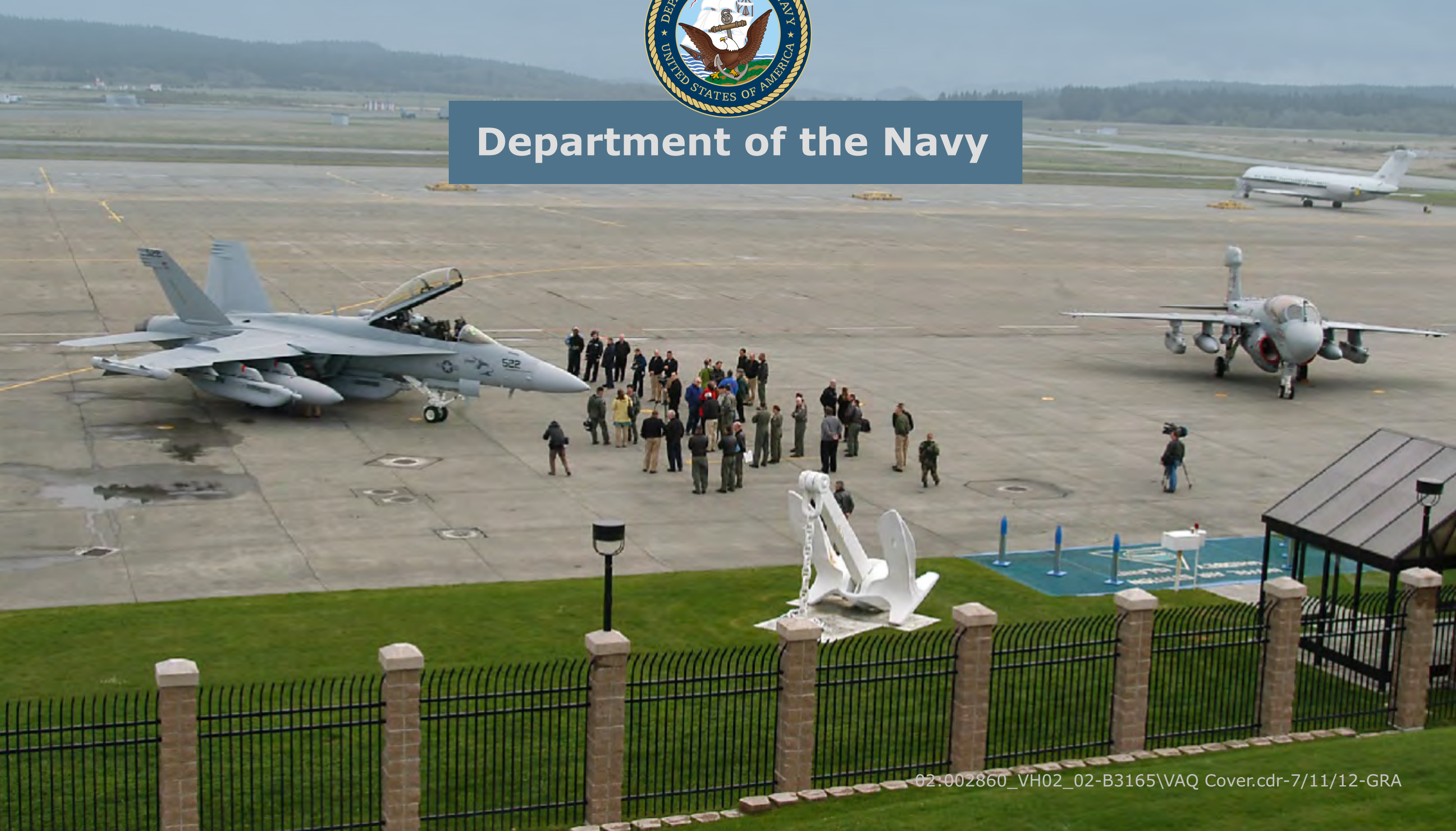
Environmental Assessment for the Expeditionary Transition of EA-6B Prowler Squadrons to EA-18G Growler at Naval Air Station Whidbey Island, Oak Harbor, Washington

Final

October 2012

Department of the Navy



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Environmental Assessment for the Transition of Expeditionary EA-6B Prowler Squadrons to EA-18G Growler at Naval Air Station Whidbey Island, Oak Harbor, Washington

Prepared by:

UNITED STATES DEPARTMENT OF THE NAVY

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Lead Agency:
Department of the Navy

In accordance with Chief of Naval Operations Instruction 5090.1C

ENVIRONMENTAL ASSESSMENT FOR THE TRANSITION OF EXPEDITIONARY EA-6B PROWLER SQUADRONS TO EA-18G GROWLER AT NAVAL AIR STATION WHIDBEY ISLAND, OAK HARBOR, WASHINGTON

October 2012

Abstract

The proposed action addressed in this environmental assessment (EA) is the transition of the Expeditionary electronic attack (VAQ) squadrons at Naval Air Station (NAS) Whidbey Island, Washington from the aging EA-6B Prowler aircraft to the newer EA-18G Growler aircraft. The EA evaluates the potential environmental effects of transitioning the Expeditionary VAQ squadrons at NAS Whidbey Island from the aging EA-6B Prowler to the newer EA-18G Growler in the 2012-2014 timeframe. The proposed action includes retaining the existing Expeditionary VAQ mission capabilities at NAS Whidbey Island; performing the in-place transition of three existing Expeditionary VAQ squadrons homebased at NAS Whidbey Island from the EA-6B aircraft to the EA-18G aircraft; potentially relocating one Reserve Expeditionary VAQ EA-6B squadron from Joint Base Andrews to NAS Whidbey Island and transitioning from the EA-6B aircraft to the EA-18G aircraft; adding up to 11 EA-18G aircraft to the Fleet Replacement Squadron (FRS) at NAS Whidbey Island to support the Expeditionary VAQ community; modifying certain facilities at Ault Field to provide facilities and functions to support the new aircraft type; and a modest increase in personnel to support the Expeditionary VAQ community. The purpose of the proposed action is to provide deployable land-based Expeditionary electronic attack community assets that meet Department of Defense requirements. The proposed action is needed to retain the Expeditionary VAQ mission and capabilities.

This EA describes and analyzes three action alternatives and a No Action Alternative. The three action alternatives differ in the number of aircraft and personnel. The proposed facility modifications for the three action alternatives are identical, except for Hangar 12, where the need for or size of the proposed addition to this hangar varies. Under the No Action Alternative, there would be no aircraft transition, Fleet Replacement Squadron aircraft addition, facility modifications, or additional personnel stationed at the installation. The No Action Alternative does not meet the purpose and need for the proposed action with regard to national defense requirements; however, it is carried forward in the EA to provide an environmental baseline for comparison. This EA analyzes the reasonably foreseeable environmental impacts of the alternatives on airspace and airfield operations, noise, land use, threatened and endangered species and other biological resources, water resources, air quality, cultural resources, socioeconomics, and environmental management.

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Acronyms and Abbreviations

AAQS	ambient air quality standards
ACHP	Advisory Council on Historic Preservation
agl	above ground level
AICUZ	Air Installations Compatible Use Zones
APE	area of potential effect
APZ	accident potential zone
ATC	air traffic control
ATSDR	Agency for Toxic Substances and Diseases
BASH	bird/wildlife aircraft strike hazard
bgs	below ground surface
BMP	best management practice
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CNATTU	Center for Naval Aviation Technical Training Unit
CO	carbon monoxide
CO_2	carbon dioxide
CVW	Carrier Air Wing
CY	calendar year
CZMA	Coastal Zone Management Act
dB	decibel
dBA	A-weighted decibel
dB re 1 μPa-m	decibels relative to 1 micropascal
DNL	day-night average sound level
DOD	Department of Defense
DON	Department of the Navy (or *the Navy*)
DPS	distinct population segment
EA	environmental assessment
EIS	environmental impact statement
EO	Executive Order

EOD	explosive ordnance disposal
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESOH	environment, safety, and occupational health
ESU	evolutionarily significant unit
FAA	Federal Aviation Administration
FCLP	field carrier landing practice
FEIS	Final environmental impact statement
FEMA	Federal Emergency Management Agency
FLEDS	flight line electrical distribution system
FONSI	finding of no significant impact
FR	*Federal Register*
FRS	Fleet Replacement Squadron
GCA	ground control approach
GHG	greenhouse gas
Hz	hertz
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
IRP	Installation Restoration Program
kHz	kilohertz
km	kilometer(s)
MBTA	Migratory Bird Treaty Act
MCB	Marine Corps Base
MMA	Multi-mission Maritime Aircraft
MMPA	Marine Mammal Protection Act
MOU	Memorandum of Understanding
MSA	metropolitan statistical area
msl	mean sea level
NAAQS	National Ambient Air Quality Standards
NAS	Naval Air Station
NAVFAC NW	Naval Facilities Engineering Command, Northwest
NAVSEA	Naval Sea Systems Command
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act

NIPTS	noise-induced permanent threshold shift
nm	nautical mile
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NOA	notice of availability
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
NS	Naval Station
NSR	New Source Review
NWAPA	Northwest Air Pollution Authority (now the NWCAA)
NWCAA	Northwest Clean Air Agency (formerly the NWAPA)
NWTRC	Northwest Training Range Complex
OLF	outlying landing field
OPNAVINST	Office of the Chief of Naval Operations Instruction
PCBs	polychlorinated biphenyls
PM_{10}	particles 10 micrometers or less
PESHE	Programmatic Environment, Safety, and Occupational Health Evaluation
POV	privately operated vehicles
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
SEL	sound exposure level
SHPO	State Historic Preservation Office
SOH	safety and occupational health
SO_2	sulfur dioxide
SUA	special use airspace
T&G	touch-and-go
tpy	tons per year
U.S.C.	U.S. Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VAQ	electronic attack (squadron)

VOC	volatile organic compound
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDNRNHP	Washington State Department of Natural Resources, Natural Heritage Program

Executive Summary

ES.1 Type of Report

This environmental assessment (EA) evaluates the relevant environmental consequences of the proposed action on the transition of the Expeditionary electronic attack (VAQ) squadrons at Naval Air Station (NAS) Whidbey Island, Oak Harbor, Washington. This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969; the Council on Environmental Quality (CEQ) guidance implementing NEPA (40 Code of Federal Regulations [CFR], Parts 1500-1508); and the Department of the Navy regulations implementing NEPA (32 CFR, Part 775). The Navy is the lead agency for the proposed action.

ES.2 Description of the Proposed Action

The Department of the Navy (DON) proposes to transition the Expeditionary VAQ squadrons at NAS Whidbey Island from the aging EA-6B Prowler to the newer EA-18G Growler in the 2012-2014 timeframe. This includes:

- Retaining the existing Expeditionary VAQ mission capabilities at NAS Whidbey Island
- In-place transitioning of three existing Expeditionary VAQ squadrons homebased at NAS Whidbey Island from the older EA-6B aircraft to the newer EA-18G aircraft
- Potentially relocating one reserve Expeditionary VAQ EA-6B squadron from Joint Base Andrews to NAS Whidbey Island and transitioning this reserve squadron from the older EA-6B aircraft to the newer EA-18G aircraft
- Adding up to 11 EA-18G aircraft to the Fleet Replacement Squadron (FRS) at NAS Whidbey Island to support the Expeditionary VAQ community
- Modifying certain facilities at Ault Field to provide facilities and functions to support the new aircraft type and an increase in personnel (up to 311 personnel, representing a 3.1% increase in the base population) to support the Expeditionary VAQ community.

The purpose of the proposed action is to provide deployable land-based Expeditionary electronic attack community assets to meet Department of Defense requirements. The proposed action is to retain the Expeditionary VAQ mission and capabilities. The Expeditionary VAQ squadrons are land-based squadrons so they do not conduct field carrier landing practice (FCLP) at Outlying Landing Field (OLF) Coupeville. Therefore, the study area is limited to the vicinity of Ault Field and no direct or indirect impacts would occur at the OLF.

ES.3 Alternatives

This EA considers three action alternatives and a No Action Alternative:

Alternative 1. The three Expeditionary squadrons at the installation would be transitioned from EA-6B Prowler aircraft to EA-18G Growler aircraft, and six EA-18G Growler aircraft would be added to the FRS. Alternative 1 would result in the addition of 91 personnel at NAS Whidbey Island.

Alternative 2. The three Expeditionary squadrons at the installation would be transitioned from EA-6B Prowler aircraft to EA-18G Growler aircraft, a fourth Expeditionary squadron consisting of five EA-18G Growler aircraft would be added, and six EA-18G Growler aircraft would be added to the FRS. Alternative 2 would result in the addition of 311 personnel at NAS Whidbey Island.

Alternative 3. The three Expeditionary squadrons at the installation would be transitioned from EA-6B Prowler aircraft to EA-18G Growler aircraft, and 11 EA-18G Growler aircraft would be added to the FRS. Alternative 3 would result in the addition of 311 personnel at NAS Whidbey Island.

No Action. Under the No Action Alternative, there would be no modification of facilities, no increase in personnel, and no new EA-18G operations at NAS Whidbey Island. The No Action Alternative does not meet the purpose and need for the proposed action with regard to Department of Defense requirements; however, the No Action Alternative is carried forward in the EA to provide a baseline against which environmental consequences can be measured. The baseline in this case is primarily based upon the end state of the *Environmental Assessment for Replacement of EA-6B Aircraft with EA-18G Aircraft at Naval Air Station Whidbey Island, Washington*, published in 2005 (which transitions the Carrier Air Wing aircraft vs. the Expeditionary aircraft squadrons). The only exception is for impacts related to noise and air quality, where current conditions (defined as calendar year [CY] 2011) are used as the baseline in order to give the reader a better understanding and comparison of existing and potential future conditions.

For the three action alternatives, some modification of facilities would be necessary to provide capacity and proper configuration for the new EA-18G Growler squadrons and additional FRS aircraft. Additional aircrew simulator space and hangar modifications, including installation of aircraft power utilities and secure mission-planning brief and debrief spaces, would be required. Additional hangar space would be necessary. Accordingly, the facility modifications that would occur under the three action alternatives are as follows:

Common facility modifications. All three action alternatives would require the following facilities modifications: An approximately 32,500-square-foot addition to Hangar 10 (Building 2699) would be constructed. Hangar 10's auxiliary buildings R-42, R-55, R-56, and 2705 would be demolished. Hangar 10's auxiliary buildings 2893 and 2894 would be relocated. An approximately 9,200-square-foot facility would be constructed for the flight simulator building (Building 2593).

Alternative 1. No additional facility modifications besides those mentioned above would occur.

Alternative 2. In addition to the modifications noted under "Common facility modifications" above, an approximately 25,200-square-foot addition to Hangar 12 (Building 2737) would be constructed.

Alternative 3. In addition to the modifications listed under "Common facility modifications" above, an approximately 4,300-square-foot addition to Hangar 12 (Building 2737) would be constructed.

No Action Alternative. No new personnel would be added to the installation, and no facility modifications would occur.

ES.4 Summary of Environmental Impacts

This EA describes reasonably foreseeable environmental impacts on airspace and airfield operations, noise, land uses, threatened and endangered species and other biological resources, water resources, air quality, cultural resources, socioeconomics, and environmental management that could result from implementation of the proposed alternatives. Reasonably foreseeable cumulative impacts with other actions are also described. The potential environmental impacts may be summarized as follows:

Airspace and Airfield Operations. None of the three action alternatives would change the types of flight operations or flight tracks conducted by Expeditionary VAQ aircraft. Alternative 1 would result in a 2.7% increase in total annual operations, and Alternatives 2 and 3 would each result in a 3.1% increase in total annual operations. Therefore, all three action alternatives would have no significant impact on airspace and airfield operations. The No Action Alternative would result in no change to types of flight operations, flight tracks, or number of annual air operations conducted by VAQ aircraft. Therefore, the No Action Alternative would have no significant impact on airspace and airfield operations.

Noise. All three action alternatives would result in minor positive impacts due to the reduced size of the day-night average sound level (DNL)[1] noise contours, which would result in at least 9% fewer people exposed to the greater than 65 decibel (dB) DNL contours for both Alternatives 2 and 3. The reduction in the DNL noise contours would occur mostly over water. Therefore, all three action alternatives would have no significant impact on the noise environment. The No Action Alternative would result in no change in and no significant impact on the noise environment.

Land Use. All three action alternatives and the No Action Alternative would have a minor impact on installation land use, regional land use, and land use controls. The Navy has determined that the proposed action is not reasonably likely to affect the use of natural resources of Washington's coastal zone under any of the three action alternatives. Therefore, all three action alternatives would have no significant impact on land use.

Air Emissions. Because NAS Whidbey Island is located in a region that is in attainment for all criteria emissions, the conformity rule does not apply to the implementation of this action. Projected emissions from temporary construction and ongoing annual operations would be below the 250 tons per year (tpy) Prevention of Significant Deterioration (PSD) significance threshold established for stationary sources for all criteria emissions. Emissions from the action were also compared to total annual mobile emissions in the Northwest Clean Air Agency region, and emissions resulting from this action represent 0.25% to 0.65% of total annual emissions. Since the total regional emissions in the region have not resulted in exceedances of the National Ambient Air Quality Standards (NAAQS), the anticipated changes in emissions under either Alternative 2 or Alternative 3 would be considered insignificant.

Biological Resources. The changes in flight operations and noise levels may affect, but are not likely to adversely affect, the marbled murrelet (*Brachyramphus marmoratus)* on the waters surrounding Whidbey Island. However, under all alternatives, there would be no effect on any other species listed under the Endangered Species Act. The operational changes would not significantly impact wildlife species of concern. The action would not result in reasonably foreseeable "takes" of marine mammal species or bald eagles. The predicted change in noise levels would have no adverse or disruptive impacts on local wildlife populations or migratory

[1] The DNL is a noise metric based on the number of air operations that occur on an average annual day at an installation over a 24-hour period.

birds. There would be a negligible increase in bird/wildlife aircraft strike hazard risk due to the 3.1% increase in annual air operations. Under NEPA, all three action alternatives and the No Action Alternative would have no significant impact on biological resources.

Cultural Resources. There would be no effect on architectural or archaeological resources under any of the three action alternatives. Therefore, all three action alternatives would have no significant impact on cultural resources. Implementation of the No Action Alternative would result in no effect and no significant impact on architectural or archaeological resources.

Water Resources. Implementation of any of the three action alternatives is not expected to result in any short- or long-term impacts on surface waters. Any stormwater runoff from the addition of 0.20 acre of additional impervious surface is expected to be contained on-site in existing grassy swales and retention systems. No impact on groundwater is anticipated under any of the three action alternatives because best management practices (BMPs) would be employed to prevent potential spills and to clean up any spill, if one occurs, before it infiltrates the groundwater. There would be no significant impact on floodplains under any of the action alternatives. The No Action Alternative would result in no significant impact on surface water, groundwater, or floodplains.

Socioeconomics. Implementation of any of the three action alternatives would result in a short-term, beneficial impact on the regional economy from construction funds spent on labor and materials purchased in the region. The No Action Alternative would not result in a short-term impact on the regional economy. Implementation of Alternative 2 or Alternative 3 would result in a minor long-term beneficial impact on the regional economy due to a small increase in the number of personnel at the air station, which would result in a proportionate increase in payroll. Implementation of Alternative 1 or the No Action Alternative would have no additional long-term impact on the regional economy. Therefore, all three action alternatives and the No Action Alternative would have no significant impact on cultural resources.

Environmental Management. Under all three of the action alternatives, any hazardous materials such as asbestos, lead-based paint, mercury, and polychlorinated biphenyls (PCBs) associated with the facilities renovations would be handled and disposed of in accordance with environmental regulations. Therefore, all three action alternatives would have no significant impact on environmental management. No additional hazardous materials would be generated as a result of the No Action Alternative and therefore no significant impact. There would be no significant impact on Installation Restoration Program sites under any of the three action alternatives or the No Action Alternative.

Cumulative Impacts. Potential cumulative impacts that could result from the transition of Expeditionary EA-6B Prowler squadrons to EA-18G Growler squadrons were analyzed. Research, literature reviews, and contacts with applicable government and non-government agencies were used to identify reasonably foreseeable actions, determine the geographic range and timeframe of implementation, and assess potential cumulative impacts by resources area.

Two federal present/ongoing and four federal reasonably foreseeable actions were examined. These U.S. Navy projects are as follows: Northwest Training and Testing at the Northwest Training Range Complex; construction of the NAS Whidbey Island petroleum, oil, and lubricants pipeline; introduction of the P-8A multi-mission maritime aircraft to the U.S. Fleet; fuel pier breakwater construction and finger pier demolition; replacement of the C-9 aircraft with the C-40 aircraft; and animal and vegetation control. Two City of Oak Harbor present/ongoing projects also were examined: the City of Oak Harbor water system improvements and clean water facilities planning. One private present/ongoing project was examined: Whidbey East Holdings, LLC's harvest of 28 acres of timber. (Section 5, Table 5-1 provides further details on these projects.)

Cumulative impacts on six resources areas were examined: airspace and airfield operations; noise; land use compatibility; air quality; biological resources (federally protected species, wildlife, migratory birds, and bird/aircraft strike hazard); and socioeconomics. Cumulative impacts on all these resources were determined not to be significant. (See Section 5 for more details on the cumulative impact analysis process and findings.)

1 Purpose of and Need for the Proposed Action

1.1 Introduction

This environmental assessment (EA) evaluates the potential environmental impacts associated with the U.S. Department of the Navy's (DON or *the Navy*'s) proposed action to transition the Expeditionary electronic attack (VAQ) squadrons at Naval Air Station (NAS) Whidbey Island, Washington, from the aging EA-6B Prowler aircraft to the newer EA-18G Growler aircraft. The proposed action is planned to begin in 2012 and will take approximately two years to complete. This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969; the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] 1500–1508); Navy procedures for implementing NEPA (32 CFR 775); and Office of the Chief of Naval Operations Instruction (OPNAVINST) 5090.1C, Change 1 (U.S. Navy July 18, 2011).

1.2 Background

NAS Whidbey Island is located in Island County, Washington, on Whidbey Island in northern Puget Sound (Figure 1-1). The air station is located in the north-central part of the island, adjacent to the Town of Oak Harbor and is divided into four distinct parcels. Ault Field, the training and operational center of NAS Whidbey Island, is the focus of this EA's analysis. The remaining three parcels—Lake Hancock, Outlying Landing Field (OLF) Coupeville, and the Seaplane Base— would not be affected by the proposed action and, therefore, are not discussed further. All proposed construction and renovation activities would take place within the installation boundary at Ault Field—specifically, in previously developed areas near or on the existing flight line.

NAS Whidbey Island has supported the electronic attack (VAQ) community for more than 30 years. There are two distinct VAQ communities: the Carrier Air Wing (CVW) Fleet VAQ squadrons and the Expeditionary VAQ squadrons. Each community has similar missions but differ in where they deploy (onboard aircraft carriers for the Fleet VAQ squadrons vs. land-based VAQ squadrons). Expeditionary VAQ squadrons are not required to conduct field carrier landing practice (FCLP) training because they do not deploy on aircraft carrier. As a result, the Expeditionary VAQ squadrons, unlike the Fleet VAQ squadrons, do not train at OLF Coupeville. NAS Whidbey Island is currently home to the following tenants:

Ecology & Environment, Inc. GIS Department Project:
R:\EDMS-Projects\navy\whidbey_growler\MAPs\MXDs\figure _1-1_proj_vicinity.mxd Date: 4/25/2012

Source: ESRI, 2010; NAVFAC GeoRediness Center, 2006; NAS Whidbey Island, 2007.

Figure 1-1

General Location

Transition of Expeditionary EA-6B Prowler Squadrons to

EA-18G Growler at NAS Whidbey Island, Washington

- Three Expeditionary VAQ EA-6B squadrons, which forward-deploy to land-based sites
- Nine CVW VAQ Fleet squadrons (currently transitioning from EA-6B aircraft to EA-18G aircraft, to be completed by 2013), which deploy on naval aircraft carriers
- The VAQ Fleet replacement squadron (FRS), which provides post-graduate training for assigned personnel (aircrews and maintainers) for both CVW and Expeditionary VAQ squadrons
- Three P-3 maritime patrol squadrons (with phased transition to P-8A aircraft beginning in 2016)
- Two EP-3 Fleet air reconnaissance squadrons
- One C-9 Fleet logistics squadron
- MH-60S search-and-rescue helicopters
- 26 other tenant commands.

Aircraft stationed at NAS Whidbey Island train in national and international airspace, in designated special use airspace (SUA) and in low-altitude military training routes located in the Northwest Training Range Complex (NWTRC), as well as in training ranges in SUA scheduled and/or controlled by other military services. The potential environmental impacts associated with related training activities of VAQ squadrons in existing military training ranges are analyzed separately in the *Northwest Training Range Complex (NWTRC) Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS*) (U.S. Navy 2010).

The primary mission of the Expeditionary VAQ squadrons (EA-6B Prowler and EA-18G Growler) includes electronic surveillance and electronic attack (e.g., use of jamming equipment and high-speed anti-radiation missiles) against hostile radar and communication systems. CVW and Expeditionary squadrons fulfill the same mission. When deployed, CVW VAQ squadrons operate from an aircraft carrier, whereas Expeditionary VAQ squadrons operate from forward-deployed land bases as directed by the U.S. Department of Defense (DOD). The current Expeditionary VAQ force structure at NAS Whidbey Island consists of three EA-6B Prowler squadrons. Previously, a fourth Expeditionary EA-6B Prowler squadron was homebased at NAS Whidbey Island but was disestablished in September 2004. A reserve Expeditionary EA-6B squadron is currently homebased at Joint Base Andrews, Maryland.

1.3 The Proposed Action

The DON proposes to transition the Expeditionary VAQ squadrons at NAS Whidbey Island from the aging EA-6B Prowler to the newer EA-18G Growler in the 2012-2014 timeframe (see Figure 1-2). This includes the following:

- Retaining the existing Expeditionary VAQ mission capabilities at NAS Whidbey Island
- In-place transitioning of three existing Expeditionary VAQ squadrons homebased at NAS Whidbey Island from the older EA-6B aircraft to the newer EA-18G aircraft
- Potentially relocating one reserve Expeditionary VAQ EA-6B squadron from Joint Base Andrews to NAS Whidbey Island and transitioning this reserve squadron from the older EA-6B aircraft to the newer EA-18G aircraft
- Adding up to 11 EA-18G aircraft to the FRS at NAS Whidbey Island to support the Expeditionary VAQ community
- Modifying certain facilities at Ault Field to provide facilities and functions to support the new aircraft type and an increase in personnel (up to 311 personnel, representing a 3.1% increase in the base population) to support the Expeditionary VAQ community.

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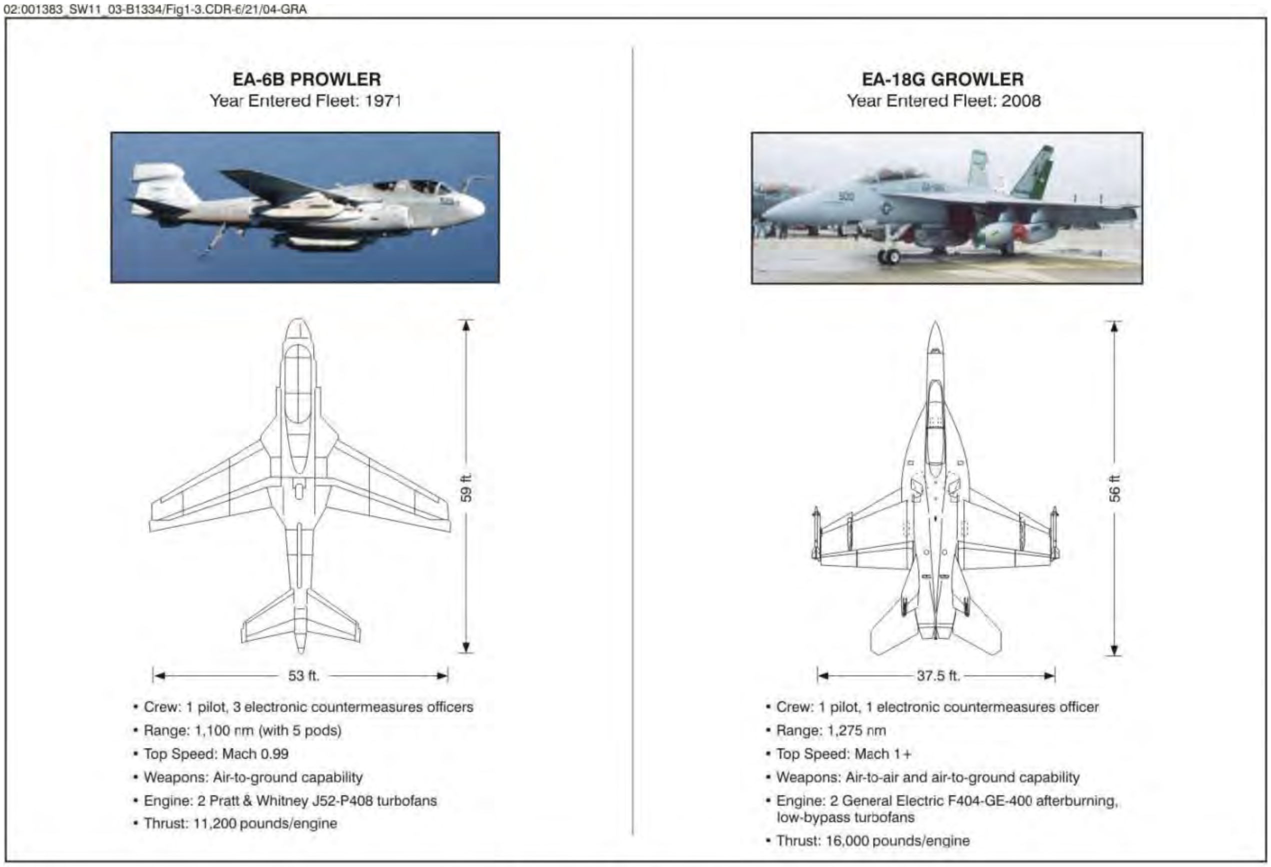

Figure 1-2 The EA-6B and the EA-18G

1.4 Purpose and Need

The purpose of the proposed action is to provide deployable land-based Expeditionary electronic attack community assets that meet DOD requirements. The proposed action is needed to retain the Expeditionary VAQ mission and capabilities. In 2005, the DOD directed the U.S. Navy to disestablish the Expeditionary VAQ capabilities and directed the U.S. Air Force to absorb the Expeditionary VAQ mission by 2012. However, in October 2009, a Deputy Secretary of Defense memorandum directed the U.S. Navy to maintain the Expeditionary VAQ capabilities indefinitely. Although the EA-6B Prowler airframe has remained operationally viable through systematic upgrades, it is approaching the end of its service life and potentially is affecting operational readiness. Thus, in December 2010, the U.S. Congress authorized the procurement of 14 additional EA-18G aircraft in part to support the Navy's plans to transition the aging Expeditionary VAQ EA-6G aircraft to the newer EA-18G aircraft.

Use of existing infrastructure and assets at NAS Whidbey Island optimizes facilities and functions to support both the CVW and Expeditionary VAQ communities and is consistent with the *N3/N5 Strategic Laydown and Dispersal of Ships and Aircraft* (U.S. Navy 2008). Specifically, single-siting the CVW and Expeditionary VAQ community enhances existing training, maintenance, and support infrastructure; offers operational synergy; and improves the ability to deploy VAQ forces quickly and efficiently. Transitioning the Expeditionary VAQ squadrons, including a small FRS component, to any other base would increase operational risks associated with the ability to meet training requirements and deployment schedules, reduce operational synergies within the VAQ community, and significantly increase the life-cycle costs of the proposed action. NAS Whidbey Island has hosted the Navy's VAQ capability for more than 30 years and is the only installation able to provide facilities for the Expeditionary VAQ squadrons within the transition timeline. For these reasons, the Navy is proposing to retain the Expeditionary VAQ mission and transition to the new EA-18G aircraft at NAS Whidbey Island.

1.5 Scope of the Environmental Assessment

This EA identifies and analyzes the potential impacts on the natural and human environment associated with implementation of three action alternatives and a No Action alternative. It describes the environmental conditions at NAS Whidbey Island under current air operations, identifies reasonable alternatives to the proposed action, evaluates the direct and indirect environmental consequences that may result from implementation of the proposed action or alternatives, and addresses potential cumulative impacts resulting from past, present, and reasonably foreseeable projects. Information contained in this EA was derived from interviews with Navy personnel and review of documents listed in the reference section (Section 8).

This EA describes potential environmental impacts on airspace and airfield operations, noise, land use, threatened and endangered species and other biological resources, water resources, air quality, cultural resources, socioeconomics, and environmental management that would be associated with changes in aircraft operation numbers, personnel transitions, and new construction and renovation of existing structures at NAS Whidbey Island. The study area for this EA is the natural and human environment in the vicinity of Ault Field at NAS Whidbey Island. Because the proposed action only covers the Expeditionary VAQ squadrons that do not deploy on aircraft carriers and do not need to conduct FCLPs at the OLF, the study area does not include OLF Coupeville.

The resources described in this EA provide baseline information that can be used to compare and evaluate potential impacts on the human environment that may result from implementation of the alternatives. Although the baseline is based upon the conditions resulting at the end state of the *2005 Environmental Assessment for Replacement of EA-6B Aircraft at Naval Air Station Whidbey Island, Washington* (which transitions only the carrier version of the EA-6B to EA-18G aircraft), it has been modified to account for current conditions (calendar year [CY] 2011) in order to give the reader a better understanding and comparison of existing and future conditions. The discussion of the existing environment focuses only on those resource areas where there is a potential for impacts. The following existing environmental resources are not addressed in detail in this EA because implementation of the proposed action and its alternatives would have a negligible effect or no effect on them: community services, transportation, socioeconomics (regional population, housing, business impacts, property values, and tourism), infrastructure and utilities, vegetation, and soils. More detailed information on these resources is located in Section 3.1.

1.6 Regulatory Compliance

1.6.1 National Environmental Policy Act

NEPA (42 U.S. Code [U.S.C.] §4321–4370d) requires federal agencies to take into consideration the potential environmental consequences of proposed actions in their decision-making process. The intent of NEPA is to protect, restore, or enhance the environment through well-informed federal decisions. This EA will assist the Navy in deciding the recommended alternative for implementation through an analysis of environmental impacts associated with each alternative (see Section 2 for a discussion of alternatives). The CEQ was established under NEPA to implement and oversee federal processes. In 1978, the CEQ issued *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act* [40 CFR §1500–1508]. These regulations specify that an EA should briefly provide sufficient analysis and evidence for determining whether to prepare an environmental impact statement (EIS) or a finding of no significant impact (FONSI) determination; aid in an agency's compliance with NEPA when an EIS is deemed unnecessary; and facilitate EIS preparation when one is necessary.

To comply with NEPA and other pertinent environmental laws and regulations (e.g., the Clean Air Act [CAA], the National Historic Preservation Act [NHPA], the Endangered Species Act [ESA], the Coastal Zone Management Act [CZMA], and the Marine Mammal Protection Act [MMPA]), this EA has been developed as part of the decision-making process for the proposed action at NAS Whidbey Island. Its primary purpose is to address the potential environmental consequences associated with the proposed action.

As required under NEPA, this EA considers various federal and state laws, ordinances, rules, regulations, and policies that are pertinent to implementation of the proposed action. Section 4 of this EA describes the impacts of each proposed action alternative to determine if it would result in significant impacts in relation to the resources of the affected environment.

1.6.2 Agency Consultation

The Navy prepared and submitted a *Biological Assessment for the Expeditionary Electronic Attack Squadron Realignment and Transition at Naval Air Station Whidbey Island* to the U.S. Fish and Wildlife Service (USFWS) on April 4, 2012 (see Appendix A). In a letter dated May 25, 2012, the USFWS concluded informal consultation pursuant to Section 7(a)(2) of the ESA of 1973, as amended (16 U.S.C. 1531 *et seq.)* and concurred with the Navy's determination that the proposed action may affect but is not likely to adversely affect the marbled murrelet, a sea bird species that is federally listed as threatened, and that forages near NAS Whidbey Island (see Appendix A, Biological Assessment).

The Navy consulted with the Washington State Historic Preservation Office (SHPO) requesting concurrence on each of the proposed alternatives for new construction and non-historic structures that the proposed action would have no adverse effect on National Register of Historic Places (NRHP)-eligible or listed historic and cultural resources. A letter of concurrence on this finding was received on July 3, 2012. Details are provided in Sections 3.7 and 4.7. Copies of the correspondence are provided in Appendix B.

The Navy has determined there would be no significant impacts on tribal treaty resources, tribal rights, or Indian lands and, therefore government-to-government consultation was not required. A letter was sent to the interested tribes on June 27, 2012, notifying them of the project and the Navy's effect determination (see Appendix B).

Based on a comprehensive coastal consistency program and policy analysis, the Navy has determined the proposed action would not affect the coastal resources or uses of Washington State. The Navy submitted a negative Coastal Consistency Determination on May 10, 2012. In a letter dated June 12, 2012, the Washington State Department of Ecology concurred with the Navy's negative determination. Copies of the Navy's negative determination and the Washington State Department of Ecology response are included in Appendix B.

1.7 Public Participation

The Navy released the Draft EA for public review on July 27, 2012, to inform the public of the proposed action and to allow the opportunity for public comment. The Draft EA public comment period began with the public notice published in the *Whidbey News Times* and the *Skagit Valley Herald* indicating the availability of the Draft EA and the locations of public review copies. A press release also was distributed to media outlets serving the area surrounding NAS Whidbey Island.

One hard copy and one electronic copy of the Draft EA were placed in the following public locations for review:

Oak Harbor Library
1000 SE Regatta Dr.
Oak Harbor, WA 98277-3091

La Conner Regional Library
614 Morris Street
La Conner, WA 98257

The Draft EA was also made available on the NAS Whidbey Island Web site: http://www.cnic.navy.mil/Whidbey/OperationsAndManagement/EnvironmentalSupport/index.htm.

Additionally, the Draft EA was made available on the Naval Facilities Engineering Command, Northwest (NAVFAC NW) Web site: https://portal.navfac.navy.mil/portal/page/portal/navfac/NAVFAC_WW_PP/NAVFAC_EFANW_PP

The public comment period was initially scheduled to last 15 days, ending August 13, 2012. However, in response to requests from local officials, the Navy extended the public review period until August 31, 2012. The Navy issued a press release on August 14, 2012, announcing the extension of the public review period and submitted letters to the local officials who made the request. Additional hard and electronic copies of the Draft EA were placed in the following public locations for review:

Coupeville Library
788 Alexander St
Coupeville WA 98239

Anacortes Public Library
1220 10th Street
Anacortes, WA 98221

1.7.1 Public Comments

A total of 233 comments were received during the public review period of which 129 comments expressed support for the proposed action and 104 comments expressed concern about the existing operations. Of the 104 comments expressing concern, 54 were specifically concerned about the noise environment in the city of Coupeville and the areas surrounding OLF Coupeville. Although Fleet CVW Growler squadrons routinely fly in the vicinity of Coupeville, the Expeditionary VAQ sqadrons identified in this proposed action do not fly at OLF Coupeville. Additionally, several emails and letters were received requesting extensions of the public review period, calling for comments from other individuals, and providing news articles and media releases.

Some citizens who voiced support for the proposed action expressed that NAS Whidbey Island and the military are an important part of the local community. Many commenters expressed their support for the continued training mission, and cited the positive socioeconomic impacts and the role of military and family members in their community as scout leaders, coaches, and civic members. Many citizens acknowledged the proactive land use planning policies implemented by the county, including real estate disclosures.

Primary concerns are addressed in the following paragraphs. The changes between the Draft EA and the Final EA are summarized in Section 1.7.2.

1.7.1.1 OLF Coupeville

Comment Summary. Several commenters stated that the EA for the proposed action is inadequate and an EIS should be prepared. The commenters said that the analysis should include impacts to the area surrounding OLF Coupeville consistent with the *EA for Replacement of EA-6B Aircraft with EA-18G Aircraft at Naval Air Station Whidbey Island (2005).* Some commenters stated that an EIS should have been prepared in 2005. These commenters stated that since the 2005 EA should have been an EIS and this information was used to develop the baseline for this proposed action that the baseline is flawed for this proposed action.

Response. The Navy complied with Navy Regulations as detailed in OPNAVINST 5090.1C, federal law, and CEQ regulations. The proposed action would not impact flights at OLF Coupeville. The Expeditionary VAQ squadrons are land-based aircraft and do not deploy on aircraft carriers. As a result, the Expeditionary VAQ squadrons do not have a requirement to train or conduct field carrier landing practice (commonly referred to as FCLPs) at OLF Coupeville. Although the proposed action could increase the number of aircraft in the Expeditionary VAQ squadron and the overall number of operations would increase at Ault Field by 2.7% to 3.1%, there would be no direct or indirect increased use of OLF Coupeville under the proposed action. Ault Field has operational capacity to accommodate the increase in flight operations as a result of the proposed action. As a result, other aircraft would not be required to relocate to OLF Coupeville for training. Therefore, the proposed action would not impact the existing or future conditions at OLF Coupeville and the surrounding area. Further analysis is not required for any resource area including, but not limited to, noise, historic structures, impacts to wildlife, and socioeconomic impacts.

The baseline for the proposed action is based upon the conditions resulting at the end state of the *EA for Replacement of EA-6B Aircraft at Naval Air Station Whidbey Island, Washington* (*2005)* (which transitions only the carrier version of the Prowler aircraft to Growlers). It has been modified to account for current conditions (CY2011) in order to give the reader a better understanding and comparison of existing and future conditions.

Each resource is analyzed in accordance with NEPA and other federal laws/regulations. The analysis supports a no significant impact finding for each resource. Therefore, an EIS is not required.

1.7.1.2 Flight Patterns/Operations

Comment Summary. Some commenters remarked about changes or variations in flight patterns, the increased number of aircraft flying together in flight patterns, and an overall increase in air traffic over Whidbey Island. These comments say that changes in flight patterns created a change in the level of noise that residents are exposed to from the aircraft. Commenters requested redirecting training operations to occur over the ocean as a method of reducing the air traffic over land. Many commenters stated they were exposed to noise associated with the longer training sessions in which aircraft are flying continuously for several hours and late-night training occurring after 10:00 p.m. Many commenters also stated that Navy aircraft are flying low over their property.

Response. Annual operations are dependent on training schedules, deployment cycles, weather events, and global events. The Navy strives to be good neighbors at all installations and recognizes public concern over aircraft operations. The Navy must however meet mission requirements to ensure ready forces. All of the airspace over Whidbey Island is part of the National Airspace System and is used by both civil and military aircraft. There are no established “no fly zones” over Oak Harbor, Whidbey Island, or the surrounding area; however, the Navy has developed designated flight tracks that represent the predominant airspace usage in the vicinity of NAS Whidbey Island. Current NAS Whidbey Island Ault Field and OLF Coupeville course rules and flight tracks are expected to remain the same because the EA-18G Growler Expeditionary VAQ squadrons would conduct the same type of operations and would use similar flight tracks as the EA-6B Prowler Expeditionary VAQ squadrons.

Flight tracks represent a general area where aircraft normally fly rather than a line in the sky. However, there are times when aircraft would fly in areas other than the flight tracks to enhance the safety of flight and for compliance with federal aviation regulations. Changes in atmospheric conditions such as wind speed and direction, as well as other aircraft operations, can influence an aircraft’s exact position within the flight track. The Navy continually reviews its own established course rules in an effort to minimize community impacts. Sometimes requirements to alter established course rules to conform to Federal Aviation Administration (FAA) restrictions and local air traffic conditions may result in a temporary increase in noise.

