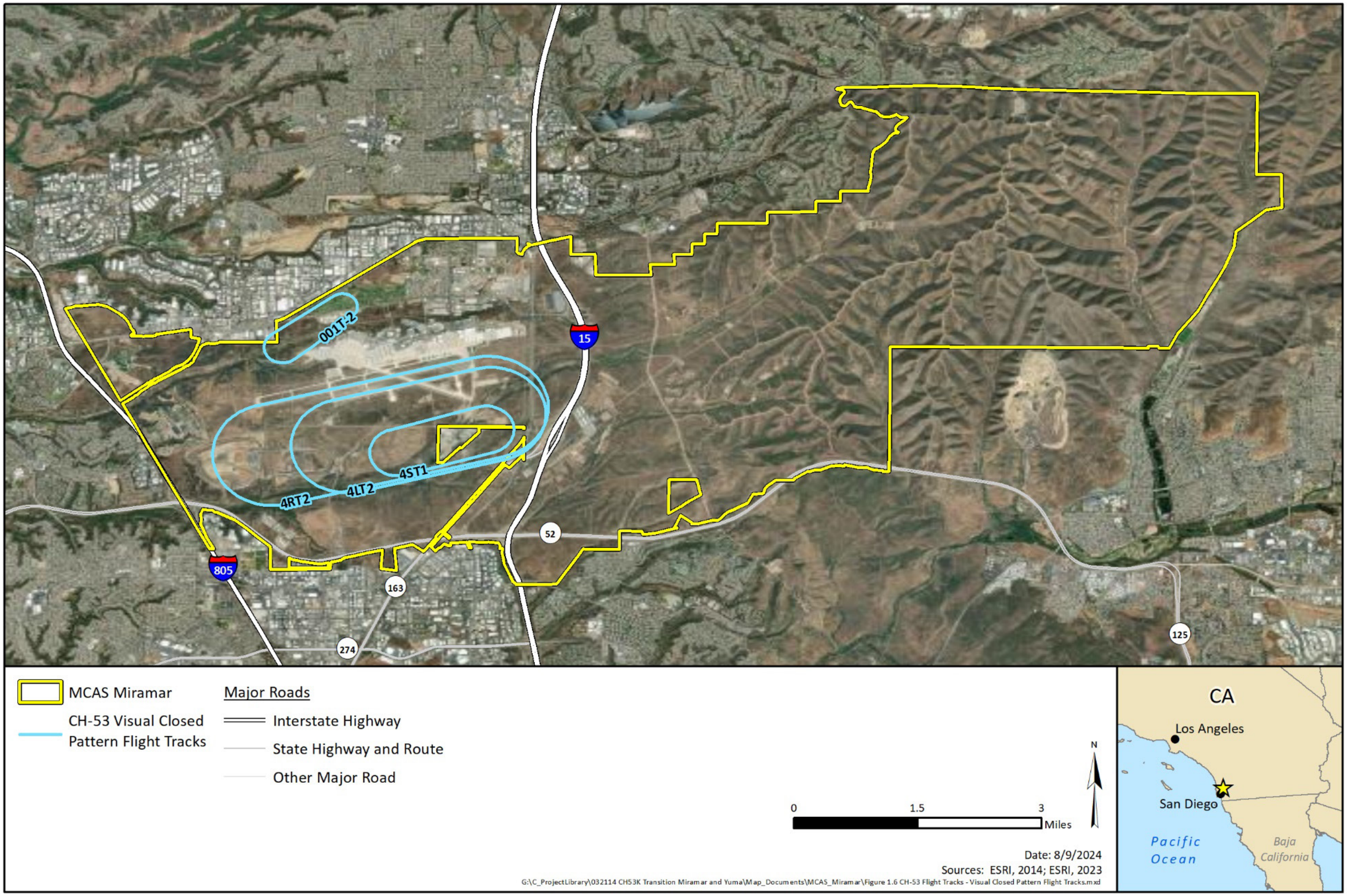

05D2
05D3-2
05D1
5D4L
15
163
52
805
274
125
MCAS Miramar
CH-53 Departure Flight Tracks from Pads
Major Roads
Interstate Highway
State Highway and Route
Other Major Road
N
0
1.5
3
Miles
Date: 8/9/2024
Sources: ESRI, 2014; ESRI, 2023
G:\C_ProjectLibrary\032114 CH53K Transition Miramar and Yuma\Map_Documents\MCAS_Miramar\Figure 1.1 CH-53 Flight Tracks - Departure Flight Tracks From Pads.mxd
CA
Los Angeles
San Diego
Pacific Ocean
Baja California


4PD1
4PD2
4PD3
4PD4NW
4PD4SW
15
163
52
805
274
125
MCAS Miramar
CH-53 Departure Flight Tracks From Runways
Major Roads
Interstate Highway
State Highway and Route
Other Major Road
0
1.5
3
Miles
N
Date: 8/9/2024
Sources: ESRI, 2014; ESRI, 2023
G:\C_ProjectLibrary\032114 CH53K Transition Miramar and Yuma\Map_Documents\MCAS_Miramar\Figure 1.2 CH-53 Flight Tracks - Departure Flight Tracks From Runways.mxd
CA
Los Angeles
San Diego
Pacific Ocean
Baja California


05A3
05A2E
05A1W
05A1E
05A2W
5A4R
5A4SW
15
163
52
805
274
125
MCAS Miramar
CH-53 Arrival Flight Tracks To Pads
Major Roads
Interstate Highway
State Highway and Route
Other Major Road
0
1.5
3
Miles
N
Date: 8/9/2024
Sources: ESRI, 2014; ESRI, 2023
CA
Los Angeles
San Diego
Pacific Ocean
Baja California


4PA1W
4PA1E
4PA2W
4PA2E
4PA3E
4PA3W
4PA4W
4PA4E
15
805
52
163
274
125
MCAS Miramar
CH-53 Arrival Flight Tracks To Runways
Major Roads
Interstate Highway
State Highway and Route
Other Major Road
N
0
1.5
3
Miles
Date: 8/9/2024
Sources: ESRI, 2014; ESRI, 2023
G:\C_ProjectLibrary\032114 CH53K Transition Miramar and Yuma\Map_Documents\MCAS_Miramar\Figure 1.4 CH-53 Flight Tracks - Arrival Flight Tracks to Runways.mxd
CA
Los Angeles
San Diego
Pacific Ocean
Baja California


4RG6
4RG5
4RG4
56
67
15
805
5
163
52
MCAS Miramar
CH-53 GCA Closed Pattern Flight Tracks
Major Roads
Interstate Highway
State Highway and Route
Other Major Road
0
1.5
3
Miles
N
Date: 8/9/2024
Sources: ESRI, 2014; ESRI, 2023
G:\C_ProjectLibrary\032114 CH53K Transition Miramar and Yuma\Map_Documents\MCAS_Miramar\Figure 1.5 CH-53 Flight Tracks - GCA Closed Pattern Flight Tracks.mxd
CA
Los Angeles
San Diego
Pacific Ocean
Baja California



001T-2
4ST1
4LT2
4RT2
15
805
52
163
274
125
MCAS Miramar
CH-53 Visual Closed Pattern Flight Tracks
Major Roads
Interstate Highway
State Highway and Route
Other Major Road
0
1.5
3
Miles
N
CA
Los Angeles
San Diego
Pacific Ocean
Baja California
Date: 8/9/2024
Sources: ESRI, 2014; ESRI, 2023
G:\C_ProjectLibrary\032114 CH53K Transition Miramar and Yuma\Map_Documents\MCAS_Miramar\Figure 1.6 CH-53 Flight Tracks - Visual Closed Pattern Flight Tracks.mxd

Maps of Representative CH-53 Flight Profiles

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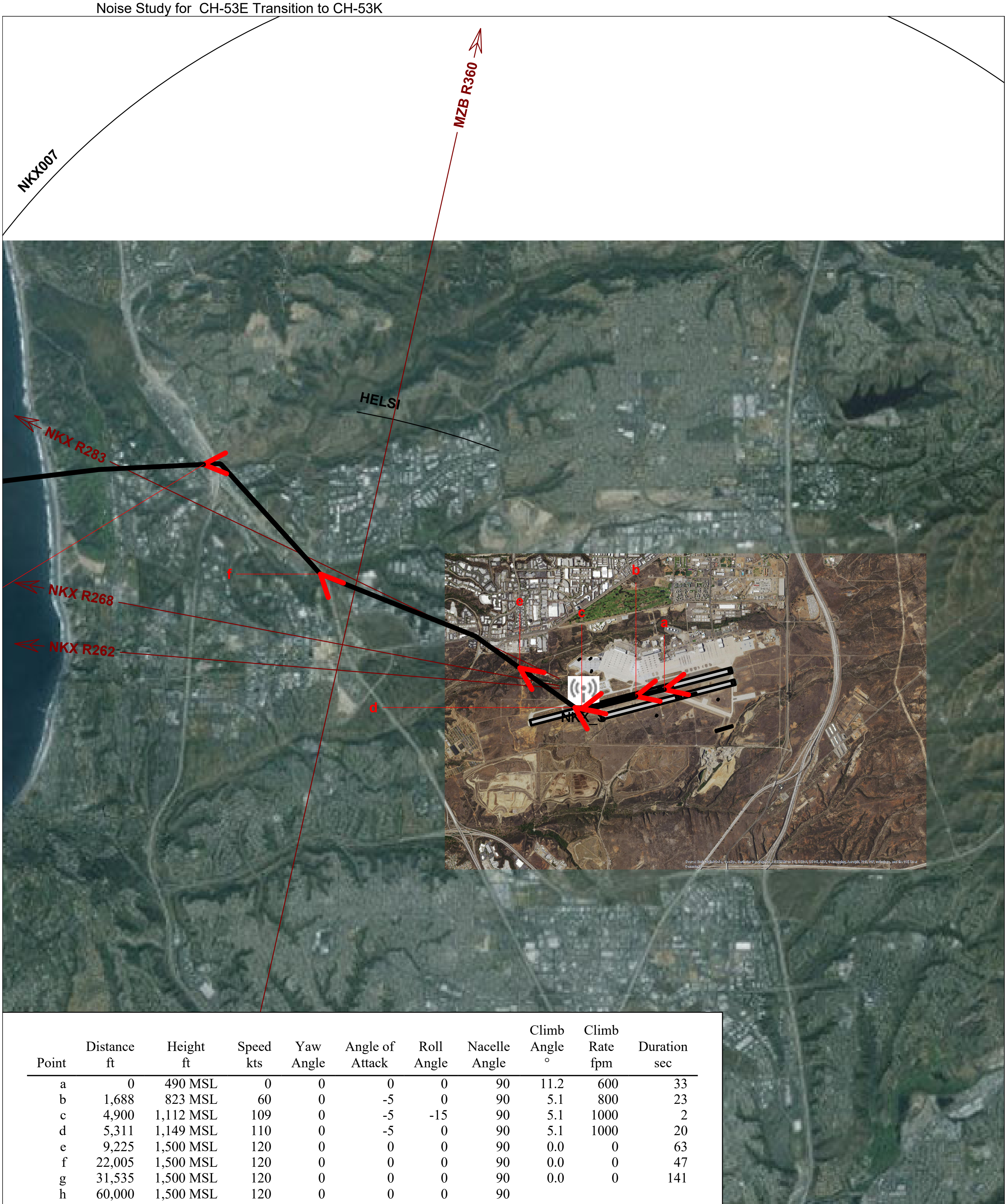
CH-53E Departure Flight Profiles