Night training is required for carrier pilots to maintain operational readiness. Pilots must train using night-vision goggles and this training must occur in the dark without moonlight. During the summer months, pilots must wait until after 10:00 p.m. locally to initiate this training and ensure complete darkness. NAS Whidbey Island guidelines indicate training generally should conclude by midnight; however, if conditions or emergent mission conditions occur, training can be extended.

All Navy pilots comply with FAA regulations and Navy regulations, which dictate allowable aircraft flight elevations. Flight altitudes are determined by many variables such as designation of flight tracks, distance between takeoff and landing locations, mission and other air traffic. Other than takeoff and landing, low-altitude flights are conducted for specific training requirements in approved areas and on approved routes.

1.7.1.3 Safety

Comment Summary. Some commenters made statements pertaining to aircraft safety and the safety of the residents and businesses in the community.

Response. The Navy places an extremely high priority on safety during training and real-world operations, and safety is important at NAS Whidbey Island. Navy pilots are well-trained, and their training includes extensive use of flight simulators and frequent practice in emergency procedures. The Navy's aviation safety record has continually improved over the past 20 years. New aircraft are subject to an extensive systems development and demonstration phase, which involves developmental testing of the engine and system-level testing of the entire aircraft prior to flight testing. Throughout testing procedures, the engine and aircraft are evaluated for endurance and reliability to ensure safe performance.

In addition, the Navy works with communities adjacent to airfields to prevent development that would be incompatible with a military airfield. The Air Installations Compatible Use Zones (AICUZ) program provides a vehicle for achieving this outcome. The primary goal of the AICUZ program is to protect the health, safety, and welfare of those living on and near a military airfield while preserving the operational capability of the airfield. Although, it is difficult to project future safety/mishap rates for any new aircraft. In all cases, the DOD maximizes the use of lessons learned and current technology to minimize the chances of aircraft mishap*s* (refer to Sections 3.4.3 and 4.4.3).

1.7.1.4 Noise

Comment Summary. Commenters stated that an increase in operations would create additional noise at their residence/business while others have commented that the EA-18G Growler is louder than the EA-6B Prowler. Some commenters also mentioned the low-frequency vibration associated with the EA-18G Growler. Additionally, commenters stated that pets and wildlife were negatively affected by the noise associated with the EA-18G Growler and cited a 2009 report on jet engine noise reduction for jet engine noise levels.

Response. The Navy conducted a comprehensive noise study to determine the noise impacts associated with the proposed action (see Appendix C for details). The day-night average sound level (DNL) is the metric used by all federal agencies for predicting human annoyance and other potential noise effects on humans. While “loudness” of an event may be the first reaction many people have to aircraft noise, the number (or duration) of events, and the time of day also influence community perception of noise and are also included in DNL. The 24-hour DNL is a reliable measure of community sensitivity to aircraft noise and is the FAA and DOD standard noise metric used in the United States (except California, which uses a similar metric) to measure the effects of aircraft noise for both commercial airports and military installations. DNL takes into account both the noise levels of all individual events that occur during a 24-hour period and the number of events and the times of those events. Since ambient noise is generally lowest during this time interval, acoustic night (10 p.m. to 7 a.m.) carries a 10–decibel (dB) penalty for any aircraft operations modeled during this period. The modeled noise contours for NAS Whidbey Island include this 10-db penalty for nighttime operations. DNL noise contours have historically been used as the noise metric for NAS Whidbey Island and 65 DNL is the lowest noise contour for which Navy land use guidance is provided and is the standard under which previous NAS Whidbey Island noise studies were conducted.

Compared to the current noise environment (CY2011, which is the baseline for this EA), the noise generated by operations of the Expeditionary EA-18G VAQ squadron flights at and around Ault Field is expected to be less based on noise modeling conducted specifically for this proposed action. The DOD analyzes aircraft noise near military airfields through a suite of computer-based programs, collectively called NOISEMAP. NOISEMAP examines all the primary factors influencing aircraft noise, including:

- Aircraft type;
- Number and time of operations;
- Flight tracks
- Aircraft power settings, speeds and altitudes;
- Numbers, duration and location of engine maintenance run-ups;
- Terrain; and

- Environmental data (temperature and humidity).

For the noise generated by specific aircraft, the DOD draws on a vast aircraft noise library. This library contains acoustic information on aircraft in the military inventory measured under controlled conditions. Aircraft noise characteristics from the noise library are used in NOISEMAP, adjusting the characteristics to local environmental conditions, to accurately predict the noise environment. Models, like NOISEMAP, are particularly useful in predicting the noise environment where operational tempos and even aircraft types are projected to change.

NOISEMAP uses the DNL metric to present noise contours in the near airfield environment. The noise contours presented for the action alternatives connect points of equal value and range from 60 DNL to 85 DNL in 5-dB increments. The Navy makes land use recommendations for compatible development. Residential land uses are normally considered incompatible with noise levels above 65 DNL. Please see Section 4.3 and the complete Noise Report in Appendix C for a more detailed description.

The Navy uses other noise metrics, such as Sound Exposure Level (SEL) to help paint a complete picture of the noise environment. The EA-18 Growler Expeditionary VAQ squadrons would continue the same type of operations and would use similar flight tracks as the EA-6B Prowler Expeditionary VAQ squadrons. At an altitude of 1,000 feet, noise modeling takes into account individual aircraft profiles and local environmental conditions to determine that the SEL acoustical energy emitted by the EA-18G Growler demonstrates that there is a decrease in noise levels by approximately 2 to 8 dB when compared to the EA-6B Prowler for most operations. For departures, the EA-6B Prowler SEL is 18 to 23 dB higher than the EA-18G Growler (see Appendix C, the Noise Report, for more information). The existing population exposed to noise levels greater than 80 dB DNL would decrease slightly under the proposed action. No new areas of population would be exposed to noise levels greater than 80 dB DNL. Under the proposed action, the land area in the noise zones would be reduced by as much as 14% and, therefore, the corresponding population in these noise zones would be reduced by as much as 9%. The proposed 65 to 75 dB DNL zone would decrease as much as 1 mile relative to the baseline scenario (see Section 4.3). The area within the DNL noise zones would decrease by approximately 5,032 acres, a large portion of which would be located over the open waters of Puget Sound and Skagit Bay. Additionally, the population exposed within the 65 DNL and greater noise zones associated with the proposed action would decrease by an estimated 948 people (see Section 4.3).

Vibration - The EA-18G Growler is recognizable by the low frequency “rumble” of its jet engines, whereas the EA-6B Prowler is associated with a higher frequency sound of its jet engines. With its increased low-frequency content, Growler take-off events have the higher potential to cause noise induced vibration. Noise-induced structural vibration may also cause annoyance to dwelling occupants because of induced secondary vibrations, or rattling of objects within the dwelling such as hanging pictures, dishes, plaques, and bric-a-brac. In general, such noise-induced vibrations occur at peak sound levels of 110 dB or greater. Structural damage would be expected if sound levels exceed 130 C-weighted decibels (dBC). However, the take-off condition has sound levels greater than 110 dBC for both EA-6B Prowler and EA-18G Growler aircraft, creating an environment conducive for noise-induced vibration. Additional information is provided in Section 4.3; also see Section 7.2 of the Noise Report in Appendix C.

Operations/Night Training - The EA-6B Prowler Squadrons have operated continuously at NAS Whidbey Island since 1971. Annual operations are dependent on training schedules, deployment cycles, weather events, and global events. The Navy strives to be good neighbors at all of its installations and recognizes public concern over noise. The Navy must however meet mission requirements to ensure ready forces; readiness requires night training. This EA addresses the effects of replacing the EA-6B Prowler Expeditionary VAQ squadron with the EA-18G Growler Expeditionary VAQ squadron. During the noise modeling process for baseline aircraft operations, the Navy included other aircraft that contribute to the noise at the installation. Since the noise data from these other aircraft are incorporated into the modeled baseline noise contours, the change in noise environment as discussed in the EA is representative of the difference between the Expeditionary EA-6B Prowler and the Expeditionary EA-18G Growler aircraft. The other aircraft modeled operations remained constant for each alternative evaluated.

In regards to the public comment about permanent restrictions for nighttime and weekend operating hours, NAS Whidbey Island Ault Field is a military airfield that is open 24 hours a day, 7 days a week. Night training is required for pilots to maintain operational readiness. Pilots must train using night-vision goggles and this training must occur in the dark. During the summer months, pilots must wait until after 10:00 p.m. locally to perform this training to ensure complete darkness. NAS Whidbey Island guidelines indicate training generally should conclude by midnight; however, if conditions or emergent mission conditions occur, training can be extended.

As a good neighbor, the Navy will continue to make every attempt to minimize its noise impacts to nearby communities. These efforts include limiting late-night flying to only mission-essential activities, locating engine run-up areas away from populated areas, and minimizing flights over heavily populated areas, while fulfilling mission requirements. In addition, the Navy works with communities to develop their land use plans to minimize noise impacts to residents.

Animals - The Navy prepared a comprehensive noise study in the preparation of this EA. The noise study evaluates the impacts of Navy aircraft to the federally threatened marbled murrelet and the EA analyzed the impacts of the proposed action on wildlife. Section 4.6 provides an analysis of the impacts of the proposed action on wildlife. Information on how the Navy analyzes noise and the impacts of noise on the environment is provided in Appendix C, the Noise Report. In the Noise Report, see Appendix B, "Discussion of Noise and its Effects on the Environment," for further information on impacts to domestic and wild animals.

2009 Report on Jet Engine Noise Reduction - The Naval Research Advisory Committee's Report on Jet Engine Noise Reduction (U.S. Navy 2009) primarily discusses the noise on the flight line and on the deck of an aircraft carrier and concerns workplace noise. While the report does discuss possible ways to reduce engine noise, the technology is not yet mature enough to be implemented. The report also suggests that the Navy examine noise limits on the design of future aircraft. This statement does not refer to the EA-18G Growler.

1.7.1.5 Health Effects

Comment Summary. Many commenters stated that late night flights occurring after 10:00 p.m. and sometimes not ending until around 1:00 a.m. are impacting their ability to get enough sleep. Commenters also mentioned the potential for EA-18G aircraft noise to negatively impact people's health and hearing. Some commenters requested the Navy to perform more studies on the impacts of aircraft noise on health.

Response. The Navy prepared a comprehensive noise study in the preparation of this EA (Appendix C). The noise study evaluated the health, safety, and well-being of citizens in and around NAS Whidbey Island. The analysis concluded that the noise contours under the proposed action would result in a decrease in land area and in population exposed to noise from the current baseline conditions. As a result, there would be a reduction in the noise and its associated effects experienced by the community. The land area in the noise zones would be reduced by as much as 14% and, therefore, the corresponding population in the noise zones would be reduced by as much as 9%. The proposed 65 to 75 dB DNL contour would decrease as much as 1 mile relative to the baseline scenario (see Section 4.3). The area within the DNL noise zones would decrease by as much as 5,032 acres, a large portion of which would be located over the open waters of Puget Sound and Skagit Bay. The population exposed within the 65 DNL and greater noise zone would decrease by as much as 948 people. As discussed in Section 4.3, no person off-station would be exposed to noise levels that would have the potential to cause hearing loss and sleep disturbance related to effects from the proposed action. Additional information on studies and health impacts can be found in Appendix C, the Noise Report. In the Noise Report, Appendix B provides more detailed information.

1.7.1.6 Socioeconomics

Comment Summary. Some commenters expressed an opinion that they could experience impacts to property value, loss of business, and a potential decrease in tourism due to increasing the noise associated with the EA-18G Growler.

Response. A comprehensive noise study was conducted as part of this EA and concluded that under all alternatives there would result in a decrease in land area and in population within the 65 dB DNL or greater noise contours as compared to baseline conditions (see Appendix C). As a result, no impacts to housing, property values, tourism, or other socioeconomic factors are expected.

Real property values are dynamic and are influenced by a combination of factors, including market conditions, neighborhood characteristics, and individual real property characteristics (e.g., the age of the property, its size, and amenities). The degree to which a particular factor may affect property values is influenced by many other factors that fluctuate widely with time and market conditions (see Section 3.1).

1.7.1.7 Jet Fuel and other Hazardous Materials

Comment Summary. A few commenter stated that the island is becoming polluted by jet fuel and other hazardous materials used by the base.

Response. The Navy has existing procedures in place to store, handle, and dispose of hazardous materials and complies with all federal and state regulations that govern their use and disposal. The Navy monitors fuel tanks and complies with all federal and state regulations that govern their use, spill prevention, and reporting requirements.

The Navy does not routinely dump fuel from aircraft. To do so would not only be environmentally unsound policy, but also would be fiscally unsound given the cost of fuel. If forced to do so because of an emergency, Navy pilots would typically attempt to dump fuel at an altitude at which the fuel would dissipate before reaching the ground and over an unpopulated area in accordance with FAA regulations.

NAS Whidbey Island is a recognized leader in environmental stewardship by its municipal and federal partners. Most recently, NAS Whidbey Island won the 2012 Northwest Bainbridge Community Award based on the following activities: leading annual Earth Day events, conducting on-base and off-base clean-up actions, working in partnership with the Northwest Marine Mammal Stranding Network, and implementation of salt water marsh restoration to improve salmon habitat with key partners such as the Skagit River Systems Cooperative which includes the Swinomish and Sauk-Suiattle Tribes, and several other programs. Additionally, NAS Whidbey Island achieved a 31% energy reduction since 2003, a 10% water use reduction since 2007, and has diverted 76% of its waste from landfills by integrating recycling programs on base. Lastly, the installation received the 2009 DOD pollution prevention award from Vice President Joe Biden.

1.7.1.9 Public Outreach

Comment Summary. Many commenters stated that they would like to see more public outreach from NAS Whidbey Island on matters of interest to the local communities. Some commenters stated they would like the base to publish training schedules and provide more information to the public about airfield operations. Some commenters wrote that their concerns/complaints are not important to NAS Whidbey Island and that they are unsatisfied with the past responses from the Navy.

Response. These comments have been submitted to NAS Whidbey Island for further consideration. NAS Whidbey Island takes all noise concerns seriously. Noise complaints are received by NAS Whidbey Island Air Operations and Public Affairs via a designated hotline. The Noise Hotline phone number is: 360-257-2681.

The Navy recognizes the importance of being good neighbors with the local communities and makes every effort to balance noise abatement with the need to train Navy pilots. There are times, however, when pilots must make varying approaches/departures that are not part of the "typical" pattern, but are consistent with FAA regulations.

Noise complaint calls are answered and information is collected from the caller concerning the time, location, and description of the noise-generating event. The calls are logged and responded to the following business day. Each complaint is reviewed by NAS Whidbey Island Air Operations, and (when appropriate) the responsible flight squadron is notified and any deviations from standard procedures are discussed to determine the need for corrective action. Upon request, the Community Planning Liaison Officer will contact the individual who complained and will provide follow-up information and explanation.

1.7.1.10 Mitigation

Comment Summary. Some commenters suggested that the Navy take appropriate measures to mitigate noise and recommended the following measures: relocating flights to be more over the water, reduce the number of nighttime flights, fly at a higher elevation, and compensate homeowners for noise impacts and potential home improvement.

Response. The Navy remains dedicated to working with the community to find ways to mitigate noise effects from airfield operations where possible and will continue the extensive noise abatement procedures already in place. These include limiting flying to only mission-essential activities, locating engine run-up areas away from populated areas, and minimizing flights over heavily populated areas, while fulfilling all mission essential requirements. In addition, the Navy works with communities to discourage locating noise-sensitive land uses in high noise areas through the use of zoning and other land use planning tools. Communities that must locate noise-sensitive land uses, such as residential, in high noise areas are encouraged to require that sound-reduction techniques be used in new construction and to require real estate disclosures.

1.7.1.11 Close NAS Whidbey Island or Relocate Aircraft

Comment Summary. Some commenters advocated closing NAS Whidbey Island or relocating the louder aircraft such as the EA-18G Growler to another Navy base that is in a less populated location. Some commenters stated that the base is a health and safety concern for the island’s community. Some commenters stated that in order to preserve the rural character of the island, the Navy should relocate, while other commenters suggested that Whidbey Island is no longer a rural farming community and that the urban environment is not conducive to the impacts associated with loud aircraft.

Response. Closing or realigning NAS Whidbey Island is beyond the scope of this EA and would require Congressional action. The Navy has no plans to recommend closing NAS Whidbey Island as it provides a vital national defense mission as the sole homebase for the Navy’s electronic attack community**.**

1.7.2 Changes from the Draft EA to the Final EA

In response to input received during the public comment period, the following updates have been made to the Final EA.

Executive Summary

- An explanation of why the proposed action would not impact OLF Coupeville has been added to ES.2.

Section 1

- An explanation of why the proposed action would not impact OLF Coupeville has been added to Section 1.5.
- An explanation of the how the baseline was developed has been added to Section 1.5.
- A synopsis of public comments and the Navy's response to those comments has been added to Section 1.7.
- A more detailed description of the EA for Replacement of EA-6B Aircraft with EA-18G Aircraft at Naval Air Station Whidbey Island, Washington (U.S. Navy July 2005) has been added to Section 1.8.

Section 2

- An explanation of why the proposed action would not impact OLF Coupeville has been added to Section 2.1.
- An explanation of the how the baseline was developed has been added to Section 2.2.4.

Section 3

- Section 3.1, "Regional Population and Housing" was renamed "Socioeconomics." Section 3.1 discusses population density, housing, property values, and tourism.
- A statement has been added to Section 3.4.3 stating that Island County has adopted a closed racetrack FCLP accident potential zone (APZ) pattern for land use regulations.

Section 4

- Additional explanation of the noise modeling process has been added to Section 4.3.
- Additional analysis has been added to Section 4.3 under Alternatives 1, 2, and 3. This analysis provides more detail on the differences between EA-6B and EA-18G noise profiles, low-frequency vibrations, and the decrease in noise associated with Expeditionary EA-18G operations when compared to baseline conditions.
- Additional citations have been included in Section 4.3.

Section 5

- This section has been reformatted and additional analysis has been included in Sections 5.3.5.1.2 and 5.3.5.1.3 to support the conclusion.

1.8 Related Environmental Documents

A number of environmental studies and assessments have been conducted at NAS Whidbey Island. These have been considered in the preparation of this document and are summarized below.

1.8.1 The Environmental Assessment for Replacement of EA-6B Aircraft with EA-18G Aircraft at Naval Air Station Whidbey Island, Washington (U.S. Navy July 2005)

This document analyzed the environmental consequences of transitioning the CVW VAQ squadrons at NAS Whidbey Island from the older EA-6B Prowler aircraft to the newer EA-18G Growler aircraft. The EA for the transition to the EA-18G Growler also analyzed an increase of one additional aircraft assigned to each CVW VAQ squadron. EA-6B squadrons have four aircraft each, while EA-18G squadrons have five aircraft each. As discussed previously in Section 1.4, this document also includes the disestablishment of the Expeditionary VAQ squadrons by 2012. Therefore, the Navy anticipated an overall decrease in the number of both CVW and Expeditionary VAQ aircraft and personnel at NAS Whidbey Island. Note: The proposed action in this document reverses that decision to disestablish the Expeditionary VAQ squadrons, and transitions the Expeditionary VAQ squadrons (not the CVW squadrons) to the EA-18G airframe.

1.8.2 Final Environmental Impact Statement (FEIS) for the Introduction of the P-8A Multi-Mission Maritime Aircraft (MMA) into the U.S. Navy Fleet (U.S. Navy December 2008)

The FEIS analyzed the environmental consequences of the U.S. Navy's proposed action to provide facilities and functions to support the homebasing of 12 P-8A MMA squadrons (72 aircraft) and one FRS (12 aircraft) at established maritime patrol homebases in NAS Jacksonville, Florida; NAS Whidbey Island, Washington; and Marine Corps Base (MCB) Hawaii, Kaneohe Bay, Hawaii. The FEIS analyzed personnel transition, new construction or renovation of structures, and all airfield operations necessary to accommodate the basing of the P-8A MMA as the Navy phases the P-3C Orion out of service, beginning in 2012. The P-8A squadrons would use the existing ranges used for P-3C squadron tactical training. Additionally, the number and type of P-8A MMA tactical training operations were projected to be the same as the P-3C training operations and would use the same weapons systems and sonobuoys currently used by the P-3C. The analysis in the 2008 FEIS also assumed the disestablishment of three Expeditionary VAQ EA-6B squadrons at NAS Whidbey Island by 2012. The FEIS resulted in a Record of Decision (ROD), dated December 30, 2008, and directed the homebasing of four P-8A squadrons to NAS Whidbey Island.

Based on the 2008 ROD, the P-8A MMA transition plan forecasts that P-3C squadrons at NAS Whidbey Island would begin transitioning to P-8A aircraft beginning in 2016. (Since the Expeditionary VAQ proposed action would occur in the 2012 to 2014 timeframe, the cumulative effects of the P-8A transition on the Expeditionary VAQ proposed action are discussed in Section 5, Cumulative Impacts.)

1.8.3 Northwest Training Range Complex (NWTRC) Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) (U.S. Navy October 2010)

In the Final NWTRC EIS/OEIS, the Navy evaluated the potential environmental effects of current, emerging, and future training; research and development; and test and evaluation activities in the NWTRC to achieve required levels of operational readiness of aviation, surface ship, submarine, and explosive ordnance disposal (EOD) units homebased and homeported at NAS Whidbey Island; Naval Station (NS) Everett; Puget Sound Naval Shipyard; Naval Base Kitsap-Bremerton; and Naval Base Kitsap-Bangor. The NWTRC includes ranges, operating areas, and airspace that extend 250 nautical miles (nm) west from the coasts of Washington, Oregon, and northern California and to the east just beyond the Washington/Idaho border.

All aircraft stationed at NAS Whidbey Island train in the national airspace, in designated SUA, and in low-altitude military training routes located within the NWTRC, as well as in training ranges in SUA scheduled and/or controlled by other military services. The potential environmental impacts associated with related training activities of VAQ squadrons in existing military training ranges were analyzed in the 2010 NWTRC EIS/OEIS. The ROD was signed October 25, 2010.

2 Description of the Proposed Action and Alternatives

2.1 Proposed Action

The DON proposes to transition the Expeditionary VAQ squadrons at NAS Whidbey Island from the EA-6B Prowler to the EA-18G Growler in the 2012-2014 timeframe. The proposed action includes the following:

- Retaining the existing Expeditionary VAQ mission capabilities at NAS Whidbey Island.
- In-place transitioning of three existing Expeditionary VAQ squadrons homebased at NAS Whidbey Island from the older EA-6B aircraft to the newer EA-18G aircraft.
- Potentially relocating one Reserve Expeditionary VAQ EA-6B squadron from Joint Base Andrews to NAS Whidbey Island and transitioning this reserve squadron from the older EA-6B aircraft to the newer EA-18G aircraft.
- Adding up to 11 EA-18G aircraft to the FRS at NAS Whidbey Island to support the Expeditionary VAQ community.
- Modifying certain facilities at Ault Field to provide facilities and functions to support the new aircraft type and an increase in personnel (up to 311 personnel, representing a 3.1% increase in the base population) to support the Expeditionary VAQ community.

The primary types of mission training and readiness requirements for the EA-18G Growler are nearly identical to those of the EA-6B Prowler, although the Expeditionary and carrier-based aircraft differ in their need for FCLP training in that the Expeditionary aircraft do not land on aircraft carriers so they do not need to train at OLF Coupeville. There would be no change in the training syllabus for the Expeditionary VAQ squadrons (arrivals, departures, or pattern operations at Ault Field); the locations of flight operations (SUA, military training routes, or flight tracks over land or water); or the current ratio of daytime to nighttime flight operations at Ault Field. While there is no change in the type and location of training operations analyzed in the Navy’s 2010 NWTRC EIS, the total number of operations is projected to be more than the baseline under all action alternatives because of the proposed increase in the number of Expeditionary VAQ aircraft (up to nine additional aircraft or up to 14 additional aircraft).

Under the proposed action, each Expeditionary VAQ squadron would increase by one additional aircraft. Each existing Expeditionary VAQ EA-6B squadron currently consists of four aircraft, but after transition the Expeditionary VAQ EA-18G squadrons would consist of five aircraft each. In addition, the existing FRS (VAQ-129) would receive additional aircraft to support the Expeditionary VAQ community. In order to maintain Expeditionary VAQ capability, the squadrons must transition to the EA-18G Growler by 2014.

There would be an increase in personnel under the proposed action. The increased maintenance and flight training requirements associated with retention of the Expeditionary VAQ mission at Whidbey Island under all action alternatives would result in a corresponding increase in personnel associated with the proposed action. The proposed relocation of one reserve Expeditionary VAQ squadron would add approximately 30 officers and 190 enlisted. Additionally, the Center for Naval Aviation Technical Training Unit (CNATTU) schoolhouse force structure would increase by an estimated five maintenance instructors and 20 additional student maintainers per year. The Electronic Attack Weapons School would add six officers and two enlisted personnel to fully staff the requirements. The proposed action would result in a total of 91 additional personnel under Alternative 1 and a total of 311 additional personnel under Alternatives 2 and 3.

Because NAS Whidbey Island does not currently have adequate hangar space, flight line electrical distribution systems (FLEDs), or flight simulator capacity to support EA-18G Growler squadrons, the proposed action includes construction, renovation, or modification of the following facilities and functions (see Figure 2-1).

Hangar 10 (Building 2699). An approximately 32,500-square-foot addition to Hangar 10 would be constructed. Hangar 10's auxiliary buildings R-42, R-55, R-56, and 2705 would be demolished. Hangar 8 (Building 2642) auxiliary buildings 2893 and 2894 would be demolished and replaced with same-sized facilities in the previously disturbed area between Hangars 10 and 8. The Hangar 10 addition would have aircraft power utilities (400 hertz [Hz]) and would include secure spaces for mission planning, briefing, and debriefing functions.

Expansion of the Flight Line Electrical Distribution System. The Navy has determined that a FLEDS is required to support the additional EA-18G aircraft. Each FLEDS consists of aircraft electrical service points providing 200Y/115V, 400 Hz electrical power for servicing aircraft located on the parking apron. The new FLEDS unit would be connected to the existing electrical distribution system and would be installed on the existing aircraft parking apron.

Flight Simulator Building (Building 2593). An approximately 9,200-square-foot facility would be constructed west of the existing flight simulator building (Building 2593). This new facility would provide space for two tactical operational flight trainers.

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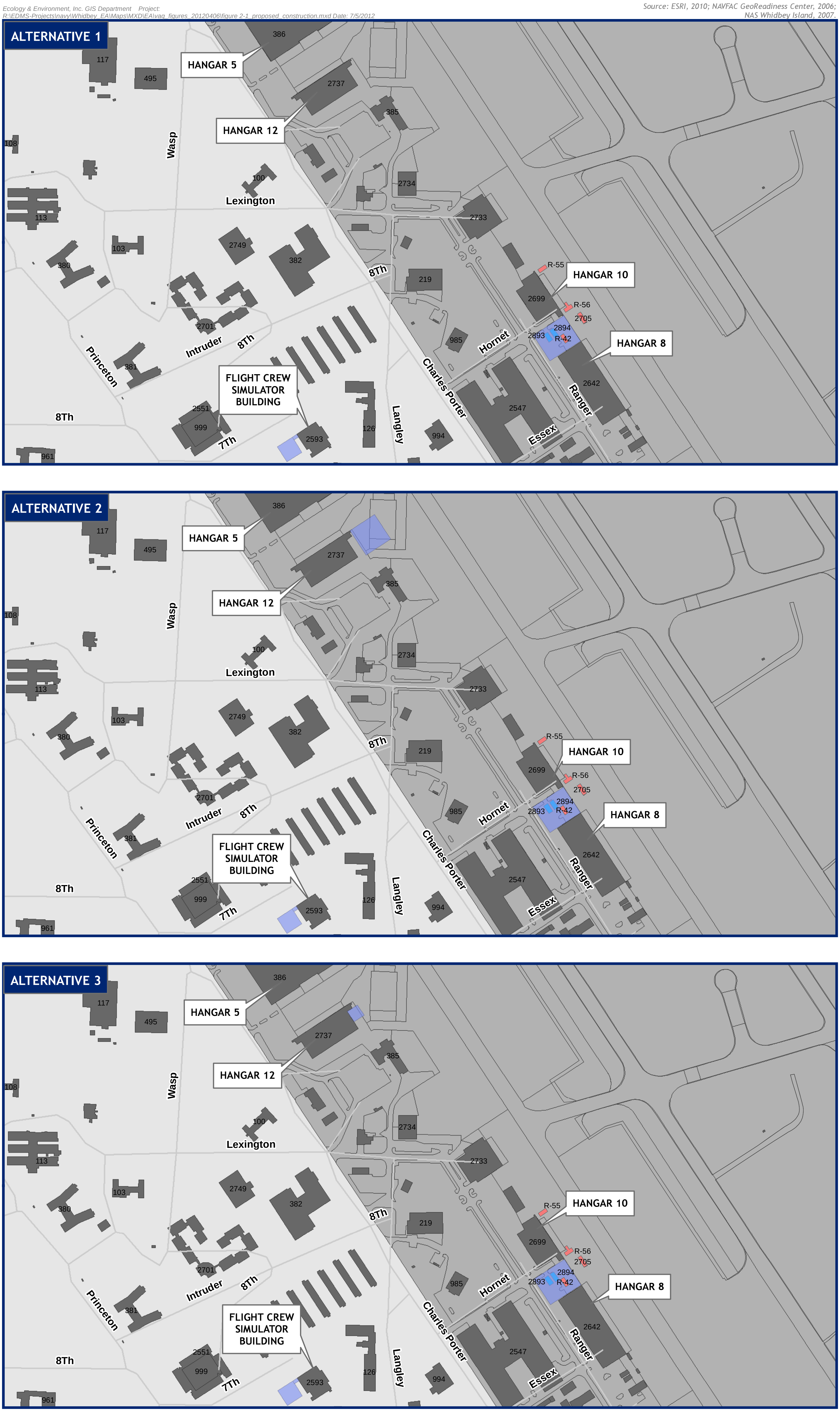
Source: ESRI, 2010; NAVFAC GeoReadiness Center, 2006; NAS Whidbey Island, 2007.



Key:
- Installation Area
- Buildings
- Runway and Airfield Surface Area

APE:
- Demolition
- New Construction
- Proposed Relocation

Figure 2-1
Proposed Construction Projects
Transition of Expeditionary EA-6B Prowler Squadrons to EA-18G Growler at NAS Whidbey Island, Washington

0 100 200 300 400 500
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Hangar 12 (Building 2737). Depending on the alternative selected, an addition to Hangar 12 may be constructed. Alternatives 2 and 3 would include, respectively, a 25,200-square-foot and a 4,300-square-foot addition to Hangar 12 to support the proposed additional aircraft to the FRS. Alternative 1 would not incorporate any modifications to Hangar 12.

The Expeditionary VAQ squadrons operating the EA-18G Growler would need the same airfield facility dimensions and characteristics as the current Expeditionary VAQ EA-6B squadrons. Because Expeditionary VAQ squadrons do not deploy on aircraft carriers, there is no requirement for these squadrons to conduct field carrier landing practice (FCLP) training at OLF Coupeville. Because the current facilities and operations at OLF Coupeville would not be affected by the proposed action, this EA does not analyze any environmental impacts at OLF Coupeville.

2.2 Alternatives

This EA addresses three action alternatives and a No Action Alternative. The alternatives were developed to provide options for different aircraft-loading scenarios.

2.2.1 Alternative 1

Under Alternative 1, three Expeditionary VAQ squadrons currently based at NAS Whidbey Island would transition from the older EA-6B aircraft to the newer EA-18G, and six EA-18G aircraft would be added to the FRS to support the training requirements of the Expeditionary VAQ community. As shown in Table 2-1, Alternative 1 would result in a total increase of nine aircraft at NAS Whidbey Island. The Expeditionary VAQ squadrons would transition to the new aircraft between 2012 and 2014 at a rate of about one squadron per year. Each Expeditionary VAQ EA-18G squadron would consist of 24 officers and 162 enlisted personnel. Alternative 1 would result in the addition of 91 personnel at NAS Whidbey Island (see Table 2-2). Each Expeditionary VAQ EA-18G squadron would be manned by the majority of personnel transitioning from the corresponding EA-6B squadron.

Total annual aircraft operations would increase from 70,557 baseline operations to 71,554 operations under Alternative 1 (see Table 2-3). New construction and the replacement of existing facilities, as shown on Figure 2-1, would include an addition to Hangar 10, expansion of the FLEDS, and construction of the flight simulator building, as described in Section 2.1.

Table 2-1 The Number of Expeditionary VAQ Aircraft at NAS Whidbey Island

	No Action Alternative	Alternative 1	Alternative 2	Alternative 3
Expeditionary VAQ Squadrons				
E/A-18G Growler	0	15 (+3)	20 (+8)*	15 (+3)
EA-6B Prowler	12	0	0	0
FRS[1]				
E/A-18G Growler	0	6 (+6)	6 (+6)	11 (+11)*
EA-6B Prowler	0	0	0	0
Total	**12**	**21 (+9)**	**26 (+14)**	**26 (+14)**

Key:

Numbers in parenthesis indicate net increase over baseline.
FRS = Fleet Replacement Squadron
VAQ = Electronic Attack
* = includes the reserve Expeditionary VAQ requirement
(1) = FRS currently operates both E/A-18G and EA-6B aircraft which only support VAQ Fleet squadrons. There are no FRS aircraft supporting Expeditionary VAQ operations as part of the baseline, as indicated by (0) in the table.

Table 2-2 Number of Expeditionary VAQ Personnel at NAS Whidbey Island

	No Action Alternative (Baseline)[1]	Alternative 1	Alternative 2	Alternative 3
Three Active-Duty Expeditionary VAQ Squadrons				
Officers	84	72 (-12)	72 (-12)	72 (-12)
Enlisted	492	486 (-6)	486 (-6)	486 (-6)
One Reserve VAQ Squadron				
Officers	N/A	0	30 (+30)	N/A
Enlisted	N/A	0	190 (+190)	N/A
FRS				
FRS Officers	68	79 (+11)	79 (+11)	109 (+41)
FRS Enlisted Maintenance	277	342 (+65)	342 (+65)	532 (+255)
CNATTU Schoolhouse				
Instructors (Officers)	11	11 (+0)	11 (+0)	11 (+0)
Instructors (Enlisted)	82	87 (+5)	87 (+5)	87 (+5)
Students (Enlisted)	130	150 (+20)	150 (+20)	150 (+20)
Weapons School				
Officers	18	24 (+6)	24 (+6)	24 (+6)
Enlisted	17	19 (+2)	19 (+2)	19 (+2)
Total Personnel	**1,179**	**1,270 (+91)**	**1,490 (+311)**	**1,490 (+311)**

Notes:
[1] The number of personnel for the baseline includes both Fleet and Expeditionary squadron personnel.

Key:
CNATTU = Center for Naval Aviation Technical Training Unit
FRS = Fleet Replacement Squadron
N/A = Not applicable
VAQ = Electronic attack

Table 2-3 Expeditionary VAQ Air Operations at Ault Field

	No Action Alternative (Baseline)		Alternative 1		Alternative 2		Alternative 3	
	12 EA-6B VAQ Aircraft	Total Airfield Operations	21 EA-18G VAQ + FRS Aircraft	Total Airfield Operations	26 EA-18G VAQ + FRS Aircraft	Total airfield Operations	26 EA-18G VAQ + FRS Aircraft	Total Airfield Operations
Departures	589	**12,009**	979	**12,399**	1,212	**12,468**	1,212	**12,468**
Arrivals	589	**12,009**	979	**12,399**	1,212	**12,468**	1,212	**12,468**
Pattern Operations	1,842	**46,539**	3,023	**46,756**	3,743	**47,799**	3,743	**47,799**
Total	**3,020**	**70,557**	**4,981**	**71,554**	**6,167**	**72,735**	**6,167**	**72,735**
Net Air Operation Change	**NA**	**NA**	**1,961**	**2.7%**	**2,178**	**3.1%**	**2,178**	**3.1%**

Key:

FRS = Fleet Replacement Squadron
VAQ = Electronic Attack

2.2.2 Alternative 2

Under Alternative 2, three Expeditionary VAQ squadrons currently based at NAS Whidbey Island would transition from the older EA-6B aircraft to the newer EA-18G; the one reserve Expeditionary VAQ EA-6B squadron from Joint Base Andrews would relocate to NAS Whidbey Island and transition from the older EA-6B to the newer EA-18G aircraft; and six EA-18G aircraft would be added to the FRS to support the training requirements of the Expeditionary VAQ community. This would result in a total increase of 14 aircraft and the addition of 311 personnel; 97 of the 311 additional personnel would be selective reservists at NAS Whidbey Island. Under Alternative 2, the relocated reserve squadron would function under its own command structure with assigned personnel and aircraft.

Alternative 2 would be implemented within the same timeframe as Alternative 1 (2012 through 2014). The Navy assumes that the majority of the reservists currently resides in the region and would work approximately seven days per month at the air station under Alternative 2.

Total annual aircraft operations would increase from 70,557 baseline operations to 72,735 annual operations under Alternative 2 (see Table 2-3). New construction and demolition, as shown on Figure 2-1, would include an addition to Hangar 10, expansion of the FLEDS, and construction of the flight simulator building, as described in Section 2.1. Alternative 2 would also include construction of an approximately 25,200-square-foot addition to Hangar 12 (Building 2737).

2.2.3 Alternative 3

Under Alternative 3, three Expeditionary VAQ squadrons currently based at NAS Whidbey Island would transition from the older EA-6B aircraft to the newer EA-18G, and 11 EA-18G aircraft would be added to the FRS to support the training requirements of the Expeditionary VAQ community and the reserve Expeditionary VAQ EA-6B squadron relocating to NAS Whidbey from Joint Base Andrews. Under either Alternative 2 or Alternative 3, a total increase of 14 aircraft and 311 personnel would result; 97 of the 311 additional personnel would be selective reservists at NAS Whidbey Island. However, under Alternative 3, the relocated reserve squadron would function as part of the FRS, sharing personnel and aircraft. Alternative 3 would be implemented within the same timeframe as Alternatives 1 and 2 (2012 through 2014). The Navy assumes the majority of the reservists currently resides in the region and would work approximately seven days per month at the air station under Alternative 3.

The transition process would result in an overall increase in the number of VAQ aircraft stationed at NAS Whidbey Island. The total number of new EA-18G aircraft would be the same as under Alternative 2, resulting in the same increase in annual operations from 70,557 baseline operations to 72,735 operations under Alternative 3 (see Table 2-3). New construction and demolition, as shown in Figure 2-1, would include an addition to Hangar 10, expansion of the FLEDS, and construction of the flight simulator building, as described in Section 2.1. Alternative 3 also would include construction of an approximately 4,300-square-foot addition to Hangar 12 (Building 2737).

2.2.4 No Action Alternative

Under the No Action Alternative, there would be no modification of facilities, no increase in personnel, and no new EA-18G operations at NAS Whidbey Island. The No Action Alternative does not meet the purpose and need for the proposed action with regard to DOD requirements; however, the No Action Alternative is carried forward in the EA to provide a baseline against which environmental consequences can be measured. The baseline in this case is based upon the conditions resulting at the end state of the *2005 Environmental Assessment for Replacement of EA-6B Aircraft at Naval Air Station Whidbey Island, Washington* (which transitions only the carrier version of the Prowler aircraft to Growlers). It has been modified to account for current conditions (CY2011) in order to give the reader a better understanding and comparison of existing and future conditions.

2.3 Alternatives Considered but Eliminated from Further Study

New homebasing alternatives were excluded from further consideration. Use of existing infrastructure and assets at NAS Whidbey Island optimizes the full transition from the EA-6B Prowler to the EA-18G Growler by 2014. The Expeditionary VAQ squadrons are currently located at NAS Whidbey Island and will continue to be based there, consistent with the logic and reasoning of homebasing tactical aircraft expressed in *N3/N5 Strategic Laydown and Dispersal of Ships and Aircraft* (U.S Navy 2008). Specifically, single-siting the CVW and Expeditionary VAQ community enhances existing training, maintenance, and support infrastructure; offers operational synergy; and improves the ability to deploy VAQ forces quickly and efficiently. Relocating the Expeditionary VAQ squadrons, including a small FRS component, to any other base would increase operational risks associated with the ability to meet training requirements and deployment schedules, would reduce operational synergies within the VAQ community, and would significantly increase the life-cycle costs of the proposed action. Therefore, an alternate location would not meet the purpose and need of the proposed action.

2.4 Preferred Alternative

Alternative 2 is operationally preferable because it replaces all aging EA-6B aircraft with the EA-18G with minimum operational disruption, maintains the reserve squadron as an independent deployable squadron, and enhances the synergy of the VAQ community.

The VAQ community is relatively small. Single-siting the VAQ community facilitates the transition of personnel and aircraft from an EA-6B squadron to an EA-18 squadron and would improve the ability to deploy VAQ forces quickly and efficiently. Relocating VAQ-209 would allow the reserve squadron to leverage VAQ community assets and capabilities at NAS Whidbey Island for training, maintenance, and support, and would improve the organizational synergy of the VAQ community. Ultimately, moving VAQ-209 to Whidbey Island would provide greater VAQ capability at less cost to the Navy by single-siting facilities and functions to support VAQ community.

Alternative 1, while viable, would result in a slightly reduced deployable VAQ capability because VAQ-209 would not relocate to NAS Whidbey Island and would not benefit from single siting with the VAQ community.

Alternative 3, while also viable, would result in a slightly reduced deployable VAQ capability because VAQ-209 would be absorbed as part of the FRS rather than existing as an independent deployable squadron.

2.5 Comparison of Alternatives

Table 2-4 summarizes the environmental consequences associated with the three action alternatives and the No Action Alternative.

Table 2-4 Comparison of Environmental Consequences

Resource	No Action Alternative	Alternative 1	Alternative 2	Alternative 3
Airspace and Airfield Operations and Aircraft Safety	No impacts on regional airspace use. Therefore, no significant impact on airspace. No change in types of flight operations, flight tracks, or number of annual air operations. Therefore, no significant impact on air operations. No significant impact would occur as NAS Whidbey Island would continue to conduct flight training in the local airfield environment and annual operations would continue to operate according to existing safety protocols.	No modifications or additions to the current airspace are proposed. Therefore, there would be no significant impact on airfields and airspace. No change in types of flight operations or flight tracks; a 2.7% increase in total annual operations with no significant impact on air operations. No significant impact would occur from aircraft mishaps or mishap response and no significant safety impacts from operational training actions would be expected for NAS Whidbey Island airfield airspace.	No modifications or additions to the current airspace are proposed. Therefore, there would be no significant impact on airfields and airspace. No change in types of flight operations or flight tracks. An approximately 3.1% increase in total annual operations with no significant impact on air operations. No significant impact would occur from aircraft mishaps or mishap response and no significant safety impacts from operational training actions would be expected for NAS Whidbey Island airfield airspace.	No modifications or additions to the current airspace are proposed. Therefore, there would be no significant impact on airfields and airspace. No change in types of flight operations or flight tracks. An approximately 3.1% increase in total annual operations with no significant impact on air operations. No significant impact would occur from aircraft mishaps or mishap response and no significant safety impacts from operational training actions would be expected for NAS Whidbey Island airfield airspace.
Noise	No change from baseline conditions. No significant impact on the existing noise environment.	No impact due to the reduction in the overall extent of the day-night level (DNL) noise zones, which would result in an overall decrease in the population within the >65 decibel (dB) DNL noise zones. Because of the decrease in population and land area within the less than 65 DNL noise zone, there would be no significant impacts. Minor increase in construction-related noise associated with construction; temporary for duration of projects and localized. No	No impact due to the reduced DNL noise contours, which would result in a decrease in the population exposed within the >65 dB DNL noise zones. The noise exposure generated by the proposed action would decrease compared to baseline conditions; therefore, there would be no significant impact. Minor increase in construction-related noise associated with construction; temporary for duration of projects and localized.	No impact due to the reduced DNL noise contours, which would result in a decrease in the population exposed within the >65 dB DNL noise zones. Minor beneficial impact on the noise environment in the vicinity of NAS Whidbey Island and therefore no significant impact. Minor increase in construction-related noise associated with construction; temporary for duration of projects and localized. No significant impact on the

Table 2-4 Comparison of Environmental Consequences

Resource	No Action Alternative	Alternative 1	Alternative 2	Alternative 3
		significant impact on the existing noise environment.	No significant impact on the existing noise environment.	existing noise environment.
Land Use	No change in installation land use, regional land use, or land use compatibility. No significant impact.	No significant impact on installation land use, regional land use, or land use compatibility.	No significant impact on installation land use, regional land use, or land use compatibility.	No significant impact on installation land use, regional land use, or land use compatibility.
Air Quality	No change from baseline conditions. No significant impact on air quality	No significant impact on air quality. The annual emissions from temporary construction and the proposed changes in operations are projected to be below 250 tpy for all criteria emissions. Emissions would represent less than 0.25% of total annual mobile source emissions in the region.	No significant impact on air quality. The annual emissions from temporary construction and the proposed changes in operations are projected to be below 250 tpy for all criteria emissions. Emissions would represent less than 0.65% of total annual mobile source emissions in the region.	No significant impact on air quality. The annual emissions from temporary construction and the proposed changes in operations are projected to be below 250 tpy for all criteria emissions. Emissions would represent less than 0.65% of total annual mobile source emissions in the region.
Biological Resources	**Special Status Species:** No effect on any federally listed species. No increase in noise levels or number of flight operations above baseline conditions; therefore, no change for the marbled murrelet. No effect on marine mammal species or bald eagles. No significant impact on special status species.	**Special Status Species:** No effect on any federally listed species would result from either construction or changes in flight operations. The changes in flight operations and noise levels may affect, but would not be likely to adversely affect, marbled murrelet in the waters surrounding Whidbey Island. The action would not result in reasonably foreseeable "takes" of marine mammal species or bald eagles; as such, the proposed action would not affect these species. No significant impact on marbled murrelet and no significant impact on other special status species.	**Special Status Species:** No effect on any federally listed species would result from either construction or changes in flight operations. The changes in flight operations and noise levels may affect, but would not be likely to adversely affect, the marbled murrelet on the waters surrounding Whidbey Island. The action would not result in reasonably foreseeable "takes" of marine mammal species or bald eagles; as such, the proposed action would not affect these species. No significant impact on marbled murrelet and no significant impact on other special status species.	**Special Status Species:** No effect on any federally listed species would result from either construction or changes in flight operations. The changes in flight operations and noise levels may affect, but would not be likely to adversely affect, the marbled murrelet on the waters surrounding Whidbey Island. The action would not result in reasonably foreseeable "takes" of marine mammal species or bald eagles; as such the proposed action would not affect these species. No significant impact on marbled murrelet and no significant impact on other special status species.

Table 2-4 Comparison of Environmental Consequences

Resource	No Action Alternative	Alternative 1	Alternative 2	Alternative 3
Biological Resources *(continued)*	**Wildlife:** No change from baseline conditions. No significant impact on wildlife.	**Wildlife:** The predicted reduction in the geographic extent of noise levels would have no adverse or disruptive impacts on local wildlife populations. No significant impact on wildlife.	**Wildlife:** The predicted reduction in the geographic extent of noise levels would have no adverse or disruptive impacts on local wildlife populations. No significant impact on wildlife.	**Wildlife:** The predicted reduction in the geographic extent of noise levels would have no adverse or disruptive impacts on local wildlife populations. No significant impact on wildlife.
	Migratory Birds: No change from baseline conditions. No significant impact on wildlife.	**Migratory Birds:** The predicted change in noise levels would have no adverse or disruptive impacts on migratory birds. No significant impact on wildlife.	**Migratory Birds:** The predicted change in noise levels would have no adverse or disruptive impacts on migratory birds. No significant impact on wildlife.	**Migratory Birds:** The predicted change in noise levels would have no adverse or disruptive impacts on migratory birds. No significant impact on wildlife.
	BASH: No changes in the BASH risk from baseline conditions. Therefore, no significant impact.	**BASH:** The overall potential for bird/wildlife airstrike is not anticipated to be significantly different. Aircrews would follow procedures outlined in the installation's Bird/Airstrike Hazard Management Plan; therefore, no significant impact.	**BASH:** The overall potential for bird/wildlife airstrike is not anticipated to be significantly different. Aircrews would follow procedures outlined in the installation's Bird/Airstrike Hazard Management Plan; therefore, no significant impact.	**BASH:** The overall potential for bird/wildlife airstrike is not anticipated to be significantly different. Aircrews would follow procedures outlined in the installation's Bird/Airstrike Hazard Management Plan; therefore, no significant impact.
Cultural Resources	**Architectural Resources:** No effect; therefore, no significant impact.	**Architectural Resources:** No effect; therefore, no significant impact.	**Architectural Resources:** No effect; therefore, no significant impact.	**Architectural Resources:** No effect; therefore, no significant impact.
	Archaeological Resources: No effect; therefore, no significant impact.	**Archaeological Resources:** No effect; therefore, no significant impact.	**Archaeological Resources:** No effect; therefore, no significant impact.	**Archaeological Resources:** No effect; therefore, no significant impact.
Water Resources	**Surface Water:** No change from baseline conditions; therefore, no significant impact.	**Surface Water:** No significant impacts on surface-water quality. The potential runoff from the addition of 0.2 acre of new impervious surface is anticipated to be retained on-site.	**Surface Water:** No significant impacts on surface-water quality. The potential runoff from the addition of 0.2 acre of new impervious surface is anticipated to be retained on-site.	**Surface Water:** No significant impacts on surface-water quality. The potential runoff from the addition of 0.2 acre of new impervious surface is anticipated to be retained on-site.

Table 2-4 Comparison of Environmental Consequences

Resource	No Action Alternative	Alternative 1	Alternative 2	Alternative 3
Water Resources *(continued)*	**Groundwater:** No change from existing conditions. Therefore, no significant impact.	**Groundwater:** No significant impact anticipated; best management practices will be employed to prevent potential spills. If any spills were to occur, the contractor would be required to conduct a cleanup immediately in accordance with procedures in OPNAVINST 5100.23G, Navy Safety and Occupational Health Program Manual, NAS Whidbey Island's Spill Prevention, Control, and Countermeasures Plan, and the air station's Hazardous Waste Management Plan.	**Groundwater:** No significant impact anticipated; best management practices will be employed to prevent potential spills. If any spills were to occur, the contractor would be required to conduct a cleanup immediately in accordance with procedures in OPNAVINST 5100.23G, Navy Safety and Occupational Health Program Manual, NAS Whidbey Island's Spill Prevention, Control, Countermeasures Plan, and the air station's Hazardous Waste Management Plan.	**Groundwater:** No significant impact anticipated; best management practices will be employed to prevent potential spills. If any spills were to occur, the contractor would be required to conduct a cleanup immediately in accordance with procedures in OPNAVINST 5100.23G, Navy Safety and Occupational Health Program Manual, NAS Whidbey Island's Spill Prevention, Control, and Countermeasures Plan, and the air station's Hazardous Waste Management Plan.
	Floodplains: No change to baseline conditions; therefore no significant impact.	**Floodplains:** No significant impact.	**Floodplains:** No significant impact.	**Floodplains:** No significant impact.
Socioeconomics	Existing economic conditions would remain unchanged. Therefore, no impact on the regional economy.	Short-term, beneficial impact from construction funds spent on labor and materials purchased in the region. No long-term impacts or significant impacts on the regional economy.	Short-term, beneficial impact from construction funds spent on labor and materials purchased in the region. Long-term beneficial impacts would be minor. No significant impacts on the regional economy.	Short-term, beneficial impact from construction funds spent on labor and materials purchased in the region. Long-term beneficial impacts would be minor. No significant impacts on the regional economy.
Protection of Children	No change from baseline conditions. Therefore, no significant impact.	No new environmental health risks and safety risks that may disproportionately affect children because the proposed action is located exclusively in an industrial-use setting in the access-restricted airfield. Therefore, no significant impact.	No new environmental health risks and safety risks that may disproportionately affect children because the proposed action is located exclusively in an industrial-use setting in the access-restricted airfield. Therefore, no significant impact.	No new environmental health risks and safety risks that may disproportionately affect children because the proposed action is located exclusively in an industrial-use setting in the access-restricted airfield. Therefore, no significant impact.

Table 2-4 Comparison of Environmental Consequences

Resource	No Action Alternative	Alternative 1	Alternative 2	Alternative 3
Environmental Justice	No change from baseline conditions. Therefore, no significant impact.	No disproportionately high and adverse human health or environmental effects on minority populations and low-income populations. Therefore, no significant impact.	No disproportionately high and adverse human health or environmental effects on minority populations and low-income populations Therefore, no significant impact.	No disproportionately high and adverse human health or environmental effects on minority populations and low-income populations. Therefore, no significant impact.
Environmental Management	**Hazardous Materials and Waste Management:** No change to baseline conditions as all hazardous wastes would continue to be collected, managed, and stored on-site in accordance with NAS Whidbey Island's guidelines. No significant impact.	**Hazardous Materials and Waste Management:** No effect on hazardous materials and the waste management program at NAS Whidbey Island. Proposed construction would be completed with the use of minimal, if any, potentially hazardous materials. Any spills would immediately be cleaned up in accordance with environmental regulations. Therefore, no significant impact.	**Hazardous Materials and Waste Management:** No effect on hazardous materials and waste management program at NAS Whidbey Island. Proposed construction would be completed with the use of minimal, if any, potentially hazardous materials. Any spills would immediately be cleaned up in accordance with environmental regulations. Therefore, no significant impact.	**Hazardous Materials and Waste Management:** No effect on hazardous materials and waste management program at NAS Whidbey Island. . Proposed construction would be completed with the use of minimal, if any, potentially hazardous materials. Any spills would immediately be cleaned up in accordance with environmental regulations. Therefore, no significant impact.
	Installation Restoration Program Sites: No change in ongoing remedial activities at NAS Whidbey Island. No significant impact.	**Installation Restoration Program Sites:** No significant impact.	**Installation Restoration Program Sites:** No significant impact.	**Installation Restoration Program Sites:** No significant impact.

Key:
BASH = Bird/Wildlife Aircraft Strike Hazard
dB = decibels
DNL = day/night average sound level
NAS = Naval Air Station
PCB = polychlorinated biphenyl
SPCC = spill prevention, control, and countermeasures

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3 Existing Environment

3.1 Introduction

This section describes the existing environmental resources at NAS Whidbey Island and in the immediate surrounding area that could be affected by the proposed action and alternatives, including the No Action Alternative. Resources evaluated include land use and coastal zone management, threatened and endangered species and other biological resources, water resources, noise, air quality, cultural resources, the regional economy, and environmental management. The resources described here provide baseline information that can be used to compare and evaluate potential impacts on the human environment that may result from implementation of the alternatives.

The CEQ regulations implementing NEPA require that a NEPA document "succinctly describe the environment of the area to be affected or created by the alternatives under consideration" (40 CFR 1502.15). The descriptions of the existing environmental resources that could be affected by implementation of the proposed action and its alternatives need be no longer than necessary. Consistent with this guidance, Navy policy directs that a NEPA document should exclude material not directly applicable to the expected impact. Therefore, the discussion of the existing environment focuses on those resource areas where there is a potential for significant impact.

Under the action alternatives, the existing environment may be affected by the following components of the proposed action:

- Aircraft operations
- New construction and renovation
- Personnel relocation and transition.

The number of additional personnel stationed or employed at NAS Whidbey Island would be 91 under Alternative 1 and 311 under Alternatives 2 or 3. Because the change in personnel would be minor in the context of the regional setting of the City of Oak Harbor and Island County, the following existing environmental resources are not addressed in detail in this EA because implementation of the proposed action and its alternatives would have a negligible effect or no effect on them.

Community Services. Changes to the existing community services, including fire protection, emergency, security, and medical services are not anticipated under any of the action alternatives for NAS Whidbey Island or the surrounding communities. All of the action alternatives project a minor increase in the number of personnel stationed or employed at NAS Whidbey Island (91 personnel under Alternative 1 and 311 under Alternatives 2 or 3) and any potential impact associated with the change in the use of on-station or residential community services would be negligible.

Transportation. Under all alternatives the number of personnel stationed or employed at NAS Ault Field would change slightly, with a corresponding negligible change in the number of personally owned vehicles, the amount of traffic, and the miles traveled. Thus, no additional congestion, traffic, or transportation requirements are anticipated on local roads or around the base.

Socioeconomics (Regional Population, Housing, Business Impacts, Property Values, and Tourism). The minor increase of 91 personnel under Alternative 1 and 311 under Alternatives 2 or 3 would result in a corresponding minor increase in regional population and demand for housing. NAS Whidbey Island has been located in this community for decades, and the local housing market routinely accommodates minor increases and decreases in population associated with transient military personnel. Therefore, no impacts are expected and population and housing is not discussed further.

Real property values are dynamic and influenced by a combination of factors, including market conditions, neighborhood characteristics, and individual real property characteristics (e.g., the age of the property, its size, and amenities). The degree to which a particular factor may affect property values is influenced by many other factors that fluctuate widely with time and market conditions. No definitive federal standards exist for quantifying the impact of aircraft and given the dynamic nature of the real estate market and the varying degree to which any combination of factors may affect the value of a particular property, it will not be possible to quantify how a potential change in aircraft noise may affect property values, so these topics are not discussed further.

Infrastructure and Utilities. The minor increase in personnel would result in a corresponding minor increase in water use, wastewater discharge, power use, and solid waste generation. These minor changes would have no effect on the current capacities of existing infrastructure and utilities. No impacts on water quality from stormwater discharge due to new construction would be expected, given the small area of new impervious surface, implementation of on-site BMPs such as those contained in the *Stormwater Management Manual for Western Washington* (Washington Department of Ecology 2005), e.g., containing potential stormwater runoff on site, using existing on-site stormwater detention facilities, and complying with existing permit conditions.

Vegetation. The proposed facility modifications would occur in a developed portion of Ault Field. New construction would be located on previously disturbed areas or areas of maintained ornamental grass typical of industrial and urban areas; so there would be no impact on unique vegetation or habitat. Approximately 9,200 square feet of maintained ornamental grass would be removed to construct the flight simulator building addition. Additional maintained ornamental grass around this building would be disturbed by construction equipment; at completion of construction, this area would be replanted or landscaped.

Soils. The proposed facility modifications would occur in a developed portion of Ault Field where the soils have been previously disturbed. While construction (i.e., clearing, grading, and movement of equipment and materials) would expose soils to wind and stormwater erosion, standard soil erosion and sedimentation control techniques such as the use of silt fencing and other measures contained in the *Stormwater Management Manual for Western Washington* (Washington Department of Ecology 2005) will mitigate these impacts to negligible levels.

3.2 Airspace and Airfield Operations

3.2.1 Airspace

Under the National Airspace System, the airspace above Ault Field is designated as Class C airspace. NAS Whidbey Island Class C airspace is: 1) airspace extending upward from the surface to and including 4,000 feet above mean sea level (msl) within a 5-mile radius of Whidbey Island NAS; 2) airspace that extends upward from 1,300 feet above msl to and including 4,000 feet above msl within a 10-mile radius of the airport from the 050° bearing from the airport clockwise to the 345° bearing from the airport; and 3) airspace extending upward from 2,000 feet above msl to and including 4,000 feet above msl within a 10-mile radius of the airport from the 345° bearing from the airport clockwise to the 050° bearing from the airport.

This Class C airspace area is in effect during the specific days and hours of operation of the Whidbey Island NAS air traffic control (ATC) facility as established in advance by a Notice to Airmen. The effective dates and times will thereafter be continuously published in the Airport/Facility Directory.

In addition to the Class C airspace, the NAS Whidbey Island radar ATC facility is responsible for the safe, orderly, and expeditious flow of both civil and military air traffic operating within 2,200 square miles of Class E airspace. The vertical limits of the airspace are defined by two layers—an upper layer with a 10-nm radius over a bottom layer with a 5-nm radius. The floor of the upper layer is 1,200 feet above msl, with a ceiling of 4,000 feet above msl. The bottom layer extends from the surface to 1,200 feet above msl. The NAS Whidbey Island radar ATC facility is responsible for the safe, orderly, and expeditious flow of air traffic operating within the 2,100 square miles of airspace.

3.2.2 Airfield Operations

Ault Field includes both fixed- and rotary-wing aircraft operations. NAS Whidbey Island provides land-based support and training for all of the Navy's active duty EA-6B Prowler and EA-18G Growler aircraft squadrons and the Pacific Fleet P-3C (being replaced by the P-8A Multi-mission Maritime Aircraft [MMA] beginning in 2012). The air station serves as host to two air wings (Electronic Attack Wing Pacific and Patrol and Reconnaissance Wing Ten), a Fleet Logistics Support squadron, and NAS Whidbey Island Search and Rescue. The EA-18G and P-3C (to be replaced by P-8A MMA) aircraft platforms are the predominant aircraft flown at NAS Whidbey Island and are operated by VAQ Wing Pacific and Patrol and Reconnaissance Wing Ten, respectively. The station also supports a Navy Reserve P-3C and C-9 squadron in addition to the air station's MH-60S search-and-rescue helicopters.

The airfield at Ault Field consists of two intersecting runways, Runway 07/25 and Runway 14/32. Both runways are 8,000 feet long and 200 feet wide. Ault Field is open seven days per week, 24 hours per day. The prevailing wind direction and noise abatement procedures result in Runways 25 and 14 being the most frequently used runways at the station. Approximately 44% of the airfield operations are assigned to Runway 25, and 36% of the airfield operations are assigned to Runway 14. Runways 07 and 32 are used less frequently; 13% of the airfield operations are assigned to Runway 07, and 7% are assigned to Runway 32.

Pilots perform approximately 70,557 flight operations (i.e., any takeoff or landing) annually at Ault Field (Wyle 2012). According to NAS Whidbey Island ATC personnel, operation types include departures (from brake release), full-stop arrivals (either "straight-in" or from an overhead-break), touch-and-go (T&G) patterns, and ground control approach (GCA) operations.

A flight operation refers to any takeoff or landing. The takeoff and landing may be part of a training maneuver (or pattern) associated with the air station runway or may be associated with a departure or arrival of an aircraft to or from defense-related SUA. Certain flight operations (e.g., GCA, T&G, etc.) are conducted as patterns. A pattern consists of a takeoff and a landing operation.

Basic flight operations at NAS Whidbey Island are:

Departure. An aircraft taking off to a local training area, a non-local training area, or as part of a training maneuver (e.g., T&G).

Straight-In/Full-Stop Arrival. An aircraft lines up on the runway centerline, descends gradually, lands, comes to a full stop, and then taxis off the runway.

Overhead Break Arrival. An expeditious arrival using visual flight rules. An aircraft approaches the runway 500 feet above the altitude of the landing pattern. Approximately halfway down the runway, the aircraft performs a 180-degree turn to enter the landing pattern. Once established in the pattern, the aircraft lowers landing gear and flaps and performs a 180-degree descending turn to land on the runway.

Ground-Controlled Approach Box. A radar or "talk down" approach directed from the ground by ATC personnel. ATC personnel provide pilots with verbal course and glide-slope information, allowing them to make an instrument approach during inclement weather. The GCA Box is counted as two operations—the landing is counted as one operation, and the takeoff is counted as another.

Touch-and-Go Operation. An aircraft lands and takes off on a runway without coming to a full stop. After touching down, the pilot immediately goes to full power and takes off again. The T&G is counted as two operations—the landing is counted as one operation, and the takeoff is counted as another.

Field Carrier Landing Practice (FCLP). An aircraft practices simulated carrier landings. FCLPs are required training for all pilots before landing on a carrier. The number of FCLPs performed is determined by the length of time that has elapsed since the pilot's last landing on a carrier. The FCLP is counted as two operations— the takeoff is counted as one, the landing is counted as another. (Because the Expeditionary VAQ Squadrons will not be based aboard aircraft carriers, they will not be performing FCLPs at OLF Coupeville.)

The baseline scenario for this study is defined as the operations during CY2011. As CY2011 was not yet complete when the analysis for this study began, the baseline scenario (i.e., CY2011) was derived from a six-year average of the NAS Whidbey Island Air Traffic Activity Reports for CY2005 through CY2010. Baseline flight operations for Ault Field total 70,557 (see Table 3-1). The EA-6B is currently being replaced by the EA-18G. The Navy provided the numbers of NAS Whidbey Island-based Prowler and Growler aircraft for CY2011 as 40 and 39, respectively. This ratio was used to adjust the proportion of Prowler and Growler operations for the baseline scenario and represents the best available snapshot of aircraft operations while the replacement of CVW EA-6B Prowler squadrons at NAS Whidbey Island with CVW EA-18G Growler squadrons is ongoing.

As shown in Table 3-1, under baseline conditions, airfield operations at Ault Field would be predominantly EA-18G, EA-6B, and P-3C operations, which would account for 26%, 27%, and 45%, respectively, of the total airfield operations (Wyle 2012). Approximately 9% (6,676 operations) of the total annual operations occur at night (2200 to 0700)

Table 3-1 2011 Modeled Annual Baseline Operations at Ault Field

Baseline Flight Operations for NAS Whidbey Island (Ault Field)

Aircraft Type	VFR Departure			Inter-facility Departure to Coupeville				
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Number of Based Aircraft	
EA-18G	1,796	117	1,913	179	11	190	EA-18G	39
EA-6B [3]	1,842	120	1,962	184	11	195	EA-6B	40
P-8A	-	-	-	-	-	-		
P-3C	7,388	210	7,598	-	-	-	Operations Totals	
C-9	196	106	302	-	-	-	Ault Field	70,557
Transient [2]	152	82	234	-	-	-		
Total	**11,374**	**635**	**12,009**	**363**	**22**	**385**		

Aircraft Type	VFR Straight-in Arrival			IFR Straight-in Arrival			TACAN Arrival			Overhead Break Arrival			Inter-facility Arrival from Coupeville		
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total
EA-18G	642	17	659	-	-	-	207	17	224	937	93	1,030	179	11	190
EA-6B [3]	658	18	676	-	-	-	212	18	230	961	95	1,056	184	11	195
P-8A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P-3C	5,173	147	5,320	1,108	31	1,139	1,108	31	1,139	-	-	-	-	-	-
C-9	196	106	302	-	-	-	-	-	-	-	-	-	-	-	-
Transient [2]	152	82	234	-	-	-	-	-	-	-	-	-	-	-	-
Total	**6,821**	**370**	**7,191**	**1,108**	**31**	**1,139**	**1,527**	**66**	**1,593**	**1,898**	**188**	**2,086**	**363**	**22**	**385**

Table 3-1 2011 Modeled Annual Baseline Operations at Ault Field

Baseline Flight Operations for NAS Whidbey Island (Ault Field)																
Aircraft Type	**Touch and Go (1)**			**FCLP (1)**			**Depart and Re-enter Pattern (1)**			**GCA Pattern (1)**			**Total**			
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	% of Total Operations
EA-18G	4,000	189	4,189	6,932	1,448	8,380	104	8	112	888	800	1,688	15,864	2,711	18,575	26.3%
EA-6B (3)	4,103	194	4,297	7,109	1,486	8,595	106	8	114	910	820	1,730	16,269	2,781	19,050	26.9%
P-8A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
P-3C	11,947	227	12,174	-	-	-	-	-	-	4328	162	4,490	31,052	808	31,860	45.2%
C-9	-	-	-	-	-	-	-	-	-	-	-	-	392	212	604	<1.0%
Transient (2)	-	-	-	-	-	-	-	-	-	-	-	-	304	164	468	<1.0%
Total	**20,050**	**610**	**20,660**	**14,041**	**2,934**	**16,975**	**210**	**16**	**226**	**6,126**	**1,782**	**7,908**	**63,881**	**6,676**	70,557	**100**

Notes:
(1) One circuit counted as two operations (1 takeoff and 1 landing)
(2) Modeled as P-3C
(3) EA-6B includes three Expeditionary Squadrons

Key:

FCLP = Field Carrier Landing Practice
GCA = Ground Control Approach
IFR = Instrument Flight Rules
TACAN = Tactical Air Navigation
VFR = Visual Flight Rules

Table 3-2 lists the Expeditionary VAQ squadrons 2011 annual baseline operations.

Table 3-2 Expeditionary VAQ 2011 Annual Baseline Operations at Ault Field, NAS Whidbey Island

	Expeditionary VAQ Air Operations (Baseline)	
	EA-6B VAQ Squadrons	EA-18G VAQ Squadrons
# Aircraft	12	0
Departures	589	0
Inter-facility Departures	0	0
Straight-in Arrivals	272	0
Overhead Break Arrivals	317	0
Inter-facility Arrivals	0	0
Touch & Go	1,289	0
FCLP	0	0
Depart-Re-enter	34	0
GCA pattern	519	0
Total	**3,020**	**0**
Maintenance Run-Ups		
Water Wash	133	0
Low Power	320	0
High Power	3	0

Source: Wyle 2012

3.2.3 Aircraft Safety

Safety is a priority for the Navy. The FAA is responsible for ensuring the safe and efficient use of U.S. airspace by military and civilian aircraft and for supporting national defense requirements. To fulfill these requirements, the FAA has established safety regulations, airspace management guidelines, a civil-military common system, and cooperative activities with the DOD. In addition, the Navy has developed guidance on airfield safety zones, flight rules, air traffic control procedures, and safety procedures.

To complement flight training, all DON pilots use state-of-the-art simulators. Simulator training includes flight operations and comprehensive emergency procedures, which minimizes risks associated with mishaps due to pilot error. Additionally, highly trained maintenance crews routinely inspect each aircraft in accordance with Navy regulations, and maintenance activities are monitored by senior technicians to ensure aircraft are equipped to withstand the rigors of operational and training events safely.

The primary safety concern with regard to military aircraft training operations is the potential for aircraft mishaps to occur. Aircraft mishaps could be caused by mid-air collisions with other aircraft or objects, weather difficulties, mechanical failures, pilot error, or bird/wildlife-aircraft strike hazards (BASH). They are classified as Class A, B, or C according to the severity of injury to individuals and total property damage, with the most severe being a Class A ($2 million or more in property damage, aircraft destroyed, or fatality or permanent total disability) and the least severe a Class C ($50,000 and $500,000 in property damage and/or nonfatal injury) (Naval Safety Center 2012).

NAS Whidbey Island maintains emergency and mishap response plans to guide responses to aircraft accidents. These plans assign agency responsibilities and prescribe functional activities necessary to react to major mishaps, whether on- or off-base. Response would normally occur in two phases. The initial response focuses on rescue, evacuation, fire suppression, safety, elimination of explosive devices, ensuring security of the area, and other actions immediately necessary to prevent loss of life or further property damage. The second phase is the mishap investigation.

3.3 Noise

Noise is generally described as unwanted sound. A sound is regarded as noise when it interferes with normal activities such as sleep or conversation or when it is subjectively judged to be annoying. Noise analysis thus requires a combination of the physical description of sound produced by an activity and an identification of the potential responses to it.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium such as air. The measurement and human perception of sound involves three basic physical characteristics: amplitude, frequency, and duration. Amplitude is a measure of the strength of the sound and is directly measured in terms of the pressure of the sound wave. The greater the sound pressure, the more energy carried by the sound and, generally, the louder the perception of that sound. The second important physical characteristic of sound is frequency, which is the number of times per second the air vibrates. Frequency is sensed as pitch; low-frequency sounds are characterized as rumbles or roars, while high-frequency sounds are typified by sirens or screeches. The third important characteristic of sound is duration, the length of time the sound can be detected.

The loudest sounds that the human ear can hear have an acoustic energy a trillion times that of sounds that can barely be detected. Because of this vast range, using a linear scale to represent the intensity of sound becomes very unwieldy. Sound is therefore usually represented on a logarithmic scale with a unit called the decibel (dB). Such a representation is called a sound level. A sound level of slightly above 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB; sound levels above 120 dB begin to be felt by the human ear as discomfort (Wyle 2012).

The minimum change in sound level that the average human ear can detect is about 3 dB. On average, a person perceives a change in sound level of about 10 dB as a doubling (or halving) of the sound's loudness, and this relation holds true for both loud and quiet sounds. A decrease in sound level of 10 dB actually represents a 90% decrease in sound intensity but only a 50% decrease in perceived loudness because of the nonlinear response of the human ear (similar to most human senses) (Wyle 2012).

In terms of frequency, sound levels are adjusted to the "A-weighted" frequency scale (dBA), which reflects the human ear's sensitivity to different frequencies of sound. A-weighting is assumed for all sound level descriptors in this document.

Aircraft noise consists of two major types of sound events: aircraft takeoffs and landings, and engine maintenance operations, or run-ups. The former can be described as intermittent sounds and the latter as continuous. Noise levels from flight operations exceeding ambient background sound levels typically occur beneath main approach and departure corridors, or in local air traffic patterns around the airfield, and in areas immediately adjacent to parking ramps and aircraft staging areas. As aircraft in flight gain altitude, their noise contribution drops to lower levels, often becoming indistinguishable from background noise.

Noise potentially becomes an issue when it interferes with our daily activities. Ambient background noise in metropolitan, urbanized areas typically varies from 60 to 70 dB and can be as high as 80 dB or greater; quiet suburban neighborhoods experience ambient noise levels of approximately 45 to 50 dB (U.S. Environmental Protection Agency [EPA] 1978).

Since flight operations dominate at an airfield, the resulting noise is highly variable. This variability is best assessed by time-average sound level metrics such as the day-night average sound level (DNL). DNL is a composite metric that averages all noise events for a 24-hour period, with a 10 dB penalty applied to nighttime events after 2200 and before 0700. It is an average quantity, mathematically representing the continuous A-weighted sound level that would be present if all of the variations in sound level that occur over a 24-hour period were smoothed out so as to contain the same total sound energy. It is a composite metric accounting for the maximum noise levels, the duration of the events (sorties or operations), and the number of events that occur over an average annual day.

The 10-dB penalty in DNL is added to noise events that take place between 2200 and 0700 the following morning. This 10-dB penalty accounts for the added intrusiveness of sounds during normal sleeping hours, both because of the increased sensitivity to noise during those hours and because ambient sound levels during nighttime are typically about 10 dB lower than during daytime hours. DNL does not represent the sound level heard at any particular time, but is an expression of community reaction to noise.

The DNL for a community is depicted as a series of contours that connect points of equal value, usually in 5-dB increments. Calculated noise contours do not represent exact scientific measurements. The area between two specific contours is known as a noise zone. The noise zones used in this study range from a low of 65 dB to more than 90 dB.

Individual response to noise levels varies and is influenced by many factors, including:

- The activity the individual is engaged in at the time of the noise
- General sensitivity to noise
- Time of day
- Length of time an individual is exposed to a noise
- Predictability of noise
- Average temperature.

A small change in dBA would not generally be noticeable. As the change in dBA increases, individual perception is greater, as shown in Table 3-3.

Table 3-3 Subjective Responses to Changes in A-Weighted Decibels

Change	Change in Perceived Loudness
1 dB	Requires close attention to notice
3 dB	Barely perceptible
5 dB	Quite noticeable
10 dB	Dramatic; twice or half as loud
20 dB	Striking; a four-fold change

Source: Wyle 2012

In general, scientific studies and social surveys have found a high correlation between the percentages of groups of people highly annoyed by a noise and the level of average noise exposure, measured in DNL (EPA 1978; Schultz 1978; Fidell et al. 1991). The DNL has become the standard metric used by many federal and state governmental agencies and organizations such as the EPA and the FAA, for assessing aircraft noise (see Figure 3-1).

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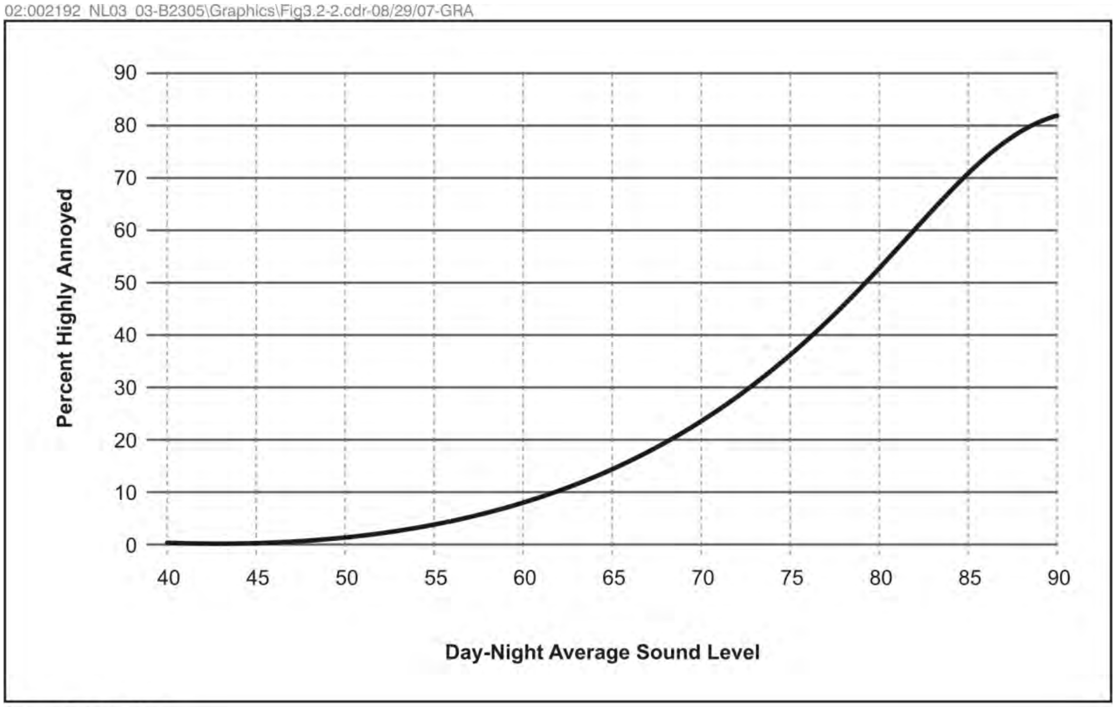

Source: Schultz 1978

Figure 3-1 Influence of Sound Level on Annoyance

In addition to presenting DNL values, which capture the average noise environment over a period of time for numerous events, sound exposure levels (SELs) are used as a supplemental metric in this study to quantify the noise exposure related to a single event and to help describe the different aspects of noise. However, the DNL metric remains the primary accepted metric for measuring the impacts on the community from aircraft noise.

SEL represents both the intensity (loudness) of a sound and its duration. Individual time-varying noise events (e.g., aircraft over flights) have two main characteristics: a sound level that changes throughout the event, and a period of time during which the event is heard. SEL provides a measure of the net exposure of the entire acoustic event, but it does not directly represent the sound level heard at any given time. During an aircraft flyover, SEL would include both the maximum noise level and the lower noise levels produced during onset and recess periods of the overflight. The SEL describes the noise associated with a single event at a specific location. Aircraft noise varies from event to event according to aircraft type and model, aircraft configuration, engine power settings, aircraft speed, weather conditions, and distance between the observer and the aircraft.

Another aspect of noise impacts to a community is the potential for noise-induced hearing loss. The 1982 EPA Guidelines specifically address the criteria and procedures for assessing noise-induced hearing loss in terms of the noise-induced permanent threshold shift (NIPTS), a quantity that defines the permanent change in hearing level, or threshold, caused by exposure to noise (EPA 1982). Numerically, the NIPTS is the change in threshold averaged over the frequencies 0.5, 1, 2, and 4 kiloHertz (kHz) that can be expected from daily exposure to noise over a normal working lifetime of 40 years, with the exposure beginning at an age of 20 years. A grand average of the NIPTS over time (40 years) and hearing sensitivity (10^{th} to 90^{th} percentiles of the exposed population) is termed the average NIPTS. A 2009 DOD policy directive requires that hearing loss risk at military airbases be estimated for the at-risk population, defined as the population exposed to a DNL greater than or equal to 80 dB (DOD 2009). Specifically, DOD components are directed to "use the 80 DNL noise contour to identify populations at the most risk of potential hearing loss." The average NIPTS that can be expected for noise exposure as measured by the DNL metric is noted in Table 3-4.

Table 3-4 Average NIPTS and 10^{th} Percentile NIPTS as a Function of DNL

DNL	Average NIPTS dB*	10^{th} Percentile NIPTS dB*
80-81	3.0	7.0
81-82	3.5	8.0
82-83	4.0	9.0
83-84	4.5	10.0
84-85	5.5	11.0
85-86	6.0	12.0
86-87	7.0	13.5
87-88	7.5	15.0
88-89	8.5	16.5
89-90	9.5	18.0

Notes: *Rounded to the nearest 0.5 dB

For example, for a noise exposure of 80 dB DNL, the expected lifetime average NIPTS is 3.0 dB, or 7.0 dB for the 10^{th} percentile (10% most sensitive population). Since hearing loss is a function of the actual sound levels rather than annoyance levels, characterizing the noise exposure in terms of DNL usually overestimates the assessment of hearing loss risk because DNL includes a 10-dB weighting factor for aircraft operations occurring between 2200 and 0700.

Existing Noise Environment

Aircraft operations and ground engine-maintenance run-ups are the primary source of noise at NAS Whidbey Island. In-frame and out-of-frame engine maintenance run-ups are used to test the engine at various power settings and durations. In-frame engine maintenance run-ups designated for low- or high-power testing are conducted at several locations at NAS Whidbey Island. Out-of-frame engine testing is conducted at an engine test cell in Building 2525 and next to Building 2765 (U.S. Navy 2005a). Pre-flight engine run-ups are generally not conducted for the types of aircraft stationed at NAS Whidbey Island.

Baseline flight operations at NAS Whidbey Island are dominated by the EA-6B, EA-18G, and P-3C aircraft (see Table 3-1). However, the EA-6B and EA-18G contribute approximately 98% of the acoustic energy to the noise environment at NAS Whidbey Island (i.e., the EA-6B and EA-18G are the loudest aircraft operating at NAS Whidbey Island) (Wyle 2012). The baseline noise zones for NAS Whidbey Island are presented on Figure 3-2.

Even though this EA analyzes only the change in aircraft for the Expeditionary VAQ squadron, the modeled 2011 baseline contains additional EA-6B aircraft operations. The replacement of CVW EA-6B Prowler squadrons at NAS Whidbey Island with CVW EA-18G Growler squadrons as analyzed in the *Environmental Assessment for Replacement of EA-6B Aircraft with EA-18G Aircraft at Naval Air Station Whidbey Island, Washington* (U.S. Navy 2005) is not yet complete. As of CY2011, a total of 39 EA-18G and 40 EA-6B aircraft were stationed at NAS Whidbey Island, which reflects the most accurate mix of aircraft to support the NAS Whidbey Island 2011 baseline noise contours.

The off-station area and the estimated 2010 population in the modeled baseline noise zones for NAS Whidbey Island are noted in Table 3-5.

The 65-dB DNL contour extends nearly to the eastern shore of the mainland across Skagit Bay, where EA-18G aircraft flying GCA descend to 1,000 feet above ground level (agl). The 65-dB DNL contour otherwise extends over land approximately 3 to 4 miles from the center of the airfield, the result of overlapping pattern operations. The 80-dB and 85-dB DNL contours extend approximately 1.7 miles and 3,400 feet to the east outside the station boundary, respectively, due to the arrival portion of EA-6B and EA-18G T&G patterns on Runway 25. The greater-than-85-dB noise zone is almost entirely contained within the base boundary, with one or two residential structures along W. Frostad Road at the eastern end of Runway 07.

Ecology & Environment, Inc. GIS Department Project:
R:\EDMS-Projects\navy\Whidbey_EA\Maps\MXD\EA\vaq_figures_20120406\figure 3-2 baseline dnl noise contours.mxd Date: 7/6/2012

Source: ESRI, 2010; Wylie 2010

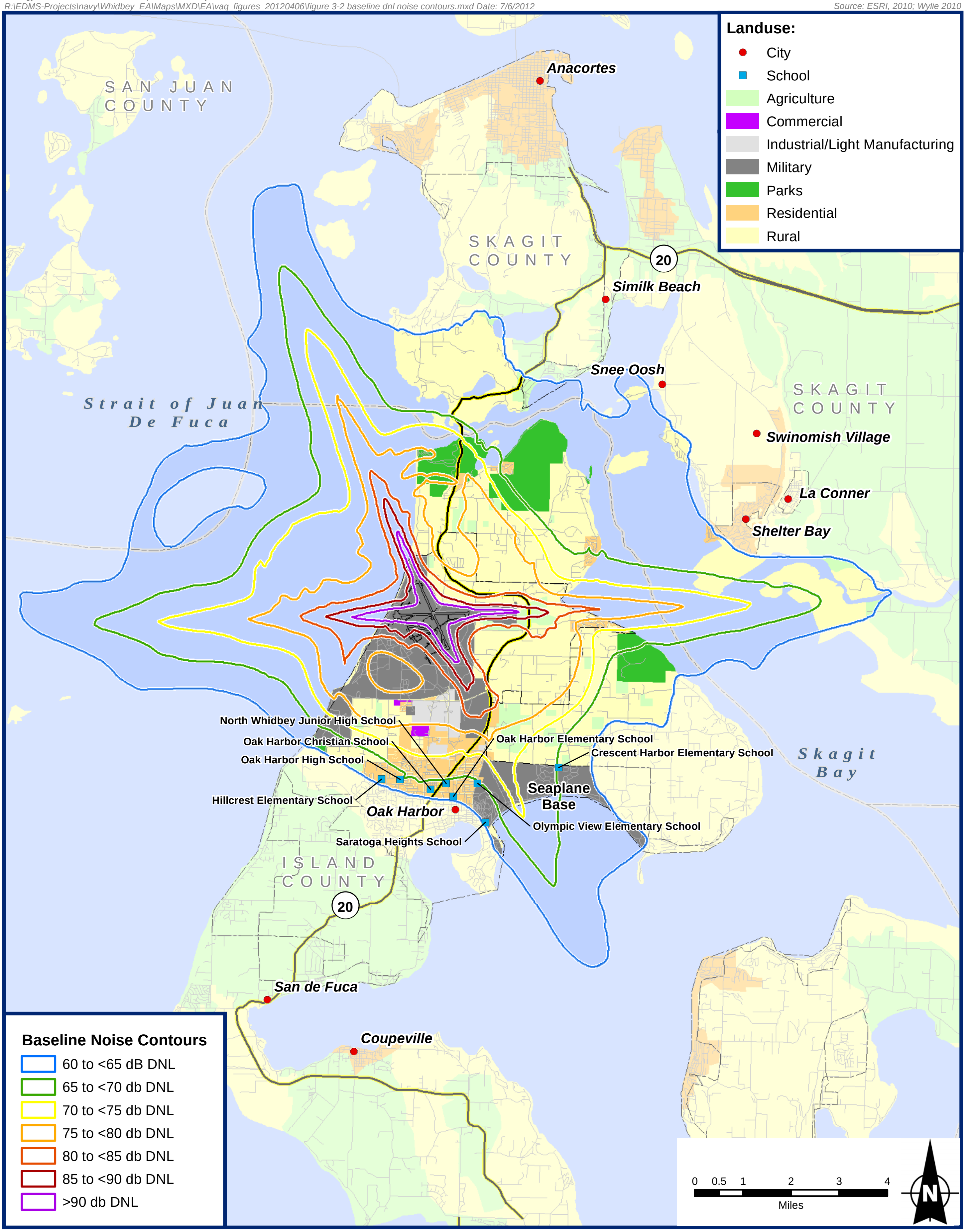

Figure 3-2
2011 Baseline DNL Noise Contours
Transition of Expeditionary EA-6B Prowler Squadrons to
EA-18G Growler at NAS Whidbey Island, Washington

Table 3-5 Area and Estimated Population within 2011 Baseline Noise Contours at NAS Whidbey Island

Noise Zone (dB DNL)	Area (Acres)	2010 Off-Station Population[1]
65 to 70 dB	12,087	4,743
70 to 75 dB	10,657	2,843
75 to 80 dB	9,489	2,789
80 to 85 dB	2,544	209
85 to 90 dB	1,110	34
>90 dB	849	1
Total	36,736	10,619

Notes:
[1] Census data are reported by blocks. The population shown is a proportion of the census block based on the geographic area of the noise zone. These data should be used for comparative purposes only and are not considered actual numbers within the noise zones.