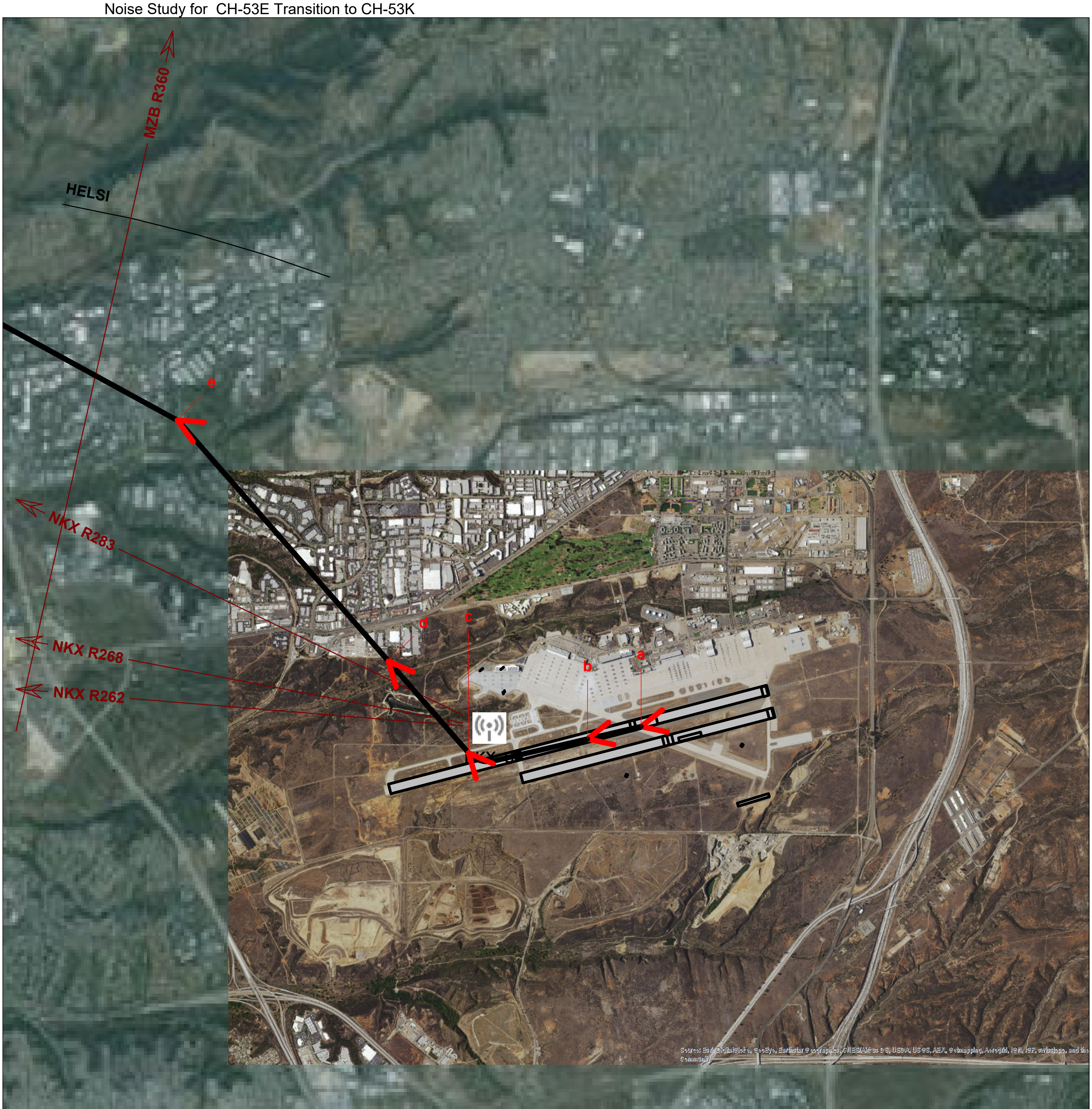
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	0	490 MSL	0	0	0	0	90	11.2	600	33
b	1,688	823 MSL	60	0	-5	0	90	5.1	800	23
c	4,900	1,112 MSL	109	0	-5	-15	90	5.1	1000	2
d	5,311	1,149 MSL	110	0	-5	0	90	5.1	1000	20
e	9,225	1,500 MSL	120	0	0	0	90	0.0	0	63
f	22,005	1,500 MSL	120	0	0	0	90	0.0	0	47
g	31,535	1,500 MSL	120	0	0	0	90	0.0	0	141
h	60,000	1,500 MSL	120	0	0	0	90			

CH-53E Departure Flight Profile 301_2 - Runway to Fairway

Flight Track 4PD1 - Fairway Departure from Runway 24P

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

Scale in Feet 1:86,700 (1 inch = 7,230 feet)



Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	0	490 MSL	0	0	0	0	90	11.2	600	33
b	1,688	823 MSL	60	0	-5	0	90	5.1	800	27
c	5,499	1,165 MSL	110	0	-5	0	90	5.1	1000	19
d	9,225	1,500 MSL	120	0	0	0	90	0.0	0	48
e	19,038	1,500 MSL	120	0	0	0	90	0.0	0	125
f	44,410	1,500 MSL	120	0	0	0	90	0.0	0	77
g	60,000	1,500 MSL	120	0	0	0	90			

CH-53E Departure Flight Profile 302_2 - Runway to Beach

Flight Track 4PD2 - Beach Departure from Runway 24P

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)

N

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	0	490 MSL	0	0	0	0	90	11.2	600	33
b	1,688	823 MSL	60	0	-5	0	90	5.1	800	21
c	4,693	1,093 MSL	108	0	-5	-15	90	5.1	1000	14
d	7,345	1,331 MSL	115	0	-5	0	90	5.1	1100	9
e	9,225	1,500 MSL	120	0	0	0	90	0.0	0	63
f	21,977	1,500 MSL	120	0	0	15	90	0.0	0	0
g	22,029	1,500 MSL	120	0	0	0	90	0.0	0	33
h	28,654	1,500 MSL	120	0	0	-15	90	0.0	0	0
i	28,672	1,500 MSL	120	0	-5	0	90	5.6	1200	101
j	49,162	3,500 MSL	120	0	0	15	90	0.0	0	14
k	52,023	3,500 MSL	120	0	0	0	90			

CH-53E Departure Flight Profile 303_2 - Runway to I-15

Flight Track 4PD3 - I-15 Departure from Runway 24P

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

Scale in Feet 1:47,000 (1 inch = 3,920 feet)

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	0	490 MSL	0	0	0	0	90	11.3	0	20
b	50	500 MSL	3	0	-5	-15	90	11.1	200	15
c	376	564 MSL	22	0	-5	0	90	11.2	800	19
d	1,688	823 MSL	60	0	-5	0	90	5.1	800	20
e	4,770	1,100 MSL	120	0	0	0	90	0.0	0	22
f	9,140	1,100 MSL	120	0	0	15	90	8.6	1800	78
g	24,973	3,500 MSL	120	0	0	0	90	0.0	0	99
h	44,987	3,500 MSL	120	0	0	0	90			

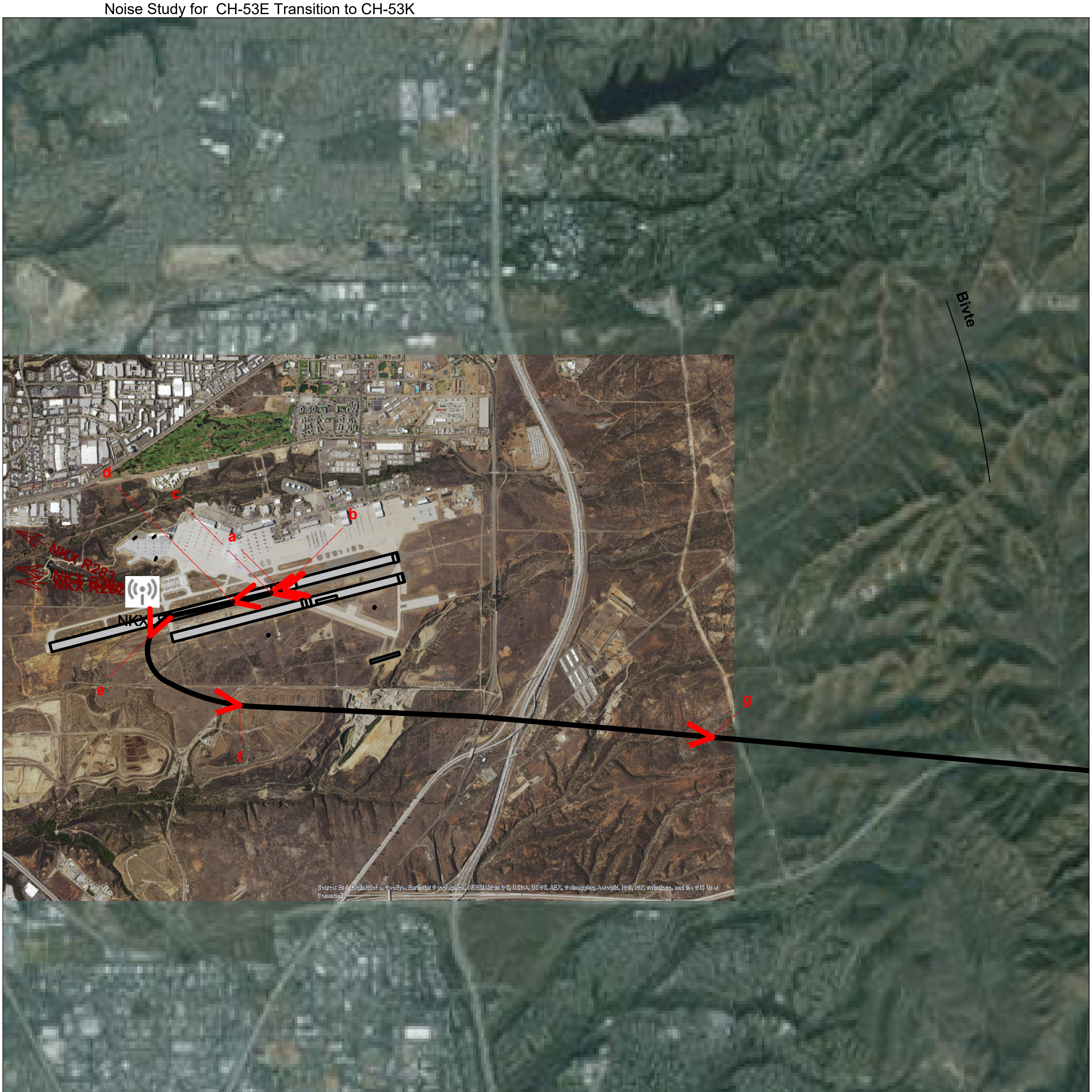
CH-53E Departure Flight Profile 304NW - Runway to Yuma

Flight Track 4PD4NW - Yuma Departure from Runway 24P

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

Scale in Feet 1:54,400 (1 inch = 4,540 feet)

N



Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	0	490 MSL	0	0	0	0	90	11.3	0	20
b	50	500 MSL	3	0	-5	-15	90	11.1	200	15
c	376	564 MSL	22	0	-5	0	90	11.2	800	19
d	1,688	823 MSL	60	0	-5	0	90	5.1	800	20
e	4,770	1,100 MSL	120	0	0	0	90	0.0	0	22
f	9,140	1,100 MSL	120	0	0	15	90	8.6	1800	78
g	24,973	3,500 MSL	120	0	0	0	90	0.0	0	99
h	44,987	3,500 MSL	120	0	0	0	90			