Key:
dB = Decibel.
DNL = Day-night average sound level.

Most of the land surrounding Ault Field and in the existing noise zones is forested and agricultural/open fields, scattered rural residential land, and scattered residential subdivisions at higher densities (see Sections 3.1.1 and 3.4 and Table 3-6). No schools or religious institutions are located within the greater-than-65-dB DNL. In addition, portions of Deception Pass State Park, north of Ault Field, are located within the 65- to 70-dB, 70- to 75-dB, and greater-than-75-dB DNL noise zones around Ault Field.

3.4 Land Use

3.4.1 Installation Land Use

NAS Whidbey Island occupies 4,337 acres on the north end of Whidbey Island in Island County, Washington. The air station is bordered on the south by the City of Oak Harbor and on the west by the Strait of Juan de Fuca. Approximately 1,040 acres (24%) of Ault Field has been developed. The remaining land area is undeveloped and supports various vegetation communities and runway clear zones.

The airfield, Ault Field, occupies the northeast portion of NAS Whidbey Island and has two 8,000-foot intersecting runways, Runways 07/25 and 14/32. Aircraft operations facilities are located southwest of the runways within the flight line and include aircraft parking ramps, taxiways, aircraft maintenance hangars, a passenger terminal, an air traffic control tower, aircraft maintenance hangars, and various other support facilities. The project area for construction projects associated with the proposed action is entirely within the developed portion of the flight line. Facilities supporting other air station functions, including housing and administration, operational support, community support, and recreational facilities, are located outside the airfield.

The air station is fenced, except for the Strait of Juan de Fuca shoreline. Access to the air station is restricted to military, civil service, contractor personnel, and authorized visitors.

3.4.2 Regional Land Use

Land adjacent to NAS Whidbey Island within Island County is rural, with large tracts of undeveloped forestland, agricultural land, and scattered residential subdivisions at higher densities. Other land uses in the vicinity of NAS Whidbey Island include:

- A mixture of residential, light industrial, and commercial uses south of NAS Whidbey Island in the City of Oak Harbor
- Commercial and light industrial uses along State Route 20, which runs along the eastern boundary of the air station
- Deception Pass State Park to the north of the air station and Joseph Whidbey State Park to the southwest
- Various public, private, and Navy-owned marinas, boat launches, campgrounds, beaches, hiking trails, and golf courses.

3.4.3 Land Use Controls

Development within and around NAS Whidbey Island is controlled, guided, or influenced by the following plans, programs, and policies:

- The NAS Whidbey Island Airfield Recapitalization Plan
- The 2004 NAS Whidbey Island Activity Overview Plan
- The NAS Whidbey Island Integrated Cultural Resources Management Plan (ICRMP)
- The NAS Whidbey Island 1996 Integrated Natural Resources Management Plan (INRMP)
- The Navy and Marine Corps AICUZ Programs
- The Island County 1998 Comprehensive Plan (updated in 2008) and Zoning Code
- The City of Oak Harbor 2009 Comprehensive Plan and Zoning Code.

Airfield Recapitalization Plan. In 2002, the Navy finalized the NAS Whidbey Island Airfield Recapitalization Plan. The purpose of the plan is to define long-term (25 to 50 years) needs for structural improvements and replacements within the airfield complex; to develop an implementation strategy to meet those needs; and to identify areas for future flight line expansion.

The Airfield Recapitalization Plan is a component of the Navy Region Northwest's Regional Overview Plan for the Puget Sound Regional Shore Infrastructure Plan. This plan addresses both a no-growth and a 15% growth scenario at NAS Whidbey Island associated with consolidation of regional facilities. In either case, this plan involves the VAQ aircraft squadrons remaining at NAS Whidbey Island.

NAS Whidbey Island Activity Overview Plan. The NAS Whidbey Island 2004 Activity Overview Plan is a comprehensive land use and facilities plan to support the long-range vision of NAS Whidbey Island. The Activity Overview Plan includes an analysis of the air station's potential airframe and squadron-loading scenarios, including replacement of the EA-6B with the EA-18G aircraft; existing conditions and future operational needs of the mission-critical, mission-support, and personnel-support departments; and existing land use constraints and potential areas for development.

The recommendations of the Activity Overview Plan are summarized in a Strategic Action Plan that identifies near-, medium-, and long-term construction, renovation, and demolition projects, and policy and planning actions. Among these recommendations is the demolition of surplus infrastructure and relocation of inappropriately sited functions and facilities. In addition, the Strategic Action Plan recommends that the efficiency of existing hangar utilization be evaluated to increase operational efficiency and maximize hangar space available for future uses.

Integrated Cultural Resources Management Plan, NAS Whidbey Island, Washington. The Navy has prepared an ICRMP that summarizes the archaeological and historic surveys at Ault Field, Seaplane Base, OLF Coupeville, Lake Hancock, and Northwest Training Range (NWTR) Boardman that have been completed and that identifies management actions in compliance with Section 106 and Section 110 of the NHPA.

NAS Whidbey Island Integrated Natural Resources Management Plan. NAS Whidbey Island prepared an INRMP in 1996, which is currently being updated in compliance with DOD Instruction 4715.3 and the Sikes Act (16 U.S.C. 670a, *et seq*.) (EA EST 1996). The INRMP is a management tool for restoring, protecting, preserving, and properly using natural resources within the air station that are compatible with and in support of the military mission. The INRMP identifies land, water, plant, fish, and wildlife resources on Ault Field, Seaplane Base, Lake Hancock, and OLF Coupeville and provides recommendations on how to manage natural resources at each location.

AICUZ Program. The AICUZ Program was established in the 1970s by the DOD to analyze operational training requirements and to address communities' concerns about aircraft noise and accident potential. The purpose of the AICUZ Program is to achieve compatibility between air stations and neighboring communities by:

- Protecting the health, safety, and welfare of civilians and military personnel by encouraging land use that is compatible with aircraft operations
- Protecting Navy and Marine Corps installation investment by safeguarding the installation's operational capabilities
- Reducing noise impacts caused by aircraft operations while meeting operational, training, and flight safety requirements
- Informing the public about the AICUZ program and seeking cooperative efforts to minimize noise and potential aircraft accident impacts.

An AICUZ study analyzes aircraft noise, accident potential, land-use compatibility, and operational procedures and provides recommendations for compatible development near air stations. Federal, state, regional, and local governments are encouraged to adopt guidelines promoting compatible development. The AICUZ study defines the noise zones and accident potential zones (APZs) that represent the area where land-use controls are needed to protect the health, safety, and welfare of those living near the air station and to preserve the military flying mission.

Noise. Under the AICUZ Program, noise zones are identified as the area between the calculated noise contours, based on operations occurring on an average annual day or average busy day. For land-use planning purposes, the noise zones are grouped into three zones. Noise Zone 1 (less than 65 dB DNL) is generally considered an area of low or no noise impact. Noise Zone 2 (65 to 75 dB DNL) is an area of increased noise impact where some land use controls are required. Noise Zone 3 (greater than 75 dB DNL) is the highest impacted area and requires the greatest degree of land use control.

Accident Potential Zones (APZs). The number and type of airfield operations are also used as the basis for identifying APZs around an airfield. While the likelihood of an aircraft mishap is remote, the Navy identifies areas of accident potential to assist in land use planning.

APZs are areas where an aircraft mishap is most likely to occur and is delineated based on historical data and departure, arrival, and pattern flight tracks on and near the airfield runways. The Navy recommends that local planning agencies plan for and construct developments that concentrate large numbers of people—such as apartments, churches, and schools—outside the APZs.

APZs include three restricted areas, with the areas nearest the runways having the most restrictions. These areas, the Clear Zone, APZ 1, and APZ 2, are configured as follows:

- **Clear Zone**. The Clear Zone extends 3,000 feet beyond the end of the runway; it measures 1,500 feet wide at the end of the runway and 2,284 feet wide at its outer edge.

- **APZ 1**. APZ 1 extends 5,000 feet beyond the Clear Zone, with a width of 3,000 feet at its outer edge. APZ 1 is typically rectangular, although it may curve to conform to the predominant flight track.

- **APZ 2**. APZ 2 extends 7,000 feet beyond APZ 1, with a width of 3,000 feet. This zone is typically rectangular, although it, too, may conform to the curve of the predominant flight track, such as the FCLP flight track.

Although ultimate control over land use and development in the vicinity of military facilities is the responsibility of local governments, the Navy recommends, through its AICUZ Program, that localities adopt programs, policies, and regulations to promote compatible development where appropriate and feasible near Navy and Marine Corps air installations. Such land-use recommendations are intended to serve as guidelines; they are based on the assumption that noise-sensitive uses (e.g., houses, churches, hospitals, amphitheaters, etc.) should be located outside the high-noise zones, and people-intensive uses should not be located within APZs. The purpose of the Navy's land-use recommendations is not to preclude productive use of land around Navy and Marine Corps air installations, but to recommend best uses of the land that are protective of human health, safety, and welfare. The Navy's recommendations can be implemented by ensuring that development restrictions are placed on noise-sensitive uses in high-noise zones and on people-intensive uses in APZs, as well as by fair disclosure in real estate transactions and use of sound-attenuating construction.

The NAS Whidbey Island AICUZ Program was established in 1977. This program was updated in 1986 and again in 2005 to account for changes in aircraft mix, tempo of aviation activity, and maintenance procedures. The APZs used in this EA are from the 2005 NAS Whidbey Island AICUZ update (U.S. Navy 2005a). The majority of the Clear Zones for NAS

Whidbey Island are located on the air station or offshore in the Strait of Juan de Fuca. The boundaries of APZ 1 and APZ 2 extend off-station into the local community.

Island County Comprehensive Plan. The Island County Comprehensive Plan was adopted in 1998 and updated in 2008 in accordance with the Washington State Growth Management Act. The plan was established to manage growth in the county through the year 2020. As mandated under Revised Code of Washington 36.70A.070, the elements addressed include land use, rural, housing, capital facilities, utilities, transportation, and shoreline management. Several optional elements are addressed in the plan as well, including parks, recreation and open space, natural lands, historic preservation, and water resources (Board of Island County Commissioners et al. 1998 [updated 2011]).

The Comprehensive Plan acknowledges the county's association with NAS Whidbey Island as well as the impacts associated with aircraft operations at Ault Field. The plan designates an "Airport and Aviation Safety Overlay," which recommends that future land use adjacent to Ault Field be maintained as rural and rural agricultural. These areas are designated rural and rural agricultural to encourage low-density development within the air station's noise zones.

Island County adopted the noise contours and APZs from the 2005 NAS Whidbey Island AICUZ Study, as well as adopted a closed loop APZ for FCLP pattern operations at Ault Field to implement the airport and aviation safety overlay district through the county's zoning ordinance and other elements of the Island County Code. Existing land uses and zoning are consistent with the Navy's recommendations for land uses within the APZs, although specific regulations have not yet been adopted for that purpose. However, the goals and policies in the county's Comprehensive Plan support the adoption of codes for compatible development within the APZs.

Consistent with the Comprehensive Plan for land uses impacted by aircraft operations, Island County has adopted a zoning ordinance; an airport and aircraft operations noise disclosure ordinance for property sold, rented, or leased within the noise zones around Ault Field and OLF Coupeville; and a noise-level reduction ordinance to specify minimum standards for building construction within the noise zones around Ault Field and OLF Coupeville. In addition, to help ensure the safety of aircraft operations, the county has adopted a signs and lighting ordinance that is designed to help preserve the dark skies and rural character of the county.

City of Oak Harbor Comprehensive Plan. The City of Oak Harbor Comprehensive Plan was adopted in 2003 and last updated in 2010 in accordance with the Washington State Growth Management Act. The plan was established to manage growth in the city through the year 2020. As mandated under the Revised Code of Washington 36.70A.070, the elements addressed include land use, housing, capital facilities, utilities, transportation, and shoreline management, as well as several optional elements.

The Comprehensive Plan contains goals and policies that address the Navy's AICUZ land use compatibility recommendations and an element, "City of Oak Harbor and Naval Air Station Whidbey Island Community Cooperation," that supports growth and development compatible with operations at Ault Field. The AICUZ recommendations are implemented through the city's adopted aviation environs overlay zone, noise attenuation standards, and noise disclosure requirement in the municipal code. Land uses within the aviation environs overlay zone are designated for low-density development. The City of Oak Harbor adopted the noise contours from the NAS Whidbey Island 2005 AICUZ Study to implement the aviation environs overlay zone through the city's zoning ordinance and other elements of the municipal code. Existing land use and zoning are consistent with the Navy's recommendations for land use compatibility within the APZs, although specific regulations have not yet been adopted for that purpose. However, the goals and policies in the Comprehensive Plan support the adoption of codes for compatible development within the APZs.

3.4.4 Land Use Compatibility

To determine the compatibility of surrounding land uses with existing aircraft operations at NAS Whidbey Island, maps of the modeled 2011 baseline noise contours for the station were overlaid on the 2012 Island County zoning map. The 2011 baseline noise contours represent the best estimate of the current noise environs in the vicinity of NAS Whidbey Island and include the 2011 mix of EA-6B Prowler and EA-18G Growler aircraft operating at NAS Whidbey Island. Land-use designations within the modeled baseline 2011 noise contours were compared to the Navy/Marine Corps land use compatibility recommendations under its AICUZ Program.

Portions of the City of Oak Harbor and Island and Skagit counties are within the modeled 2011 baseline noise contours for NAS Whidbey Island (see Figure 3-2). Table 3-6 provides the total area, by land use category, within the 65- to 70-dB DNL, 70- to 75-dB DNL, and greater-than-75-dB DNL noise contours around Ault Field. According to the AICUZ guidelines, all land use categories in the less-than-65-dB DNL noise zone are considered to be compatible.

As shown in Table 3-6, approximately 97% of the land uses within the noise contours around Ault Field are considered compatible land uses, including agriculture, business park, industrial, light manufacturing, military, parks, roads, rural, rural service, and water.

Approximately 3% of the total area within the greater-than-65-dB DNL noise contour consists of residential and municipal uses (municipality, Oak Harbor residential, rural residential, and rural village), which are generally considered to be incompatible with aircraft operations.

Table 3-6 Existing Land Uses in the 2011 Baseline Noise Zones around Ault Field

Land Use	Noise Zone (acres)						Total Acres
	65 to 70 dB DNL	70 to 75 dB DNL	75 to 80 dB DNL	80 to 85 dB DNL	85 to 90 dB DNL	>90 dB DNL	
Agriculture	92	368	332	148	55	0	**995**
Commercial	0	57	16	1	0	0	**74**
Industrial/Light Manufacturing	10	120	342	0	0	0	**472**
Military	724	779	1,125	809	636	713	**4,786**
Parks	369	549	130	0	0	0	**1,048**
Residential	577	494	120	7	0	0	**1,198**
Rural	1,385	2,152	3,939	465	78	1	**8,020**
Forest/Open Space	403	9	0	0	0	0	**412**
Open Water	8,370	5,940	3,187	1,008	325	103	**18,933**
Total Acres (% of Total Land Use)	**11,930 (33%)**	**10,468 (29%)**	**9,191 (26%)**	**2,438 (7%)**	**1,094 (3%)**	**817 (2%)**	**35,938**

Source: Island County Land Use and Zoning Maps 2012; Wyle 2012
Note: Some totals may not sum exactly due to rounding.

Key:
dB = Decibel.
DNL = Day-night average sound level.

3.5 Air Quality

3.5.1 Air Quality Regulations

The Clean Air Act (CAA) is the primary federal statute governing the control of air quality. The CAA designates six pollutants as "criteria pollutants" for which National Ambient Air Quality Standards (NAAQS) have been established to protect public health and welfare. These include particles of 10 micrometers or less in diameter (PM_{10}), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), lead, and ozone. Areas that do not meet NAAQS for criteria pollutants are designated "nonattainment areas" for that pollutant. Under the CAA, state and local agencies may establish ambient air quality standards (AAQS) and regulations of their own, provided these are at least as stringent as the federal requirements. Table 3-7 summarizes the federal and state AAQS.

Table 3-7 National and Washington State Ambient Air Quality Standards

Pollutant	Federal Primary Standards		Washington State Standards	
	Level	Averaging Time	Level	Averaging Time
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour[1]	Same as Federal Standards	
	35 ppm (40 mg/m^3)	1-hour[1]		
Lead	0.15 $\mu g/m^3$	Rolling 3-month Average	Same as Federal Standards	
	1.5 $\mu g/m^3$ (note 2)	Quarterly Average		
Nitrogen Dioxide	0.053 ppm (note 3) (100 $\mu g/m^3$)	Annual (Arithmetic Mean)	Same as Federal Standards	
	0.100 ppm	1-hour[4]		
Particulate Matter (PM_{10})	150 $\mu g/m^3$	24-hour[5]	Same as Federal Standards	
Particulate Matter ($PM_{2.5}$)	15.0 $\mu g/m^3$	Annual[6] (Arithmetic Mean)	Same as Federal Standards	
	35 $\mu g/m^3$	24-hour[7]	Same as Federal Standards	
Ozone	0.075 ppm (2008 std)	8-hour[8,9c]	Same as Federal Standards	
	0.08 ppm (1997 std)	8-hour[9a,9b,9c]		
	0.12 ppm (note 10a,b)	1-hour (Daily Max)	0.12 ppm	1-hour (Daily Max)[10a]
Sulfur Dioxide	0.03 ppm	Annual (Arithmetic Mean)	0.02 ppm	Annual (Arithmetic Mean)
	0.14 ppm	24-hour[1]	0.10 ppm	24-hour
	75 ppb[11]	1-hour[1]	0.40 ppm	1-hour, more than once per year
			0.25 ppm	1-hour, more than twice per 7-day period
Total Suspended Particulate			60 $\mu g/m^3$	Annual
			150 $\mu g/m^3$	24-hour

Source: EPA 2010a; Washington State Department of Ecology 2010.

Notes:
1 Not to be exceeded more than once per year.
2 Final rule signed October 15, 2008.
3 The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard
4 To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb (effective January 22, 2010).
5 Not to be exceeded more than once per year on average over 3 years.
6 To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 $\mu g/m^3$.
7 To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 $\mu g/m^3$ (effective December 17, 2006).
8 To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm (effective May 27, 2008).
9a To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
9b The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.
9c EPA is in the process of reconsidering these standards (set in March 2008).
10a EPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligations under that standard ("anti-backsliding").
10b The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is $\leq$1.
11 Final rule signed June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.

Key:
$\mu g/m^3$ = micrograms per cubic meter.
Max = maximum
mg/m^3 = milligrams per cubic meter
$PM_{2.5}$ = particulate matter 2.5 micrometers or less
PM_{10} = particulate matter 10 micrometers or less
ppm = parts per million.
ppb = parts per billion.
std = standard

Under the General Conformity Rule, federal actions in nonattainment areas must conform to an applicable state implementation plan, and a general conformity analysis is prepared for that action. However, Island County is in attainment of the NAAQS for all criteria pollutants (EPA 2010a). Because the region is in attainment, the CAA General Conformity Rule does not apply, and a general conformity analysis and determination is not required. Mobile source emissions regulations are not applicable to this action (http://www.epa.gov/air/genconform/faq.html).

3.5.2 Existing Conditions

The Northwest Clean Air Agency (NWCAA), formerly the Northwest Air Pollution Authority (NWAPA), is the regional agency responsible for overseeing the state's operating permit program for Island, Skagit, and Whatcom counties. NAS Whidbey Island is the only major source of stationary emissions in Island County, although other major sources are located in Skagit and Whatcom counties. NAS Whidbey Island operates under a Title V Operating Permit approved by the NWCAA in 2005. The stationary sources regulated under the issued permit include all gasoline storage tanks; jet engine test cells; aircraft painting, cleaning, and repair operations; and boilers, furnaces, and generators. In accordance with the Title V Operating Permit, significant stationary source emissions are reported annually.

The activities associated with the proposed action that may be regulated under the Title V Operating Permit are limited to the modification and replacement of some buildings and test cell operations. Aircraft operations and personally owned vehicle emissions, as mobile sources, are not regulated by the NWCAA. However, mobile operations would result in the majority of new emissions associated with this action and have been quantified.

3.5.3 Climate Change and Greenhouse Gas Emissions

Climate change refers to any significant change in measures of climate lasting for an extended period. Climate change may result from natural factors such as changes in the sun's intensity or slow changes in the Earth's orbit around the sun; natural processes within the climate system; or from human activities that change the atmosphere's composition and/or the land surface. Global warming is an average increase in the temperature of the atmosphere, which can contribute to changes in global climate patterns. Global warming can occur from a variety of causes, both natural and human. Global climate change threatens ecosystems, water resources, coastal regions, crop and livestock production, and human health (EPA 2010b).

Many scientific studies correlate the observed rise in global annual average temperature and the resulting change in global climate patterns with the increase in greenhouse gases (GHGs) in the Earth's atmosphere. Worldwide use of fossil fuels is the primary cause of that increase (EPA 2010b). Most of our energy comes from non-renewable fossil fuels, such as oil, gas, and coal. These fuels are used primarily for electricity production and transportation. The American economy depends on energy, and our country's security is also closely intertwined with its energy use. A wisely planned sustainability policy that addresses issues of economy, conservation, and future viability will allow the United States to move toward a safer and more secure future (U.S. Department of Homeland Security 2010).

Federal agencies are required to address emissions of GHGs with analysis and emission reduction planning. Executive Order (EO) 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, signed in October 2009 (*Federal Register* 2009), and the Energy Policy Act of 2005 require federal agencies to reduce energy consumption, reduce dependence on petroleum, and increase the use of renewable energy resources. Additionally, Washington Administrative Code (WAC), Chapter 173-441, establishes a mandatory GHG reporting requirement for facilities that emit 10,000 metric tons of carbon dioxide (CO_2) equivalents or more in a calendar year. A CO_2 equivalent is a metric used to compare emissions from various GHGs based upon their global warming potential.

In February 2010, the CEQ issued Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions (CEQ 2010). In this guidance, the CEQ affirmed the requirements of NEPA and CEQ regulations and their applicability to GHGs and climate change impacts. The CEQ recommends that the environmental analysis and documents produced in the NEPA process should provide the decision-maker with relevant and timely information about the environmental effects of his or her decision and reasonable alternatives to mitigate those impacts. In regard to GHGs and climate change, this includes the consideration of GHG emission effects of the proposed and alternative actions and the relationship of climate change effects to the proposed action or alternatives. While GHG emissions occur locally, GHG impacts are both global in scale and cumulative over time. GHG emissions for the baseline and the proposed action are presented and assessed in Section 5, Cumulative Impacts.

3.6 Biological Resources

3.6.1 Wildlife

The flight line area at Ault Field currently contains paved surfaces (Hangar 10 and Hangar 12) or maintained lawn and landscaped areas (flight simulator building). These areas are expected to harbor limited wildlife and limited suitable habitat for wildlife (see Figure 2-1, Section 2). Landscaped areas are used by wildlife species able to acclimate to human disturbance. These include small mammals such as the raccoon (*Procyon lotor*), the house mouse (*Mus musculus*), squirrels, and moles; songbirds such as swallows and the American robin (*Turdus migratorius*); non-native birds such as the European starling (*Sturnus vulgaris*) and rock pigeon (*Columba livia*); and common reptiles such as garter snakes (*Thamnophis* spp. [EA EST 1996]).

Other habitats at Ault Field include grasslands, wet meadows, forests, coastal bluffs, beaches, dunes, freshwater wetlands, and marine and riparian habitats. The grasslands at Ault Field have little structural diversity and provide a low number of habitat niches for relatively few wildlife species. Similarly, the wet meadows at Ault Field lack structural diversity and the hydrologic regime necessary to provide surface water year-round and thus attract fewer species than areas with more complex wetland systems and deeper marsh and open water components. Wildlife that could be present in the Ault Field habitats includes migratory waterfowl, neotropical migratory songbirds, raptors, small burrowing mammals, and reptiles. The northern harrier (*Circus cyaneus*) is known to nest in undisturbed grasslands near the runway (EA EST 1996). Other species observed in these habitats during field surveys included the great blue heron (*Ardea herodias*) and black-tailed deer (*Odocoileus hemionus columbianus* [E & E 2007]).

The highest diversity of wildlife species at Ault Field occurs in the southwest portion of the installation, in the vicinity of Rocky Point. This area contains stands of mature forest, coastal bluffs, beach strand, native dune vegetation, and a large freshwater wetland. The freshwater wetland has been identified by the Washington Department of Natural Resources as a significant habitat for neotropical migratory birds (EA EST 1996).

Several small and two relatively large forest blocks are scattered throughout Ault Field. Common wildlife using the forested habitat include the black-tailed deer, cottontail rabbit (*Sylvilagus floridanus*), raccoon, coyote (*Canis latrans*), garter snakes, salamanders (*Ambystoma* spp.), frogs (*Rana* spp.), and numerous species of birds. Marine habitats are located adjacent to the western boundary of Ault Field and comprise intertidal and subtidal areas. Numerous marine fishes, terrestrial and aquatic mammals, and invertebrates occur on beaches and in adjacent waters associated with these habitats. Cormorants (*Phalacrocorax* sp.), loons (*Gavia* sp.), grebes (*Podiceps* sp.), and various species of diving ducks are common year-round and/or are seasonal residents of the marine habitats (EA EST 1996). There is no access to freshwater spawning and rearing habitats along the shores of Ault Field for anadromous species (Miller 2007).

The riparian habitat along the runway ditches and Clover Valley Lagoon provides nesting areas for many bird species, including ducks, rails, coots, blackbirds, and kingfishers. Amphibians that live in the aquatic and riparian habitat of the runway ditches and lagoon include frogs and salamanders. Clover Valley Stream, which has been straightened and channelized on the air station but transitions to a natural feature east of the installation, is listed by the WDFW as a priority resident fish habitat for resident cutthroat trout (*Oncorhynchus clarki* [WDFW 2010]). Farther east, Dugualla Bay is home to the many species of flora and fauna that are typical in other inlets in Puget Sound.

3.6.2 Federally Protected Species

3.6.2.1 Threatened and Endangered Species

The ESA of 1973 and subsequent amendments provide for the conservation of threatened and endangered species of animals and plants and the habitats in which they are found. The Navy ensures that consultations are conducted as required under Section 7 of the ESA for any action that “may affect” a federally listed threatened or endangered species. Although protection of species listed at the state level as threatened or endangered is not legally mandated for federal agencies, the Navy encourages cooperation with states to protect such species where such protection is consistent with an installation’s mission.

Information on the potential occurrence of federally listed threatened and endangered species within and in the vicinity of NAS Whidbey Island and adjacent waters was obtained from the USFWS Western Washington Fish and Wildlife Office; the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS) Northwest Regional Office; the Washington Department of Fish and Wildlife (WDFW); and the Washington State Department of Natural Resources, Natural Heritage Program (WDNRNHP).

Each of these agencies maintains databases to track the occurrence of threatened and endangered species: the USFWS and WDFW provide species occurrences on a county level (USFWS 2010a; WDFW 2010, 2011a; WDNRNHP 2010); the NMFS provides species occurrences by marine and estuarine waterbodies (NMFS 2010a, b; WDFW 2010, 2011a). For the purposes of this EA, USFWS and NMFS databases were searched to identify the potential occurrences of federally listed threatened and endangered species within Island County and the waters surrounding Whidbey Island. A total of 13 ESA-listed species were identified as occurring within the vicinity of Ault Field (Table 3-8). The current status of the species listed in these areas by the USFWS and NMFS was verified through the WDFW and WDNRNHP.

Potential impacts would be related to a proposed increase in the number of flight operations and noise. Given the nature of the proposed action, all listed species are addressed in this document; however, the risk for the marbled murrelet is greater than all of the ESA-listed species because of the height at which the marbled murrelet flies and the speed of the aircraft. For this reason, marbled murrelets are discussed in a separate section below.

Golden Indian Paintbrush (*Castilleja levisecta)***:** This perennial herb occurs in open grasslands at elevations below 330 feet around the periphery of the Puget Trough (USFWS 2011b). Most populations occur on glacially derived soils. Primary threats to this species include competition with encroaching native and non-native species, habitat modification through succession of grassland to shrub and forest habitat, habitat conversion through residential or commercial development, and grazing by herbivores (USFWS 2011b).

Five populations of golden paintbrush occur on the north half of Whidbey Island. The largest population occurs near Forbes Point on the Seaplane Base at Crescent Harbor, approximately 4 miles southeast of Ault Field. No populations or individual occurrences of the golden Indian paintbrush have been identified on Ault Field. Furthermore, no suitable habitat to support the species occurs within the proposed construction area.

Coastal/Puget Sound Bull Trout Distinct Population Segment (DPS): There are no suitable spawning streams on Whidbey Island. Most bull trout found along the shoreline are traveling from the Skagit, Stillaguamish, and Snohomish River systems to forage (Miller 2007). It is thought that bull trout primarily use the shallower nearshore waters along the eastern shore of Puget Sound and occasionally use or cross deeper waters to access nearshore locations along the west side of the sound. Bull trout have reportedly been caught by fishermen in some nearshore areas of Whidbey Island (Washington Conservation Commission April 2000); however, this catch may have been Dolly Varden (*S. malma*), because bull trout and Dolly Varden are closely related char species native to Washington State. They coexist in many of the same drainages and, being similar in appearance, are extremely difficult to differentiate visually (USFWS 1997). The waters of the Puget Sound are critical habitat area for this species.

Table 3-8 Federally Threatened and Endangered Species that May Occur at or in the Vicinity of NAS Whidbey Island

Category	Common Name	Scientific Name	ESA Listing	Presence in the Action Area
Plants	Golden Indian paintbrush	*Castilleja levisecta*	Threatened	No populations or individual occurrences have been identified on Ault Field. No suitable habitat to support the species occurs in the action area.
Fish	Washington-Puget Sound bull trout	*Salvelinus confluentus*	Threatened	No suitable spawning streams on Whidbey Island. The waters adjacent to Ault Field are designated as critical habitat.
	Bocaccio	*Sebastes paucispinis*	Endangered	Juveniles and young adults may inhabit shallow waters adjacent to Ault Field. There is no critical habitat.
	Canary rockfish	*Sebastes pinniger*	Threatened	
	Yelloweye rockfish	*Sebastes ruberrimus*	Threatened	
	Puget Sound Chinook salmon	*Oncorhynchus tshawytscha*	Threatened	No suitable spawning streams occur on Whidbey Island. The waters adjacent to Ault Field are designated as critical habitat.
	Puget Sound steelhead	*Oncorhynchus mykiss*	Threatened	No suitable spawning streams occur on Whidbey Island. The waters adjacent to Ault Field are designated as critical habitat.
	Eulachon (Columbia River smelt)	*Thaleichthys pacificus*	Threatened	No suitable spawning streams occur on Whidbey Island. Populations may inhabit waters adjacent to Ault Field.
	North American green sturgeon	*Acipenser medirostris*	Threatened	No suitable spawning streams occur on Whidbey Island. Adults may inhabit waters adjacent to Ault Field.
Mammals	Humpback whale	*Megatera novaengliae*	Endangered	Low numbers of individuals are known to be present in waters adjacent to Ault Field and in the Strait of Juan de Fuca.
	Southern resident killer whale	*Orcinus orca*	Endangered	Individuals have been observed numerous times during spring, summer, and fall in the Strait of Juan de Fuca, including waters adjacent to Whidbey Island, including Ault Field.
	Steller sea lion	*Eumetopias jubatus*	Threatened	Low numbers of individuals are known to be present in waters adjacent to Ault Field and in the Strait of Juan de Fuca.
Birds	Marbled murrelet	*Brachyramphus marmoratus*	Threatened	Surveys indicate that marbled murrelet densities in shallow waters adjacent to Whidbey Island, including those off of Ault Field range from 2 to nearly 4 individuals per square mile.

Source: NMFS 2010a, b; USFWS 2010b; WDFW 2011a; WDNRNHP 2010

Puget Sound/Georgia Basin Bocaccio (*Sebastes paucispinis)* DPS and Puget Sound/Georgia Basin Canary Rockfish (*Sebastes pinniger*) DPS: Adult bocaccio and canary rockfish generally reside in water deeper than 160 feet, but juveniles and young adults inhabit shallow waters (NMFS 2011a, 2011b) such as those adjacent to Whidbey Island. No critical habitat has been designated for these species at this time.

Puget Sound/Georgia Basin Yelloweye Rockfish (*Sebastes ruberrimus)* DPS: Adult yelloweye rockfish generally reside in water deeper than 80 feet, and often more than 300 feet, but juveniles and young adults inhabit shallow waters (NMFS 2011c) such as those adjacent to Whidbey Island. No critical habitat has been designated for this species at this time.

Puget Sound Chinook Salmon (*Oncorhynchus tshawytscha)* Evolutionarily Significant Unit (ESU): There are no suitable spawning streams on Whidbey Island for Chinook salmon. However, the east and west coast of Whidbey Island, including Crescent Harbor, Skagit Bay, and the Strait of Juan de Fuca, is included in the Puget Sound Chinook salmon ESU critical habitat (NMFS 2011d).

Puget Sound Steelhead (*Oncorhynchus mykiss)* ESU: There are no suitable spawning streams on Whidbey Island for steelhead trout. However, naturally spawned steelhead populations occur in streams in the river basins of the Puget Sound, Strait of Juan de Fuca, and Hood Canal, Washington (NMFS 2011e). This anadromous fish[2] thus is likely to be present in the marine waters adjacent to Whidbey Island, which is designated steelhead critical habitat.

Southern Eulachon (*Thaleichthys pacifics)* DPS: The eulachon is anadromous, and in the continental United States most eulachon originate in the Columbia River basin (NMFS 2011f). Therefore, these eulachon would not pass through the Puget Sound or Strait of Juan de Fuca on the way to the ocean. However, because eulachon are occasionally recorded in the coastal rivers and tributaries of the Puget Sound (NMFS 2011f), they could occur in the waters off Whidbey Island. There is no suitable spawning habitat on Whidbey Island for this species.

Southern North American Green Sturgeon (*Acipenser medirostris)* DPS: The critical habitat for the southern North American green sturgeon DPS includes coastal United States marine waters up to 360 feet deep from Monterey Bay, California, north to Cape Flattery, Washington, including the Strait of Juan de Fuca (74 *Federal Register* [October 9, 2009]: 52300-52351). The adult green sturgeon resides in nearshore oceanic waters, bays, and estuaries (NMFS 2011g) and could occur in the waters off Whidbey Island.

[2] Anadromous fish are those that return to fresh water to spawn.

Humpback Whale (*Megaptera novaeangliae)*: The outer shore of western Washington was historically inhabited by humpback whales. Currently, waters off of northern Washington may be areas where California, Oregon, Washington, and British Columbia whales mix (NMFS 1991). Feeding typically occurs over deep, oceanic waters during migration, while feeding and breeding habitats are mostly in shallow coastal waters over continental shelves (Clapham and Meade 1999). The species typically feeds on krill (*Euphausia pacifica*) and small schooling fish, including herring (*Clupea harengus)*, mackerel, sand lance, sardines, anchovies, and capelin. Humpback whales are known to be present in the Strait of Juan de Fuca in low numbers and in recent years have been sighted, but only rarely, in Puget Sound (Miller 2007). They are now considered only occasional visitors to the area (Falcone et al. 2005). With regards to their hearing, while no tests on humpback whale hearing have been made, Houser et al. (2001) constructed a humpback audiogram using a mathematical model based on the internal structure of the ear and estimated sensitivity to frequencies from 0.7 to 10 kHz, with maximum relative sensitivity between 2 and 6 kHz.

Southern Resident Killer Whale (*Orcinus orca*) DPS: The southern resident killer whale resides in the inland waterways of Puget Sound in the spring, summer, and fall and has been observed numerous times in the Strait of Juan de Fuca, including areas adjacent to Whidbey Island (NMFS 2008). These waters provide critical habitat for this species (NMFS 2011h). When feeding, this species most commonly targets chinook salmon. It appears to consume other salmonids that appear less frequently, such as rockfish, halibut (*Hippoglossus stenolepis*), lingcod (*Opio elongatus*), and herring. Both behavioral and auditory brainstem response techniques indicate that killer whales have a frequency range of 1 to 100 kHz and are most sensitive at 20 kHz (Szymanski et al. 1999).

Steller Sea Lion (*Eumetopias jubatus)*: Although no rookeries exist in the state of Washington, Steller sea lions are present throughout the year (WDFW 2000). Numbers vary seasonally throughout the year, with peak counts of 1,000 sea lions present during the fall and winter months. Haul-out sites are found on jetties, offshore rocks, and islands. Major haul-out sites are located along the outer coast from the Columbia River to Cape Flattery, as well as in the Strait of Juan de Fuca, and occasionally on navigation buoys in Puget Sound (WDFW 2000). Steller sea lions have been documented to haul out on Navy submarines in the Puget Sound (U.S. Navy 2001a). Steller sea lions are opportunistic predators, feeding primarily on fish and cephalopods, and their diet varies geographically and seasonally. No haul-out sites have been recorded on Whidbey Island (WDFW 2011a), although Steller sea lions have been known to occur around the island. This area provides critical habitat for this species. When the underwater hearing sensitivity of two Steller sea lions was tested, the hearing threshold of the male was significantly different from that of the female. The range of best hearing for the male was from 1 to 16 kHz, with maximum sensitivity (77 decibels relative to 1 micropascal [dB re 1 μPa-m]) at 1 kHz. The range of best hearing for the female was from 16 to above 25 kHz, with maximum sensitivity (73 dB re 1 μPa-m) at 25 kHz. However, because of the small number of animals tested, the findings could not be attributed to individual differences in sensitivity or sexual dimorphism (Kastelein et al. 2005).

Marbled Murrelet. The marbled murrelet is federally listed as threatened under the ESA. The Migratory Bird Treaty Act (MBTA) also protects the marbled murrelet. According to a five-year review completed by the USFWS in 2009, the national marbled murrelet population has been declining (between 2.4% and 4.3% annually) (USFWS 2009). Primary causes of this species' decline are habitat degradation (e.g., human-induced and wild fires); fragmentation of forests; and over-harvesting of old-growth coastal forests. In the marine environment, factors contributing to its decline include oil spills and the use of gill-netting in inshore areas (Nelson 1997).

The marbled murrelet is an alcid (a web-footed diving bird with short legs and wings), less than 10 inches long. This species ranges from Alaska to western central California (Santa Cruz County), occurring mainly within 3 miles of shore. Distribution can vary depending on coastline topography, river plumes, the presence of coastal forest, and season (Falxa et al. 2009). The marbled murrelet nests in either forested or rocky areas, depending on its location in its range. More specifically, the species breeds in forested areas on sea-facing slopes, cliffs on islands, and cliffs along the coast (Nelson 1997). During the breeding season, murrelets are typically bound to their nesting sites. After breeding and during winter, the marbled murrelet tends to disperse and move farther offshore. The highest concentrations of murrelets still tend to occur close to shore and within protected waters.

In Washington State, the marbled murrelet breeds exclusively in forested habitats (Nelson 1997). Within these habitats, the optimal habitat for the marbled murrelet includes areas with the following characteristics:

- A greater number of potential nest platforms
- A greater percentage of dominant trees (trees 32 inches in diameter or larger) with moss

- A lower density of moss on dominant trees (as compared to a randomly chosen site in the same habitat)
- Low elevation
- The presence of old-growth western hemlock (*Tsuga heterophylla*).

The presence of these birds within Washington State decreases with increasing stand elevation, distance inland, lichen cover, and canopy cover (Nelson 1997).

Occurring in the waters adjacent to Whidbey Island, the marbled murrelet is considered an opportunistic feeder rather than a specialist, consuming prey that is most readily available at different times of the year, wherever prey is available. The marbled murrelet's foraging patterns vary seasonally. In the summer, the marbled murrelet forages within 3 miles of shore, generally preferring shallow water that is usually less than 200 feet deep. The foraging activity during this time is highest in areas of upwelling, shallow banks, mouths of bays, narrow passages between islands, over underwater sills, and within kelp beds. During summer, marbled murrelets in Puget Sound primarily forage on Pacific sand lance (*Ammodytes hexapterus*), Pacific herring (*Clupea pallasii*), and surf smelt (*Hypomesus pretiosus* [Penttila 2007]). Winter foraging habitat is similar to summer foraging habitat. Murrelet individuals typically forage in stratified waters (e.g., tidal rips or river mouths) within 3 miles of the shore (Nelson 1997). In winter, their dominant prey includes krill, mysid shrimp (*Americamysis bahia*), amphipods, and Pacific herring (Nelson 1997).

The marbled murrelet populations are split into six geographic areas, or Conservation Zones, from the Canadian border to approximately San Francisco Bay (USFWS 1997b). Two of these zones are in Washington: conservation zone 1, which includes the Strait of Juan de Fuca, Hood Canal, and the San Juan Islands; and conservation zone 2, which includes the outer Washington coast. The proposed action would occur within conservation zone 1.

In the Puget Sound region of northwest Washington State, the population estimate of marbled murrelets is 5,623 individuals (Falxa et al. 2009). This population declined 7.4% from 2001 to 2010 (WDFW 2011b). Marbled murrelets are distributed throughout the inland marine waters of Washington during the summer, with higher concentrations in the San Juan Islands, north Hood Canal, and south coast of the Strait of Juan de Fuca. In winter, the concentration shifts toward the more protected waters of the San Juan Islands, Hood Canal, Discovery Bay, Saratoga Passage, and Port Townsend (Strachan et al. 1995).

Surveys along the inner coastline of Whidbey Island (including Crescent Harbor) found that marbled murrelet densities were 3.73 per square mile during the 2000 to 2003 breeding season (Miller et al. 2006). However, monitoring data from 2005 showed the average density of marbled murrelets within the inland waters of Puget Sound was approximately 2.42 per square mile in areas close to shore (Raphael et al. 2007). Surveys indicate that marbled murrelets likely occur in Crescent Harbor and Floral Point (Naval Base Kitsap-Bangor) throughout the year, as these alcids were also sighted in winter (Nysewander et al. 2005; Falxa et al. 2009). The Puget Sound Ambient Monitoring Program reported a 1.84-fold increase in densities between summer and winter (Nysewander et al. 2005). Densities begin increasing in late fall/early winter and start to decline in late winter/early spring (Miller et al. 2006).

The marbled murrelet's preferred habitat type—old-growth coniferous forests near coastal areas—occurs only in small patches at NAS Whidbey Island. None of these small patches have been identified as supporting marbled murrelet nesting (U.S. Navy 2005b). Also, no marbled murrelet occupancy sites are currently known to be present at Ault Field. This species has been known to forage in the inshore marine environment and has been observed foraging in the waters next to Ault Field (U.S. Navy 2005b).