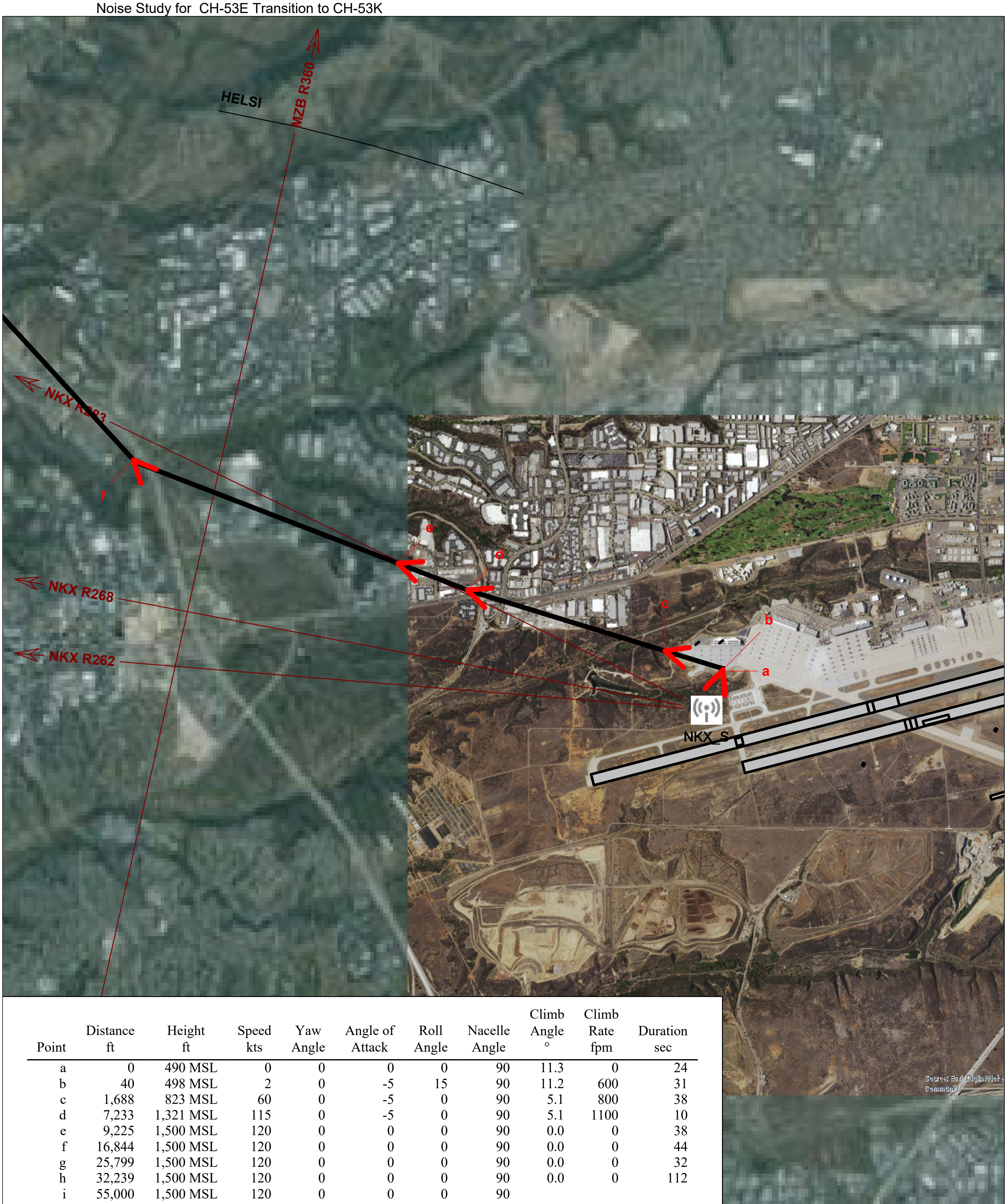
CH-53E Departure Flight Profile 304SW - Runway to Yuma

Flight Track 4PD4SW - Yuma Departure from Runway 24P

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

Scale in Feet 1:54,400 (1 inch = 4,540 feet)

N



Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	0	490 MSL	0	0	0	0	90	11.3	0	24
b	40	498 MSL	2	0	-5	15	90	11.2	600	31
c	1,688	823 MSL	60	0	-5	0	90	5.1	800	38
d	7,233	1,321 MSL	115	0	-5	0	90	5.1	1100	10
e	9,225	1,500 MSL	120	0	0	0	90	0.0	0	38
f	16,844	1,500 MSL	120	0	0	0	90	0.0	0	44
g	25,799	1,500 MSL	120	0	0	0	90	0.0	0	32
h	32,239	1,500 MSL	120	0	0	0	90	0.0	0	112
i	55,000	1,500 MSL	120	0	0	0	90			

CH-53E Departure Flight Profile 305_2 - Pads to Fairway

Flight Track 05D1 - Fairway Departure from Pad 5

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

Scale in Feet 1:40,300 (1 inch = 3,360 feet)

N

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	0	490 MSL	0	0	0	0	90	11.4	100	20
b	99	510 MSL	6	0	-5	15	90	11.1	700	29
c	1,688	823 MSL	60	0	-5	0	90	5.1	800	50
d	9,225	1,500 MSL	120	0	0	0	90	0.0	0	20
e	13,361	1,500 MSL	120	0	0	0	90	0.0	0	127
f	39,005	1,500 MSL	120	0	0	0	90	0.0	0	79
g	55,000	1,500 MSL	120	0	0	0	90			

CH-53E Departure Flight Profile 306_2 - Pads to Beach

Flight Track 05D2 - Beach Departure from Pad 5

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

Scale in Feet 1:45,300 (1 inch = 3,770 feet)

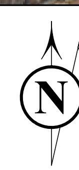
N

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	0	490 MSL	0	0	0	0	90	11.5	0	19
b	49	500 MSL	3	0	-5	-15	90	11.1	600	31
c	1,688	823 MSL	60	0	-5	0	90	5.1	800	50
d	9,225	1,500 MSL	120	0	0	0	90	0.0	0	22
e	13,778	1,500 MSL	120	0	0	0	90	0.0	0	29
f	19,621	1,500 MSL	120	0	-5	0	90	5.7	1200	99
g	39,743	3,500 MSL	120	0	0	0	90			

CH-53E Departure Flight Profile 307_2_2 - Pads to I-15

Flight Track 05D3_2 - I-15 Departure from Pad 5

Scale in Feet 1:25,100 (1 inch = 2,090 feet)



Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	0	490 MSL	0	0	0	0	90	11.5	0	19
b	49	500 MSL	3	0	-5	15	90	11.1	600	31
c	1,688	823 MSL	60	0	-5	0	90	5.1	800	20
d	4,770	1,100 MSL	120	0	0	0	90	0.0	0	15
e	7,740	1,100 MSL	120	0	0	0	90	0.0	0	66
f	21,071	1,100 MSL	120	0	-5	0	90	8.9	1900	76
g	36,375	3,500 MSL	120	0	0	0	90	0.0	0	244
h	85,879	3,500 MSL	120	0	0	0	90			

CH-53E Departure Flight Profile 308_2 - Pads to Yuma

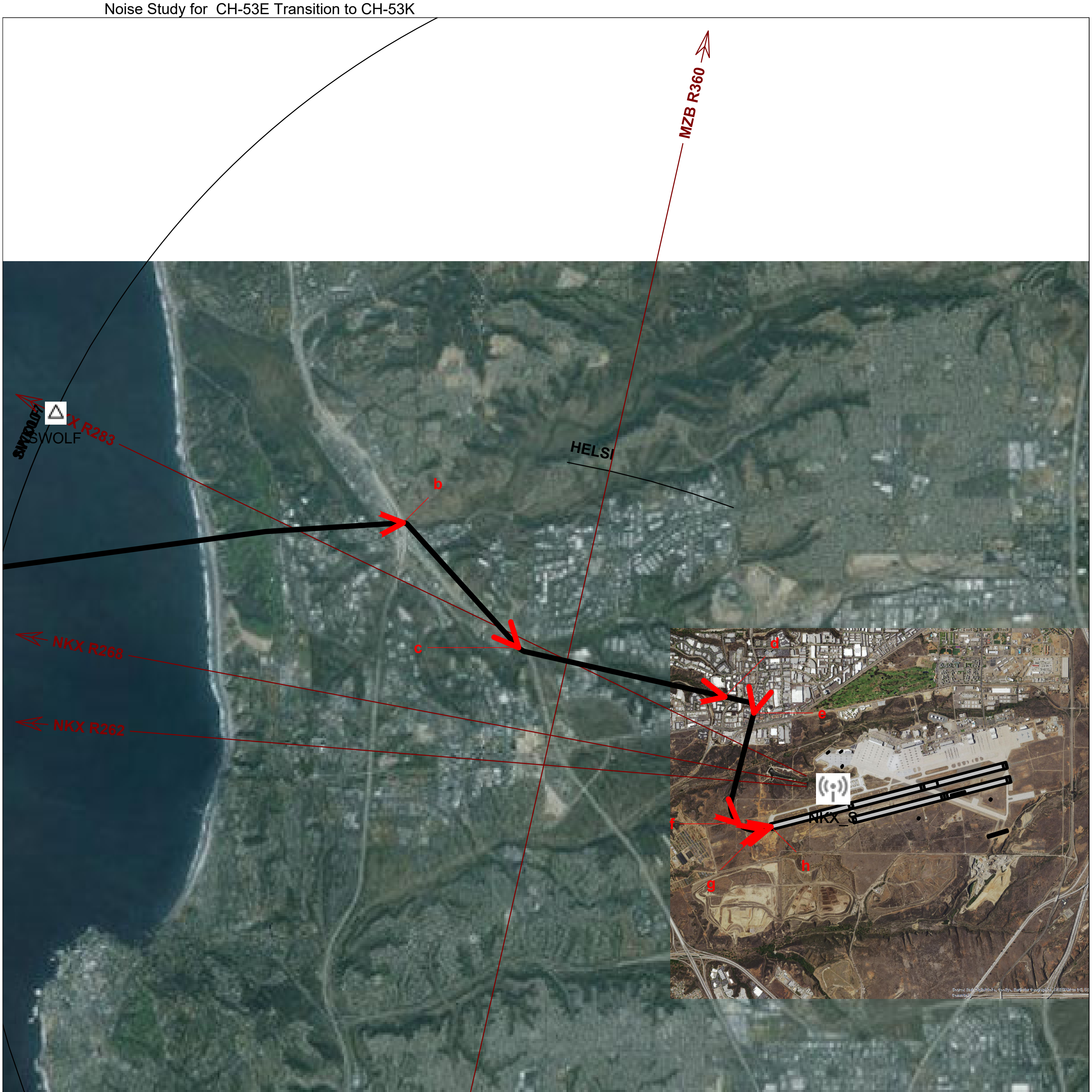
Flight Track 5D4L - Yuma Departure from Pad 5 Left Pattern to cross South of Field

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

Scale in Feet 1:56,600 (1 inch = 4,720 feet)

N

CH-53E Arrival Flight Profiles



Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	50,687	1,500 MSL	120	0	0	0	90	0.0	0	112
b	28,075	1,500 MSL	120	0	0	15	90	0.0	0	41
c	19,691	1,500 MSL	120	0	0	-15	90	-2.7	-600	52
d	9,225	1,000 MSL	120	0	0	0	90	0.0	0	9
e	7,380	1,000 MSL	115	0	5	0	90	-1.8	-300	31
f	1,688	823 MSL	100	0	5	0	90	-11.2	-1300	11
g	502	589 MSL	30	0	5	0	90	-11.2	-300	20
h	0	490 MSL	0	0	0	0	90			