3.6.2.2 Marine Mammals

All marine mammals are protected under the MMPA of 1972, amended in 1994. The MMPA is administered by the NMFS and the USFWS. This act generally prohibits "take" of marine mammals in U.S. waters by any person and by U.S. citizens in international waters. "Take" under MMPA is defined as harass, hunt, capture, kill, or collect, or attempt to harass, hunt, capture, kill or collect. However, there are certain exceptions to the take prohibitions. MMPA allows lawful activities to incur incidental take if an incidental take permit is obtained. In accordance with this act, the Navy does not deliberately take a marine mammal.

Harassment as defined under military readiness activities in the MMPA is classified as either Level A or Level B. MMPA Level A harassment includes any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild. MMPA Level B harassment for military readiness activities is "any act that disturbs or is likely to disturb a marine mammal or marine mammal stock by causing disruption of natural behavioral patterns including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering to a point where such behaviors are abandoned or significantly altered."

Six marine mammals that are not listed under the ESA but that receive protection under the MMPA may occur in the waters adjacent to Ault Field: minke whale (*Balaenoptera acutorostrata*), gray whale (*Eschrichtius robustus*), harbor porpoise (*Phocoena phocoena*), Dall's porpoise (*Phocoenoides dalli*), California sea lion (*Zalophus californianus*), and harbor seal (*Phoca vitulina richardii*).

Minke Whale: The minke whales found in waters off California, Oregon, and Washington appear to be resident in that area and to have home ranges, whereas those farther north are migratory. Minke whales typically feed on krill, Japanese anchovy *(Engraulis japonicus),* Pacific saury *(Cololabis saira),* herring, sand lance *(Ammodytes* sp.*),* and walleye pollock (Perrin and Brownell 2002).

Within the Puget Sound, there is an area of primary occurrence around the San Juan Islands and in the Strait of Juan de Fuca (see Figure 1-1 for geographic locations). This occurrence extends into Admiralty Inlet on the west side of Whidbey Island. Dorsey et al. (1990) noted minke whales feeding in locations of strong tidal currents in inland waters of Puget Sound; prey included juvenile herring and probably sand lance (Hoelzel et al. 1989). While no empirical data on the hearing ability of this species are available, Ketten (1997) hypothesized that mysticetes (large whales with baleen such as this species) are most adapted to hear low to infrasonic frequencies.

Gray Whale: Widely distributed in the Pacific, from the Bering Sea (feeding grounds) to the Gulf of Mexico (during breeding), some gray whales enter Puget Sound during their migration. In recent years, gray whales have been sighted in the southern part of Puget Sound, particularly in Elliott Bay. Gray whales are known to enter Puget Sound in spring and remain there through the early summer months; some are present in the region as early as January (Calambokidis et al. 1994). The area of primary occurrence extends from the outer coast into the Strait of Juan de Fuca to north of the Kitsap Peninsula, including the area around Whidbey Island. Gray whales are sensitive to low noise levels. The threshold for inducing feeding interruptions from air gun noise was a received level of 173 dB re 1 μPa-m. For continuous industrial noise, the threshold for inducing avoidance was a received level of 120 dB re 1 μPa-m (Malme et al. 1984).

Harbor Porpoise: Harbor porpoise are generally found in cool temperate to subarctic waters over the continental shelf in both the North Atlantic and North Pacific. They feed primarily on Pacific herring, market squid, and smelts (Gearin et al. 1994; Read 1999). The harbor porpoise used to be common throughout Puget Sound (Scheffer and Slipp 1948; Flaherty and Stark 1982). However, most recent sightings in Puget Sound have been limited to the central portion, with several sightings north of Whidbey Island (Calambokidis et al. 1992; U.S. Navy 2006; Raum-Suryan and Harvey 1998). Recent psycho-acoustic studies of harbor porpoise found the range of best hearing to be 16 to 140 kHz, with a reduced sensitivity around 64 kHz and maximum sensitivity between 100 and 140 kHz (Kastelein et al. 2002).

Dall's Porpoise: Feeding primarily on small fish and squid, the Dall's porpoise is the most common cetacean in northern Puget Sound, occurring often off of the northern end of Whidbey Island (Osborne et al. 1988). There are no published data on the hearing abilities of this species. However, based on the morphology of the cochlea, the upper hearing threshold is estimated to be about 170 to 200 kHz (Awbrey et al. 1979).

California Sea Lion: In the non-breeding season, adult and subadult males of this species migrate northward along the coast to the Pacific Northwest, including Washington. They feed on a wide variety of prey, including many species of fish and squid (Antonelis et al. 1990; Lowry et al. 1991). Present in Puget Sound from around September through May, they have been observed hauled out on log booms, navigation buoys, and U.S. Navy submarines (NMFS 1997; Jeffries et al. 2000; U.S. Navy 2001a). Their range of maximum hearing sensitivity underwater is between 1 and 28 kHz, and they show relatively poor hearing at frequencies below 1 kHz (Schusterman et al. 1972; Kastak and Schusterman 1998). In air, the effective upper hearing limit is approximately 36 kHz, and the best range of sound detection is from 2 to 16 kHz (Schusterman 1974).

Harbor Seal: As opportunistic feeders, feeding on fish and invertebrates, harbor seals are a coastal species, rarely found more than 12 miles from shore. Haul-out areas can include intertidal and subtidal rock outcrops, sandbars, sandy beaches, peat banks in salt marshes, and manmade structures such as log booms, docks, and recreational floats (Schneider and Payne 1983; Jeffries et al. 2000). Human disturbance can affect haul-out choice (Harris et al. 2003). Harbor seals hear nearly as well in air as underwater (Kastak and Schusterman 1998). In water, they hear frequencies from 1 to 180 kHz and are most sensitive to frequencies below 50 kHz. In air, they hear frequencies from 0.25 kHz to 30 kHz and are most sensitive to 6 to 16 kHz (Richardson 1995; Terhune and Turnbull 1995; Wolski et al. 2003).

3.6.2.3 Bald and Golden Eagles

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act of 1940, as amended in 1978. This act prohibits anyone without a permit issued by the Secretary of the Interior from "taking" bald or golden eagles, including their parts, eggs, or nests. It defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb" (16 U.S.C. 668-668d). "Disturb" means "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (50 CFR Part 22). Inactive eagle nests, which may become active again, are also protected under the act.

Recovery of the bald eagle has been especially dramatic in Washington State, where the number of occupied nests increased from 105 in 1980 to 840 in 2005. Bald eagle nesting territories are now found along much of the shorelines of Puget Sound. Washington State also supports the largest wintering population of bald eagles in the continental U.S. (Stinson et al. 2001).

According to WDFW priority species habitat maps, a number of bald eagle territories are present in and around Ault Field. Bald eagles are often observed along NAS Whidbey Island's shoreline perched in trees on the top of shoreline bluffs. Three bald eagle nests are located on or immediately adjacent to Ault Field: one is in the southwest portion of the installation along the coastline at Rocky Point, and two are adjacent to the northern boundary of Ault Field (WDFW 2012). A study completed in 1996 (EDAW, Inc. 1996) found that eagles use most of the Ault Field shoreline bordering the Strait of Juan de Fuca. Five areas of concentrated bald eagle use were identified at Ault Field:

- The area immediately surrounding Rocky Point
- The point north of Cliffside Park
- The 1 mile of shoreline adjacent to the sewage treatment pond
- The pilings/approach lights on and just offshore of the approach (northwest) end of Runway 15
- The area along the northern boundary of Ault Field near the North Gate.

A number of nests also have been located along the western shoreline of Whidbey Island. It is believed that eagles nesting at these various locations frequently forage in Oak and/or Crescent Harbors.

Golden eagles are foraging, transient visitors to NAS Whidbey Island during migration periods. There are no known nests of golden eagles on the installation (NAS Whidbey Island 2012).

3.6.2.4 Migratory Birds

The MBTA is the primary legislation in the United States established to conserve migratory birds. The MBTA prohibits taking, killing, or possessing migratory birds except under the terms of a valid permit issued pursuant to federal regulation. Under 50 CFR Part 21, the Armed Forces are authorized to take migratory birds during military readiness activities; however, the Armed Forces must confer and cooperate with the USFWS on the development and implementation of conservation measures to minimize or mitigate adverse effects of military readiness activities if it determines that such activities may have a significant adverse effect on a population of migratory birds. Congress defines military readiness as all training and operations of the Armed Forces that relate to combat and the adequate and realistic testing of military equipment, vehicles, weapons, and sensors for proper operation and suitability for combat use. An activity has a significant adverse effect if, over a reasonable period of time, it diminishes the capacity of a population of a migratory bird species to maintain genetic diversity, to reproduce, and to function effectively in its native ecosystem.

Military readiness activities include operation and maintenance of the aircraft at an airfield. However, construction of support infrastructure operations is not considered a military-readiness activity. Migratory bird conservation in relation to non-military readiness activities is addressed separately in a Memorandum of Understanding (MOU) developed in accordance with EO 13186, "*Responsibilities of Federal Agencies to Protect Migratory Birds*", signed January 10, 2001. This memorandum between the DOD and the USFWS outlines the responsibility of federal agencies to protect migratory birds and how to incorporate conservation efforts into their routine operations and construction activities and was recently re-signed to cover DOD activities through 2013.

In 1994, the Navy conducted a point-count for neotropical migratory songbirds at NAS Whidbey Island in cooperation with the Student Conservation Association. The most frequently observed neotropical migratory songbirds at the station included the American robin, savannah sparrow (*Passerculus sandwichensis*), song sparrow (*Melospiza melodia*), marsh wren (*Cistothorus palustris*), American goldfinch (*Spinus tristis*), bushtit (*Psaltriparus minimus*), rufous hummingbird (*Selasphorus rufus*), European starling, American crow (*Corvus* *brachyrhynchos*), chestnut-backed chickadee (*Poecile rufescens*), golden-crowned kinglet (*Regulus satrapa*), Swainson's thrush (*Catharus ustulatus*), red-winged blackbird (*Agelaius phoeniceus*), common yellowthroat (*Geothlypis trichas*), and house finch (*Carpodacus mexicanus* [EA EST 1996]).

3.6.3 Bird / Aircraft Strike Hazard

The presence of resident and migratory birds creates a BASH risk at NAS Whidbey Island. NAS Whidbey Island comprises diverse habitat structures. When habitat diversity increases, the number of species attracted also increases. This diverse habitat structure is desirable for many avian species but can be hazardous to flight operations. The greatest risk occurs at Ault Field due to the presence of water-filled ditches, freshwater wetlands, marine shoreline, perch sites, tall brush, and short grass in the vicinity of the runways, all of which attract numerous bird species.

From a wildlife management perspective, diverse habitats provide all three of the essential items for birds: food, water, and shelter. Food is in the form of small mammals and/or fruit/seed bearing vegetation. The existing shelter provides hiding, loafing, nesting, and thermal cover, as well as excellent habitat for a thriving prey base of insects, mice, voles, and rabbits. The prey base is the main attractant for many bird species, including several species of raptors such as bald eagles, red-tailed hawks (*Buteo jamaicensis*), rough-legged hawks (*B. lagopus*), and northern harriers (*Circus cyaneus*), which create an airstrike hazard.

In FY2011, a total of 64 birds were struck by aircraft during flight operations at NAS Whidbey Island, with the highest number of strikes (25) occurring in September (Queen 2012). Bird species struck included dark-eyed junco (*Junco hyemalis*), Vaux's swift (*Chaetura vauxi*), rock dove/pigeon (*Columba livia*), dunlin (*Calidris alpina*), various thrush, ring-billed gull (*Larus delawarensis*), MacGillivray's warbler (*Oporornis tolmiei*), American goldfinch (*Carduelis tristis*), mallards, barn swallow (*Hirundo rustica*), western meadowlark (*Sturnella neglecta*), mourning dove (*Zenaida macroura*), savannah sparrow (*Passerculus sandwichensis*), great horned owl (*Bubo virginianus*), Arctic tern (*Sterna paradisaea*), red-tail hawk, northern harrier, and numerous unknown species.

3.7 Cultural Resources

3.7.1 Regulatory Framework

Section 106 of the NHPA of 1966, as amended, requires federal agencies to integrate consideration of historic preservation into the early stages of project planning. Under Section 106, the head of any federal agency having direct or indirect jurisdiction over a proposed federal or federally financed undertaking is required to account for the effects of the proposed action on any district, site, building, structure, or object that is included or is eligible for inclusion in the NRHP. Eligibility determinations are based on NRHP criteria (Table 3-9) for historic significance and National Park Service (NPS) criteria (Table 3-10) for architectural integrity.

Table 3-9 National Register of Historic Places Criteria for Historic Significance

36 CFR 60.4, Part I
The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and: A. That are associated with events that have made a significant contribution to the broad patterns of our history; or B. That are associated with the lives of persons significant in our past; or C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or D. That have yielded, or may be likely to yield, information important in prehistory or history.
36 CFR 60.4, Part II
Ordinarily, cemeteries, birthplaces, or graves of historical figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historic buildings, properties primarily commemorative in nature, and properties that have achieved significance within the past 50 years shall not be considered eligible for the NRHP. However, such properties will qualify if they are integral parts of districts that do meet the criteria or if they fall within the following categories: A. A religious property deriving primary significance from architectural or artistic distinction or historical importance; or B. A building or structure removed from its original location but which is significant primarily for architectural value or which is the surviving structure most importantly associated with a historic person or event; or C. A birthplace or grave of a historical figure of outstanding importance if there is no appropriate site or building directly associated with his or her productive life; or D. A cemetery which derives its primary significance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events; or E. A reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan and when no other building or structure with the same association has survived; or F. A property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own exceptional significance; or G. A property achieving significance within the past 50 years if it is of exceptional importance.

Table 3-10 National Park Service Criteria for Architectural Integrity

Criteria	Definition of Architectural Integrity
Location	Must not have been moved.
Design	Must retain historic elements that create the form, plan, space, structure, and style of the property.
Setting	Setting must retain its historic character.
Materials	Must retain the key exterior materials dating from the period of its historic significance.
Workmanship	Methods of construction from its time of significance must be evident.
Feeling	Physical features must convey its historic character.
Association	Must be the actual place where a historic event or activity occurred and must be sufficiently intact to convey that relationship to an observer.

Source: NPS 1995.

The Advisory Council on Historic Preservation (ACHP) has published regulations detailing the Section 106 consultation process in 36 CFR Part 800. Pursuant to these regulations, the federal agency must determine and document the area of potential effect (APE), defined in § 800.16(d) as “the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist.” For the purposes of the Section 106 consultation process, the Navy has determined that the APE for the proposed action consists of Hangar 8 (Building 2642); Hangar 10 (Building 2699) and its six auxiliary buildings (R-42, R-55, R-56, 2705, 2893, and 2894); Hangar 12 (Building 2737); and the flight simulator building (Building 2593). All historic resources at Ault Field are individually eligible; there are no historic districts in the flight line area (U.S. Navy 2002a; Houser 2010).

3.7.2 Architectural Resources

In a letter dated January 26, 2010, the Washington SHPO determined that Ault Field is not eligible as a historic district. However, Ault Field does contain some resources that are individually eligible for the NRHP (Houser 2010).

The buildings in the APE—Hangar 8 (Building 2642), Hangar 10 (Building 2699), Hangar 12 (Building 2737), and the flight simulator building (Building 2593)—were determined not eligible for the NRHP by the Washington SHPO (Houser 2010). Hangar 10’s six auxiliary buildings (R-42, R-55, R-56, 2705, 2893, and 2894) also are not eligible because Buildings 2705, 2893, and 2894 are less than 50 years old and Buildings R-42, R-55, and R-56 are temporary buildings that are less than 50 years old.

Figure 2-1 (Section 2) shows the facility modifications that would occur under the three action alternatives. These facility modifications would include the following:

- **All three action alternatives.**
  - Demolition of four of Building 2699's (Hangar 10) auxiliary buildings (R-42, R-55, R-56, and 2705)
  - Relocation of two of Building 2699's (Hangar 10) auxiliary buildings (2893 and 2894) from their current location between Buildings 2699 and 2642 (Hangar 8) to a previously disturbed area between Hangars 10 and 12 (Buildings 2699 and 2737, respectively)
  - Construction of an approximately 32,500-square-foot addition to Building 2699 (Hangar 10)
  - Construction of an approximately 9,200-square-foot facility as a flight simulator building.

- **Alternative 1.** No additional facility modifications.

- **Alternative 2.** Construction of an approximately 25,200-square-foot addition to Building 2737 (Hangar 12).

- **Alternative 3.** Construction of an approximately 4,300-square-foot addition to Building 2737 (Hangar 12).

The APE for this undertaking is defined as these buildings.

Of the ten buildings included in the action alternatives, four have been previously evaluated and determined not eligible for listing in the NRHP (Reference Log # 012610-05-USN). These include 2593 (flight simulator), 2642 (Hangar 8), 2699 (Hangar 10), and 2737 (Hangar 12). Buildings 2705, 2983, and 2894 do not need evaluations as they are less than 50 years old, built in 1986, 2006, and 2006, respectively. Buildings R-42, R-55, and R-56 are temporary buildings and are not eligible for the NRHP.

3.7.3 Archaeological Resources

The Navy has evaluated information for archaeological resources at Ault Field that is included in the *Historic and Archaeological Resources Protection Plan* (Dames and Moore 1994), the *Archaeological Resources Assessment and Protection Plan*, and the *Integrated Cultural Resources Management Plan* (U.S. Navy 2002a) for NAS Whidbey Island. Ault Field was evaluated for the potential presence of archaeological resources in 1994 and 1997, which included limited field reconnaissance. Results of these evaluations indicated that while there are a number of archaeologically sensitive areas at Ault Field, they are all located in relatively undeveloped areas at the perimeter of the airfield. Based on subsequent archaeological resource assessments of NAS Whidbey Island, archaeological resources were identified, but none are in the APE and none of the archaeological sites at Ault Field are eligible for the NRHP (U.S. Navy 2002a).

Based on this evaluation, the Navy has determined that the APE is located in an area of Ault Field that is not considered archaeologically sensitive. The APE would have sustained prior surface and subsurface ground disturbance during construction of the runways and associated buildings and structures at Ault Field between 1940 and 1989, such that it is unlikely that any intact archaeological deposits are present.

3.8 Water Resources

3.8.1 Surface Water

Ault Field is located in the upper Puget Sound basin, at the eastern end of the Strait of Juan de Fuca. Defined by the U.S. Geological Survey (USGS) as a 95-mile-long channel, the Strait of Juan de Fuca is the principal outlet for the Georgia Strait and Puget Sound, connecting both to the Pacific Ocean (USGS 2007). NAS Whidbey Island includes 15.5 miles of shoreline bordering the inland estuarine waters of Puget Sound. These waters include the Strait of Juan de Fuca, Admiralty Inlet, Oak Harbor, Crescent Harbor, and Saratoga Passage. The eastern end of Ault Field is approximately 2 miles west of Dugualla Bay, a waterbody on the northeast corner of Whidbey Island that leads into the larger Skagit Bay to the east.

No naturally occurring rivers, streams, lakes, or ponds are present on Ault Field. The original shallow, meandering watercourses that were present on Ault Field have been channelized and straightened into a series of ditches that now comprise the station’s stormwater conveyance system. These ditches have a total length of approximately 20 miles (EA EST 1996).

NAS Whidbey Island complies with its National Pollutant Discharge Elimination System (NPDES) permit for release of stormwater from various industrial facilities located at the station. As part of the permit program, NAS Whidbey Island has prepared a stormwater pollution prevention plan to control stormwater discharges from the station that may adversely affect the water quality in the Strait of Juan de Fuca and Dugualla Bay. The plan identifies potential sources of stormwater contamination and describes the BMPs that are used to prevent or minimize exposing stormwater to pollutants. Structural BMPs are used at on-base industrial and process areas such as vehicle or aircraft maintenance, wash-down, and fueling areas; material storage, loading, and unloading areas; and waste disposal areas that are exposed to stormwater. Structural BMPs include erosion and sediment controls, berms or dikes around critical areas, retention/detention basins, oil/water separators, and leak detection systems. Non-structural BMPs include preventive maintenance practices, regular inspections, spill prevention and response, procedures and practices for significant materials storage and handling, and regular pavement cleaning to remove oil and grease.

3.8.2 Groundwater

Groundwater beneath NAS Whidbey Island is present in three main aquifer systems: the shallow, intermediate, and deep aquifers. The aquifers are composed of sand or sand and gravel with confining layers of till, clay, and silt. The shallow aquifer is a major water-bearing zone on Whidbey Island and generally ranges in depth from 20 to 145 feet below ground surface (bgs); the intermediate aquifer extends throughout the northern portion of Whidbey Island, and its water levels are generally 5 to 20 feet beneath the shallow aquifer; the deep aquifer (or sea-level aquifer) is a continuous water-bearing zone on Whidbey Island, with water levels ranging from 11 to 17 feet above sea level (Simonds 2002).

The EPA has designated the Whidbey Island aquifer system as a sole-source aquifer: it is the only supply of potable water for at least half of the residents. There is no viable alternative source of drinking water for those using groundwater, and the aquifer boundaries have been defined (URS 1995).

Water-level data from environmental investigations at NAS Whidbey Island and regional studies indicate that groundwater flow at Ault Field generally follows surface topography. Most of the groundwater underlying Ault Field converges in the central runway areas and likely discharges eastward to Dugualla Bay. Groundwater along the western side of Ault Field appears to discharge westward to the Strait of Juan de Fuca (EA EST 1996).

NAS Whidbey Island does not use groundwater as a source of drinking water. Rather, treated surface water is piped to the installation from the Skagit River. The City of Oak Harbor uses the Skagit River for 75% of its drinking water, with the remaining 25% supplied by three municipal wells. Island County residents near Ault Field who are not located in the Oak Harbor water district use private wells for drinking water.

In the mid-1990s, contaminated groundwater was found to be migrating off site toward private water supply wells. The source of this groundwater contamination was a former landfill located in the southeastern portion of the installation. In response, the Navy designed an extraction and treatment system to treat and control the migration of contaminated groundwater. All private wells in the vicinity of the contaminant plume were closed, and the residences were connected to public water supplies (Agency for Toxic substance and Disease Registry [ATSDR] 1993).

3.8.3 Floodplains

EO 11988, *Floodplain Management*, requires federal agencies to identify and consider practicable alternatives for locating incompatible facilities in areas identified as floodplains. The EO defines the term "floodplain" as "the lowland and relatively flat areas adjoining inland and coastal waters including flood-prone areas of offshore islands, including at a minimum, that area subject to a 1% or greater chance of flooding in any given year." This zone of a 1% or greater chance of flooding in any given year is also commonly referred to as the 100-year floodplain because flooding is expected to occur once every 100 years, on average. Where practicable alternatives to siting federal facilities in the 100-year floodplain are not available, the facilities must be constructed in accordance with and be consistent with the intent of the standards and criteria of the National Flood Insurance Program.

According to the Island County Planning and Community Development, areas within the 100-year floodplain at Ault Field have been mapped by the Federal Emergency Management Agency (FEMA) as Zone V (Griffin 2012). Zone V are areas along coasts subject to inundation by the 1% annual-chance flood event with additional hazards associated with storm-induced waves (FEMA 2012). Storm-related tidal flooding occasionally occurs east of the runways, next to the eastern boundary of the installation, during winter storms when high winds combine with extreme high tides on Dugualla Bay to bring the tidal surge farther inland than normal (EA EST 1996). The runway ditch network handles stormwater drainage for Ault Field and the surrounding area. None of the proposed construction areas at NAS Whidbey Island are prone to flooding from stormwater flow through the airfield ditch system.

3.9 Socioeconomics

Oak Harbor and Island County, Washington, are in the Seattle-Tacoma-Bellevue metropolitan statistical area (MSA). Approximately 25% of Island County residents commute beyond the county limits for employment, primarily to Snohomish, King, and Skagit counties (State of Washington Office of Financial Management 2004). However, because of concerns about limited off-island linkages, Island County is working to develop more commercial centers and light industry that would provide employment opportunities for county residents (U.S. Navy 2005b).

NAS Whidbey Island is a major employer in the county, both directly and indirectly. Table 3-11 summarizes the air station's direct economic impact in Island County. Besides employment in the federal, state, and local government sectors, Island County employment includes the retail, construction, real estate, health care, and accommodation and food services sectors (U.S. Navy 2005b).

Table 3-11 Direct Economic Impacts of NAS Whidbey Island on Island County

Employment, uniformed and civilian personnel	10,066 personnel
Payroll	$399.1 million
Military retiree pensions	$91.1 million
TriCare payments to private providers	$14.1 million
Contracts for goods and services	$12.2 million
On-station retail spending	$22.0 million
Net direct spending[1]	$516.5 million

Source: State of Washington Office of Financial Management 2004

Note:
[1] Reduced by on-station retail spending.

Environmental Justice and Protection of Children

In 1994, EO 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations (Environmental Justice)*, was issued to focus the attention of federal agencies on human health and environmental conditions in minority and low-income populations. This EO was also established to ensure that, if there were disproportionately high and adverse human health or environmental effects of federal actions on these populations, those effects would be identified and addressed. Environmental justice is achieved if minority and low-income communities are not subjected to disproportionately high or adverse environmental effects.

In 1997, EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks (Protection of Children)*, was issued to identify and address issues that affect the protection of children. Children may suffer disproportionately more environmental health and safety risks than adults because of a variety of factors, including children's neurological, digestive, immunological, and other bodily systems that are still developing; children eat more food, drink more fluids, and breathe more air in proportion to their body weight than adults; children's behavior patterns may make them more susceptible to pollution and accidents because they are less able to protect themselves; and children's sizes and weights may diminish their protection from standard safety features.

As shown on Table 3-12, the study area (Island and Skagit Counties) has a lower than national and state percentage of minority populations, and also a lower percentage of the population living below the poverty level. Island County likewise has a lower percentage of children compared to either the national or state percentages. Skagit County is below the national percentage for child populations and equal to the state percentage.

Table 3-12 Baseline Minority, Low Income, and Child Populations

Jurisdiction	Total Population	Percent Population Total Minority	Percent Population Below Poverty Level	Percent Population Aged 19 or Younger
United States	308,745,538	27.6	15.3	30.0
Washington State	6,724,540	22.7	13.4	26.3
Island County	78,506	13.9	9.4	23.0
Skagit County	116,901	16.6	11.5	26.3

Source: U.S. Census Bureau, 2010 Census

Table 3-13 presents data on the minority, low-income, and children populations living underneath the baseline noise zones for NAS Whidbey Island. The affected population under these areas was determined using U.S. Census Bureau 2010 data to calculate the total affected area within each census bloc, and then used to proportion the percentage of the population affected for that area.

Table 3-13 Baseline Minority, Low Income, and Child Populations Underlying NAS Whidbey Island Noise Zones

Noise Zone (dB DNL)	Total Population	Percent Population Total Minority	Percent Population Below Poverty Level	Percent Population Aged 19 or Younger
65-70	4,743	37.9	8.8	24.5
70-75	2,843	28.1	8.7	23.6
75-80	2,789	21.8	8.1	24.3
80-85	209	17.7	13.3	21.1
85-90	34	20.6	17.6	23.5
>90	1	0	0	0

Source: U.S. Census Bureau, 2010 Census

[1] Minority is defined as individual(s) who are members of the following population groups: American Indian or Alaska Native; Asian; Native Hawaiian or Pacific Islander; Black or African American, not of Hispanic origin; or Hispanic.

3.10 Environmental Management

This section discusses ongoing environmental management and restoration programs at NAS Whidbey Island, including petroleum storage.

3.10.1 Regulatory Overview

NAS Whidbey Island is managing hazardous wastes and hazardous materials and substances and is remediating any contamination resulting from past operations in accordance with the following programs:

- **The Resource Conservation and Recovery Act (RCRA)** regulates the treatment, storage, transportation, handling, labeling, and disposal of hazardous waste. The Hazardous and Solid Waste Amendments of 1984 added the requirement for treatment, storage, and disposal facilities with permits issued after November 8, 1984, to include corrective actions.

- **The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)** requires federal agencies to conduct any needed response actions to clean up contamination from past releases of hazardous substances causing an unacceptable risk to human health and the environment. The military complies with CERCLA under the Installation Restoration Program (IRP). This program is used to manage inactive hazardous waste sites and hazardous material spills.

3.10.1.1 Management of RCRA-Defined Hazardous Waste

NAS Whidbey Island is a large-quantity generator of hazardous waste, as defined by RCRA, a status applying to facilities generating 2,200 pounds (1,000 kilograms) or more of hazardous waste. In CY2008, NAS Whidbey Island generated 114,700 pounds of hazardous waste. Hazardous waste-generating activities for aircraft and vehicle repair and maintenance include painting; solvent-based cleaning and degreasing; mechanical and chemical paint and rust removal; fluids change-out; electroplating; metal casting; machining; and welding or soldering. If not consumed during use, these materials and possibly their containers eventually may be disposed of as a solid or hazardous waste. As required by Chapter 15, Paragraph 5.3, of OPNAVINST 5090.1C, the *Navy Environmental and Natural Resources Program Manual*, NAS Whidbey Island maintains a hazardous waste management plan to establish procedures and provide guidance regarding hazardous waste generation, accumulation, and disposal at the installation (Naval Facilities Engineering, Northwest 2009).

Hazardous wastes are accumulated at less-than-90-day satellite accumulation points throughout the station before being transferred to permitted storage facilities. These wastes are collected and stored on-site in accordance with NAS Whidbey Island's RCRA permit. The Defense Reutilization and Marketing Office is responsible for contracting for off-site disposal of most hazardous waste.

The DOD collects all annual hazardous- and solid-waste generation data for each Navy, Marine Corps, Army, and Air Force installation in order to track its progress in meeting its goals for waste reduction. Waste categories in the pollution prevention annual data summary are defined by the source of the waste, such as a plating shop (electroplating and circuit-board manufacturing processes), fluids change (i.e., used solvents, hydraulic fluids, lubricants), facility operations (i.e., cleaning and maintenance, pest-management applications, used batteries), chemical paint-stripping, painting operations, and rust and coating removal.

3.10.1.2 Management of Hazardous Materials and Substances

NAS Whidbey Island uses hazardous materials and substances during aircraft and vehicle repair and maintenance and building and grounds maintenance. Materials used include petroleum, oils, and lubricants; solvents and thinners; caustic cleaning compounds and surfactants; cooling fluids (antifreeze); adhesives; acids and corrosives; paints; and herbicides, pesticides, and fungicides. Hazardous materials are controlled by Navy procedures such as OPNAVINST 5100.23G, *Navy Safety and Occupational Health (SOH) Program Manual*, and technical contracting requirements.

Asbestos-containing materials are subject to regulation under the federal Toxic Substances Control Act of 1976 (40 CFR 763) and by the State of Washington under its asbestos regulations (WAC Chapter 296-62 Part I-1).

Lead-based paint is commonly found in demolition debris (exterior painted wood, siding, window frames, and plaster) from buildings constructed before 1960. Once removed from a building, lead-based paint is typically managed as a hazardous waste and, as such, is subject to regulation by the EPA under its hazardous waste regulations (40 CFR 260 to 265). The State of Washington considers lead-based paint a potentially dangerous waste and regulates its disposal under WAC Chapter 173-303, *Dangerous Waste Regulations*.

Mercury is found in fluorescent light bulbs, neon bulbs, ultraviolet bulbs, and high-intensity discharge bulbs (used for outdoor lighting and in commercial buildings). Mercury is also found in older temperature- and pressure-measuring devices, clocks, switches, and other items. The Mercury Education and Reduction Act of 2003 banned the sale of most mercury-containing products and mandated labeling mercury-containing light bulbs. Mercury is regulated by the EPA under its hazardous waste regulations (40 CFR 260 to 265) and by the State of Washington as a dangerous waste under WAC Chapter 173-303.

Polychlorinated biphenyls (PCBs) are regulated under the Toxic Substances Control Act of 1976 (40 CFR Part 761). In Washington, PCBs are regulated as a dangerous waste under WAC Chapter 173-303. PCBs were used as coolants and lubricants in electrical transformers manufactured between 1929 and 1977 and in fluorescent light ballasts manufactured through 1979 (U.S. Navy 2010a).

3.10.2 Installation Restoration Program Sites

Hazardous waste disposal sites at NAS Whidbey Island are investigated under the DOD's IRP, established in 1980, in compliance with the requirements of CERCLA for former waste sites and RCRA for sites associated with ongoing operations. The program's mission is to protect human health and the environment by identifying, characterizing, and cleaning up contamination on military installations resulting from formerly accepted use and disposal practices for hazardous waste.

NAS Whidbey Island has 23 sites in various stages of investigation and remediation under the IRP. No sites are located at or beneath Hangar 8, 10, or 12. The closest IRP site, northeast of the existing aircraft parking apron and runways and approximately 1,100 feet northeast of Hangar 10, is a complex of ditches consisting of approximately 9 miles of connected ditches and culverts draining the runway area and receiving discharges from many of the station's storm drains. Previous dumping and spills have contaminated the ditch sediments with total petroleum hydrocarbons, lead, arsenic, and pesticides. An ROD was signed in April 1995, and approximately 6,000 cubic yards of contaminated sediments were excavated from the ditch complex and disposed of before being capped. In May 1996, the Navy completed construction work, including restoration.

4 Environmental Consequences

4.1 Introduction

This section describes the potential environmental impacts of the proposed action and alternatives. The direct and indirect impacts of Alternatives 1, 2, and 3, and the No Action Alternative are described and compared by resource area. Proposed mitigation measures to minimize or avoid adverse impacts, if applicable, are also discussed for each of the resources evaluated here.

Significance in the context of NEPA was determined according to Section 1508.27 of the Environmental Quality Improvement Act of 1970, as amended [43 *Federal Register* 56003, Nov. 29, 1978]. The primary factors considered for each resource area in determining significance requires considerations of both context and intensity.

(a) **Context.** The significance of an action must be analyzed in several *contexts* such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant.

(b) **Intensity.** This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. The following should be considered in evaluating *intensity*:

1) Impacts that may be both beneficial and adverse. A significant effect may exist even if the federal agency believes that, on balance, the effect would be beneficial.
2) The degree to which the proposed action would affect public health or safety.
3) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.
4) The degree to which the potential effects on the quality of the human environment may be highly controversial.
5) The degree to which the possible effects on the human environment would be highly uncertain or would involve unique or unknown risks.
6) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.
7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.
8) The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the NRHP, or may cause loss or destruction of significant scientific, cultural, or historical resources.

9) The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined critical under the ESA.
10) Whether the action threatens a violation of federal, state, or local law or requirements imposed for the protection of the environment.

4.2 Airspace and Airfield Operations

4.2.1 Airspace

Alternative 1

Since no modifications of or additions to the current airspace are proposed in support of the proposed action, the impact analysis focuses on changes in airspace use that would result from changes in the number of aircraft operations. Furthermore, the proposed increase in air operations of 2.7% would not place additional significant restrictions on civilian aircraft use of the airspace. As such, no significant impacts on airfields and airspace would occur under Alternative 1.

Alternatives 2 and 3

Because the VAQ EA-18G would be operating within the same flight parameters used for NAS Whidbey Island airspace and the proposed increase of 3.1% in air operations would not place additional significant restrictions on civilian aircraft use of the airspace, Alternatives 2 and 3 would not have a significant impact on airfields and airspace.

No Action Alternative

Under the No Action Alternative, there would be no increase in personnel and no construction to support the new aircraft. Therefore, the No Action Alternative would have no significant impact on airfields and airspace.

4.2.2 Airfield Operations

Alternative 1

The projected number of annual aircraft operations (Table 4-1) was calculated by assuming that the majority of operations by the transitioned Expeditionary VAQ squadrons would be the same as the operations currently performed by the existing EA-18G Growler squadrons at NAS Whidbey Island. The exceptions are that the Expeditionary VAQ squadrons would not conduct any FCLP operations and would conduct only about 75% as many GCA patterns as the baseline EA-18G squadrons. Total operations by the transitioned Expeditionary VAQ squadrons would increase over baseline operations by the existing Expeditionary VAQ

EA-6B Prowler squadrons under Alternative 1, with a corresponding increase in total annual operations at NAS Whidbey Island of 2.7% (1,961 operations).

Table 4-1 Proposed VAQ Air Operations at Ault Field (2014)

	No Action Alternative (Baseline)		Alternative 1		Alternative 2		Alternative 3	
	12 EA-6B VAQ Aircraft	Total Airfield Operations	21 EA-18G VAQ + FRS Aircraft	Total Airfield Operations	26 EA-18G VAQ + FRS Aircraft	Total Airfield Operations	26 EA-18G VAQ + FRS Aircraft	Total Airfield Operations
Departures	589	**12,009**	979	**12,399**	1,212	**12,468**	1,212	**12,468**
Arrivals	589	**12,009**	979	**12,399**	1,212	**12,468**	1,212	**12,468**
Pattern Operations	1842	**46,539**	3023	**46,756**	3,743	**47,799**	3,743	**47,799**
Total	**3,020**	**70,557**	**4,981**	**71,554**	**6,167**	**72,735**	**6,167**	**72,735**
Net Air Operation Change	**NA**	**NA**	**1,961**	**2.7%**	**2,178**	**3.1%**	**2,178**	**3.1%**

Key:
VAQ = Electronic Attack
FRS = Field Replacement Squadron

The proposed Expeditionary VAQ EA-18G Growler squadrons would follow the same training and deployment cycle as the EA-6B Prowler squadrons, and no change is proposed to existing types of flight operations or flight tracks. Projected operations would consist primarily of direct arrivals and departures and T&G operations, with the remaining operations including "depart and re-enter" patterns and GCA patterns. The proposed increase in air operations for Alternative 1 is well below the recent historical air operations tempo of more than 78,000 for NAS Whidbey Island (U.S. Navy 2008b). Therefore, the increase in air operations under Alternative 1 would have no significant impact on air operations at NAS Whidbey Island.

Alternatives 2 and 3

Under Alternatives 2 and 3, total annual operations at NAS Whidbey Island would increase by 3.1% (2,178 operations). As noted under Alternative 1, the proposed Expeditionary VAQ EA-18G Growler squadrons would follow the same training and deployment cycle as the EA-6B Prowler squadrons, and no change is proposed to existing types of flight operations or flight tracks. The total number of proposed air operations at NAS Whidbey Island under Alternatives 2 and 3 (72,735), although higher than proposed air operations under Alternative 1, still would be below the air station's recent historical air operations tempo of more than 78,000 (U.S. Navy 2008b), and thus the increase in air operations under Alternatives 2 and 3 would have no significant impact on air operations at NAS Whidbey Island.

No Action Alternative

Under the No Action Alternative, there would be no change in the number of annual air operations (70,557) and thus there would be no significant impact on air operations.

4.2.3 Aircraft Safety

Alternative 1

Airspace managers work to minimize safety risks through a number of measures. These include but are not limited to providing and disseminating information to airspace users, requiring appropriate levels of training for those using the airspace, setting appropriate standards for equipment performance and maintenance, defining rules governing the use of airspace, and assigning appropriate and well-defined responsibilities to the users and managers of the airspace.

Alternative 1 would add nine aircraft and an associated 1,961 operations at NAS Whidbey Island. This is an approximate 2.7% increase in overall airfield flight operations at Ault Field.

Current airspace safety procedures, maintenance, training, and inspections would continue to be implemented. Additional airfield flight operations would adhere to established safety procedures. No changes in established clear zones, APZs, or other established airfield safety features would be required. Thus, no significant impact on the probability that an aircraft mishap would occur and no impact on mishap response would be expected under Alternative 1.

There would be no changes in the potential for public health or safety impacts under Alternative 1, including those related to aviation safety. All current training regulations and procedures would continue to reflect EA-18G-specific rules, and pilots would continue to adhere to training policies. Since the EA-18G is an existing airframe at the base, an update to response plans and associated equipment, including the emergency and mishap response plans, would not be required. As such, the NAS Whidbey Island airfield safety conditions would be similar to existing conditions. No significant safety impacts from operational training actions would be expected for NAS Whidbey Island airfield airspace.

Alternatives 2 and 3

As noted under Alternative 1, there would be no changes in the potential for public health or safety impacts under Alternatives 2 and 3. Flight operations would continue to be conducted as described above according to existing safety protocols.

Alternatives 2 and 3 would add 14 aircraft and an associated 82,178 operations at NAS Whidbey Island. This is an approximate 3.1% increase in overall airfield flight operations at Ault Field. Current airspace safety procedures, maintenance, training, and inspections would continue to be implemented. Additional airfield flight operations would adhere to established safety procedures. No changes in established Clear Zones, APZs, or other established airfield safety features would be required. Thus, no significant impact on the probability that an aircraft mishap would occur and no impact on mishap response would be expected under either Alternative 2 or 3.

No Action Alternative

Under the No Action Alternative, the number of annual air operations at NAS Whidbey Island would not change. As such, no impacts on public health or safety, including those related to aviation safety, would be expected. NAS Whidbey Island would continue to conduct flight training in the local airfield environment and annual operations would continue to operate according to existing safety protocols. Therefore, no significant safety impacts under the No Action Alternative would be expected for NAS Whidbey Island airspace.

4.3 Noise

Alternative 1

Operations. Under any alternative, the noise environment would decrease compared to baseline conditions. Compared to the current noise environment (CY2011) (baseline), the noise generated by operations of the Expeditionary EA-18G VAQ squadron flights at and around Ault Field is expected to be less based on noise modeling conducted specifically for this proposed action (see Appendix C). The DOD analyzes aircraft noise near military airfields through a suite of computer-based programs, collectively called NOISEMAP. NOISEMAP, like its cousin, Integrated Noise Model (INM; which is used at civil airports) examines all the primary factors influencing aircraft noise, including:

- Aircraft type;
- Number and time of operations;
- Flight tracks;
- Aircraft power settings, speeds and altitudes;
- Numbers, duration and location of engine maintenance run-ups;
- Terrain; and

- Environmental data (temperature and humidity).

For the noise generated by specific aircraft, the DOD draws on a vast aircraft noise library. This library contains acoustic information on aircraft in the military inventory measured under controlled conditions. Aircraft noise characteristics from the noise library are used in NOISEMAP, adjusting the characteristics to local environmental conditions, to accurately predict the noise environment. Models, like NOISEMAP and INM, are particularly useful in predicting the noise environment where operational tempos and even aircraft types are projected to change.

NOISEMAP uses the DNL metric to present noise contours in the near airfield environment. DNL combines those factors that concern the public most about noise—the loudness and the number and duration of all events (total noise energy) —that occur in an average annual day. DNL also considers the time of day, adding a 10-dB penalty to night operations (between 10:00 p.m. and 7:00 a.m.) to account for the more intrusive noise at a time when the ambient noise level is low.

The noise contours presented for the action alternatives connect points of equal value, and range from 60 DNL to 85 DNL, in 5-dB increments. The Navy makes land use recommendations for compatible development (U.S. Navy 2008). Residential land uses are normally considered incompatible with noise levels above 65 DNL.

Alternative 1 has the largest decrease in the noise environment for implementing the proposed action. The noise contours for Alternative 1 are similar to, but slightly smaller than, the contours for Alternatives 2 and 3. This is because the same type of aircraft will be performing the same types of operations and using the same flight tracks near Ault Field. The total number of air operations is also very similar. Alternative 1 would have 4,981 EA-18G VAQ operations while Alternatives 2 and 3 would have 6,167 EA-18G VAQ operations. This would be an increase of 23.8% for Alternatives 2 and 3 over Alternative 1.