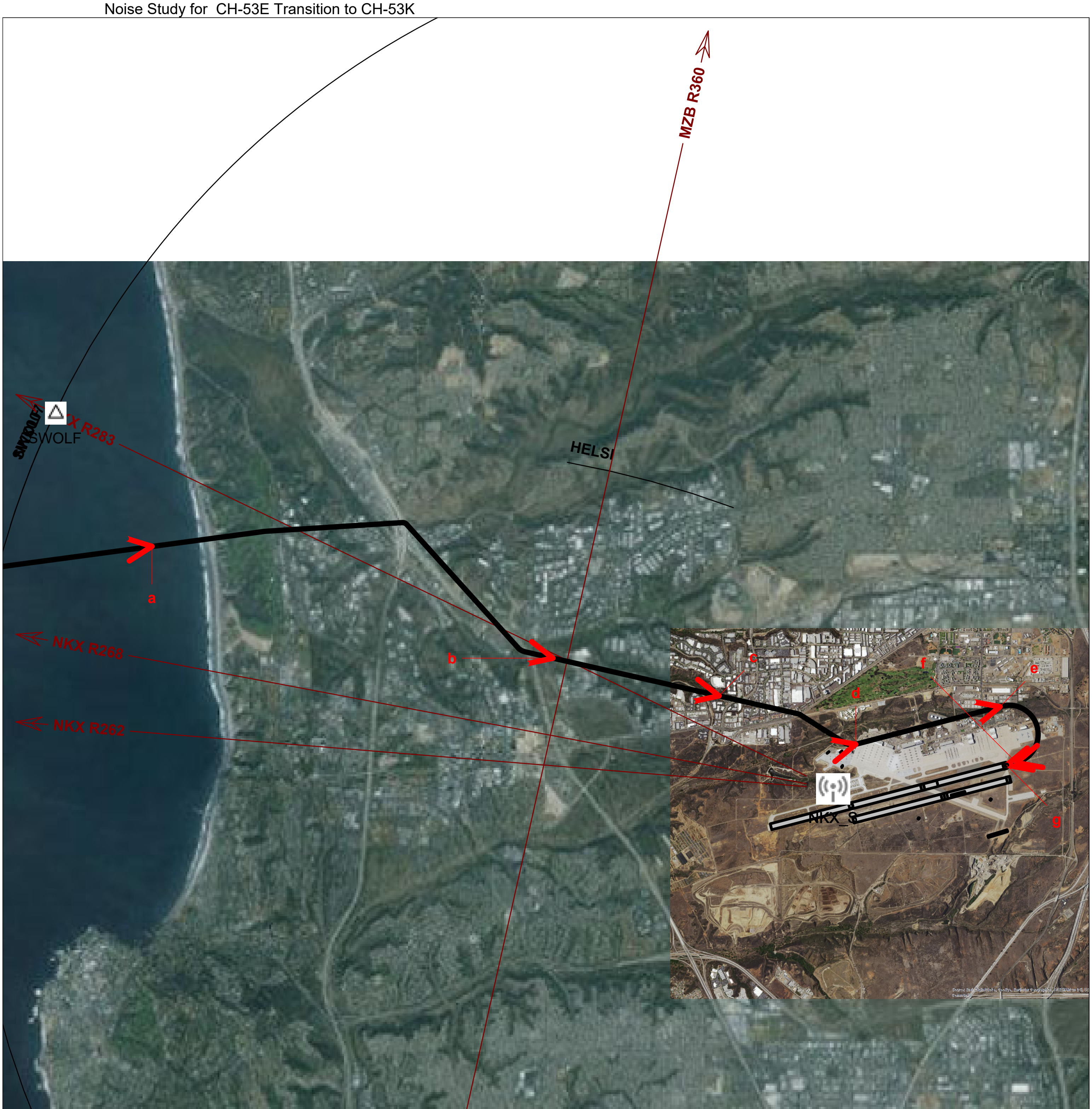
CH-53E Non-Break Arrival Flight Profile 310E - fairway to runway

Flight Track 4PA1E - Fairway Arrival to Runway 06L

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

Scale in Feet 1:80,200 (1 inch = 6,690 feet)

N



Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	50,687	1,500 MSL	120	0	0	0	90	0.0	0	112
b	28,075	1,500 MSL	120	0	0	15	90	0.0	0	41
c	19,691	1,500 MSL	120	0	0	-15	90	-3.9	-800	36
d	12,429	1,000 MSL	120	0	0	0	90	0.0	0	37
e	5,092	1,000 MSL	115	0	5	0	90	-5.1	-700	38
f	502	589 MSL	30	0	5	0	90	-11.2	-300	20
g	0	490 MSL	0	0	0	0	90			

CH-53E Non-Break Arrival Flight Profile 310W - fairway to runway

Flight Track 4PA1W - Fairway Arrival to Runway 24R

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

Scale in Feet 1:80,200 (1 inch = 6,690 feet)

N

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	55,000	1,000 MSL	120	0	0	0	90	0.0	0	182
b	18,128	1,000 MSL	120	0	0	0	90	0.0	0	44
c	9,225	1,000 MSL	120	0	0	0	90	0.0	0	9
d	7,351	1,000 MSL	115	0	5	0	90	-1.8	-300	31
e	1,688	823 MSL	100	0	5	0	90	-11.2	-1200	12
f	406	570 MSL	24	0	5	0	90	-11.1	-200	20
g	0	490 MSL	0	0	0	0	90			

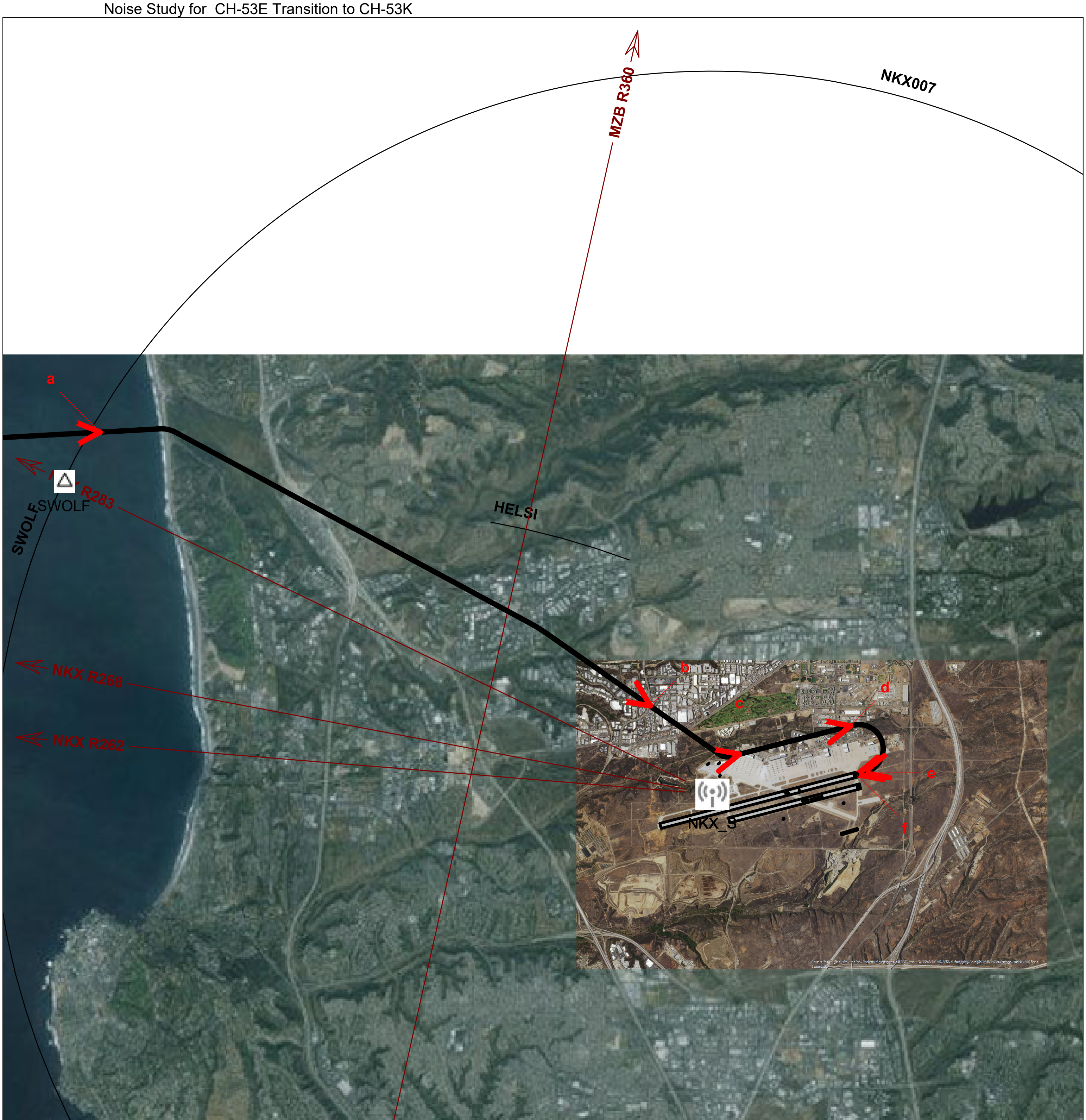
CH-53E Non-Break Arrival Flight Profile 311E - Beach to runway

Flight Track 4PA2E - Beach Arrival to Runway 06L

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

Scale in Feet 1:95,700 (1 inch = 7,980 feet)

N



Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	55,000	1,000 MSL	120	0	0	0	90	0.0	0	182
b	18,128	1,000 MSL	120	0	0	0	90	0.0	0	31
c	11,915	1,000 MSL	120	0	0	0	90	0.0	0	34
d	5,145	1,000 MSL	115	0	5	0	90	-5.2	-600	40
e	406	570 MSL	24	0	5	0	90	-11.1	-200	20
f	0	490 MSL	0	0	0	0	90			

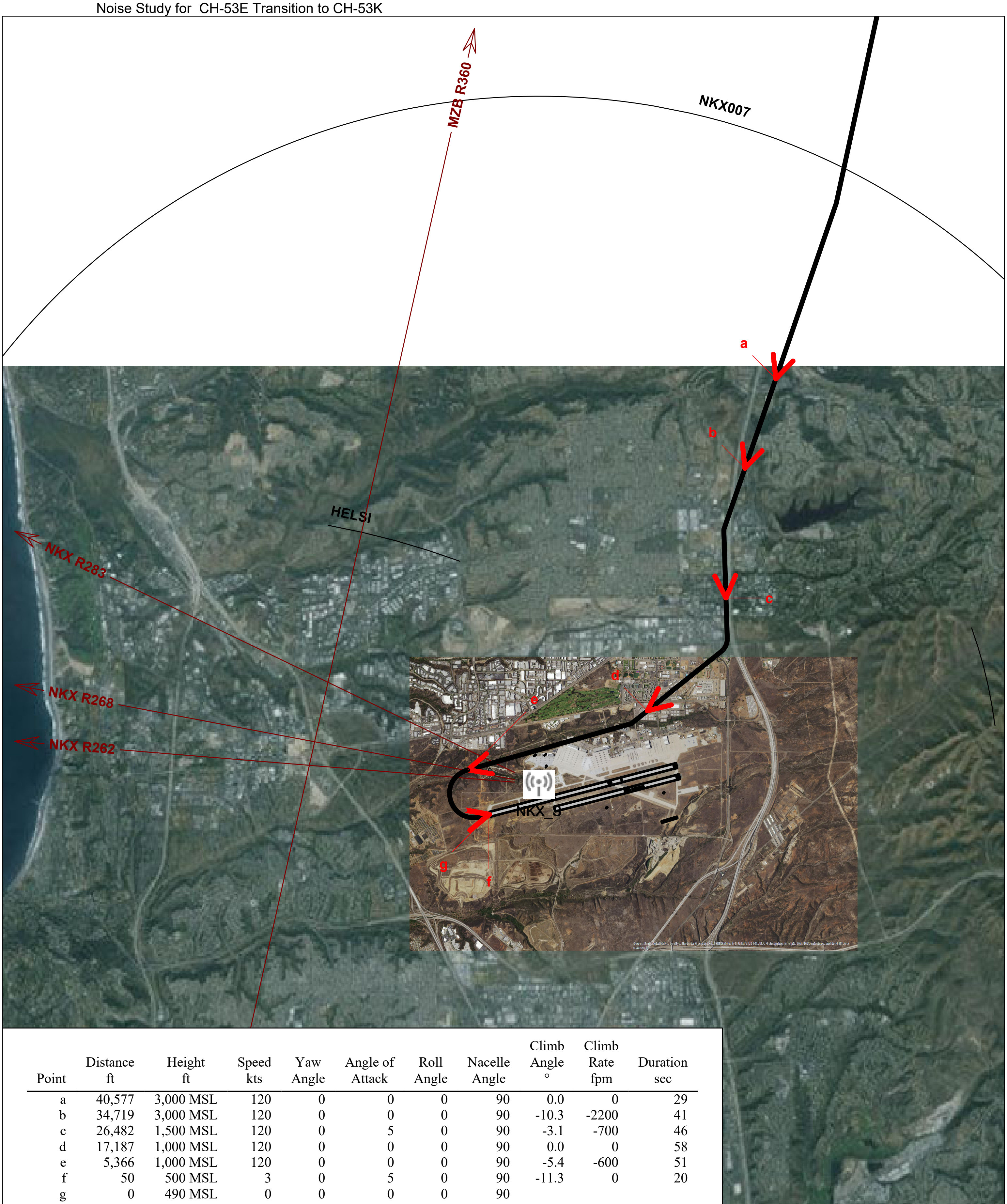
CH-53E Non-Break Arrival Flight Profile 311W - Beach to runway