Because the aircraft type, flight tracks, and types of operations are the same, the Navy calculated the difference in decibels using the following formula:

$$10 * \log (1+ \% \text{ increase}) = \text{Decrease in DNL (dB)}$$

$$10*\log (1.2381) = \text{dB}$$

$$= .93 \text{ dB}$$

A difference of less than 1 dB is imperceptible to the human ear and will have minimal impact on the contour lines between Alternative 1 and Alternative 2. A change in decibels would have to be above 3 dB DNL to be barely perceptible to the human ear.

Potential noise impacts under each alternative are presented as changes in the DNL. The area of the projected 2014 DNL noise zones would decrease under Alternative 1 compared to the baseline. A large portion of this area is located over the open waters of Puget Sound and Skagit Bay. Likewise, fewer people would be located in the projected noise zones under Alternative 1. The existing population exposed to noise levels greater than 80 dB DNL would decrease slightly under Alternative 1. No new populated areas would be exposed to noise levels greater than 80 dB DNL. Because no new areas of population would be exposed to noise levels greater than 80 dB DNL, no increase in hearing loss risk would be expected.

Because of the decrease in population and land area within the less than 65-dB DNL noise zone, Alternative 1 would have no significant impacts on the noise environment in the vicinity of Ault Field at NAS Whidbey Island. Even though total air operations would increase by 2.7% after transition to the EA-18G aircraft, the noise exposure generated by the proposed air operations would decrease relative to baseline conditions. The primary reason for this is that on a single-event basis, the EA-18G SEL decreases in noise levels by 2 to 8 dB when compared to theEA-6B SEL for most types of air operations (Wyle 2012). The single events with the greatest SEL affecting the area approximately 500 feet offshore to the west of NAS Whidbey Island have been identified and are presented in Appendix C, Tables 7-1 and 7-2. EA-6B SELs range between 121 and 133 dB at a distance of 500 feet offshore. EA-18G SELs range between 104 and 127 dB at a distance of 500 feet offshore (Wyle 2012). For the arrival portions of closed patterns, the EA-6B and the EA-18G produce similar noise levels (similar SELs, with differences of 3 dB or less). However, for departures, the EA-6B SELs are 18 to 23 dB greater than the EA-18G, primarily due to the lower altitude climb-out profile of the EA-6B (Wyle 2012).

NAS Whidbey Island has recently received complaints of building rattle/vibration due to Fleet Growler operations. While the aircraft decreases noise levels by 2 dB to 8 dB for most air operations conducted at NAS Whidbey Island, the EA-18G emits a lower frequency noise at takeoff, which, while not considered “louder” in technical terms, has a higher potential to cause noise-induced vibrations (Wyle 2012). See Appendix C for more detailed information.

Noise-induced structural vibration may also cause annoyance to dwelling occupants because of induced secondary vibrations or rattling of objects within the dwelling such as hanging pictures, dishes, plaques, and bric-a-brac. Window panes may vibrate noticeably when exposed to certain levels of airborne noise. The Growler's unweighted spectral levels are, on average, 11 dB greater than the Prowler during a Mil power takeoff passing through 1,000 feet agl for frequencies less than 50 Hz. For approaches and cruise power at 1,000 feet agl, the frequency spectra of the two aircraft are similar for frequencies less than 50 Hz with average differences of 3 to 5 dB. With its increased low-frequency content, the Growler takeoff events have the slightly higher potential to cause noise-induced vibration.

While aircraft noise is assessed for land use compatibility in terms of A-weighted decibels (dBA) (of Day-Night Average Sound Level), to assess the potential for structural vibration, rattle or damage, C-weighting is utilized. Due to the EA-6B's spectra sound levels, especially in frequencies minimally affected by the C-weighting, C-weighted sound levels for the EA-6B and EA-18G only differ by 1 to 2 C-weighted decibels (dBC) for the takeoff and approach conditions. In cruise flight, the C-weighted sound levels for the EA-6B are approximately 8 dBC greater than EA-18G. None of these conditions cause C-weighted sound levels to exceed 130 dBC and structural damage would not be expected, however, the takeoff condition has C-weighted sound levels greater than 110 dBC for both aircraft, creating an environment conducive to noise-induced vibration. (Wyle 2012). Due to the minor differences in noise-induced structural vibrations between the EA-6B and EA-18G, and the fact that the change in aircraft has little effect on the overall noise environment, no significant impacts are expected. **Construction.** Construction under Alternative 1 would result in short-term construction-related noise impacts. Typical noise emission levels for construction equipment are listed in Table 4-2. Noise impacts related to construction would be intermittent and temporary (during the approximate 10-month construction period). Furthermore, at the airfield, noise from aircraft operations is the dominant noise and would tend to mask the construction-related noise; thus, Alternative 1 would have no significant impact on the existing noise environment. (For the complete noise report, see Appendix C.)

Table 4-2 Typical Noise Emission Levels for Construction Equipment

Type of Equipment	Noise Level at 50 Feet (dBA)
Air Compressor	81
Asphalt Spreader (paver)	89
Asphalt Truck	88
Backhoe	85
Bulldozer	87
Compactor	80
Concrete Plant	83

Table 4-2 Typical Noise Emission Levels for Construction Equipment

Type of Equipment	Noise Level at 50 Feet (dBA)
Concrete Spreader	89
Concrete Mixer	85
Concrete Vibrator	76
Crane (derrick)	88
Delivery Truck	88
Diamond Saw	90
Dredge	88
Dump Truck	88
Front End Loader	84
Gas-Driven Vibro-compactor	76
Hoist	76
Jackhammer (paving breaker)	88
Line Drill	98
Motor Crane	83
Pile Driver/Extractor	101
Pump	76
Roller	80
Shovel	82
Truck	88
Tug	85
Vibratory Pile Driver/Extractor	89

Source: Patterson et al. 1974.

Key:
dBA = A-weighted decibels

Alternatives 2 and 3

Operations. The projected 2014 DNL noise zones also would decrease in area under Alternatives 2 and 3. These alternatives represent the largest contour but smallest decrease from the baseline in the noise environment (and therefore the greatest impact, i.e., the worst case scenario) for implementing the proposed action. The noise contours for Alternative 1 would be slightly smaller than those of Alternatives 2 and 3; however, because the difference between the projected Alternative 1 noise contour and the projected Alternatives 2 and 3 noise contours would not be discernible when drawn on a map, the contours that represent the largest change in baseline conditions were used in this analysis. Thus, the greatest potential impact for the off-station area and estimated population within the projected 2014 DNL noise zones at NAS Whidbey Island would occur under Alternatives 2 and 3. Projected 2014 DNL noise zones for NAS Whidbey Island for Alternatives 2 and 3 are shown on Figure 4-1.

Under Alternatives 2 and 3, the land area in the noise zones would be reduced by 14% and, therefore, the corresponding population in the noise zones would be reduced by 9%. The proposed 65- to 75-dB DNL zone for Alternatives 2 and 3 would decrease as much as 1 mile relative to the baseline scenario (see Figure 4-1). The area within the DNL noise zones would decrease by approximately 5,032 acres, a large portion of which would be located over the open waters of Puget Sound and Skagit Bay. The population exposed to the greater-than-65-dB DNL noise zone would decrease by an estimated 948 people. Similar to Alternative 1, Alternatives 2 and 3 would have a less than significant impact on the noise environment in the vicinity of NAS Whidbey Island because of the noise exposure generated by the proposed action would decrease when compared to baseline conditions. This results from the lower EA-18G SEL, compared to the EA-6B SEL, as explained under Alternative 1. Similar to Alternative 1, Alternatives 2 and 3 could result in a slightly higher potential for noise-induced vibration impacts from EA-18G take-off operations. In conclusion, there would be no significant impact on the noise environment as a result of operational noise.

The existing population exposed to noise levels greater than 80 dB DNL would decrease slightly under Alternatives 2 and 3. No new areas of population would be exposed to noise levels greater than 80 dB DNL. Therefore, there are no new populations with a potential for long-term increase hearing loss risk.

Construction. Projected construction-related noise under Alternatives 2 and 3 would be similar to Alternative 1 because each alternative would require similar construction equipment (see Table 4-2 for typical noise emission levels for construction equipment). In addition to the minor facilities construction and modifications for Alternative 1, Alternatives 2 and 3 would include constructing an up to 25,000-square-foot addition to Hangar 10. Noise impacts related to construction would be intermittent over the approximate 10-month construction period. As noted under Alternative 1, aircraft noise would tend to mask construction-related noise at the airfield; thus, Alternatives 2 and 3 would have no significant impact on the existing noise environment.

No Action Alternative

Under the No Action Alternative, there would be no new facility construction or change in the aircraft operating at NAS Whidbey Island and thus no change to and no significant impact on the existing noise environment in the vicinity of the air station.

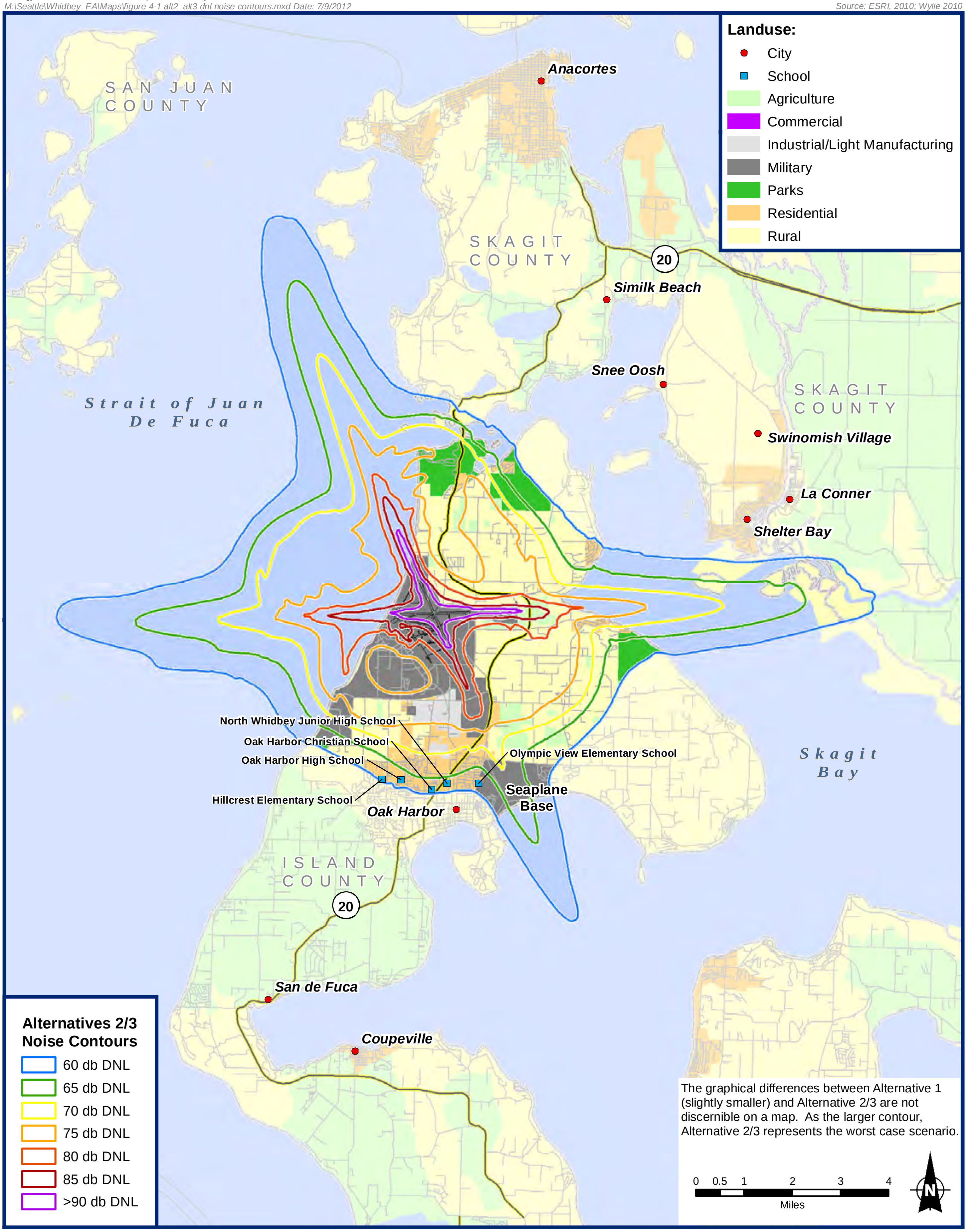

Figure 4-1
Proposed Alternative 2/3 Noise Contour,
Transition of Expeditionary EA-6B Prowler Squadrons to
EA-18G Growler at NAS Whidbey Island, Washington

4.4 Land Use

4.4.1 Installation Land Use

Alternative 1

Under Alternative 1, the proposed construction, demolition, and renovation projects would be located entirely within the existing developed area of the flight line and would be consistent with the current training and operations land uses at the flight line. The addition to the flight simulator building would be constructed on land that is currently maintained lawn. This land use change would be consistent with adjacent land uses. Thus, Alternative 1 would have no significant impact on land use at NAS Whidbey Island.

Alternatives 2 and 3

The proposed construction, demolition, and renovation projects under Alternatives 2 and 3, similar to the projects under Alternative 1, would be located entirely within the existing developed area of the flight line and would be consistent with existing land uses in that area. Alternatives 2 and 3 would also include constructing an addition to Hangar 12 (25,200 square feet under Alternative 2 and 4,300 square feet under Alternative 3,) which also would be consistent with the training and operations land uses in that area. Constructing the flight simulator building in the maintained lawn area would be consistent with adjacent training uses. Thus, Alternatives 2 and 3 would have no significant impact on land use at NAS Whidbey Island.

No Action Alternative

The No Action Alternative would maintain current land use conditions and therefore would have no significant impact on land use at NAS Whidbey Island.

4.4.2 Regional Land Use

Alternative 1

Construction, demolition, and renovation associated with Alternative 1 would occur entirely on NAS Whidbey Island and would not affect areas outside the air station. Under Alternative 1, a negligible number of new personnel would transfer to the air station. This influx of new personnel and their families would not be expected to result in changes to regional land use (e.g., through construction of new housing or new businesses or changes in transportation infrastructure). For these reasons, Alternative 1 would have no significant impact on regional land use.

Alternatives 2 and 3

Construction, demolition, and renovation associated with Alternatives 2 and 3 would occur entirely on NAS Whidbey Island and would not affect areas outside the air station. Under Alternatives 2 and 3, 311 additional personnel, 97 of which are selective reservists, would transfer to Whidbey Island. Most of the selective reservists already reside in the region and would commute to the air station. Any additional influx of new personnel and their families would not be expected to result in changes in regional land use, so Alternatives 2 and 3 would have no significant impact on regional land use.

No Action Alternative

Under the No Action Alternative, no changes in regional land use would occur and, thus, there would be no significant impact on regional land use.

4.4.3 Land Use Compatibility

Alternative 1

The Navy typically issues land use compatibility recommendations for the greater-than-65-dB DNL noise zones. The noise contours for Alternative 1 are similar, but slightly smaller, than the contours for Alternatives 2 and 3. Aircraft operations associated with transition of the Expeditionary VAQ squadrons would result in a reduction in land area in the greater-than 65-dB DNL noise zones under Alternative 1. Because no additional residential areas within Oak Harbor would be included within the projected greater-than-65-dB DNL noise zones, Alternative 1 would have no significant impacts on land use compatibility but would result in a positive impact on land use compatibility in the vicinity of NAS Whidbey Island.

Alternatives 2 and 3

Aircraft operations associated with transition of the Expeditionary VAQ squadrons would result in a reduction in land area within the greater-than-65 dB DNL noise zones under Alternatives 2 and 3. The noise contours for Alternative 1 would be slightly smaller than those of Alternatives 2 and 3. However, because the difference between the projected Alternative 1 noise contour and the projected Alternatives 2 and 3 noise contours would not be discernible when drawn on a map, the contours that represent the largest change in baseline conditions were used in this analysis. Table 4-3 shows the change in the acreages of different land uses within the greater-than-65-dB DNL noise zones between the baseline (2011) and projected (2014) noise zones under Alternatives 2 and 3. Alternatives 2 and 3 represent the worst-case scenario of increased Expeditionary VAQ aircraft operations at Ault Field, with an increase of 3,482 annual operations. Under Alternatives 2 and 3, there would be a reduction of approximately 14% in the acreage of land and water within the projected greater-than 65-dB DNL noise zones. The majority of the change in the reduction in noise would occur in the 65- to 80-dB DNL noise contour (87%). No additional residential areas within Oak Harbor would be in the projected greater-than-65-dB DNL noise contours under Alternatives 2 and 3. Thus, Alternatives 2 and 3 would have no significant impacts on land use compatibility but would result in a positive impact on land use compatibility in the vicinity of NAS Whidbey Island.

No Action Alternative

The No Action Alternative, represented as the baseline condition in Table 4-3, would have no significant impact on land-use compatibility because current aviation activities at NAS Whidbey Island would continue unchanged.

Table 4-3 Comparison of 2011 Baseline/No Action Alternative and Alternatives 2 and 3 Projected Noise Contours at Ault Field

Alternative	Noise Zone (acres) 65 to 70 dB DNL	70 to 75 dB DNL	75 to 80 dB DNL	80 to 85 dB DNL	85 to 90 dB DNL	>90 dB DNL	Total Acres
2011 Baseline No Action Alternative	12,088	10,657	9,489	2,544	1,111	849	36,736
Alternatives 2 and 3	9,252	9,641	8,987	2,270	1,019	535	31,704
Change %Change	**(2,836)[1] (23.5%)**	**(1,016) (9.5%)**	**(502) (5.3%)**	**(274) (10.8%)**	**(92) (8.3%)**	**(314) (37.0%)**	**(5,032) (13.7%)**

[1] Numbers in parentheses represent a reduction in value.
Key:
dB = Decibel.
DNL = Day-night average sound level.

4.5 Air Quality

Air emissions associated with the proposed action would be generated from short-term construction and long-term changes to aircraft operations and personnel commuting (e.g., privately operated vehicles [POVs]).

Construction would result in construction equipment emissions from all equipment operations as well as volatile organic compound (VOC) emissions from paving and painting and fugitive dust from grading and earth-moving. These emissions are calculated separately from operational emissions because they would be temporary in nature and would occur prior to full implementation of the proposed action. Changes in mobile operational emissions and test cell operations would result from the replacement of EA-6B with EA-18G aircraft operations and new EA-18G aircraft operations associated with this action. Increased POV use from commuting activities of new station personnel would also result in an increase of emissions. Other site emissions not specifically listed in the impact analysis, such as those from stationary sources (other than the test cells), other aircraft and station vehicles, ground support equipment, and other sources, are assumed to remain constant under this action. (Cumulative impacts are discussed in Section 5.3.4.)

4.5.1 Construction Emissions

Construction emissions for all three action alternatives were estimated using emission factors from the EPA's NONROAD model, based on estimates of equipment to be used throughout the year, and assuming a one-year construction period, with an estimated total of 250 workdays. A workday is assumed to be eight hours long. Construction-worker commuting and material deliveries are also considered, as VOC emissions from paving and painting and particulate emissions from site grading. Total projected annual construction emissions in tons per year at NAS Whidbey Island under each alternative are listed in Table 4-4. The construction equipment, activities, emission factors, and calculations are detailed in Appendix D.

Table 4-4 Construction Emissions at NAS Whidbey Island, All Action Alternatives

Activity	Emissions (tpy)				
	VOCs	CO	NO_X	SO_2	PM_{10}
Alternative 1					
Construction equipment	0.21	1.11	2.37	0.01	0.19
VOCs from paving and painting	1.12				
PM_{10} from grading and demolition					0.20
Worker commuting and deliveries	4.10	0.54	0.44	0.01	1.00
Total	**5.43**	**1.65**	**2.80**	**0.01**	**1.39**
Alternative 2					
Construction equipment	0.21	1.11	2.37	0.01	0.19
VOCs from paving and painting	1.79	5.20			
PM_{10} from grading and demolition					0.20
Worker commuting and deliveries	4.10	0.54	0.44	0.01	1.00
Total	**6.10**	**6.84**	**2.80**	**0.01**	**1.39**
Alternative 3					
Construction equipment	0.21	1.11	2.37	0.01	0.19
VOCs from paving and painting	1.23	2.95			
PM_{10} from grading and demolition					0.20
Worker commuting and deliveries	4.10	0.54	0.44	0.01	1.00
Total	**5.54**	**4.60**	**2.82**	**0.01**	**1.39**

Table 4-4 Construction Emissions at NAS Whidbey Island, All Action Alternatives

Key:
CO = carbon monoxide
NAS = Naval Air Station
NO_x = nitrogen oxides
PM_{10} = particles10 micrometers or less in diameter
SO_2 = sulfur dioxide
tpy = tons per year
VOCs = volatile organic compounds

4.5.2 Operations Emissions

This analysis considers emissions from the replacement of EA-6B flight and maintenance operations with EA-18G operations, the increase in EA-18G Growler flight and maintenance operations, and new POV operations by additional station personnel for each of the action alternatives. Flight and maintenance operation changes were determined based on noise analysis operation totals (Wyle 2012). Inter-facility operations and FCLPs were excluded because the Expeditionary VAQ squadron does not fly to OLF Coupeville or conduct FCLP operations. All other total operations were estimated using a ratio of total aircraft considered in the noise analysis and aircraft specifically affected by this action. The net change in emissions was estimated based on the removal of 12 EA-6B existing aircraft and operations of 21 (Alternative 1) or 26 (Alternatives 2 and 3) new EA-18G aircraft. Existing test cell emissions were based on reported data and calculated according to the NSA Whidbey Island Air Operating Permit. Projected test cell operations were estimated from a ratio to 2011 test cell operations as estimated in the Aircraft Noise Study for the Introduction of the P-8A MMA to the Fleet (Wyle July 2008) and emissions calculated using emission factors developed by the Navy's Aircraft Environmental Support Office (AESO March 2011a, March 2011b). The change in annual emission totals that result from this action are listed in Table 4-5. Emissions of EA-18G Growler flight operations and maintenance operations are based upon operational emission factors developed by the Navy's Aircraft Environmental Support Office (AESO 2009 and 2011b). See Appendix D for emissions calculations and specific document references.

Emissions from POVs were estimated using the EPA's Mobile 6 (EPA 2010c) emission factors based on the change in personnel estimates summarized in Table 2-2 (Section 2) and assuming that 56% of new personnel would be full time and commute 250 days per year, while 44% of personnel would be part-time and commute 25% of these days.

Table 4-5 Operations Emissions

Operation	Emissions (tpy)				
	CO	NO_x	HC	SO_2	PM_{10}
Existing EA-6B Operations (12 Aircraft)					
LTOs[1]	18.0	3.4	8.6	1.3	9.0
Pattern Operations[2]	1.1	5.5	0.2	0.8	3.0
Total Emissions from Flight Operations	**19.1**	**8.9**	**8.8**	**2.1**	**12.0**
Water Wash	0.9	0.1	0.4	0.05	0.4
Low Power	3.5	0.4	1.6	0.2	1.7
High Power	0.01	0.0	0.00	0.003	0.01
Test Cell	3.14	3.8	1.24	0.835	3.61
Total Emissions from Maintenance Operations	**7.6**	**4.2**	**3.2**	**1.1**	**5.8**
Total Emissions from Existing Expeditionary VAQ EA-6B Operations	**26.7**	**13.1**	**12.0**	**3.2**	**17.8**
Alternative 1: Projected EA-18 G Operations (21 Aircraft)					
EA-18G					
LTOs	130.1	15.2	34.3	2.6	8.7
Pattern Operations	0.5	14.2	0.1	1.4	3.9
Total Emissions from Flight Operations	**130.6**	**29.4**	**34.3**	**4.0**	**12.6**
Water Wash	0.3	0.005	0.1	0.006	0.03
Low Power	13.3	0.5	8.8	0.3	1.7
High Power	1.1	0.1	0.1	0.0	0.0
Test Cell	11.2	5.2	1.5	0.4	0.7
Total Emissions from Maintenance Operations	**25.9**	**5.7**	**10.5**	**0.7**	**2.5**
Total Emissions from Proposed Expeditionary VAQ EA-18G Operations	**156.5**	**35.2**	**44.8**	**4.7**	**15.1**
Total Change in Aircraft Operation Emissions	**129.8**	**22.0**	**32.9**	**1.5**	**-2.8**
Total Change in POV Emissions	**8.8**	**0.7**	**0.9**	**0.0**	**2.0**
Total Change in Operation Emissions	**138.6**	**22.7**	**33.8**	**1.5**	**-0.8**
Alternative 2 and 3: Projected EA-18 G Operations (26 Aircraft)					
EA-18G					
LTOs	161.1	18.9	42.4	3.2	10.8
Pattern Operations	0.6	17.6	0.1	1.7	4.8
Total Emissions from Flight Operations	**161.7**	**36.4**	**42.5**	**4.9**	**15.6**
Water Wash	0.4	0.0	0.2	0.0	0.0
Low Power	16.4	0.6	10.9	0.4	2.1
High Power	1.3	0.1	0.1	0.0	0.0
Test Cell Operations	13.9	6.4	1.9	0.5	0.9
Total Emissions from Maintenance Operations	**32.0**	**7.1**	**13.0**	**0.9**	**3.0**
Total Emissions from Proposed Expeditionary VAQ EA-18G Operations	**193.8**	**43.5**	**55.5**	**5.8**	**18.7**
Total Change in Aircraft Operation Emissions	**167.1**	**30.4**	**43.5**	**2.6**	**0.8**
Total Change in POV Emissions	**30.1**	**2.3**	**3.2**	**0.0**	**6.7**
Total Change in Operation Emissions	**197.2**	**32.7**	**46.7**	**2.6**	**7.5**

Table 4-5 Operations Emissions

Notes:
1 LTOs include departure and arrival, auxiliary power unit (APU), idling, taxi, and run-up operations.
2 Pattern operations include Touch and Go, Depart/re-enter, and GCA Box operations.

Key:

CO	=	carbon monoxide
HC	=	hydrocarbon
NAS	=	Naval Air Station
NO_x	=	nitrogen oxides
PM_{10}	=	particles10 micrometers or less in diameter
POV	=	personally operated vehicle
SO_2	=	sulfur dioxide
TPY	=	tons per year
VAQ	=	electronic attack

4.5.3 Air Quality Impacts

Total annual emissions from construction and operations for each alternative are summarized in Tables 4-4 and 4-5 above. Since NAS Whidbey Island is located in a region that is *in attainment* for all criteria emissions, the conformity rule does not apply to the implementation of this action at NAS Whidbey Island. There are no applicable regulations or regulatory thresholds for mobile emissions. New Source Review (NSR) or Prevention of Significant Deterioration (PSD) standards establish 250 tpy thresholds for criteria pollutants for major stationary emissions sources under which emissions from stationary sources are considered insignificant. While mobile and temporary emissions are not subject to these standards, they provide an adequate yet conservative threshold to compare total emissions from the action.

In addition, the projected increase in emissions under this proposed action would occur in a large, three-dimensional area at and above NAS Whidbey Island, Island County, and Skagit County, or the NWCAA region. The airspace in which the projected emissions from the new replacement aircraft would occur extends beyond the boundaries of NAS Whidbey Island, its horizontal extent being generally on the order of a county and vertically extending 3,000 feet. The last available inventory of mobile sources in the region was conducted for 2002 by the NWAPA (2004) (see Table 4-6).

Alternative 1

Under Alternative 1, the annual emissions from temporary construction and the projected changes in operations would be below 250 tpy for all criteria emissions. Emissions represent less than 0.27% of total annual mobile source emissions in the region, and total regional mobile emissions have not resulted in exceedances of the NAAQS in the region. Therefore, the net increase in annual emissions as a result of implementing Alternative 1 would not have a significant, adverse impact.

Alternative 2 and 3

Under Alternative 2 and 3, the annual emissions from temporary construction and the projected changes in operations are projected to be greater than emissions under Alternative 1, but will still be below 250 tpy for all criteria emissions. Emissions represent less than 0.65% of total annual mobile source emissions in the region, and total regional mobile emissions have not resulted in exceedances of the NAAQS in the region. Therefore, the net increase in annual emissions as a result of implementing of Alternative 2 or 3 would not have a significant, adverse impact.

No Action Alternative

Under the No Action Alternative, there would be no new air emissions due to new facility construction or change in the aircraft operating at NAS Whidbey Island and thus no change to and no significant impact on the existing air emissions in the vicinity of the air station.

Table 4-6 Comparison of Percent Change in Mobile Source Emissions with NWCAA Region

	Emissions (tpy)[2]				
	CO	NO_x	VOCs	SO_2	PM_{10}
Change in Emissions Associated with Alternative 1	138.6	22.7	33.8	1.5	(0.8)
Total Mobile Source Emissions in Skagit, Island, and Whatcom Counties (NWCAA Region)[1]	140,341.2	23,747.8	12,735.6	2,983.4	1,159.4
% Change in Mobile Source Emissions in NWCAA Region, Alternative 1	0.10%	0.10%	0.27%	0.05%	-0.07%
Change in Emissions Associated with Alternative 2 and 3	197.2	32.7	46.7	2.6	7.5
% Change in Mobile Source Emissions in NWCAA Region, Alternative 2 and 3	0.14%	0.14%	0.37%	0.09%	0.65%

Note:
[1] Emission totals provided by NWAPA 2004. Total mobile emissions do not include aircraft emissions; therefore, existing aircraft emissions at NAS Whidbey Island as calculated in the 2005 *Environmental Assessment for Replacement of EA-6B with EA-18G* (U.S. Navy 2005) analysis are added to the totals provided by the Northwest Air Pollution Authority (NWAPA; now the Northwest Clean Air Agency [NWCAA]).

4.6 Biological Resources

4.6.1 Wildlife

Alternative 1

Construction. The paved surfaces and maintained lawn and landscaped areas that would be affected by the proposed construction under Alternative 1 are not likely to support a high diversity or abundance of wildlife species. Species present in these areas would be expected to be acclimated to human disturbance. Construction in these areas would result in both direct and indirect impacts on resident wildlife. Direct effects could include mortality of less mobile species, such as small mammals and reptiles. The loss of the mowed lawn and landscaped area would cause species to move to other areas with suitable habitat, indirectly resulting in a decrease in the number of wildlife species in the area. However, the overall loss of wildlife species would be considered minor, given the relatively large amount of suitable habitat that would remain near the proposed development. Since the proposed construction projects would be located directly next to existing developed areas, negligible impacts on wildlife as a result of habitat fragmentation would occur. Temporary displacement of wildlife may occur in peripheral areas during construction, when noise and human activity levels increase. However, once construction has been completed, wildlife should return to these peripheral areas. Some wildlife species such as songbirds, small mammals, reptiles, and amphibians that are able to adapt to the landscaped conditions of urban environments can be expected to inhabit the developed areas. Therefore, construction under Alternative 1 would have no significant impact on wildlife.

Operation. Under Alternative 1, the total number of annual EA-18G Growler flight operations at Ault Field would increase by approximately 2.7%. Studies that focus on investigating the impacts of aircraft noise on wildlife and domestic animal species have observed a variety of species, including waterfowl, shore birds, songbirds, terrestrial mammals, marine mammals, and domestic animals (cows, chickens, sheep, and horses). Overall, the studies suggest that species differ in their response to aircraft noise (Manci et al. 1988). All species not exposed to aircraft noise, however, seem to initially respond with some form of a startle response, the intensity and duration of which diminishes or disappears with subsequent exposures. Other general responses include running, stampeding, flying, circling, or becoming motionless. Several studies indicate that there is a strong tendency for species to acclimate or habituate to noise disturbances (Grubb and King 1991; Ellis et al. 1991; Manci et al. 1988; Fraser et al. 1985; Black et al. 1984). Given the nature of the current NAS Whidbey Island operations, locally occurring wildlife species have likely become habituated to aircraft noise, and operational changes under Alternative 1 would have no significant impact on wildlife.

Alternatives 2 and 3

Construction. Construction and any environmental consequences of construction under Alternatives 2 and 3 would be the same as under Alternative 1. As construction would have no significant impact on wildlife under Alternative 1, construction under Alternatives 2 and 3 also would have no significant impact on wildlife.

Operation. Under Alternatives 2 and 3, the total number of annual EA-18G Growler flight operations at Ault Field would increase by approximately 3.1%, as opposed to 2.7% under Alternative 1. Even though there would be less than a 2% increase in operations under these two alternatives, compared to Alternative 1, overall noise would be less than historic averages at NAS Whidbey Island. Wildlife has become habituated to aircraft noise at NAS Whidbey Island since its establishment in the early 1940s, as discussed under Alternative 1. As such, environmental consequences of operations under Alternatives 2 and 3 would have no significant impact on wildlife.

No Action Alternative

Under the No Action Alternative, no additional facilities would be constructed, and current aviation activities at the station would continue unchanged; therefore, there would be no significant impact on wildlife.

4.6.2 Federally Protected Species

4.6.2.1 Threatened and Endangered Species

As noted in Section 3.6.1 above, 13 federal ESA-listed threatened and endangered species potentially occur in the vicinity of NAS Whidbey Island (see Table 3-8). These species are the golden Indian paintbrush, eight fish species, one bird, and three marine mammal species. Of these species, the USFWS has expressed particular concern over potential impacts on the marbled murrelet, discussed separately below (see Section 4.6.2.2).

Alternative 1

Construction. No populations or individual occurrences of the golden Indian paintbrush have been identified on Ault Field. Furthermore, no suitable habitat to support the species occurs within the proposed construction area. Consequently, the Navy has determined that the proposed action would have no effect on the golden Indian paintbrush, which is federally listed as threatened.

None of the construction proposed under Alternative 1 would directly affect any of the aquatic habitats that could be inhabited by ESA-listed aquatic species (see Table 3-8). Indirect effects would be mitigated because stormwater runoff would be contained in existing detention facilities, preventing degradation of water quality in marine waters surrounding the installation and thereby avoiding impacting ESA-listed aquatic species.

Construction would occur on currently developed land that is not suitable habitat for any of the ESA-listed species either occurring or potentially occurring at or in the vicinity of NAS Whidbey Island. As a result, construction activities under this alternative would have no effect on federally protected threatened and endangered species present at NAS Whidbey Island or in the surrounding areas under the ESA. There would be no significant impact on federally protected threatened and endangered species present at NAS Whidbey Island under NEPA.

Operation. Under Alternative 1, the number of EA-18G Growler flight operations at Ault Field would increase from the current number by 2.7%. Transmission of sound from a moving airborne source to a receptor under water is influenced by numerous factors, but significant acoustic energy is primarily transmitted into the water directly below the craft in a narrow cone (Naval Sea Systems Command [NAVSEA] 2012). As a result, underwater sounds from the aircraft are strongest just below the surface and directly under the aircraft. For example, the maximum sound levels in water from an aircraft overflight at 985 feet altitude is approximately 150 dB re 1µ Pa for an F/A-18 aircraft (and the EA-18G, which is a variant of the F/A aircraft [NAVSEA 2012]). However, in general, acoustic energy generated from an aircraft is reflected away from entering the water column because noise from atmospheric sources does not transmit well under water (Richardson et al. 1995). While underwater sound is strongest directly under the aircraft, this would be extremely short-term under the proposed action because the sound levels created by the EA-18G would decline at increasing lateral distances from the aircraft's flight track or location and with increasing depth in the water. Any underwater sounds propagated from the aircraft would decline rapidly after the aircraft has passed and would not indirectly impact ESA-listed aquatic species. Unlike the EA-6B, the EA-18G departing from Ault Field typically would ascend more rapidly at takeoff, thereby spending less time than the EA-6B at less than 1,000 feet over water. For example, based on a departure from Runway 13, an EA-18G would reach 1,622 feet in altitude approximately 500 feet offshore, compared to the EA-6B, which, on the same flight track, would reach 750 feet in altitude.

Overall, the replacement of the EA-6B Prowler with the EA-18G Growler and the associated changes in flight operations would result in a slight decrease in the <75 dB noise contours in the marine environment off of Ault field. While ESA-listed aquatic species would be exposed to aircraft-generated noise wherever aircraft overflights occur, under Alternative 1 potential direct over-water noise impacts would decrease slightly.

Steller sea lions are the only species that spend considerable time out of the water as well as submerged underwater and are therefore exposed to both over-water noise and underwater noise. While Steller sea lions may occur in Puget Sound waters, they are likely infrequent visitors to the shoreline of Whidbey Island; there are no Steller sea lion rookeries or haul-outs in the vicinity of Whidbey Island. Thus, the infrequency of occurrence, coupled with the ongoing flight activities at NAS Whidbey Island and the lack of construction in marine waters or near shorelines, would result in no direct effect on the Steller sea lion.

The 2.7% increase in flight operations associated with the proposed action would not be expected to measurably change the existing underwater environment of the marine waters off of Ault Field. Thus, there would be no indirect effect on foraging habitat or a reduction in the primary food stocks of humpback whales (krill, herring, sand lance, and capelin), southern resident killer whales (salmon), or Steller sea lions (fish and cephalopods) from changes in aircraft noise.

Given these conclusions, as well as the nature of ongoing air operations at NAS Whidbey Island under all action alternatives and of other sources of noise (e.g., shipping traffic) in the surrounding area, the predicted change in noise levels would not disrupt the life history of ESA-listed marine species present in marine waters adjacent to Ault Field. Thus, Alternative 1 would have no effect on ESA-listed species, excluding the marbled murrelet (see Section 4.6.2.2), and no significant impact on threatened and endangered species under NEPA.

Alternatives 2 and 3

Construction. Construction activities under Alternatives 2 and 3 would be very similar to Alternative 1 and would be located in the immediate area of the airfield away from the shoreline. Thus, no effect under the ESA and no long-term or short-term significant impacts on threatened and endangered species are anticipated under NEPA.

Operation. Under Alternatives 2 and 3, there would be an increase in the number of EA-18G Growler flight operations at Ault Field compared to baseline conditions. The total number of annual flight operations at Ault Field would increase by 3.1% compared to baseline conditions. Similar to Alternative 1, the replacement of the EA-6B Prowler with the EA-18G Growler and the associated changes in flight operations would not cause a measurable change in the existing noise environment in the marine environment off of Ault Field. Alternatives 2 and 3 would have no effect on ESA-listed species excluding the marbled murrelet (see Section 4.6.2.2), and no significant impact on threatened and endangered species under NEPA for reasons similar to Alternative 1.

No Action Alternative

Construction. Under the No Action Alternative, the EA-6B would not be replaced and no construction would occur. Therefore, the environmental consequences of the No Action Alternative are represented as no change from the existing conditions, and there would be no effect on threatened and endangered species under the ESA and no significant impact on threatened and endangered species under NEPA.

Operation. The No Action Alternative would maintain the current aviation activities at the station; therefore, there would be no effect on threatened and endangered species under the ESA and no significant impact on threatened and endangered species in or nearby NAS Whidbey Island under NEPA.

4.6.2.2 Marbled Murrelet

As murrelets occur year-round near the project area, in Crescent Harbor, the EA-18G Growler aircraft departing or landing at Ault Field could affect them. As noted in Section 3.6.1.1, the USFWS is concerned about a trend of decreasing population of murrelets and has identified two stressors that may occur as a result of the changes to the Expeditionary VAQ squadrons: noise and the risk of a bird/aircraft strike. Of the two stressors, noise impact is a greater concern. Departing aircraft, in particular, increase the risk of noise impacts more than approaching aircraft (USFWS 2010c; 2011c).

Noise

Surrounding noise sources may impact hearing and predator detection, vocalization, and response behavior of a marbled murrelet. As a result, changes in noise in an area may alter an individual’s survival ability by decreasing its predator-detection capabilities or effectiveness at foraging. Assessing potential impacts of noise on murrelets involves a complex interaction of several factors such as location of nearby noise source, predators, and foraging habitat, and habituation of birds to an area.

Impacts on Murrelet Hearing and Predator Detection. The hearing frequency of marbled murrelets is unknown, as is the level of physical hearing damage from aircraft noise. Hearing may play a less important role in predator detection for the murrelet than vision. In the marine environment, where murrelets spend virtually their entire lives, vision is typically unobstructed. Murrelets are also often associated with other seabirds in the marine environment, which likely enhances early predator detection for all species. Any murrelets with diminished hearing sensitivity would be expected to continue to forage without a significant reduction in their predator-detection capabilities.

Vocalization. Vocalization plays an important role in foraging for murrelets in the marine environment (Strachan et al. 1995), so the proposed changes in noise from the increase in flight operations could inhibit or disrupt this behavior. Murrelets may respond with an increase in scanning (head turning), a raised vocal output, and changed singing location. It is not expected that intermittent masking periods of short duration (e.g., aircraft takeoff or landing) would alter the murrelet's daily or seasonal foraging activities.

Response Behaviors. In general, response behaviors that could indicate disturbance of murrelets in the marine environment include aborted or delayed feeding, reduced foraging success (exhibited through more foraging dives or longer foraging bouts), and avoidance of foraging areas. Crescent Harbor is considered to be a murrelet foraging site and these behaviors, if chronic, could result in a fitness reduction in adults or nestlings (Frid and Dill 2002; Romero 2004; Walker et al. 2005 as cited in USFWS 2010a), the outcome of which could affect survival and fertility of individuals.

Habituation appears to be an important consideration in measuring bird response in terms of whether or not the stressor causes a disturbance, such as the change in noise levels from increased EA-18G Growler operations. Currently, there are no studies documenting behavioral responses of marbled murrelets to aircraft noise or whether the species is habituated to such noise. However, studies assessing habituation of waterfowl to aircraft noise have typically shown limited response of the birds to aircraft overflights (Black et al. 1984 as cited in Manci et al. 1988; Ward et al. 1987, 1988; Fleming et al. 1996; Conomy et al. 1998). For example, the responses of American black ducks (*Anas rubripes*), American wigeon (*A. americana*), gadwall (*A. strepera*), and American green-winged teal (*A. crecca carolinensis*) to exposure to low-level flying military aircraft at Piney and Cedar islands, North Carolina, were assessed. Investigators determined that the cost to each species was low because disruptions represented a low percentage of their time-activity budgets, only a small proportion of birds reacted to disturbance (approximately 2%), and the likelihood of resuming the activity disrupted by an aircraft disturbance event was high (64%) (Conomy et al. 1998a). Investigators concluded that levels of aircraft disturbance recorded were not adversely affecting the time-activity budgets of selected waterfowl species wintering at these islands. Based on these previous studies, it is assumed that murrelets that have had no previous exposure to aircraft sound fields initially may have a strong behavioral response, but that over time, as they become habituated to the noise, they are not likely to abort foraging as a result of encountering a sound field.

Strike Risk

Assessing the strike risk for birds involves measuring a complex interaction of several factors such as aircraft speed and altitude, time of day, weather conditions that affect visibility, and the seasonal or daily flight behavior of the species in question. Murrelets spend a considerable amount of time on top of the water (not foraging) in any given day. While there is no nesting habitat on Whidbey Island, murrelets could fly over Whidbey Island from more distant marine waters to inland nesting sites. Their flight behavior is predominantly associated with foraging and flights to nest sites. When flying, murrelets generally fly at lower altitudes (less than 500 feet) and at slower speeds in marine areas, similar to those around Whidbey Island. Murrelets likely have adapted this behavior of low flight altitudes in the marine environment to optimize energy expenditure (by gaining increased lift from the interaction of air currents and wave action) or to maintain proximity to the surface of the water for escape from aerial predators through diving.

Alternative 1

Construction. As construction would be more than 1 mile from the Strait of Juan Fuca, combined with ongoing noise generated at the airfield there would be no construction-related impacts on either marbled murrelets or their habitat under this alternative; therefore, under NEPA no significant impact on the marbled murrelet is likely as a result of construction.

Operation.