Flight Track 4PA2W - Beach Arrival to Runway 24R

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

Scale in Feet 1:95,700 (1 inch = 7,980 feet)

N



Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	40,577	3,000 MSL	120	0	0	0	90	0.0	0	29
b	34,719	3,000 MSL	120	0	0	0	90	-10.3	-2200	41
c	26,482	1,500 MSL	120	0	5	0	90	-3.1	-700	46
d	17,187	1,000 MSL	120	0	0	0	90	0.0	0	58
e	5,366	1,000 MSL	120	0	0	0	90	-5.4	-600	51
f	50	500 MSL	3	0	5	0	90	-11.3	0	20
g	0	490 MSL	0	0	0	0	90			

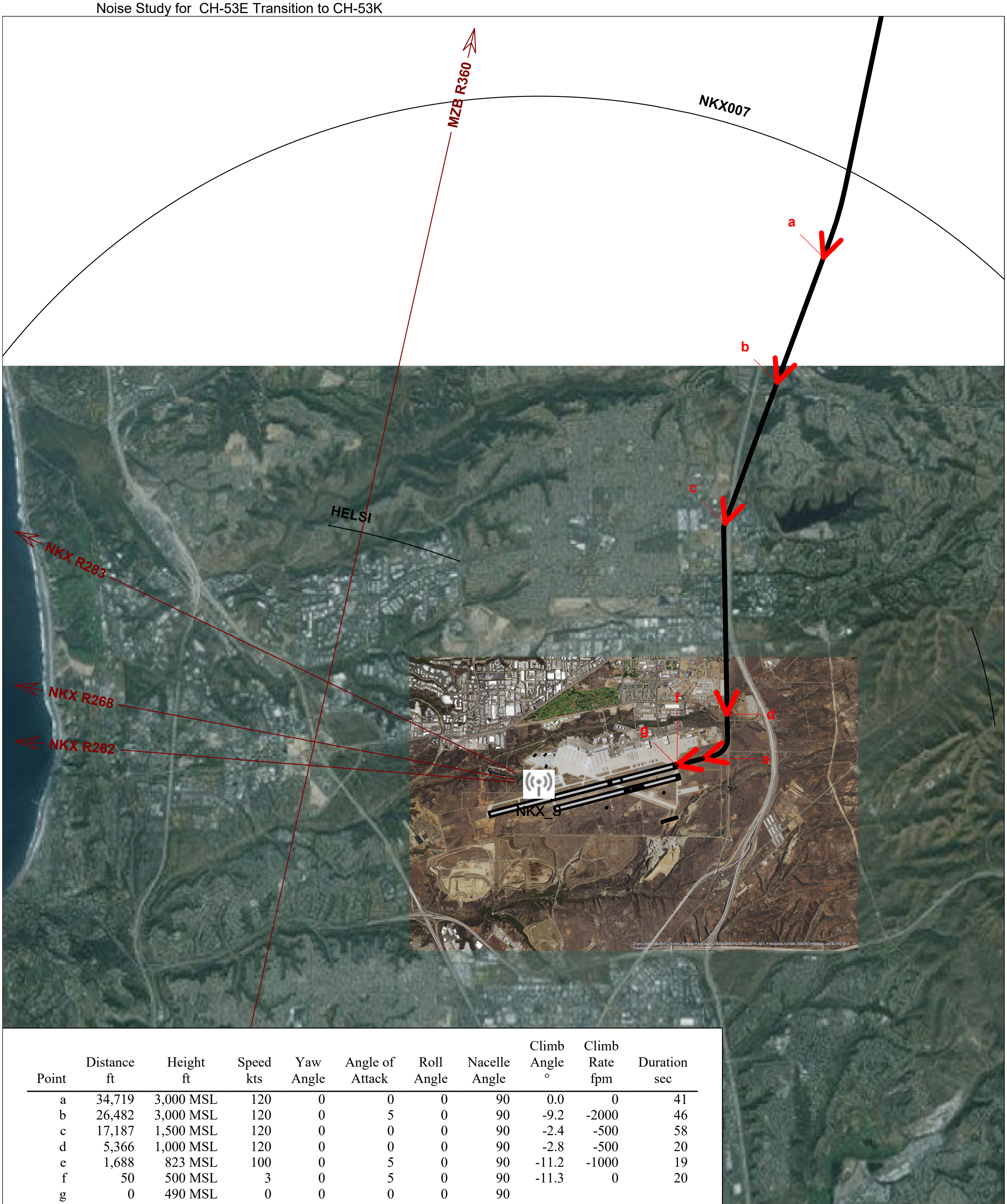
CH-53E Non-Break Arrival Flight Profile 312E - I15 to runway

Flight Track 4PA3E - I-15 Arrival to Runway 06P

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

Scale in Feet 1:93,300 (1 inch = 7,770 feet)

N



Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	34,719	3,000 MSL	120	0	0	0	90	0.0	0	41
b	26,482	3,000 MSL	120	0	5	0	90	-9.2	-2000	46
c	17,187	1,500 MSL	120	0	0	0	90	-2.4	-500	58
d	5,366	1,000 MSL	120	0	0	0	90	-2.8	-500	20
e	1,688	823 MSL	100	0	5	0	90	-11.2	-1000	19
f	50	500 MSL	3	0	5	0	90	-11.3	0	20
g	0	490 MSL	0	0	0	0	90			

CH-53E Non-Break Arrival Flight Profile 312W - I15 to runway

Flight Track 4PA3W - I-15 Arrival to Runway 06P

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

Scale in Feet 1:93,300 (1 inch = 7,770 feet)

N

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	43,844	3,000 MSL	120	0	0	0	90	0.0	0	94
b	24,841	3,000 MSL	120	0	0	0	90	-6.9	-1500	77
c	9,229	1,100 MSL	120	0	0	0	90	0.0	0	22
d	4,770	1,100 MSL	120	0	0	0	90	-5.1	-1000	17
e	1,688	823 MSL	100	0	5	0	90	-11.2	-1000	19
f	50	500 MSL	3	0	5	-15	90	-11.3	0	20
g	0	490 MSL	0	0	0	0	90			

CH-53E Non-Break Arrival Flight Profile 313E - Yuma to runway
Flight Track 4PA4E - Yuma arrival to Runway 06P

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

Scale in Feet 1:76,500 (1 inch = 6,370 feet)

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	40,549	3,000 MSL	120	0	0	0	90	0.0	0	89
b	22,478	3,000 MSL	120	0	0	0	90	-7.6	-1600	70
c	8,248	1,100 MSL	120	0	0	0	90	0.0	0	17
d	4,770	1,100 MSL	120	0	0	0	90	-5.1	-1000	17
e	1,688	823 MSL	100	0	5	0	90	-11.2	-1000	19
f	50	500 MSL	3	0	5	-15	90	-11.3	0	20
g	0	490 MSL	0	0	0	0	90			

CH-53E Non-Break Arrival Flight Profile 313W - Yuma to runway

Flight Track 4PA4W - Yuma arrival to Runway 06P

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

Scale in Feet 1:50,500 (1 inch = 4,200 feet)

N

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	55,000	1,500 MSL	120	0	0	0	90	0.0	0	137
b	27,273	1,500 MSL	120	0	0	0	90	0.0	0	45
c	18,105	1,500 MSL	120	0	0	0	90	0.0	0	44
d	9,225	1,500 MSL	120	0	0	0	90	-5.8	-1200	26
e	4,316	1,000 MSL	105	0	5	0	90	-3.9	-700	15
f	1,688	823 MSL	100	0	5	0	90	-11.2	-1100	16
g	200	529 MSL	12	0	5	0	90	-11.0	-100	20
h	0	490 MSL	0	0	0	0	90			

CH-53E Non-Break Arrival Flight Profile 314E - fairway to pads

Flight Track 05A1E - Fairway Arrival to Pad 3

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

Scale in Feet 1:40,200 (1 inch = 3,350 feet)

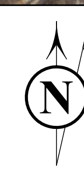
N

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	55,000	1,500 MSL	120	0	0	0	90	0.0	0	165
b	21,510	1,500 MSL	120	0	0	0	90	0.0	0	48
c	11,820	1,500 MSL	120	0	0	0	90	-4.9	-1000	31
d	5,986	1,000 MSL	103	0	5	0	90	0.0	0	18
e	2,853	1,000 MSL	103	0	5	0	90	-8.6	-1600	7
f	1,688	823 MSL	100	0	5	0	90	-11.2	-1100	16
g	200	529 MSL	12	0	5	0	90	-11.0	-100	20
h	0	490 MSL	0	0	0	0	90			

CH-53E Non-Break Arrival Flight Profile 314W - fairway to pads

Flight Track 05A1W - Fairway Arrival to Pad 3

Scale in Feet 1:40,200 (1 inch = 3,350 feet)



Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	50,000	1,000 MSL	120	0	0	0	90	0.0	0	57
b	38,447	1,000 MSL	120	0	0	0	90	0.0	0	136
c	10,909	1,000 MSL	120	0	0	0	90	0.0	0	42
d	2,931	1,000 MSL	103	0	5	0	90	-8.1	-1500	7
e	1,688	823 MSL	100	0	5	0	90	-11.2	-1200	14
f	281	545 MSL	17	0	5	-15	90	-11.1	-200	20
g	0	490 MSL	0	0	0	0	90			

CH-53E Non-Break Arrival Flight Profile 315E - Beach to pads

Flight Track 05A2E - Beach Arrival to Pad 3

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

Scale in Feet 1:43,600 (1 inch = 3,630 feet)

N

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	50,000	1,000 MSL	120	0	0	0	90	0.0	0	57
b	38,447	1,000 MSL	120	0	0	0	90	0.0	0	118
c	14,533	1,000 MSL	120	0	0	0	90	0.0	0	33
d	8,312	1,000 MSL	103	0	5	0	90	0.0	0	22
e	4,448	1,000 MSL	103	0	5	0	90	-3.7	-700	16
f	1,688	823 MSL	100	0	5	0	90	-11.2	-1200	14
g	281	545 MSL	17	0	5	-15	90	-11.1	-200	20
h	0	490 MSL	0	0	0	0	90			

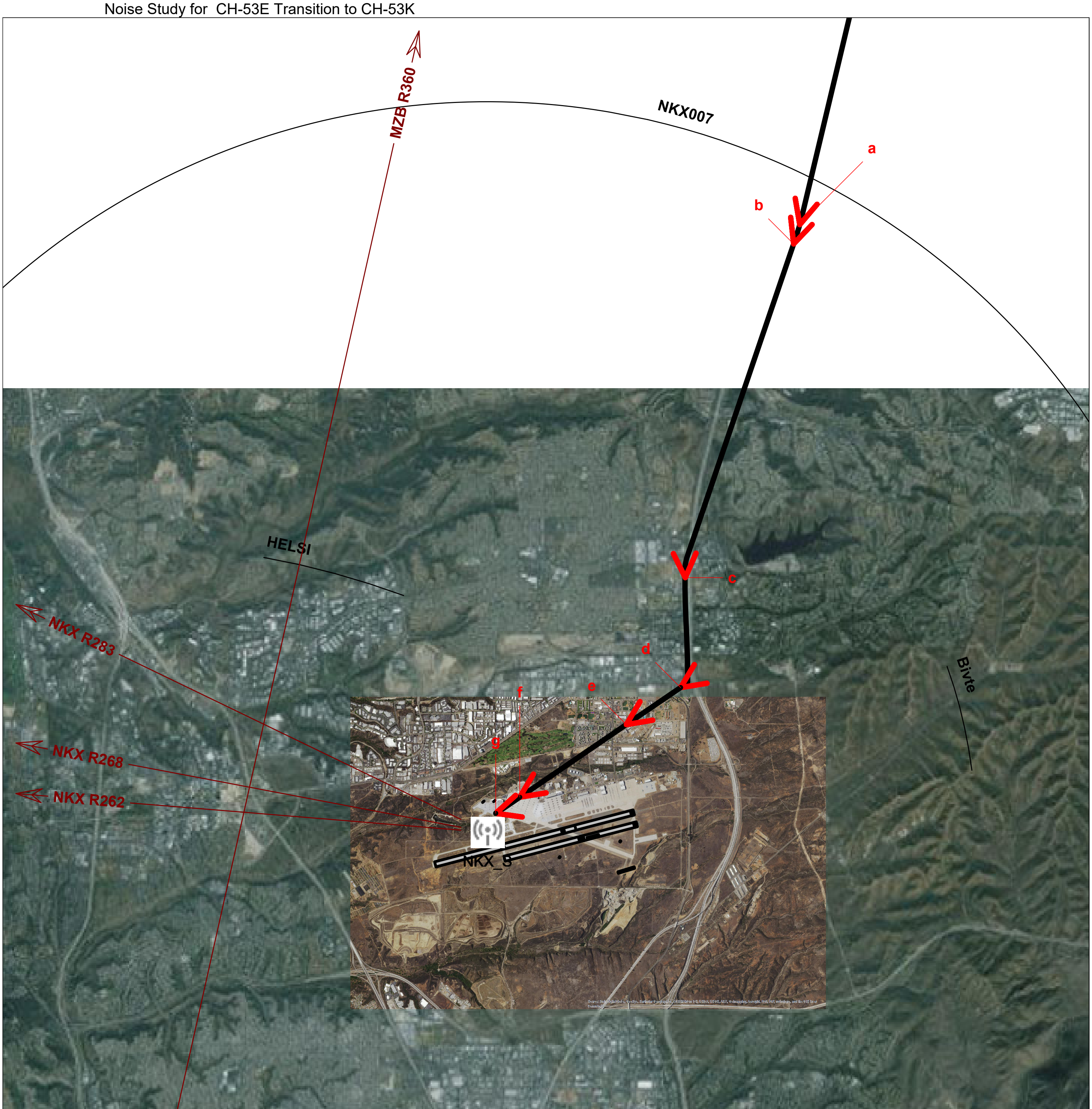
CH-53E Non-Break Arrival Flight Profile 315W - Beach to pads

Flight Track 05A2W - Beach Arrival to Pad 3

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

Scale in Feet 1:43,600 (1 inch = 3,630 feet)

N



Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	41,315	3,000 MSL	120	0	0	0	90	0.0	0	6
b	40,139	3,000 MSL	120	0	0	0	90	-4.2	-900	101
c	19,665	1,500 MSL	120	0	0	0	90	0.0	0	33
d	13,063	1,500 MSL	120	0	0	0	90	0.0	0	19
e	9,225	1,500 MSL	120	0	0	0	90	-5.1	-1000	41
f	1,688	823 MSL	100	0	5	0	90	-11.2	-1000	20
g	0	490 MSL	0	0	0	0	90			

CH-53E Non-Break Arrival Flight Profile 316_2 - I15 to pads

Flight Track 05A3 - I-15 Arrival to Pad 3

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

Scale in Feet 1:95,300 (1 inch = 7,940 feet)

N

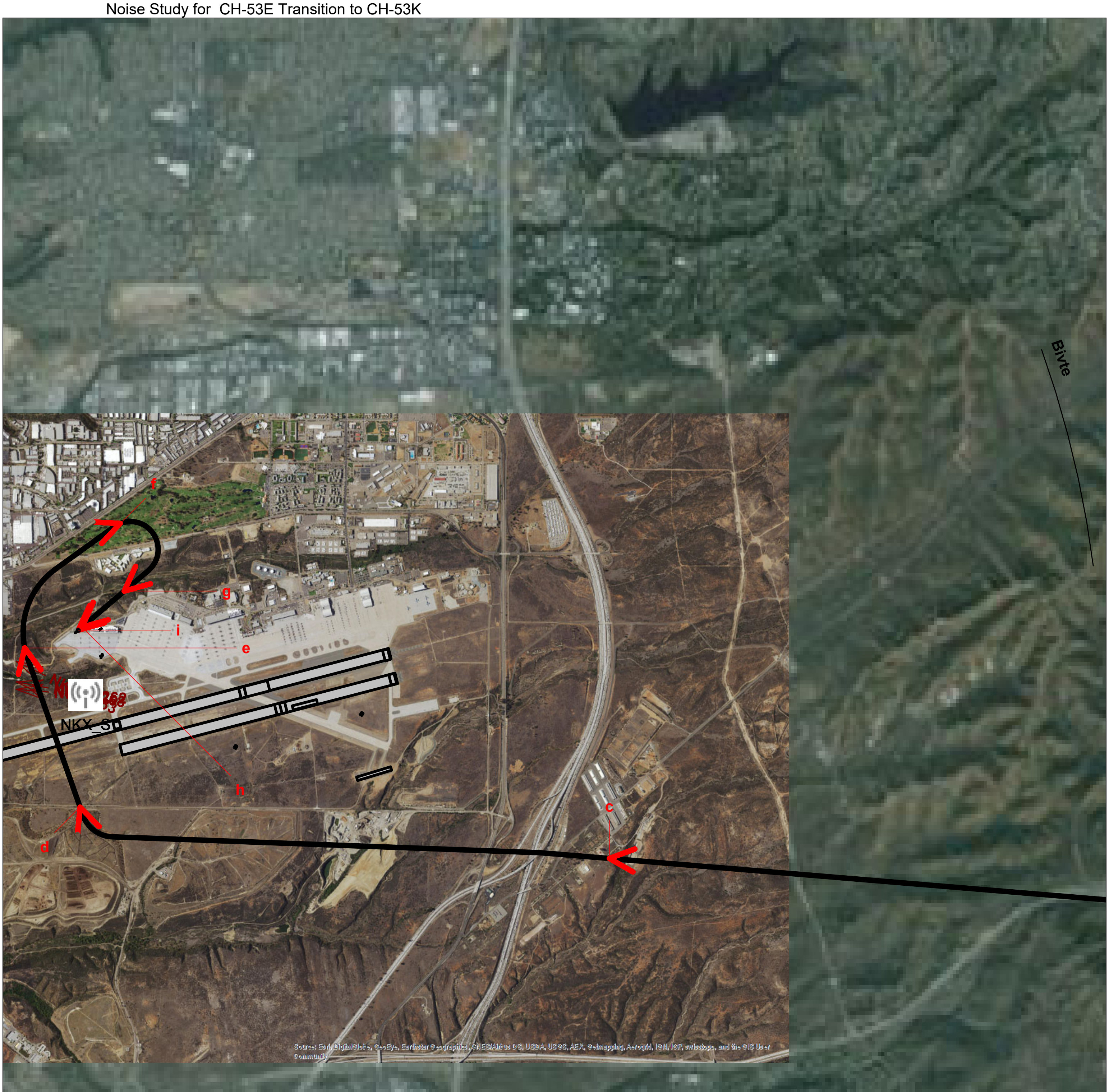
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	84,428	3,000 MSL	120	0	0	0	90	0.0	0	146
b	54,871	3,000 MSL	120	0	0	0	90	0.0	0	7
c	53,413	3,000 MSL	120	0	0	-15	90	0.0	0	7
d	52,085	3,000 MSL	120	0	0	0	90	0.0	0	85
e	34,842	3,000 MSL	120	0	0	0	90	-5.8	-1200	72
f	20,184	1,500 MSL	120	0	5	0	90	-3.5	-700	41
g	11,955	1,000 MSL	120	0	0	0	90	0.0	0	39
h	4,142	1,000 MSL	120	0	0	0	90	-4.0	-800	15
i	1,429	810 MSL	100	0	5	0	90	-12.6	-1100	17
j	0	490 MSL	0	0	0	0	90			

CH-53E Non-Break Arrival Flight Profile 317_2 - Yuma to pads

Flight Track 5A4R - Yuma arrival to Pad 5 via north of field

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

Scale in Feet 1:44,400 (1 inch = 3,700 feet)



Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	77,672	3,000 MSL	120	0	0	0	90	0.0	0	154
b	46,528	3,000 MSL	120	0	0	0	90	0.0	0	84
c	29,537	3,000 MSL	120	0	0	0	90	-5.6	-1200	76
d	14,219	1,500 MSL	120	0	5	0	90	-6.0	-1300	23
e	9,498	1,000 MSL	120	0	0	0	90	0.0	0	23
f	4,770	1,000 MSL	120	0	0	0	90	-3.3	-600	17
g	1,688	823 MSL	100	0	5	0	90	-11.2	-1100	17
h	131	516 MSL	8	0	5	15	90	-11.2	-100	19
i	0	490 MSL	0	0	0	0	90			