Noise. Under Alternative 1, the proposed realignment and transition of the Expeditionary VAQ squadrons at NAS Whidbey Island would increase the total number of annual EA-18G Growler flight operations at Ault Field by approximately 2.7% compared to baseline conditions; however, SELs would decrease from 121 to 133 dB for the EA-6B to 104 to 127 dB for the EA-18 (see Section 4.3).

No detailed studies of the effect of airborne noise on marbled murrelets or that evaluate the response of marbled murrelets (or other alcids) to elevated in-air sound in the marine environment have been conducted. It is assumed for projects in the marine environment that marbled murrelet response to above-ambient sound levels on the water would be similar to those expected in the terrestrial environment. Historically, surrogate species studies, such as the examination of the emperor penguin (*Aptenodytes forsteri*) hearing, have established 92 dBA SEL as the disturbance threshold for airborne noise for the marbled murrelet (USFWS 2010a, 2011a). As such, the Navy used the 92-dB SEL contour for air operations at Ault Field as well as for analysis of the frequency and duration of aircraft operations at a greater-than-92-dBA SEL as part of its assessment of impacts (USFWS 2010c, 2011c).

The frequency, duration, and intensity of the murrelets' exposure to the noise signature of the EA-18G aircraft depends upon the flight profile being performed. The greater-than-92-dB noise created by an EA-18G would be intermittent and range between 20 and 60 seconds in duration, with the longer time period occurring when aircraft are arriving at the airfield. This short-term, intermittent disruption, combined with the low density of marbled murrelets per kilometer (km) in waters off of NAS Whidbey Island (fewer than five birds per km), could briefly change an individual murrelet's behavior (Marbled Murrelet Effectiveness Monitoring Module 2008; Falxa et al. 2011). This alteration is comparable to that currently observed for the EA-6B operations. Regardless of the brief behavior response discussed above, even under the worst-case conditions, the impact would be for a relatively short duration (up to 60 seconds). This installation has been in operation since the 1940s, so it is likely that individual birds in waters next to Ault Field are habituated to ongoing aircraft activity.

Strike Risk. The height at which the marbled murrelet flies and the speed of the aircraft is the risk factor considered when assessing the likelihood of aircraft colliding with murrelets. It is assumed that flight altitudes of murrelets over marine waters next to Ault Field would be low as they descend from these altitudes to foraging sites (USFWS 2010a). Murrelets likely have adapted this behavior of low flight heights to optimize energy expenditure (increased lift from the interaction of air currents and wave action) or to stay near the water to escape from aerial predators through diving. Although data are lacking, it is assumed that flight altitude over water is generally less than 500 feet.

As such, the likelihood of collision between a marbled murrelet and an EA-18G on any given flight is largely determined by jet speed, the flight duration within 500 feet of the water, and the number of individuals present. Unlike the EA-6B, the EA-18G departing from Ault

Field typically ascends more rapidly at takeoff, thereby spending less time than the EA-6B to pass through the 0- to 500-foot range of highest collision risk. For example, based on a standard departure, an EA-18G would reach 1,622 feet in altitude approximately 500 feet offshore, compared with the EA-6B, which, on the same flight track, would reach only 750 feet in altitude. Given the very short duration and rapid ascent of the EA-18G, the risk of collision is expected to be lower for departing flights than current operations of the EA-6B.

Approaching aircraft spend comparatively more time in murrelet airspace (less than 500 feet) than departing aircraft because they maintain lower flight altitudes and a more horizontal trajectory. Aircraft approaching Runway 25 typically do not descend below 1,000 feet agl until they are over Whidbey Island itself. However, aircraft would descend to 1,000 feet agl or less over the Strait of Juan de Fuca when approaching Runway 13, increasing the potential risk of collision with murrelets in this area. However, murrelets in the vicinity of Ault Field are primarily located at Crescent Harbor and are likely to fly well below the flight paths of aircraft approaching Ault Field. Because both the EA-6B and EA-18G have similar arrival flight profiles and operate at similar speeds, altitudes, and descent rates while approaching Ault Field, the potential for bird strike upon arrival by either aircraft is low.

There have been no documented murrelet aircraft strikes at Ault Field. The expected intersection of murrelet flight with the EA-18G airspace is expected to be infrequent and brief, given the murrelet densities next to Ault Field, their low-flight patterns in the marine environment, and the rapid ascent of the EA-18G from Ault Field.

The Navy consulted with the USFWS on the potential risk of noise impacts and strike on December 10, 2010, and then on December 8, 2011. Following these consultations, the Navy completed and submitted a biological assessment to the USFWS on March 30, 2012, that addressed the potential impacts of realignment and transition of the expeditionary VAQ squadrons on the marbled murrelet. The Navy determined that the proposed action may affect, but is not likely to adversely affect, the marbled murrelet. Based on the Navy's findings in their biological assessment, the USFWS issued a letter of concurrence on May 24, 2012 (see Appendices A and B).

Overall, because of the faster climb rate and slightly less noise generated by the EA-18G Growler compared with the EA-6B Prowler, there would be fewer long-term impacts on marbled murrelets than under baseline conditions. The proposed action may affect, but is not likely to adversely affect, the marbled murrelet under the ESA. Under NEPA, there would be no significant impact on the marbled murrelet as a result of operations under Alternative 1.

Alternatives 2 and 3

Construction. **C**onstruction under Alternatives 2 and 3 would be in the same location as Alternative 1. As this construction would be more than 1 mile from the shoreline and ongoing noise at the airfield, no construction-related impacts on marbled murrelets or their habitat are anticipated under these alternatives; therefore, under NEPA, no significant impact on the marbled murrelet is likely as a result of the proposed construction.

Operation. Alternatives 2 and 3 would increase the total number of annual EA-18G Growler flight operations at Ault Field by approximately 3.1%. Implementation of these alternatives would result in long-term noise levels similar to those described under Alternative 1. Although noise levels would be similar between all action alternatives, the increase of 3.1% in flight operations under Alternative 2 and 3 would increase the overall risk of potential strikes to nearby marbled murrelets. As a result, there would be an increased negative impact on marbled murrelets over the long-term under Alternatives 2 and 3.

However, because the EA-18G ascends faster than the EA-6G, there would be an overall decrease in the potential risk of strike when compared with historic operations at the airfield. The faster climb rate and slightly lower sound level of the EA-18G would result in fewer long-term impacts on marbled murrelets under these two alternatives than under baseline conditions. The proposed action may affect, but is not likely to adversely affect, the marbled murrelet under the ESA. Therefore, under NEPA, there would be no significant impact on the marbled murrelet as a result of operations under Alternatives 2 and 3.

No Action Alternative

Because the No Action Alternative would not increase noise levels or the number of flight operations above baseline conditions, it is anticipated that there would be no effect on the marbled murrelet under the ESA and no significant impact on the marbled murrelet under NEPA.

4.6.2.3 Marine Mammals

Marine mammals protected under the MMPA potentially occurring in the marine waters adjacent to Ault Field (i.e., Puget Sound and the Strait of Juan de Fuca) include the minke whale, gray whale, harbor porpoise, Dall’s porpoise, California sea lion, and harbor seal.

Alternative 1

Construction. No construction activities in the marine environment would occur under Alternative 1; therefore, there would be no direct impacts on marine mammals under the proposed action. Proper implementation of the measures to control stormwater runoff from construction sites and new impervious surfaces would prevent degradation of water quality in surface waters surrounding the installation, thereby avoiding any indirect impacts on marine mammals. Construction activities under Alternative 1 thus are not expected to impact marine mammals protected under the MMPA, so there would be no significant impact under NEPA.

Operation. Alternative 1 proposes a 2.7% increase in flight operations. Studies have documented that 1) marine mammals (specifically gray whales) have shown no outward physical behavioral response to aircraft noise or overflights; 2) exposure to noise from very low-flying aircraft does not always alarm or cause hauled-out seals (specifically monk seals) to flee into the water; and 3) aircraft are thought to have a much smaller potential for impacting marine mammals compared with other sources of underwater noise, including ship traffic, drill rigs, and seismic surveys (NPS 1994; U.S. Air Force 2000; Zhang et al. 2003). However, as discussed in Section 4.5.1.1, transmission of sound from a moving airborne source to an underwater receptor is influenced by significant acoustic energy, primarily transmitted into the water directly below an aircraft in a narrow cone (NAVSEA 2012). As a result, underwater sound from the aircraft is strongest just below the surface and directly under the aircraft. For example, the maximum sound levels in water from an aircraft overflight at 985 feet altitude is approximately 150 dB re 1µ Pa for an F/A-18 aircraft[3] (NAVSEA 2012).

Although underwater noise directly under an aircraft at less than 1,000 feet altitude can be high, in general, acoustic energy generated from an aircraft is reflected away from the water column, as noise from atmospheric sources do not transmit well under water (Richardson et al. 1995). While underwater sound is strongest directly under the aircraft, this would be extremely short-term under the proposed action because the sound levels created would decline at increasing lateral distances from the aircraft's flight track or location and with increasing depth in the water. Any underwater sounds propagated from the aircraft would decline rapidly after the aircraft has passed and would not indirectly impact a marine mammal.

Both the EA-6B and EA-18G have similar arrival flight profiles and operate at similar speeds, altitudes, and descent rates while approaching Ault Field. Approaching aircraft spend comparatively more time in 1,000-foot altitude airspace than departing aircraft because they maintain lower flight altitudes and a more horizontal trajectory. Aircraft approaching Runway 25 typically do not descend below 1,000 feet agl until they are over Whidbey Island itself.

[3] The EA-18G Growler is a variant of the FA-18F (Super Hornet) strike-fighter aircraft.

However, aircraft would descend to 1,000 feet agl or less over the Strait of Juan de Fuca when approaching Runway 13, increasing noise near marine mammals in this area. However, because no haul-outs have been identified immediately next to Ault Field and because the EA-18G transmits less noise than the EA-6B, descending EA-18G would not affect marine mammals when compared with baseline conditions.

Unlike the EA-6B, the EA-18G departing from Ault Field typically ascends more rapidly at takeoff, thereby spending less time than the EA-6B at less than 1,000 feet altitude. For example, on a departure from Runway 13, an EA-18G would reach 1,622 feet in altitude approximately 500 feet offshore, compared with the EA-6B, which, on the same flight track, would reach only 750 feet in altitude. This, combined with the fact that no haul-outs have been identified immediately next to Ault Field, would not affect marine mammals when compared with baseline conditions. Consequently, the Navy has determined that this alternative would not affect nor result in reasonably foreseeable “takes” of a marine mammal species by harassment, injury, or mortality as defined under the MMPA, and under NEPA there would be no significant impact on marine mammals as a result of operations under Alternative 1.

Alternatives 2 and 3

Construction. Because construction activities would be the same under Alternatives 2 and 3 as under Alternative 1, any environmental consequences also would be the same. As construction activities under Alternative 1 would have no impact on marine mammals protected by the MMPA, construction activities under Alternatives 2 and 3 also would have no effect to marine mammals protected under the MMPA, so there would be no significant impact under NEPA.

Operation. Under Alternatives 2 and 3, the proposed transition of the Expeditionary VAQ squadrons at NAS Whidbey Island would increase the total number of annual EA-18G Growler flight operations at Ault Field by approximately 3.1%. Consequently, the Navy has determined that this alternative would not affect or result in reasonably foreseeable “takes” of a marine mammal species by harassment, injury, or mortality as defined under the MMPA.

Because the EA-18G ascends faster than the EA-6G, there would be an overall decrease in the noise impacts on marine mammals when compared with historic operations at the airfield. The faster climb rate and slightly lower sound level of the EA-18G would result in fewer long-term impacts on marine mammals under these two alternatives than under baseline conditions.

Descending EA-6B and EA-18G aircraft approaching NAS Whidbey Island do not descend below 1,000 feet agl until they are either over Whidbey Island itself or the Strait of Juan de Fuca, exposing marine mammals to similar impacts because of the aircrafts' similar trajectories. However, because no haul-outs have been identified immediately next to Ault Field and the EA-18G transmits less noise than the EA-6B, a descending EA-18G would not affect marine mammals when compared to baseline conditions.

Therefore, under NEPA there would be no significant impact on the marine mammals as a result of operations under Alternatives 2 and 3.

No Action Alternative

Under the No Action Alternative, no additional facilities would be constructed, current flight operations at the station would continue, and there would be no change in existing conditions or impacts on marine mammals protected under the MMPA. Therefore, under NEPA there would be no significant impact on marine mammals as a result of the No Action Alternative.

4.6.2.4 Bald and Golden Eagles

Alternative 1

Construction. Given the historical occurrence of bald eagles in the vicinity of NAS Whidbey Island, there is the potential for bald eagles to be in the general vicinity of the proposed area. However, no bald eagles are likely to be present within the immediate proposed construction area because of the absence of preferred foraging or nesting habitat. In addition, a take permit as authorized under the Bald and Golden Eagle Protection Act (16 U.S.C. §§ 668 668d, June 8, 1940, as amended 1959, 1962, 1972, and 1978) is not applicable. Therefore, construction activities under Alternative 1 would not impact bald and golden eagles near NAS Whidbey Island, and under NEPA, there would be no significant impact.

Operation. Alternative 1 proposes a 2.7% increase in the number of EA-18G Growler flight operations at Ault Field. A study by Grubb and King (1991) on the reactions of bald eagles to human disturbances showed that pedestrians and helicopters elicited far greater responses than aircraft. Ellis et al. (1991) showed that eagles typically respond to the proximity of a disturbance, such as a pedestrian or aircraft within 300 feet, rather than the noise level.

Based on bald eagle response to human disturbances and the slight decrease in noise of the EA-18G, aircraft operations under Alternative 1 would not impact bald and golden eagles, and under NEPA there would be no significant impact.

Alternatives 2 and 3

Construction. Construction activities under Alternatives 2 and 3 would be similar to Alternative 1. Therefore, construction activities under these alternatives would not impact bald and golden eagles near NAS Whidbey Island; therefore, under NEPA there would be no significant impact.

Operation. Under Alternatives 2 and 3, the proposed transition of the Expeditionary VAQ squadrons at NAS Whidbey Island would increase the total number of annual EA-18G Growler flight operations at Ault Field by approximately 3.1%, an increase in operations similar to the increase under Alternative 1. Therefore, based on bald eagle response to human disturbances and the slight decrease in noise of the EA-18G, aircraft operations under Alternatives 2 and 3, as compared with the baseline, would not impact bald and golden eagles; therefore, under NEPA there would be no significant impact.

No Action Alternative

Under the No Action Alternative, no additional facilities would be constructed, and current flight operations at the station would not change; therefore, under NEPA there would be no significant impact on bald and golden eagles.

4.6.2.5 Migratory Birds

Alternative 1

As discussed in Section 3.6.4, routine operation and maintenance of the EA-18G Growler at Ault Field and proposed construction of support infrastructure are not exempt from the take prohibitions of the MBTA (see Rule 72, *Federal Register* 56926). The paved surfaces and maintained lawn and landscaped areas that would be affected by the proposed construction under Alternative 1 would not support a high diversity or abundance of birds. While the proposed new construction would disturb approximately 0.2 acre of habitat potentially used by various species of neotropical migratory songbirds, removal of this habitat would not impact migratory bird species populations at the station, considering the availability of remaining suitable habitat. Furthermore, no direct mortality of migratory birds would result from construction because birds would be expected to relocate to other areas of suitable habitat during construction. The NAS

Whidbey Island BASH Plan provides project and operations guidance to aid in MBTA compliance. Based on the availability of remaining suitable habitat, removal of habitat due to construction under Alternative 1 would not impact migratory birds at NAS Whidbey Island. In addition, noise levels under Alternative 1 would decrease slightly and would therefore have no significant impact on migratory bird species under NEPA.

Alternatives 2 and 3

Construction. Construction activities under Alternatives 2 and 3 would be similar to Alternative 1. Therefore, construction activities under these alternatives would not impact migratory bird species near NAS Whidbey Island; therefore, there would be no significant impact under NEPA.

Operation. Under Alternatives 2 and 3, the proposed transition of the Expeditionary VAQ squadrons at NAS Whidbey Island would increase the total number of annual EA-18G Growler flight operations at Ault Field by approximately 3.1%, an increase in operations similar to the increase under Alternative 1. Therefore, based on migratory bird species response to human disturbances and the slight decrease in noise of the EA-18G, aircraft operations under Alternatives 2 and 3, as compared with the baseline, would not have a significant impact on these species under NEPA.

No Action Alternative

Under the No Action Alternative, no additional facilities would be constructed, and current aviation activities at the station would continue unchanged. Therefore, no significant impact on migratory bird species is anticipated under NEPA.

4.6.3 Bird / Aircraft Strike Hazard

Alternative 1

Alternative 1 would not create attractants, such as diverse habitat structure, that would have the potential to increase the concentration of birds in the vicinity of Ault Field. (Potential bird species susceptible to strike in the vicinity of Ault Field are described in Section 3.6.4).

Considering the minor increase (2.7% under Alternative 1) in annual air operations and utilization of existing flight tracks, a minor increase in the BASH risk would occur at NAS Whidbey Island. With the minor increase in air operations, there would be a potential for increased bird strikes of one to two birds a year under Alternative 1. This increase would be offset by the strike mitigation/BASH plans implemented at NAS Whidbey Island. The implementation of BASH measures would decrease any significant increase of strike hazards or impact of such hazards on birds and, therefore, would not be a significant impact.

Alternatives 2 and 3

Similar to Alternative 1, Alternatives 2 and 3 would not create attractants for birds and would only result in a minor increase (3.1%) in annual air operations. With ongoing BASH mitigations measures implemented, environmental consequences under Alternatives 2 and 3 would be the same as baseline conditions. Therefore, there would be no significant increase of or significant impact on strike hazards or impact of such hazards on birds.

No Action Alternative

Under the No Action Alternative, no additional facilities would be constructed, and current aviation operations at the station would continue unchanged; therefore, no changes in and no significant impact on BASH risk would occur

4.7 Cultural Resources

4.7.1 Architectural Resources

Alternative 1

Use of existing facilities and functions with minor internal modifications or renovations under Alternative 1 would not impact cultural resources at NAS Whidbey Island. The airfield facilities that would be modified or renovated are not listed on the NRHP, nor are they considered potentially eligible for listing on the NRHP (Hardlines Design Company 2010). Six structures at NAS Whidbey Island have been determined to be NRHP-eligible: Buildings 118, 112, 386, 410, 457, and 458.

Normally, the most sensitive components of a structure to airborne noise are the windows and, infrequently, the plastered walls and ceilings. An evaluation of the peak sound pressures impinging on the structure is normally sufficient to determine the possibility of damage. In general, at sound levels above 130 dB there is the possibility of vibration (Wyle 2012). While certain frequencies (such as 30 Hz for window breakage) may be of more concern than other frequencies, conservatively, only sounds above 130 dB lasting more than one second are potentially damaging to structural components (Wyle 2012). A study, directed specifically at the effects of low-altitude, high-speed aircraft on structures showed that there is little probability of structural damage occurring as a result of such operations (Wyle 2012). As noted above, there would be no instances of aircraft sound levels exceeding or reaching 130 dB with replacement of the EA-6B with the EA-18G. In fact, future sound levels would be lower with replacement of the EA-6B.

The Navy initiated Section 106 consultation on June 18, 2012 with the Washington SHPO regarding Alternative 1 and its effects on historic properties at the NAS Whidbey Island (see Appendix B). In a letter dated July 3, 2012, responding to the Navy's request for consultation, the Washington SHPO concurred with the Navy's determination that the proposed Expeditionary VAQ squadron transition at NAS Whidbey Island under Alternative 1 would have no adverse effect on historical resources because none are located in or immediately adjacent to the APE (see Figure 2-1). Therefore, Alternative 1 would have no significant impact on historical resources.

Alternatives 2 and 3

Use of existing facilities and functions with minor internal modifications or renovations and future sound levels under Alternatives 2 and 3 would not impact cultural resources at NAS Whidbey Island for the same reasons described under Alternative 1. The Navy initiated Section 106 consultation on June 18, 2012 with the Washington SHPO regarding Alternatives 2 and 3 and their effects on historic properties at NAS Whidbey Island (see Appendix B). In a letter dated July 3, 2012, responding to the Navy's request for consultation, the Washington SHPO concurred with the Navy's determination for Alternatives 2 and 3. The Navy has determined that no historical resources are located in the APE. However, one NRHP-eligible historical resource, Hangar 5 (Building 386), is located outside of, but adjacent to, the APE and northwest of Hangar 12 (Building 2737). Hangar 5 was determined eligible for the NRHP under Criterion C (i.e., for its architectural design as the only example of a Miramar Hangar in Washington State).

The Navy concluded that Alternatives 2 and 3 would have no adverse effect on historical resources, specifically Hangar 5 (Building 386), because the setting of this building has not been identified as contributing to the significance of this building and because changes to the setting, which would be visible only from or in views of the rear of the hangar, would not affect those architectural design qualities that make it eligible for listing in the NRHP. Therefore, Alternatives 2 and 3 would have no significant impact on historical resources.

No Action Alternative

Under the No Action Alternative, there would be no changes to and no adverse effects on architectural resources at NAS Whidbey Island. Therefore, the No Action Alternative would have no significant impact on historical resources.

4.7.2 Archaeological Resources

Alternative 1

The APE for Alternative 1 is an area of construction in previously disturbed areas at Ault Field located in an area of NAS Whidbey Island that is not considered sensitive for archaeological resources. The Navy concluded the proposed Expeditionary VAQ squadron transition at NAS Whidbey Island would have no effect on archaeological resources. In case of an inadvertent discovery of Native American human remains and/or archaeological resources during construction, the Navy will notify the appropriate tribal governments and the state Department of Archaeology and Historic Preservation as to the treatment of the remains and/or archaeological resources per applicable laws. Because the APE is located entirely on the airfield the Navy determined there would be no significant impacts on tribal treaty resources, tribal rights, or Indian lands under Alternative 1; therefore, government-to-government consultation is not required. A letter was sent to the tribes on June 27, 2012, notifying them of the project and the Navy's effect determination (see Appendix B).

Alternatives 2 and 3

The APE for Alternatives 2 and 3 is the same as for Alternative 1 and is located in an area of NAS Whidbey Island that is not considered sensitive for archaeological resources. The Navy concluded that the proposed Expeditionary VAQ squadron transition at NAS Whidbey Island would have no effect on archaeological resources. In case of an inadvertent discovery of Native American human remains and/or archaeological resources during construction, the Navy will notify the appropriate tribal governments and the state Department of Archaeology and Historic Preservation as to the treatment of the remains and/or archaeological resources per applicable laws. The Navy determined there would be no significant impacts on tribal treaty resources, tribal rights, or Indian lands under Alternatives 2 and 3; therefore, government-to-government consultation is not required. A letter was sent to the tribes on June 27, 2012, notifying them of the project and of the Navy's effect determination (see Appendix B).

No Action Alternative

Under the No Action Alternative, there would be no effect on archaeological resources. Therefore, the No Action Alternative would have no significant impact on archaeological resources.

4.8 Water Resources

4.8.1 Surface Water

Alternative 1

As noted in Section 3.8.1, because no surface waterbodies are located in the proposed project area, the construction, demolition, and renovation projects under Alternative 1 would not directly impact surface waters. Sediments could be eroded from exposed ground, or fuels or other chemicals could potentially be released during construction, which could indirectly impact surface waters. However, these potential impacts would be minimized or avoided by incorporating BMPs for erosion and sediment control during ground-disturbing activities, which would prevent the uncontrolled discharge of sediments and associated pollutants.

Under Alternative 1, the addition to the flight simulator building (Building 2593) would create 0.2 acre of new impervious surface, which would generate approximately 123,800 gallons of stormwater runoff per year. The NAS Whidbey Island Public Works Department confirmed that this runoff would be contained on-site in existing and proposed retention facilities (Tyhuis 2012). No other new impervious surface would be created under Alternative 1.

The current NPDES permit for NAS Whidbey Island includes restrictions on the amount of stormwater that may be discharged to either the Strait of Juan de Fuca or Dugualla Bay. With the increase in the amount of impervious surface proposed under Alternative 1, it is expected that the additional stormwater runoff would be within the conditions of the existing NPDES permit and would not require a revision to the current permit (Tyhuis 2012). As a result, impacts on water quality from stormwater discharge would be highly localized, given the small amount of new impervious surface (less than 1 acre), implementation of on-site BMPs to reduce storm water runoff, use of existing stormwater detention facilities, and compliance with existing permit conditions. Thus, Alternative 1 would have no significant impact on surface water quality.

Alternatives 2 and 3

Construction, demolition, and renovation projects under Alternatives 2 and 3 would not directly impact surface waters. As noted under Alternative 1, potential impacts from the release of sediments or fuels or other chemicals from the construction sites would be minimized or avoided by incorporating BMPs for erosion and sediment control during ground-disturbing activities. Alternatives 2 and 3 would create the same amount of new impervious surface that would be created under Alternative 1 (0.2 acre). As explained under Alternative 1, this small increase in impervious surface, coupled with implementation of on-site BMPs, use of existing stormwater detention facilities, and compliance with existing permit conditions, would minimize impacts on surface water quality. Thus, Alternatives 2 and 3 would have no significant impact on surface water quality.

No Action Alternative

The No Action Alternative would not change existing conditions; therefore, the No Action Alternative would have no significant impact on water quality.

4.8.2 Groundwater

Alternative 1

As the first of the three main aquifers, the shallow aquifer begins at approximately 20 feet bgs. None of the proposed construction and demolition activities under Alternative 1 would extend to a depth below the surface that would directly impact this underlying water table. Furthermore, recent geotechnical borings in the surrounding area suggest that the new impervious surface also would not impact groundwater in the area (Tyhuis 2012). Potential spills of fuels or other chemicals could occur during construction and/or demolition. However, the Navy would use BMPs, including spill prevention and immediate cleanup of spills, to prevent any infiltration of fuels or other chemicals into area groundwater resources in the unlikely event of a spill. Therefore, Alternative 1 would have no significant impact on groundwater resources.

Alternatives 2 and 3

Alternatives 2 and 3 would have no significant impact on groundwater resources for the same reasons described under Alternative 1.

No Action Alternative

Under the No Action Alternative, there would be no construction or demolition; therefore, the No Action Alternative would have no significant impact on groundwater resources.

4.8.3 Floodplains

Alternative 1

The FEMA Flood Insurance Rate Map indicates that the proposed construction areas under Alternative 1 are located outside of the 100-year floodplain (FEMA 2007). Furthermore, because of their locations, the proposed construction areas at NAS Whidbey Island are not prone to flooding from stormwater flow in the airfield ditch system. Therefore, there would be no significant impact on floodplains under Alternative 1.

Alternatives 2 and 3

The proposed construction areas under Alternatives 2 and 3, including the northeast end of Hangar 12, are located outside the 100-year floodplain and the area prone to flooding during periods of heavy stormwater flow (FEMA 2007). Therefore, there would be no significant impact on floodplains under Alternatives 2 and 3.

No Action Alternative

Under the No Action Alternative, there would be no changes in existing conditions; therefore, there would be no significant impact on floodplains.

4.9 Socioeconomics

Alternative 1

Under Alternative 1, construction projects undertaken to support the proposed action would have a short-term, beneficial impact on the regional economy because a large portion of the construction funds would be spent on labor and materials purchased in the region. As additional income is injected into the regional economy through expanded employment, procurement, and construction expenditures, employment and earnings would multiply. Every additional dollar spent on local contractors and suppliers to support the construction would stimulate the regional economy and create more employment and business opportunities.

However, because construction-related investments are considered one-time expenditures, these positive economic impacts would be short-term. Once these funds leave the regional economy through savings, taxes, or purchases of goods and services from outside the region, the positive effects would no longer be multiplied. Construction of the proposed Hangar 10 addition and the construction of the flight simulator building (Building 2593) addition would have a temporary beneficial impact on the local economy in the vicinity of NAS Whidbey Island, primarily due to an increase in temporary employment during construction of the proposed facilities.

Over the long-term, Alternative 1 would result in a small increase in the number of personnel at the air station when compared to the population of the City of Oak Harbor and Island County, which would generate a proportionate increase in payroll. This small, long-term increase in payroll, although beneficial, would not be expected to impact the overall regional economy. Therefore, this minor change in the number of personnel employed at the air station or on the air station's payroll would not have significant negative impacts on the regional economy under Alternative 1.

The environmental justice analysis focuses on the potential for a disproportionately high and adverse exposure of minority, low-income, and child populations projected to occur from aircraft noise associated with the alternatives. The noise contours for Alternative 1 are similar, but slightly smaller than the contours for Alternatives 2 and 3. The difference between the projected Alternative 1 noise contour and the projected Alternatives 2 and 3 noise contours would not be discernible when drawn on a map; therefore, the contours that represent the largest change in baseline conditions were used in this analysis. The greatest potential impact for the off-station area and estimated population within the projected 2014 DNL noise zones at NAS Whidbey Island would occur under Alternatives 2 and 3.

However, the area of the projected 2014 DNL noise zones would decrease under either Alternative 1 or Alternatives 2 and 3, compared to the baseline. Fewer people would be located in the projected noise zones under Alternative 1, therefore, reducing the population potentially affected by noise. Because of the lesser population and land area within the ≥65-dB DNL noise zone, Alternative 1 would not be expected to result in any disproportionately high and adverse impacts on minority, low-income, or child populations. Thus, there would be no significant impact.

Alternatives 2 and 3

Alternatives 2 and 3 would have short-term, beneficial impacts similar to those described under Alternative 1, resulting from the proposed construction, demolition, and renovation projects. Over the long-term, Alternatives 2 and 3 each would result in a small increase in the number of personnel at the air station when compared with the population of the City of Oak Harbor and Island County, which would generate a proportionate increase in payroll. This small, long-term increase in payroll, although beneficial, is not expected to impact the overall regional economy.

Additionally, under Alternatives 2 and 3, NAS Whidbey Island would gain an additional 311 people, with 97 being selective reservists, who would work approximately seven days per month at the air station. It is assumed that most of these selective reservists already reside in the region and would commute to the air station. Because the selective reservists currently reside in the region, there would be a negligible change in regional spending as a result of the proposed action. The transition of the selective reservists to NAS Whidbey Island would have a slight positive impact on local spending on goods and services in Oak Harbor and Island County. Thus, Alternatives 2 and 3 would have no significant impact on the regional economy.

As discussed under Alternative 1, the area of the projected 2014 DNL noise zones would decrease under either Alternative 1 or Alternatives 2 and 3, compared to the baseline. Fewer people would be located in the projected noise zones under Alternatives 2 and 3; therefore, reducing the population potentially affected by noise. Because of the lesser population and land area within the ≥65–dB DNL noise zone, Alternatives 2 and 3 would not be expected to result in any disproportionately high and adverse impacts on minority, low-income, or child populations. Thus there would be no significant impact.

No Action Alternative

The No Action Alternative would not involve any construction, demolition, or renovation projects or change the number of personnel employed at the air station or the air station's payroll. Thus, there would be no short- or long-term beneficial impacts on the overall regional economy under the No Action Alternative; existing economic conditions would remain unchanged. Therefore, the No Action Alternative would have no significant impact on the regional economy.

Under the No Action Alternative, there would be no change in the aircraft operating at NAS Whidbey Island and thus no change to the existing noise environment or the affected population within the ≥65-dB DNL noise zone. Therefore, there would be no disproportionately high and adverse impacts on minority, low-income, or child populations. Thus there would be no significant impact.

4.10 Environmental Management

4.10.1 Hazardous Materials and Waste Management

Alternative 1

Under Alternative 1, transition of the Expeditionary VAQ squadrons and continued operation of these squadrons would not introduce any additional hazardous materials and/or waste streams that cannot be managed by existing hazardous material and waste management functions and facilities at NAS Whidbey Island. NAS Whidbey Island currently handles hazardous materials and hazardous waste associated with operation and maintenance of EA-6B Prowler aircraft and EA-18G Growler aircraft, and facilities or functions needed to handle EA-18G Growler equipment and associated materials and waste streams are already in place.

Proposed construction would be completed with the use of minimal quantities, if any, of potentially hazardous materials (e.g., paint, solvents). Spills of fuel, oil, or other chemicals from construction vehicles and equipment could occur during construction. Any spills will be immediately cleaned up following procedures in OPNAVINST 5100.23G, *Navy Safety and Occupational Health (SOH) Program Manual*, NAS Whidbey Island's *Spill Prevention, Control, Countermeasures Plan* and the air station's *Hazardous Waste Management Plan* (NAVFAC NW April 14, 2009) to minimize potential impacts on human health and the environment.

Vehicle repair and maintenance activities at NAS Whidbey Island are not projected to change with transitioning from EA-6B Prowler aircraft to EA-18G Growler aircraft. The EA-18G aircraft would be serviced using the same cleaners, coolants, paints, and other materials used to service the existing aircraft fleet. All hazardous wastes would continue to be collected, managed, and stored on-site in accordance with NAS Whidbey Island's Central Hazardous Waste 90-Day Accumulation Facility guidelines, which includes the following regulations:

- OPNAVINST 5100.23G, Navy Safety and Occupational Health (SOH) Program Manual
- WAC Chapter 296-62 Part I-1, Occupational Health Standards, Safety Standards for Carcinogens
- Washington State Dangerous Waste Regulations, WAC Chapter 173-303
- Toxic Substances Control Act of 1976 (40 CFR 761 and 40 CFR 763)
- 40 CFR 260-265, Hazardous Waste Management System.

Based on the above, Alternative 1 would have no significant impact on hazardous materials and waste management at NAS Whidbey Island.

Alternatives 2 and 3

Components of the hazardous materials and waste management procedures for the transition of the Expeditionary VAQ squadrons and continued operation of these squadrons under Alternatives 2 and 3 would be the same as described under Alternative 1. Proposed construction under Alternatives 2 and 3 would add a minor amount to the quantities of potentially hazardous materials currently handled by NAS Whidbey Island. Therefore, Alternatives 2 and 3 would have no significant impact on hazardous materials and waste management at NAS Whidbey Island.

No Action Alternative

Under the No Action Alternative, NAS Whidbey Island would continue to handle hazardous materials and hazardous waste associated with operation and maintenance of EA-6B Prowler aircraft and EA-18G Growler aircraft. The No Action Alternative would have no significant impact on hazardous materials and waste management at NAS Whidbey Island.

4.10.2 Installation Restoration Program Sites

Alternative 1

Alternative 1 would have no impact on ongoing remedial activities at NAS Whidbey Island. None of the proposed demolition or construction activities would require removal or disturbance of surface soil, subsurface soil, groundwater, or existing groundcover near or within any IRP site; therefore, contaminated media are not likely to be encountered during implementation of Alternative 1. Because of this, Alternative 1 would have no significant impact on IRP sites.

Alternatives 2 and 3

Alternatives 2 and 3 would have no impact on ongoing remedial activities at NAS Whidbey Island. Likewise, contaminated media are not likely to be encountered during implementation of Alternatives 2 and 3, for the same reasons listed under Alternative 1. Therefore, Alternatives 2 and 3 would have no significant impact on IRP sites.

No Action Alternative

The No Action Alternative would not result in changes in ongoing remedial activities or IRP sites on NAS Whidbey Island and, therefore, would have no significant impact on IRP sites.

5 Cumulative Impacts

The CEQ regulations for implementing NEPA define cumulative impacts as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what other agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts can result from individually minor but collectively significant actions by various agencies (federal, state, and local) or individuals that take place over time. Accordingly, a cumulative impact analysis must identify and define the scope of other actions and their relationship with the proposed action or its alternatives if there is the potential for environmental impacts to overlap in space and time.

The CEQ provides guidance on cumulative impacts analysis in *Considering Cumulative Effects Under the National Environmental Policy Act* (CEQ 1997). This guidance further identifies cumulative impacts as those environmental impacts resulting from "spatial and temporal crowding" of environmental disruptions; if additional disruptions occur within a system before that system has recovered from a first disruption, the effects of those disruptions will accumulate. Therefore, an analysis of cumulative impacts normally includes a defined geographic study area based on the context of each resource that would be impacted by the proposed action and a timeframe, including past, present, and reasonably foreseeable future actions, the effects of which may overlap in time with the proposed action.

5.1 Identifying Geographic Study Areas for Cumulative Impacts Analysis

The geographic study area for analysis of cumulative impacts can vary for different resources. CEQ guidance (CEQ 1997) indicates that geographic boundaries for cumulative impact analysis almost always should be expanded beyond those for project-specific analysis. An appropriate geographic study area generally depends on what distance an effect might extend. The CEQ guidance identifies potential geographic boundaries for cumulative impacts analysis. For air quality, the potentially affected air quality region is the appropriate boundary for assessment of cumulative impacts from releases of pollutants into the atmosphere. For land-based impacts on water resources, watershed boundaries may be the appropriate geographic study area. For wide-ranging or migratory wildlife, specifically marine mammals, fish, and sea birds, any impacts of the proposed action may combine with the impacts of other actions within the range of the population. Based on this guidance, a specific geographic study area is identified at the beginning of each resource discussion.

5.2 Past, Present, and Reasonably Foreseeable Actions for Cumulative Impacts Analysis

Table 5-1 briefly describes actions that have been determined to be relevant to the analysis of cumulative impacts associated with the proposed action. The Navy has made an effort to identify and evaluate past, ongoing, and reasonably foreseeable future actions that have or would have similar and potentially cumulative or additive effects on those of the proposed action. Identifiable present effects of past actions are analyzed to the extent that they may be additive to the impacts of the proposed action. In general, the Navy lists and analyzes the effects of individual past actions only where appropriate; cumulative impacts analysis typically focuses on the combined effects of past, present, and reasonably foreseeable future actions. This analysis may be qualitative rather than quantitative when data on the environmental effects of past actions are insufficient. Analysis of cumulative impacts primarily includes present and reasonably foreseeable future actions that may have present or ongoing effects with the proposed action.

The proposed action is planned to begin in 2012 and would take approximately two years to complete. The timeframe for cumulative impacts resulting from aircraft operations under the proposed action would start in 2005, when the *Environmental Assessment for Replacement of EA-6B Aircraft with EA-18G Aircraft at Naval Air Station Whidbey Island, Washington*, was completed, and would continue into the foreseeable future to 2019 with the replacement of the P-3C Orion aircraft with the P-8A MMA. The timeframe for cumulative impacts resulting from foreseeable construction at Ault Field would start in 2012 and would continue to 2019.

Table 5-1 Past, Present, and Reasonably Foreseeable Future Actions near NAS Whidbey Island

Action Proponent (Agency/ Individual)	Project Name	Location and Description	Year Occurred/ To Occur	Resource Areas Impacted by the Project
Past				
Navy	Northwest Training Range Complex EIS	This EIS covers training activities, force structure changes, and range enhancements in the Northwest Training Range Complex. That range consists of ocean operating areas, special use airspace, and land-based training areas from 250 nautical miles west of the coasts of Northern California, Oregon, and Washington inland to the Washington/Idaho border, including Military Operating Areas and training areas in the vicinity of NAS Whidbey Island. The Navy evaluated increases in training activities; accommodation of changes in basing locations for ships, aircraft, and personnel (force structure changes); and provided for range enhancements in the Northwest Training Range Complex. Baseline training activities will increase and training activities associated with force structure changes will be implemented for the EA18G Growler, Guided Missile Submarine, P-8A MMA, unmanned aerial systems, air-to-air missiles and sonobuoys. Most activities in the inshore area will increase, but mine countermeasure activities will decrease. Underwater detonations will decrease from 60 detonations per year to two detonations per year at Crescent Harbor, and no more than two underwater detonations per year will take place at Floral Point (Naval Base Kitsap-Bangor), for a maximum of four detonations per year (U.S. Navy 2010b).	Ongoing	▪ Airspace and Airfield Operations ▪ Noise ▪ Land Use Compatibility ▪ Air Quality ▪ Biological Resources: Federally Protected Species; Wildlife; Migratory Birds, and Bird Aircraft Strike Hazard.

Table 5-1 Past, Present, and Reasonably Foreseeable Future Actions near NAS Whidbey Island

Action Proponent (Agency/ Individual)	Project Name	Location and Description	Year Occurred/ To Occur	Resource Areas Impacted by the Project
Past				
Navy	Replacement of the P-3C Orion Aircraft with the P-8A MMA	NAS Whidbey Island; NAS Jacksonville, Florida; Marine Corps Base Hawaii Kaneohe Bay; and NAS North Island, California The Navy is constructing facilities and providing functions to support the homebasing of 12 P-8A MMA squadrons and one FRS. Under the Record of Decision (ROD), four P-8A MMA squadrons (24 aircraft) will be homebased at NAS Whidbey Island. The number of military personnel at the air station is projected to decrease by 484 people, while the number of civilian and contractor personnel is projected to increase by 166 people (resulting in a net decrease of 318 personnel). New construction will include an aircraft hangar, a contractor logistics support building, an expansion of the existing Tactical Support Center and construction of new privately-owned vehicle parking, training facilities, an operational storage facility, and ordnance storage (U.S. Navy 2008).	2012-2019	▪ Airspace and Airfield Operations ▪ Noise ▪ Land Use Compatibility ▪ Air Quality ▪ Biological Resources: Federally Protected Species; Wildlife; Migratory Birds, and Bird Aircraft Strike Hazard. ▪ Socioeconomics
Navy	Replacement of EA-6B Prowler Aircraft with EA18G Growler Aircraft	NAS Whidbey Island Replacement of the EA-6B Prowler with the EA18G Growler is ongoing. The replacement process was anticipated to result in an overall decrease in the number of aircraft and associated personnel at NAS Whidbey Island (U.S. Navy 2005b). The proposed action of this EA supplements the 2005 replacement EA of EA-6B Prowler aircraft with EA-18G Growler aircraft.	2008-2014	▪ Noise ▪ Air Quality

Table 5-1 Past, Present, and Reasonably Foreseeable Future Actions near NAS Whidbey Island

Action Proponent (Agency/ Individual)	Project Name	Location and Description	Year Occurred/ To Occur	Resource Areas Impacted by the Project
Present/Ongoing				
Navy	Northwest Training and Testing EIS	The study area for this EIS includes activities within existing range complexes and facilities: (1) the Northwest Training Range Complex, (2) the Naval Undersea Warfare Center Keyport Range Complex, (3) the Southeast Alaska Acoustic Measurement Facility. Additionally, the proposed action includes the resumption of testing activities in Carr Inlet Operations Area and the proposed action includes pier-side sonar testing at Naval Base Kitsap at Bremerton, Naval Base Kitsap at Bangor, and Naval Station Everett. The Navy is proposing to conduct training and testing activities primarily within existing range complexes, operating areas, testing ranges, and selected Navy pier-side locations in the Pacific Northwest. The purpose of the proposed action is to conduct training and testing activities to ensure the Navy accomplishes its mission to maintain, train, and equip combat-ready military forces. This analysis will reassess the environmental analyses of Navy at-sea training and testing activities contained in two previous EISs/OEISs and various environmental planning documents, and consolidate these analyses into a single environmental planning document. This reassessment will support reauthorization of permits under the Marine Mammal Protection Act and the Endangered Species Act for activities to be carried out from 2015 to 2020. The Navy is preparing an EIS for this action and the draft is expected to be released to the public in the fall of 2013.	2015	▪ Airspace and Airfield Operations ▪ Noise ▪ Land Use Compatibility ▪ Air Quality ▪ Biological Resources: Federally Protected Species; Wildlife; Migratory Birds, and Bird Aircraft Strike Hazard.