CH-53E Non-Break Arrival Flight Profile 318SW - Yuma to pads2

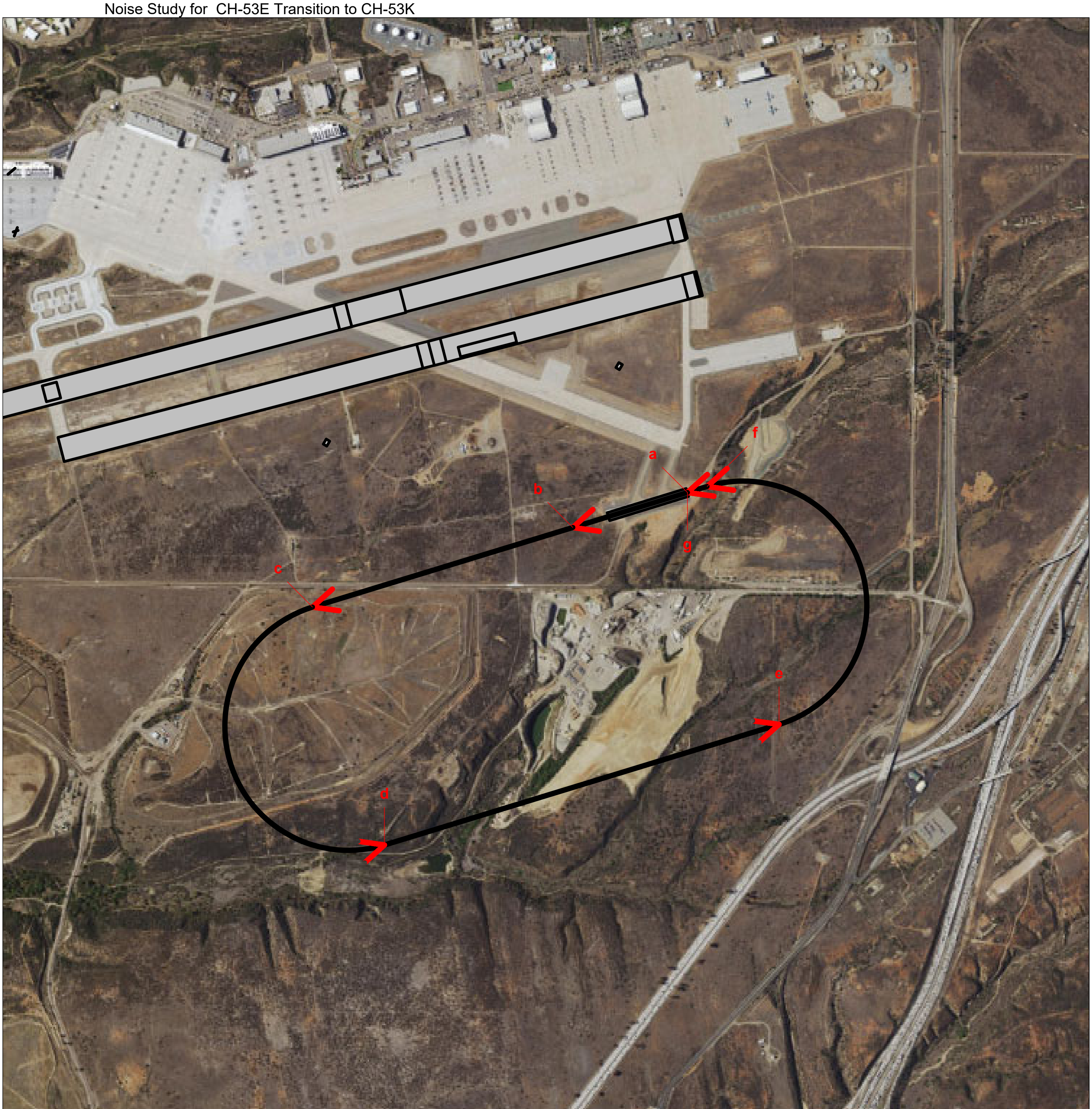
Flight Track 5A4SW - Yuma arrival to Pad 5 Straight-in

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

Scale in Feet 1:46,500 (1 inch = 3,880 feet)

N

CH-53E Touch and Go Flight Profiles



Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	490 MSL	0	0	0	0	90	28.4	1600	29	
b	1,451	800 AGL	60	0	0	0	90	0.0	0	24	
c	4,750	800 AGL	100	0	0	15	90	0.0	0	28	
d	9,462	800 AGL	100	0	0	0	90	0.0	0	30	
e	14,462	800 AGL	100	0	0	15	90	0.0	0	28	
f	19,174	800 AGL	100	0	0	0	90	-72.3	-15900	3	
g	19,424	490 MSL	0	0	0	0	90				Changed 19424 to 19425 16Feb06

CH-53E T&G Flight Profile 319_2

Flight Track 4ST1 - LHD pattern; LH; 3000 ft abeam; 5000 ft downwind; 800 ft MSL

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

Scale in Feet 1:19,700 (1 inch = 1,650 feet)

N

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	0	490 MSL	0	0	0	0	90	28.4	1600	29
b	1,451	800 AGL	60	0	0	0	90	0.0	0	78
c	12,000	800 AGL	100	0	0	15	90	0.0	0	60
d	22,210	800 AGL	100	0	0	0	90	0.0	0	71
e	34,210	800 AGL	100	0	0	15	90	-4.4	-400	121
f	44,420	490 MSL	0	0	0	0	90			

CH-53E T&G Flight Profile 320_2

Flight Track 4RT2 - LH patt; 1nm abeam; 2nm downwind; 1600 ft MSL

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)

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	0	490 MSL	0	0	0	0	90	28.4	1600	29
b	1,451	800 AGL	60	0	0	0	90	0.0	0	49
c	8,000	800 AGL	100	0	0	15	90	0.0	0	56
d	17,424	800 AGL	100	0	0	0	90	0.0	0	47
e	25,424	800 AGL	100	0	0	15	90	-4.8	-400	112
f	34,850	490 MSL	0	0	0	0	90			

CH-53E T&G Flight Profile 321_2

Flight Track 4LT2 - 6000 ft abeam; 8000 ft downwind; 1600 ft MSL

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

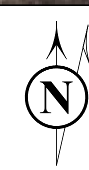
Scale in Feet 1:35,500 (1 inch = 2,960 feet)

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec
a	0	0 AGL	0	0	0	0	90	8.2	400	27
b	1,391	200 AGL	60	0	0	-20	90	5.3	800	26
c	4,874	1,000 MSL	100	0	0	0	90	0.0	0	35
d	10,742	1,000 MSL	100	0	0	-30	90	-8.5	-1200	11
e	12,253	300 AGL	60	0	0	0	90	-7.4	-400	34
f	13,990	75 AGL	0	0	0	0	90			

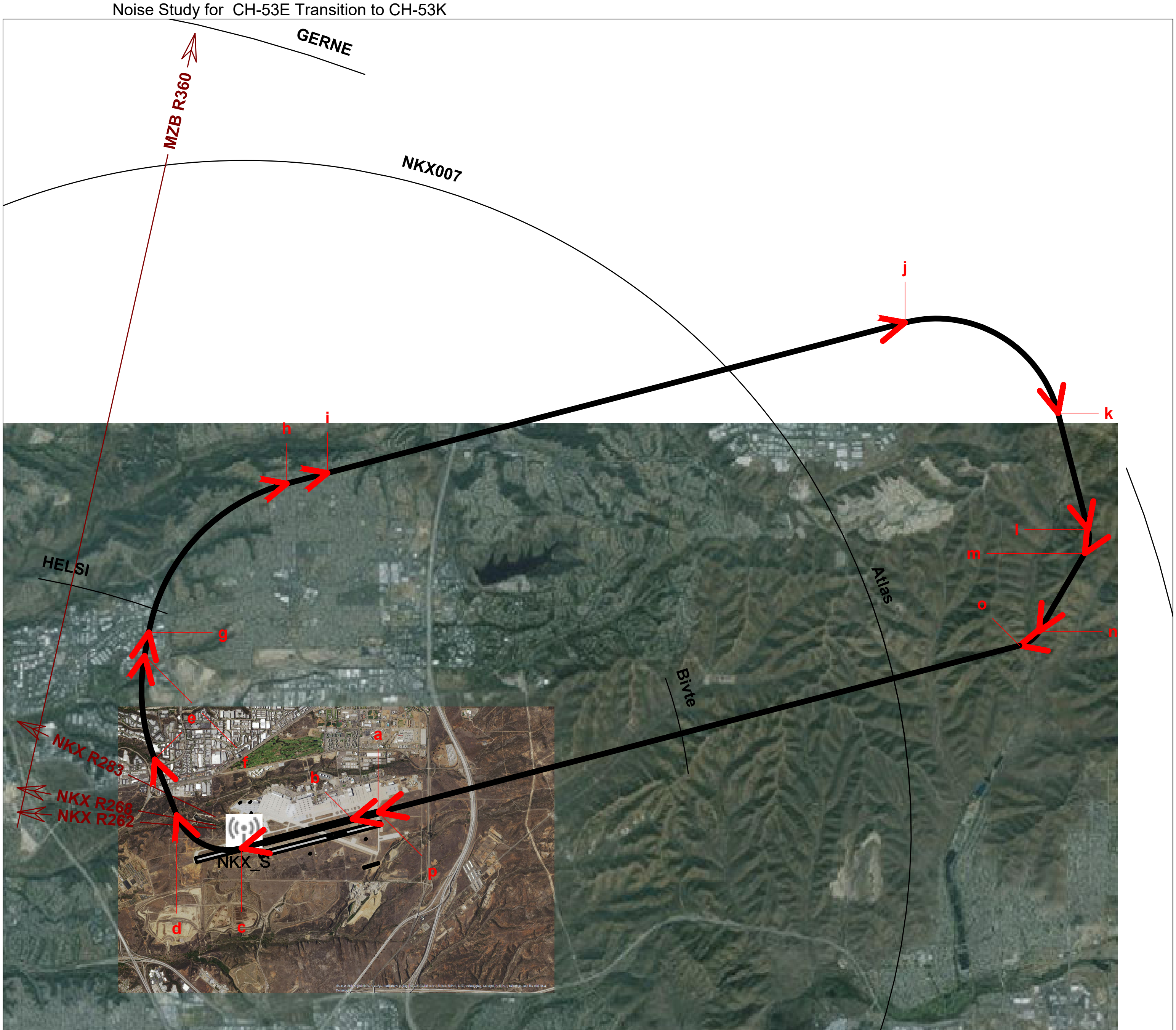
CH-53E T&G Flight Profile 322_2

Flight Track 001T_2 - Helo Spot pattern (near West Ramp); RH; <=1200 ft upwind; 1000 ft MSL

Scale in Feet 1:12,200 (1 inch = 1,020 feet)



CH-53E GCA Box Pattern Flight Profiles

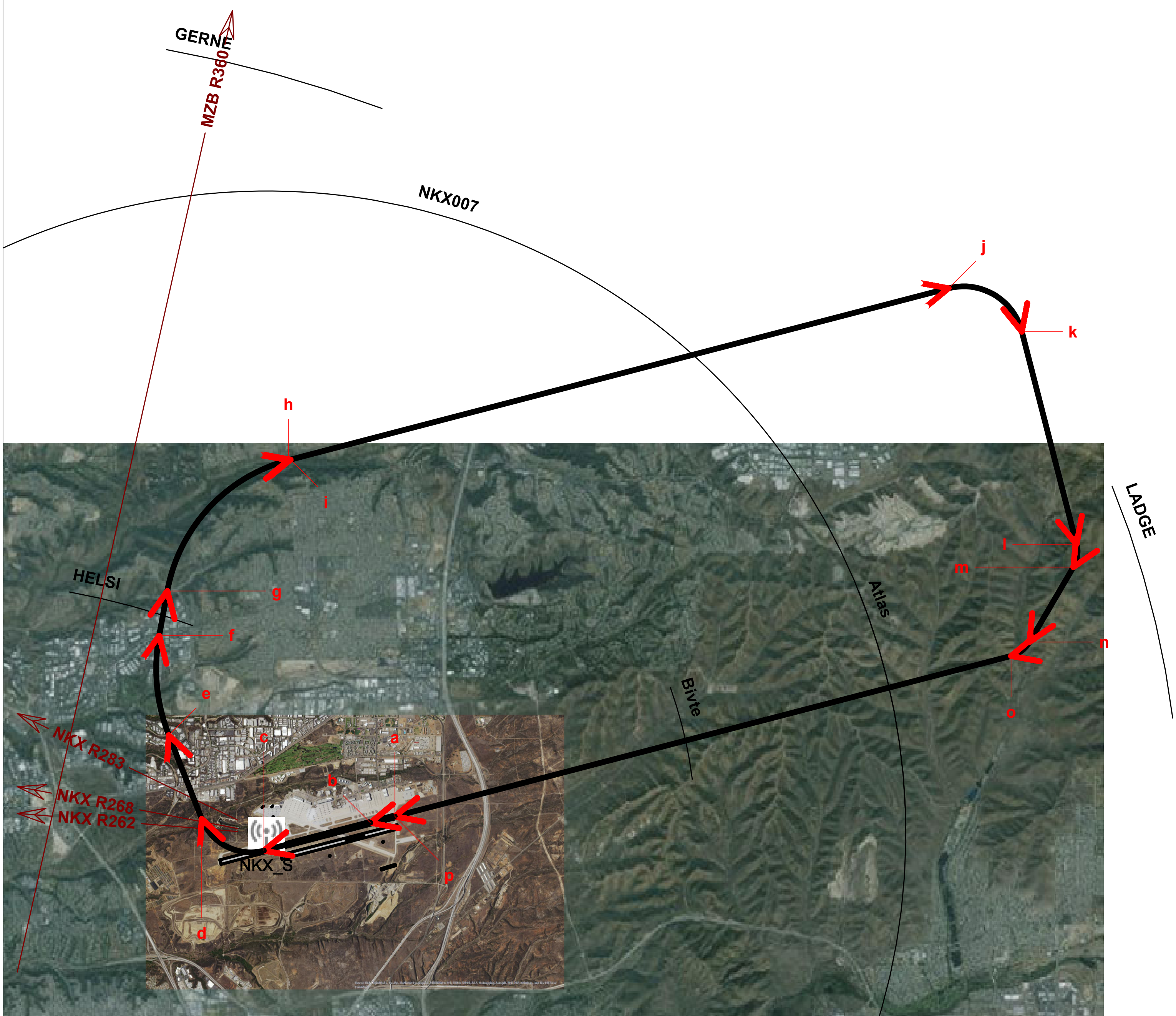


Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	490 MSL	0	0	0	0	90	11.2	600	33	
b	1,687	823 MSL	60	0	-5	0	90	5.1	700	53	
c	9,000	1,479 MSL	103	0	-5	-15	90	5.1	900	29	
d	14,070	1,934 MSL	106	0	-5	0	90	5.1	1000	21	
e	17,870	2,276 MSL	107	0	-5	-15	90	5.1	1000	36	
f	24,572	2,877 MSL	111	0	-5	0	90	5.1	1000	8	
g	26,072	3,012 MSL	111	0	-5	-15	90	4.2	800	70	
h	39,685	4,000 MSL	120	0	-5	0	90	0.0	0	13	
i	42,364	4,000 MSL	120	0	0	0	90	0.0	0	188	
j	80,385	4,000 MSL	120	0	0	-15	90	0.0	0	62	
k	92,951	4,000 MSL	120	0	0	0	90	0.0	0	38	
l	100,581	4,000 MSL	120	0	0	-15	90	0.0	0	8	
m	102,151	4,000 MSL	120	0	5	0	90	-7.9	-1700	28	
n	107,901	3,200 MSL	120	0	5	-15	90	0.0	0	8	
o	109,471	3,200 MSL	120	0	5	0	90	-3.7	-500	323	
p	151,674	490 MSL	35	0	0	0	90				Changed 151671 to 151674 16Feb06

CH-53E GCA Box Flight Profile 323_2

Flight Track 4RG4 - RW GCA Box; 3.5 nm abeam; 7nm final

Scale in Feet 1:112,000 (1 inch = 9,320 feet)



Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	490 MSL	0	0	-5	0	90	11.2	600	33	
b	1,687	823 MSL	60	0	-5	0	90	5.1	700	53	
c	9,000	1,479 MSL	103	0	-5	-15	90	5.1	900	29	
d	14,070	1,934 MSL	106	0	-5	0	90	5.1	1000	33	
e	20,027	2,469 MSL	109	0	-5	-15	90	5.1	1000	36	
f	26,729	3,071 MSL	112	0	-5	0	90	5.1	1000	16	
g	29,729	3,340 MSL	113	0	-5	-15	90	3.0	600	63	
h	42,208	4,000 MSL	120	0	-5	0	90	0.0	0	1	
i	42,364	4,000 MSL	120	0	0	0	90	0.0	0	223	
j	87,529	4,000 MSL	120	0	0	-15	90	0.0	0	31	
k	93,812	4,000 MSL	120	0	0	0	90	0.0	0	72	
l	108,336	4,000 MSL	120	0	0	-15	90	0.0	0	8	
m	109,906	4,000 MSL	120	0	5	0	90	-7.9	-1700	28	
n	115,656	3,200 MSL	120	0	5	-15	90	0.0	0	8	
o	117,226	3,200 MSL	120	0	5	0	90	-3.7	-500	324	
p	159,555	490 MSL	35	0	0	0	90				Changed 159553 to 159555 16Feb06

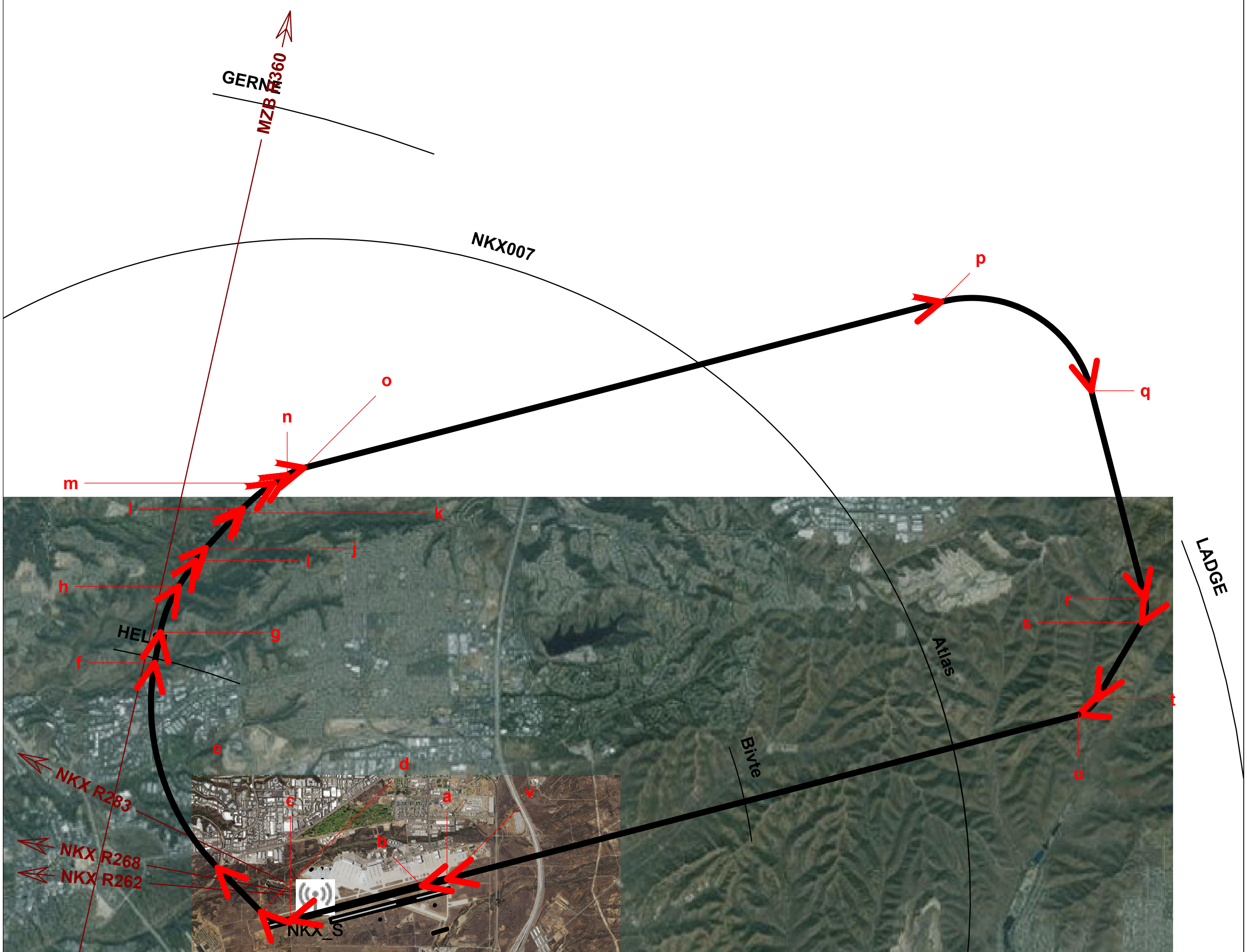
CH-53E GCA Box Flight Profile 324_2

Flight Track 4RG5 - RW GCA Box; 4 nm abeam; 7nm final

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 = 9,800 feet)

N



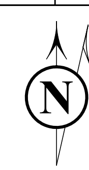
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	490 MSL	0	0	-5	0	90	11.2	600	33	
b	1,687	823 MSL	60	0	-5	0	90	5.1	700	64	
c	10,500	1,614 MSL	104	0	-5	-15	90	5.1	1000	12	
d	12,594	1,802 MSL	105	0	-5	0	90	5.1	1000	22	
e	16,594	2,161 MSL	107	0	-5	-15	90	5.1	1000	77	
f	30,992	3,454 MSL	114	0	-5	0	90	5.1	1000	10	
g	32,992	3,633 MSL	115	0	-5	-15	90	5.1	1000	16	
h	36,203	3,921 MSL	116	0	-5	0	90	2.3	500	10	
i	38,203	4,000 MSL	120	0	-5	-15	90	0.0	0	5	
j	39,250	4,000 MSL	120	0	-5	0	90	0.0	0	15	
k	42,364	4,000 MSL	120	0	0	0	90	0.0	0	2	
l	42,750	4,000 MSL	120	0	0	-15	90	0.0	0	13	
m	45,367	4,000 MSL	120	0	0	0	90	0.0	0	5	
n	46,367	4,000 MSL	120	0	0	-15	90	0.0	0	6	
o	47,553	4,000 MSL	120	0	0	0	90	0.0	0	211	
p	90,253	4,000 MSL	120	0	0	-15	90	0.0	0	62	
q	102,819	4,000 MSL	120	0	0	0	90	0.0	0	69	
r	116,719	4,000 MSL	120	0	0	-15	90	0.0	0	8	
s	118,289	4,000 MSL	120	0	5	0	90	-7.9	-1700	28	
t	124,039	3,200 MSL	120	0	5	-15	90	0.0	0	8	
u	125,609	3,200 MSL	120	0	5	0	90	-3.7	-500	324	
v	167,942	490 MSL	35	0	0	0	90				Changed 167936 to 167942 16Feb06

CH-53E GCA Box Flight Profile 325_2

Flight Track 4RG6 - RW GCA Box; 4.6 nm abeam; 7nm final

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

Scale in Feet 1:121,000 (1 inch = 10,100 feet)



Appendix C: 2024 National and California Ambient Air Quality Standards

Table of Ambient Air Quality Standards

Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [1]		National Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)[8]	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.070 ppm (137 µg/m^3)		
Respirable Particulate Matter (PM10)[9]	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		—		
Fine Particulate Matter (PM2.5)[9]	24 Hour	—	—	35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	9.0 µg/m^3	15.0 µg/m^3	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	—	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	—	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	
Nitrogen Dioxide (NO_2)[10]	1 Hour	0.18 ppm (339 µg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 µg/m^3)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)		53 ppb (100 µg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[11]	1 Hour	0.25 ppm (655 µg/m^3)	Ultraviolet Fluorescence	75 ppb (196 µg/m^3)	—	Ultraviolet Flourescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 µg/m^3)	
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas)[11]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[11]	—	
Lead[12,13]	30 Day Average	1.5 µg/m^3	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m^3 (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 µg/m^3		
Visibility Reducing Particles[14]	8 Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

See footnotes on next page …

1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.

3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4. Any equivalent measurement method which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

7. Reference method as described by the U.S. EPA. An “equivalent method” of measurement may be used but must have a “consistent relationship to the reference method” and must be approved by the U.S. EPA.

8. On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

9. On February 7, 2024, the national annual PM2.5 primary standard was lowered from 12.0 $\mu g/m^3$ to 9.0 $\mu g/m^3$. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 $\mu g/m^3$, as was the annual secondary standard of 15.0 $\mu g/m^3$. The existing 24-hour PM10 standards (primary and secondary) of 150 $\mu g/m^3$ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

10. To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

11. On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.
Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

12. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

13. The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 $\mu g/m^3$ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

14. In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

Appendix D: Agency Correspondence