Table 5-1 Past, Present, and Reasonably Foreseeable Future Actions near NAS Whidbey Island

Action Proponent (Agency/ Individual)	Project Name	Location and Description	Year Occurred/ To Occur	Resource Areas Impacted by the Project
City of Oak Harbor	City of Oak Harbor Water System Improvements	The city is planning to construct improvements to its water system in order to replace aging infrastructure and meet minimum storage requirements over the next 20-year planning horizon. Improvements will include construction of a new water reservoir tank, which will be 150 feet in diameter and 39 feet tall, with a capacity of 4.0 million gallons, and a new booster station. The reservoir tank and booster station will be located off of Gun Club Road, south of Ault Field. Additionally, 5,700 feet of 18-inch and 24-inch water transmission mains will be installed along Gun Club Road from Oak Harbor Road to the reservoir site. Other, follow-on improvement projects may include extension of large diameter mains and construction of pressure regulating valve stations in the city's distribution system. The project will allow the city to supply water to Seaplane Base through its distribution system (City of Oak Harbor 2012).	2012 – 2019	▪ Noise ▪ Biological Resources: Federally Protected Species; Wildlife; and Migratory Birds. ▪ Socioeconomics
City of Oak Harbor	Clean Water Facilities Planning	Two sites under consideration, one near Windjammer Park and one north of Seaplane Base (Matson 2011) The City of Oak Harbor is planning to replace its two existing wastewater treatment facilities (WWTFs), which are nearing the end of their useful lives and lack the technology to meet increasingly stringent water quality standards, with a modern WWTF. This project is currently in the planning stages. The new WWTF would use a membrane bioreactor wastewater treatment process and would discharge treated effluent to Oak Harbor (Matson 2011).	By 2017	▪ Noise ▪ Biological Resources: Federally Protected Species; Wildlife; and Migratory Birds. ▪ Socioeconomics

Table 5-1 Past, Present, and Reasonably Foreseeable Future Actions near NAS Whidbey Island

Action Proponent (Agency/ Individual)	Project Name	Location and Description	Year Occurred/ To Occur	Resource Areas Impacted by the Project
Whidbey East Holdings, LLC	Harvest of 28 acres of timber	4606 Jones Road, Oak Harbor. Harvest of about 28 acres of a 40-acre site consisting of three contiguous parcels, with up to 1,500 yards of grading for logging road construction.	2012	▪ Noise ▪ Biological Resources: Federally Protected Species; Wildlife; and Migratory Birds.
Navy	NAS Whidbey Island Petroleum, Oil, and Lubricants Pipeline	NAS Whidbey Island The Navy would construct 4.4 miles of 12-inch underground petroleum, oil, and lubricants pipeline from storage tanks located on Seaplane Base to storage tanks located on NAS Whidbey Island and decommission two existing 55-year-old pipelines. The existing pipelines would be used as conduits for communication systems or decommissioned by draining, plugging, and abandoning them in compliance with environmental requirements.	FY 2012	▪ Noise ▪ Biological Resources: Federally Protected Species; Wildlife; and Migratory Birds. ▪ Socioeconomics
Reasonably Foreseeable				
Navy	Fuel Pier Breakwater Construction and Finger Pier Demolition	NAS Whidbey Island Seaplane Base Demolition of a 536-foot-long finger pier and construction of a 320-foot-long partial depth sheet pile breakwater.	FY 2014	▪ Noise ▪ Biological Resources: Federally Protected Species; Wildlife; and Migratory Birds.
Navy	Replacement of the C-9 Aircraft with the C-40 Aircraft	NAS Whidbey Island The four C-9 Skytrain II aircraft stationed at NAS Whidbey Island would be replaced by three C-40 Clipper aircraft.	FY 2015	▪ Airspace and airfield operations ▪ Noise ▪ Land Use Compatibility ▪ Air Quality ▪ Biological Resources: Federally Protected Species; Wildlife; Migratory Birds, and Bird Aircraft Strike Hazard.

Table 5-1 Past, Present, and Reasonably Foreseeable Future Actions near NAS Whidbey Island

Action Proponent (Agency/ Individual)	Project Name	Location and Description	Year Occurred/ To Occur	Resource Areas Impacted by the Project
Navy	Animal and Vegetation Control EA	The Navy is proposing to implement a rodent management program using both a rodenticide and controlled burning of the airfield open areas at Ault Field. An EA will be prepared.	Programmatic FY 2013	▪ Air Quality ▪ Biological Resources: Federally Protected Species; Wildlife; and Migratory Birds.

Key:

CATEX	=	Categorical exclusion
EA	=	Environmental assessment
EIS	=	Environmental impact statement
FRS	=	Fleet replacement squadron
FY	=	Fiscal year
MMA	=	Multi-mission maritime aircraft
SEPA	=	Washington State Environmental Policy Act
WWTF	=	Wastewater treatment facility

5.3 Cumulative Impact Analysis

Cumulative impacts are discussed below by resource. This section does not address resources that the Navy has determined would not be impacted by the proposed action because the proposed action would not contribute to any cumulative impacts on these resources. Resources that are not analyzed include vegetation, soils, regional population and housing, community services, infrastructure and utilities, transportation, installation land uses, regional land uses, land use controls, coastal zone, architectural resources, archaeological resources, surface waters, groundwater, floodplains, hazardous materials and waste management, and IRP sites. These resources are discussed in Sections 3 and 4.

5.3.1 Airspace and Airfield Operations

The geographic study area for cumulative impacts on airspace and airfield operations is the navigable airspace controlled by NAS Whidbey Island. A summary of the relevant impacts of the Navy's proposed action, the relevant impacts of other projects that impact airspace and airfield operations, and the cumulative impacts of these projects combined is provided below.

5.3.1.1 Summary of Impacts from the Proposed Action

Under the proposed action, most of the pattern operations originating at Ault Field would be conducted within the Class C airspace over the airfield or within an up to 10-nm radius of the airfield (depending on altitude). The proposed action would result in an increase in total annual operations at Ault Field, ranging from a 2.7% increase (1,961 operations) under Alternative 1 to a 3.1% increase (2,178 operations) under Alternatives 2 and 3. Thus, no significant impacts to airspace and airfield operations are anticipated.

5.3.1.2 Summary of Impacts from Other Projects

Projects that have the potential to cumulatively impact airspace and airfield operations in combination with the proposed action include the NWTRC EIS training activities, the replacement of EA-6B aircraft with EA-18G aircraft at NAS Whidbey Island (carrier-based VAQ squadrons), the pending Northwest Training and Testing EIS training and testing activities, as well as the replacement of the P-3C Orion aircraft with the P-8A MMA and the replacement of the C-9 aircraft with the C-40 aircraft.

The airspace-related activities associated with the NWTRC EIS project included additional operations in the inshore area around NAS Whidbey Island. Aircraft were already operating in this airspace and no significant changes in the types of airspace classification and uses were anticipated. Therefore, it was determined that there would be no significant impacts on airspace and airfield operations at Ault Field. The replacement of EA-6B aircraft with EA-18G aircraft at NAS Whidbey Island (carrier-based VAQ squadrons) anticipated a reduction of 7,335 operations following replacement of 72 EA-6B Prowler aircraft with 57 EA-18G Growler aircraft (U.S. Navy 2005b); however, there were no changes in the types of airspace classification or usage.

As a result of the replacement of the still transitioning P-3C Orion squadrons with P-8A MMA squadrons there would be less than a 1% decrease in operations at Ault Field. The replacement of P-8A MMA squadrons would not change the existing types of flight operations or flight tracks that are currently under use with the P-3C Orion squadrons. Additionally, the Navy is currently analyzing future training and testing activities in the NWTRC as well as at Navy Research, Development, Test and Evaluation (RDT&E) ranges both at offshore and inshore marine ranges in the Northwest Training and Testing EIS project. This project is not complete, so no final or quantitative analysis can be completed and the exact nature of the impacts is not yet known. However, the project has the potential to impact airspace similar to the impacts described in the NWTRC EIS. There is the potential for an increase in aircraft operations, as well as the potential development, testing, and introduction of new aircraft. The Northwest Training and Testing EIS will contain further discussion of cumulative impacts related to this project.

Additionally, the replacement of the C-9 Skytrain II aircraft has not been fully developed, so potential changes to airfield operations associated with this action cannot be assessed at this time. However, it is not expected that the percentage of total aircraft operations conducted by the C-9 Skytrain II replacement aircraft, C-40 Clipper, or the overall flight patterns of the aircraft would change significantly as a result of the replacement actions, and so it is expected that impacts on airspace and airfield operations would be minor.

5.3.1.3 Cumulative Impacts

The proposed action's increase of up to 3.1% in aircraft operations, combined with the proposed actions described in the NWTRC EIS, the Replacement of the P-3C Orion Aircraft with the P-8A MMA EIS, the Northwest Training and Testing EIS, and the replacement of the C-9 Skytrain II with the C-40 Clipper would not have a significant cumulative impact on airspace and airfield operations at Ault Field. No significant changes in the types of classification or use of the airspace are anticipated. Additionally, at this time, it is not anticipated that the combination of the ongoing projects and the expected foreseeable projects would significantly change or increase the number of operations. Therefore, when considered in combination, no significant cumulative impacts on airspace and airfield operations are expected.

5.3.2 Noise

The geographic study area for cumulative impacts on noise is defined as the area within the Alternative 2 and 3 noise zones depicted on Figure 4-1 (Section 4). A summary of the relevant impacts of the Navy's proposed action, the relevant impacts of other projects that generate noise, and the cumulative impacts of these projects combined is provided below.

5.3.2.1 Summary of Impacts from the Proposed Action

Current and projected 2014 noise contours associated with Ault Field would be smaller than the historic contours associated with the EA-6B Prowler aircraft, which began operating at NAS Whidbey Island in 1970. Implementation of the proposed action would result in a decrease in the land area within the noise zones. No additional residential areas in Oak Harbor would be included in the projected greater-than-65-dB DNL noise zones under any of the action alternatives. Construction-related noise impacts associated with the proposed action would be intermittent and temporary and would be expected to occur only during an approximately 10-month construction period. Construction noise would be masked by the more dominant aircraft operation noise. Thus, no significant impacts on the existing noise environment are anticipated.

5.3.2.2 Summary of Impacts from Other Projects

Projects that have the potential to cumulatively impact noise in combination with the proposed action include the NWTRC EIS training activities, the Replacement of the P-3C Orion Aircraft with the P-8A MMA EIS, the replacement of EA-6B aircraft with EA-18G Aircraft at NAS Whidbey Island (carrier-based VAQ squadrons), the pending Northwest Training and Testing EIS training and testing activities, the City of Oak Harbor Water System Improvements, the Clean Water Facilities project, the harvest of 28 acres of timber, construction of the NAS Whidbey Island petroleum, oil, and lubricants pipeline, fuel pier breakwater construction and finger pier demolition, and the replacement of the C-9 aircraft with the C-40 aircraft.

The training activities associated with the NWTRC include additional aircraft training and underwater detonations in the inshore area around NAS Whidbey Island, but not a large increase in aircraft overflights over terrestrial areas. If the noise associated with the increased training falls within the greater-than-65-dB noise zones in the vicinity of NAS Whidbey Island, there is a potential for increased noise impacts. Underwater detonations have been proposed to decrease from 58 per year to two per year at Crescent Harbor resulting in a decrease to noise impacts from detonations. Some above-ambient sounds levels could be expected from these detonations if they are closer to the surface in the water column. Therefore, it was determined that there would be no significant impact on noise receptors from noise associated with surface ships, aircraft, and underwater explosive ordnance training.

Aircraft operations associated with transitioning P-3C Orion squadrons with the P-8A MMA squadrons would decrease by less than 1%. This minor decrease would not significantly change the amount of land and water area within the greater-than-65-dB noise zones in the vicinity of NAS Whidbey Island. Therefore, there is the potential for minor decreased noise impacts on the population in the vicinity of NAS Whidbey Island. Additionally, the replacement of the EA-6B with EA-18G aircraft as evaluated in the 2005 EA will result in a 36% reduction in the population exposed to aircraft noise greater than 65 dB DNL around Ault Field and in a 28% decrease in the land area within the greater than 65 dB DNL noise contour round Ault Field.

The Navy is currently analyzing future training and testing activities in the NWTRC as well as at Navy RDT&E ranges, both in the offshore and inshore marine environments, in the Northwest Training and Testing EIS project. This project is not complete, so no final or quantitative analysis can be completed and the exact nature of the impacts is not yet known. However, the project has the potential for impacts similar to those described in the NWTRC EIS. There is the potential for an increase in aircraft operations, as well as the potential development, testing, and introduction of new aircraft. The Northwest Training and Testing EIS will contain further discussion of cumulative impacts related to this project.

Construction-related noise could result from the replacement of the City of Oak Harbor’s two existing water treatment facilities under the City of Oak Harbor Water Systems Improvement project and the Clean Water Facilities Planning project, the harvest of 28 acres of timber, the NAS Whidbey Island petroleum, oil and lubricants pipeline, and the fuel pier breakwater construction and finger pier demolition. These projects could have the potential to impact the population in Oak Harbor; however, it is expected that any impacts would be minor due to the short-term timeframe of the projects. The construction of a breakwater and the demolition of a pier could have the potential to impact the population at NAS Whidbey Island Seaplane Base; it is not expected that the noise from construction and demolition would extend off the base. Therefore, it is expected that impacts from increased noise would be minor and short-term during the construction and demolition phases of these projects.

Furthermore, the replacement of four C-9 Skytrain II aircraft by three C-40 Clipper aircraft has not been fully developed, so potential changes to the noise environment associated with this action cannot be assessed at this time. However, it is not expected that the percentage of total aircraft operations conducted by the C-9 Skytrain II replacement aircraft, C-40 Clipper, or the overall flight patterns of the aircraft would change significantly as a result of the replacement actions, and so it is expected that impacts to noise would be minor.

5.3.2.3 Analysis of Cumulative Impacts

The proposed action combined with the proposed actions of the ten projects discussed above would not have a significant cumulative noise impact. The proposed action would result in a 14% reduction in the amount of land and water area within the greater-than-65-dB noise zones in the vicinity of Whidbey Island. The transition of the P-8A MMA would result in an approximately 20-dB reduction in SELs over the current P-3's and a less than 1% decrease in aircraft operations. The C-40 is anticipated to be quieter than the C-9 and fewer of them would be homebased at NAS Whidbey Island. Finally, the 2005 EA that analyzed the transition of the E/A-6B with E/A-18G has resulted in a reduction of aircraft noise since the E/A-18G is quieter that the E/A-6B. Additionally, the Northwest Training and Testing project has not been developed but the potential noise impacts from training could remain the same or increase. Although an increase in training is possible, it is not anticipated to increase at a level that would create a significant cumulative impact. As a result, the overall nose impacts of these projects would likely reduce the noise associated with NAS Whidbey Island and it surrounding areas.

The construction projects in the area, such as the replacement of the P-3C Orion aircraft with the P-8A MMA, City of Oak Harbor water system improvements, the harvest of 28 acres of timber, and construction of the NAS Whidbey Island petroleum, oil, and lubricants pipeline would all be expected to take place during 2012, potentially in the same timeframe as the construction for the proposed action. It is expected that any construction noise, both on the installation and off the installation, would be temporary or intermittent.

Because of the positive impact from the reduction of acreage under the noise contours resulting from the proposed action and the small amount of construction noise both on and off the installation, the cumulative impacts from construction and from air operations would not be significant.

5.3.3 Land Use Compatibility

The geographic study area for cumulative impacts on land use is defined as the area surrounding NAS Whidbey Island. A summary of the relevant impacts of the Navy's proposed action, the relevant impacts of the other projects that impact land use compatibility, and the cumulative impacts of these projects combined are provided below.

5.3.3.1 Summary of Impacts from the Proposed Action

Under the proposed action, there would be a reduction of approximately 14% in the acreage of land and water within the projected greater-than-65-dB DNL noise zones. No additional residential areas within Oak Harbor would be included in the projected greater-than-65-dB DNL noise zones. This would result in a positive impact on land use compatibility in the vicinity of the air station.

5.3.3.2 Summary of Impacts from Other Projects

Projects that have the potential to cumulatively impact land use compatibility in the area surrounding NAS Whidbey Island in combination with the proposed action include the NWTRC EIS, Replacement of the P-3C Orion Aircraft with the P-8A MMA EIS, Northwest Training and Testing EIS, and the Replacement of the C-9 Aircraft with the C-40 Aircraft.

The training and testing activities associated with the NWTRC EIS project could increase the amount of land within the greater-than-65-dB DNL noise zones due to the increase in aircraft training operations as well as the potential development, testing, and introduction of new aircraft. As described in the NWTRC EIS, there is potential for increased aircraft operations in the inshore area but not a large increase in aircraft overflights over terrestrial areas. Therefore, it was determined that no significant impacts to land use compatibility in the vicinity of NAS Whidbey Island would occur.

The change in operations associated with the replacement of the P-3C Orion squadrons with P-8A MMA squadrons would decrease aircraft operations by less than 1%. Under the ROD for the P-8A, an additional 6 acres of land would be included within the projected greater-than-65-dB DNL noise zones (U.S. Navy 2008). None of the action alternatives resulted in additional residential acreage included within the projected greater-than-65-dB DNL noise zones (U.S. Navy 2008). With the potential for more squadrons and the FRS to be based at NAS Whidbey Island, additional land could be included within the greater-than-65-dB DNL noise zones and could have the potential for minor impacts. Additionally, it was determined in the Replacement of the P-3C Orion Aircraft with the P-8A MMA EIS that no additional incompatible land uses were located within the noise zones.

The Navy is currently analyzing future training and testing activities in the NWTRC as well as at Navy RDT&E ranges, both in the offshore and inshore marine environments, in the Northwest Training and Testing EIS project. This project is not complete, so no final or quantitative analysis can be completed and the exact nature of the impacts is not yet known. However, the project has the potential to impact land use compatibility similar to the impacts described in the NWTRC EIS. There is the potential for an increase in aircraft operations, as well as the potential development, testing, and introduction of new aircraft. The Northwest Training and Testing EIS will contain further discussion of cumulative impacts related to this project.

The replacement of four C-9 Skytrain II aircraft by three C-40 Clipper aircraft has not been fully developed, so potential changes to the noise environment associated with this action cannot be assessed at this time. However, it is not expected that the percentage of total aircraft operations conducted by the C-9 Skytrain II replacement aircraft, C-40 Clipper, or the overall flight patterns of the aircraft would change significantly as a result of the replacement actions, and so it is expected that impacts on land use would be minor.

5.3.3.3 Analysis of Cumulative Impacts

The proposed action would reduce up to approximately 14% of the acreage of land and water within the projected greater than 65-dB DNL noise zones, in contrast to the potential minor increase in land and water within the greater than 65-dB DNL noise zones as described in the NWTRC EIS, Replacement of the P-3C Orion Aircraft with the P-8A MMA EIS, Northwest Training and Testing EIS, and the replacement of the C-9 Skytrain II with the C-40 Clipper. Because of the positive impact from the reduction of acreage within the noise zones resulting from the proposed action, it is likely there would be no change in noise zones from the replacement of the C-Skytrain II with the C-40 Clipper and the potential minor impacts described in the NWTRC EIS, Northwest Training and Testing EIS, and the Replacement of the P-3C Orion Aircraft with the P-8A MMA EIS, so there would be no significant cumulative impacts on land use compatibility within the vicinity of NAS Whidbey Island.

5.3.4 Air Quality

The geographic study area for cumulative impacts on air quality is defined as the occurrence of emissions in a large, three-dimensional area at and above NAS Whidbey Island,

Island County, and Skagit County. The airspace in which the projected emissions from the new replacement aircraft would occur extends beyond the boundaries of NAS Whidbey Island, its horizontal extent being generally on the order of a county and vertically extending 3,000 feet. A summary of the relevant impacts of the Navy's proposed action, the relevant impacts of the other projects that impact air quality and the cumulative impacts of these projects combined are provided below.

5.3.4.1.1 Summary of Impacts from the Proposed Action

Replacement of the Expeditionary EA-6B squadrons with the EA-18G would have no significant impact on local air quality. The increases are not considered to be a significant impact on regional air quality. The NWAPA is in attainment for all criteria pollutants, and the increase would not cause the region to be in violation of any of the NAAQS.

Stationary source emissions of CO from the test cell are projected to increase and missions of VOCs, NO_X, SO_2 and PM_{10} are projected to decrease. Increased emissions of CO are not considered to be a significant impact on regional air quality because the projected increases woul be well below the PSD threshold as defined under the CAA.

Greenhouse Gas Emissions and Climate Change

GHG emissions are by nature global and cumulative, as individual sources of GHG emissions are not large enough to have an appreciable effect on climate change. A significant impact on global climate change could only occur when the GHG emissions of a proposed action combine with GHG emissions from other manmade activities on a global scale. Even when considering the projects together, no global-scale changes to GHG emissions would occur.

5.3.4.1.2 Summary of Impacts from Other Projects

Projects that have the potential to cumulatively impact air quality in the area surrounding NAS Whidbey Island in combination with the proposed action include the NWTRC EIS project, the Replacement of the P-3C Orion Aircraft with the P-8A MMA EIS, the Northwest Training and Testing EIS project, the replacement of the C-9 aircraft with the C-40 aircraft, and the Animal Vegetation Control EA.

As described in the NWTRC EIS, training activities could increase, including changes in basing locations for ships, aircraft, personnel, and range enhancements. Although the proposed action could result in increases in emissions of air pollutants above the baseline conditions, associated emissions would not exceed air quality standards in U.S. territory and emissions outside U.S. territorial waters and would not adversely affect offshore air quality; therefore, no significant impacts would be expected to occur.

Air quality impacts associated with the replacement of the P-3C Orion aircraft with the P-8A MMA would result from emissions from short-term construction activities, long-term aircraft operations, and personnel commuting changes. Both temporary construction emissions and annual operating emissions are projected to be approximately 230 tpy and therefore would have no significant impact on air quality in the region. Additionally, the Navy is currently analyzing future training and testing activities in the NWTRC as well as at Navy RDT&E ranges, both in the offshore and inshore marine environments, in the Northwest Training and Testing EIS project. This project is not complete so no final or quantitative analysis can be completed and the exact nature of the impacts are yet unknown. However, the project has the potential to result in increases in emissions of air pollutants. There is the potential for an increase in aircraft operations, as well as the potential development, testing, and introduction of new aircraft. The Northwest Training and Testing EIS will contain further discussion of cumulative impacts related to this project.

The replacement of four C-9 Skytrain II aircraft has not been fully developed, so potential changes in air quality associated with this action cannot be assessed at this time. It is expected that this action would result in decreased aircraft operations emissions because of a proposed reduction in airframes. Projected emissions data are unavailable for this project, although emissions would be expected to be small due to the nature of the proposed action.

The Navy will prepare an EA for the proposed implementation of a rodent management program that proposes controlled burning at the airfield. Emissions would be expected to include short-term particulate matter; however, the Navy has not yet completed an air quality analysis so air emissions have not yet been calculated. The Navy would comply with all applicable air quality permits throughout the life of the project. This project would be small-scale and temporary in duration. Therefore, this project would have no significant long-term impact on air quality in the region.

5.3.4.1.3 Analysis of Cumulative Impacts

NAS Whidbey Island is located in regions that are in attainment for all criteria emissions. PSD standards establish 250 tpy thresholds for criteria pollutants for major stationary emissions sources. Due to the rural nature of the study area, emissions from the projects described above would be minimal. Whidbey Island is expected to remain largely rural into the foreseeable future, and air emissions from all sources are not expected to increase significantly above current levels. Therefore, there would be no significant cumulative impacts on air quality within the vicinity of NAS Whidbey Island.

5.3.5 Biological Resources

This section discusses the impacts to federally protected species, wildlife, migratory birds, and BASH that may have the potential for a cumulative impact from the Navy's proposed action and other past, ongoing, or reasonably foreseeable future actions. Marine mammals, bald and golden eagles, and federally protected species (except for the marbled murrelet) are discussed in this EA, but are not discussed in this section because the Navy's proposed action would have no impact and therefore, there would be no combined cumulative impact.

5.3.5.1 Federally Protected Species

The geographic study area for cumulative impacts on the marbled murrelet is defined as the area within the Alternative 2 and 3 noise zones depicted on Figure 4-1. A summary of the relevant impacts of the Navy's proposed action, the relevant impacts of other projects that generate noise, and the cumulative impacts of these projects combined is provided below.

5.3.5.1.1 Summary of Impacts from the Proposed Action

As discussed in Section 4.3, under all three action alternatives in this EA, the proposed changes in flight operations and noise levels may affect, but are not likely to adversely affect, the federally threatened marbled murrelet on the waters surrounding Whidbey Island. The risk of collision would increase in the immediate vicinity of Ault Field while aircraft are operating below 500 feet agl, but aircraft spend a short time in marbled murrelet airspace. No construction-related impacts to the marbled murrelet or its habitat would occur under the proposed action. In a letter dated May 24, 2012, the USFWS concurred with the Navy's affect determination. Thus, no significant impacts to marbled murrelets are anticipated.

5.3.5.1.2 Other Projects

Projects that have the potential to cumulatively impact the marbled murrelet in combination with the proposed action include the NWTRC EIS project, the Replacement of the P-3C Orion Aircraft with the P-8A MMA EIS, the Northwest Training and Testing EIS project, the City of Oak Harbor Water System Improvements, harvesting of 28 acres of timber, the NAS Whidbey Island petroleum oil, and lubricants pipeline project, fuel pier breakwater construction and finger pier demolition, replacement of the C-9 aircraft with the C-40 aircraft, and the Animal and Vegetation Control EA.

According to the EIS for the NWTRC, the proposed action would involve aircraft overflights, and underwater detonations that may affect, but are not likely to adversely affect, the marbled murrelet. Additionally, it was determined that activities in the NWTRC would not destroy or adversely modify critical habitat for the marbled murrelet. There would be no significant impacts on the murrelet from aircraft noise and aerial and underwater sound from underwater detonations. The impacts on the marbled murrelet may range from short-term behavioral reactions to temporary or permanent threshold shift of hearing sensitivity for marbled murrelets foraging underwater at the time of the detonation. The USFWS does not expect essential or normal marbled murrelet behavior to be significantly impaired or disrupted by the activities associated with the military training in the NWTRC. The Navy has prepared a monitoring plan for pre-, during, and post-detonations. The Navy will report the dates, times, locations, and water depth of all detonations and the marbled murrelet response to these detonations to the USFWS.

As described in the Replacement of the P-3C Orion Aircraft with the P-8A MMA EIS, the negligible change in noise exposure associated with aircraft operations of this action may affect, but is not likely to adversely affect, the marbled murrelet. Given the nature of the current NAS Whidbey Island operations, locally occurring individuals have likely become habituated to aircraft noise. The increase in strike risk would be negligible as air operation numbers would not contribute greatly to current operations at NAS Whidbey Island. Additionally, the Navy is currently analyzing future training and testing activities in the NWTRC as well as at Navy RDT&E ranges, both in the offshore and inshore marine environments, in the Northwest Training and Testing EIS project. This project is not complete so no final or quantitative analysis can be completed and the exact nature of the impacts are yet unknown. However, the project has the potential to impact the marbled murrelet similar to the impacts described in the NWTRC EIS. There is the potential for an increase in aircraft operations, as well as the potential development, testing, and introduction of new aircraft. Similar levels of underwater detonations at Crescent Harbor are anticipated as well. The Northwest Training and Testing EIS will contain further discussion of cumulative impacts related to this project. The Navy will consult with the USFWS, as necessary, as part of the EIS process. Mitigation measures, as needed, will be incorporated into the EIS.

Construction-related impacts could result from the replacement of the City of Oak Harbor's two existing water treatment facilities under the City of Oak Harbor Water Systems Improvement project, the Clean Water Facilities Planning project, the harvest of 28 acres of timber, the NAS Whidbey Island petroleum, oil and lubricants pipeline, and the fuel pier breakwater construction and finger pier demolition. The marbled murrelet could be disrupted during foraging and nesting activities. However, this potential disruption would be expected to be minor because it would be short-term, and federal and state mitigation measures, as needed, would be adhered to. Additionally, the discharge of effluent into Oak Harbor as a result of improvement of the City of Oak Harbor's water supply infrastructure and the replacement of the City of Oak Harbor's two existing water treatment facilities would not be expected to impact the marbled murrelets nearshore foraging areas because all discharge would be treated before its release.

Additionally, the harvest of timber could have the potential to impact marbled murrelet nesting habitat because the species nests in old-growth forests located in coastal areas. However, it would be expected that this project would not be implemented during nesting season. Ample forested habitat is available in the adjacent 4,134-acre Deception Pass State Park; therefore, through mitigation, it is expected that the harvesting of 28 areas would not significantly impact the marbled murrelet.

The replacement of the C-9 Skytrain II aircraft has not been fully developed, so potential impacts on the marbled murrelet from this action cannot be accurately assessed at this time. However, it is not expected that the percentage of total aircraft operations conducted by the C-9 Skytrain II replacement aircraft, C-40 Clipper, or the overall flight patterns of the aircraft would change significantly as a result of the replacement actions, and so it is expected that impacts to marbled murrelets would be minor. The Navy will consult with the USFWS during the NEPA process and incorporate mitigation as needed.

The Animal and Vegetation Control project would not be expected to impact the marbled murrelet as the action would occur in a habitat that is not suitable to the species. The Navy will prepare an EA for the proposed implementation of a rodent management program that uses a rodenticide and controlled burning. The Navy will consult with the USFWS during the NEPA process and will incorporate mitigation as needed.

5.3.5.1.3 Analysis of Cumulative Impacts

The proposed action when considered with other past, present, and future actions is not anticipated to have a significant cumulative impact on the marbled murrelet. It is expected that the marbled murrelet has habituated to the current noise associated with aircraft training from NAS Whidbey Island. Changes in the noise levels are not expected to be significantly different from current levels in that the types of operations and flights are similar to past actions. Although operations in the area may increase, this would be offset somewhat by the quieter nature of the Growler aircraft. In addition, the reduction of EOD operations in the bay is expected to decrease impacts to the murrelet. The Navy has consulted with USFWS on the impacts to the marbled murrelet for past and current projects and will continue to do so for future projects.

Construction-related impacts such as the modification and construction of additional buildings/hangars associated with the proposed action and the projects listed above would be short-term and the projects are not occurring concurrently. Construction would not be expected to have a significant cumulative impact on the marbled murrelet.

5.3.5.2 Wildlife

The geographic study area for cumulative impacts on wildlife is defined as the area covered by the Alternative 2 and 3 noise zones depicted on Figure 4-1. A summary of the relevant impacts of the Navy’s proposed action, the relevant impacts of other projects, and the cumulative impacts of these projects on wildlife is provided below.

5.3.5.2.1 Summary of Impacts from the Proposed Action

The paved surfaces and maintained lawn and landscaped areas that would be affected by the proposed construction would not likely support a high diversity or abundance of wildlife species. Species present in these areas would be expected to be acclimated to human disturbance. Temporary displacement of wildlife would occur in peripheral areas during construction, when noise and human activity levels increase. However, once construction has been completed, wildlife should return to these peripheral areas. Some wildlife species such as songbirds, small mammals, reptiles, and amphibians that are able to adapt to the landscaped conditions of urban environments can be expected to inhabit the developed areas.

There would be an increase in the number of EA-18G Growler flight operations (by 2.7% under Alternative 1 and 3.1% under Alternatives 2 and 3) but a decrease in noise levels at Ault Field compared to baseline conditions. Several studies indicate that there is a strong tendency for species to acclimate or habituate to noise disturbances (Grubb and King 1991; Ellis et al. 1991; Manci et al. 1988; Fraser et al. 1985; Black et al. 1984). Given the nature of the current NAS Whidbey Island operations, locally occurring wildlife species have likely become habituated to aircraft noise. Therefore, the proposed action would not significantly impact wildlife.

5.3.5.2.2 Summary of Impacts from Other Projects

Projects that have the potential to cumulatively impact wildlife in combination with the proposed action include the NWTRC EIS project, the Replacement of the P-3C Orion Aircraft with the P-8A MMA EIS, the Northwest Training and Testing EIS project, the City of Oak Harbor Water System Improvements, Clean Water Facilities Planning, harvesting of 28 acres of timber, construction of the NAS Whidbey Island petroleum, oil, and lubricants pipeline, fuel pier breakwater construction and finger pier demolition, replacement of the C-9 aircraft with the C-40 aircraft, and the Animal and Vegetation Control EA.

The increase in noise from aircraft training activities in the NWTRC EIS project would not have a significant impact on wildlife. The areas of land that would be affected are disturbed from prior use and provide poor quality wildlife habitat. Additionally, there would be an increase of aircraft training activities in inshore areas, but not a large increase in aircraft overflights over terrestrial areas. Given that the nature and types of operations would not change, and given the less than significant increase in noise, it was determined that there would be no significant impacts on wildlife.

The introduction of the P-8A MMA aircraft and operational changes would not have a significant impact on wildlife because the increase of the land area within the greater-than-65-dB DNL noise zones would be negligible. Given the nature of the current NAS Whidbey Island operations, locally occurring wildlife species have likely become habituated to aircraft noise. Increased noise during the construction period would temporarily displace wildlife. However, this potential disruption would be minor as it would be short-term and wildlife should return upon the completion of construction. Additionally, the removal of habitat would likely have a negligible effect on wildlife as they can relocate to other suitable habitat located in the vicinity. As determined in the Replacement of the P-3C Orion Aircraft with the P-8A MMA EIS, this action would not have a significant impact on wildlife.

The Navy is currently analyzing future training and testing activities in the NWTRC as well as at Navy RDT&E ranges, both in the offshore and inshore marine environments, in the

Northwest Training and Testing EIS project. This project is not complete, so no final or quantitative analysis can be completed and the exact nature of the impacts are yet unknown. However, the project has the potential to impact wildlife similar to the impacts described in the NWTRC EIS. There is the potential for an increase in aircraft operations, as well as the potential development, testing, and introduction of new aircraft. The Northwest Training and Testing EIS will contain further discussion of cumulative impacts related to this project. Additionally, the replacement of the C-9 Skytrain II aircraft has not been fully developed, so potential impacts on wildlife from this action cannot be accurately assessed at this time. However, it is not expected that the percentage of total aircraft operations conducted by the C-9 Skytrain II replacement aircraft, C-40 Clipper, or the overall flight patterns of the aircraft would change significantly as a result of the replacement actions. Therefore, impacts on wildlife in the vicinity of Whidbey Island would be expected to be minor.

Construction-related noise could result from the replacement of the City of Oak Harbor's two existing water treatment facilities under the City of Oak Harbor Water Systems Improvement project, the Clean Water Facilities Planning project, the harvest of 28 acres of timber, the NAS Whidbey Island petroleum, oil and lubricants pipeline, and the fuel pier breakwater construction and finger pier demolition. These projects could cause increased noise during the construction period, which would temporarily displace wildlife. However, this potential disruption would be expected to be short-term and wildlife should return upon the completion of construction. The harvesting of timber would have the potential to impact wildlife habitat for species that utilize forested areas; however, there is ample forested habitat in the adjacent 4,134-acre Deception Pass State Park. Therefore, the harvesting of 28 acres of timber is not expected to impact wildlife because the wildlife could relocate.

The Navy will prepare an EA for the proposed implementation of a rodent management program comprised of the use of a rodenticide and controlled burning. The Navy will confer with the Washington Department of Ecology during the NEPA process and will incorporate mitigation as needed to protect other wildlife. Additionally, the controlled burning would have the potential to displace wildlife that utilizes airfield open areas at Ault Field. After vegetation recovers at Ault Field, wildlife could return to the areas that were burned. This impact would be expected to be minor as Ault Field is not known to support a high diversity or number of wildlife species.

5.3.5.2.3 Analysis of Cumulative Impacts

Noise generated by air operations associated with the proposed action and the proposed actions of the projects described above would not be significant. Aircraft currently fly in the area so wildlife would likely be habituated to increased noise levels. Noise generated by construction associated with the proposed action and the proposed actions of the projects described above would be short-term and would not occur concurrently. In conclusion, the proposed action, combined with the proposed actions of the projects described above would not have a significant cumulative impact on wildlife.

5.3.5.3 Migratory Birds

The geographic study area for cumulative impacts on migratory birds is defined as the area in the Alternative 2 and 3 noise zones depicted on Figure 4-1. A summary of the relevant impacts of the Navy's proposed action, the relevant impacts of other projects, and the cumulative impacts of these projects on migratory birds is provided below.

5.3.5.3.1 Summary of Impacts from the Proposed Action

The paved surfaces and maintained lawn and landscaped areas that would be affected by the proposed construction would not support a high diversity or abundance of birds. While the proposed new construction could disturb approximately 0.2 acre of habitat potentially used by various species of neotropical migratory songbirds, removal of this habitat would not impact migratory bird species populations and no direct mortality of migratory birds would result. Based on the availability of remaining suitable habitat, removal of habitat due to construction would not impact migratory birds at NAS Whidbey Island. During operations, noise levels would decrease slightly and, therefore, would not have a significant impact on migratory bird species.

5.3.5.3.2 Other Projects

Projects that have the potential to cumulatively impact migratory birds in combination with the proposed action include the Northwest Training Range Complex EIS project, the Replacement of the P-3C Orion Aircraft with the P-8A MMA EIS, Northwest Training and Testing EIS project, the City of Oak Harbor Water System Improvements, Clean Water Facilities Planning, harvesting of 28 acres of timber, construction of the NAS Whidbey Island petroleum, oil, and lubricants pipeline, fuel pier breakwater construction and finger pier demolition, replacement of the C-9 aircraft with the C-40 aircraft, and the Animal and Vegetation Control EA.

The increase in noise from aircraft training activities currently ongoing and analyzed in the NWTRC EIS project would not have a significant impact on migratory birds. The areas of land that would be affected by this training are disturbed from prior use and provide poor quality habitat. Additionally, as implemented, there may be an increase of aircraft training activities in inshore areas, but not a large increase in aircraft overflights over terrestrial areas. Given that the nature and types of operations would not change, and given the less than significant increase in noise, it was determined that there would be no significant impacts on wildlife.

The change in noise exposure associated with the Replacement of the P-3C Orion Aircraft with the P-8A MMA would not have significant impact on migratory birds. Given the nature of the current NAS Whidbey Island operations, locally occurring migratory bird species have likely become habituated to aircraft noise. It is anticipated that increased noise during the construction period temporarily would displace migratory birds. However, this potential disruption would be expected to be minor as it would be short-term and migratory birds should return upon the completion of construction. Additionally, the Navy is currently analyzing future training and testing activities in the NWTRC as well as at Navy RDT&E ranges, both in the offshore and inshore marine environments, in the Northwest Training and Testing EIS project. This project is not complete so no final or quantitative analysis can be completed and the exact nature of the impacts are yet unknown. However, the project has the potential to impact migratory birds similar to the impacts described in the Northwest Training Range Complex EIS. There is the potential for an increase in aircraft operations, as well as the potential development, testing, and introduction of new aircraft. The Northwest Training and Testing EIS will contain further discussion of cumulative impacts related to this project.

Construction-related noise could result from the replacement of the City of Oak Harbor's two existing water treatment facilities under the City of Oak Harbor Water Systems Improvement project, the Clean Water Facilities Planning project, the harvest of 28 acres of timber, the NAS Whidbey Island petroleum, oil and lubricants pipeline, and the fuel pier breakwater construction and finger pier demolition. These projects could cause increased noise during the construction period, which would temporarily displace migratory birds. However, this potential disruption would be expected to be short-term and migratory birds should return upon the completion of construction. The harvesting of timber would have the potential to impact migratory bird habitat for species that utilize forested areas; however, there is ample forested habitat in the adjacent 4,134-acre Deception Pass State Park. Therefore, it is expected that the harvesting of 28 areas would note impact migratory birds as they could relocate.

The replacement of four C-9 Skytrain II aircraft has not been fully developed, so potential impacts on migratory birds from this action cannot be accurately assessed at this time. However, it is not expected that the percentage of total aircraft operations conducted by the C-9 Skytrain II replacement aircraft, C-40 Clipper, or the overall flight patterns of the aircraft would change significantly as a result of the replacement actions. Therefore, impacts on migratory birds in the vicinity of Whidbey Island would be expected to be minor.

The Navy will prepare an EA for the proposed implementation of a rodent management program comprised of the use of a rodenticide and controlled burning. The Navy will consult with USFWS during the NEPA process and incorporate mitigation as needed. Additionally, the controlled burning would have the potential to displace migratory birds that utilize airfield open areas at Ault Field. After vegetation recovers at Ault Field, migratory birds could return to the areas that were burned. This impact would be expected to be minor as Ault Field is not known to support a high diversity or number of migratory bird species.

5.3.5.3.3 Analysis of Cumulative Impacts

Noise disturbance from aircraft associated with the proposed action and the projects described above would not be significant. Aircraft currently fly in the area so migratory birds would likely be habituated to increased noise levels. Noise generated by construction associated with the proposed action and the projects described above would be short-term and would not occur concurrently. In conclusion, the proposed action, combined with the projects described above would not pose a significant cumulative impact. Air operations in the area are currently ongoing and migratory birds most likely have been habituated and construction activities would be short-term.

5.3.5.4 Bird/Aircraft Strike Hazard

The geographic study area for cumulative impacts on BASH is defined as the area within the Alternatives 2 and 3 noise zones depicted on Figure 4-1. A summary of the relevant impacts of the Navy's proposed action, the relevant impacts of other projects, and the cumulative impacts of these projects on BASH is provided below.

5.3.5.4.1 Summary of Impacts from the Proposed Action

The proposed action would not create attractants, such as diverse habitat structure, that would have the potential to increase the concentration of birds in the vicinity of Ault Field. Considering the minor increase (2.7% under Alternative 1 and 3.1% under Alternatives 2 and 3) in annual air operations and use of existing flight tracks, a minor increase in the BASH risk could occur at NAS Whidbey Island. With the minor increase in air operations, there would be a potential for increased bird strikes of one to two birds a year under the action alternatives. Thus, no significant impacts to BASH risk are anticipated.

5.3.5.4.2 Summary of Impacts from Other Projects

Projects that have the potential to cumulatively impact BASH in combination with the proposed action include the NWTRC EIS project, the Replacement of the P-3C Orion Aircraft with the P-8A MMA EIS, the Northwest Training and Testing EIS project, replacement of the C-9 aircraft with the C-40 aircraft, and the Animal and Vegetation Control EA.

The activities associated with the NWTRC EIS project include additional training activities in the inshore area around NAS Whidbey Island. Aircraft were already operating in this airspace and no significant changes in the types of airspace classification and uses were anticipated. Therefore, it was determined that an increase in aircraft operations and training in the inshore areas would have no significant impact on the BASH risk under the proposed action for the NWTRC EIS project.

The BASH risk would decrease with a decrease in air operation numbers at NAS Whidbey Island as a result of the replacement of the P-3C Orion aircraft with the P-8A MMA. Therefore, due to the decrease in aircraft operations and utilization of existing flight tracks, no increase in the BASH risk would be expected to occur at NAS Whidbey Island. Additionally, the Navy is currently analyzing future training and testing activities in the NWTRC as well as at Navy RDT&E ranges, both in the offshore and inshore marine environments, in the Northwest Training and Testing EIS project. This project is not complete so no final or quantitative analysis can be completed and the exact nature of the impacts are yet unknown. However, the project has the potential to impact BASH risk similar to the impacts described in the NWTRC EIS. There is a potential for increase in aircraft operations and training activities, as well as the potential development, testing, and introduction of new aircraft. The Northwest Training and Testing EIS will contain further discussion of cumulative impacts related to this project.

The replacement of four C-9 Skytrain II aircraft has not been fully developed, so potential impacts on BASH risk from this action cannot be accurately assessed at this time. A reduction in the number of aircraft is proposed, but it is not known if the number of operations would remain the same or be reduced. As a result, this action would not be expected to change BASH risk. No new land or water areas within the vicinity of NAS Whidbey Island would be expected to be impacted. Therefore, BASH risk would be expected to remain the same as current conditions.

The Navy will prepare an EA for the proposed implementation of a rodent management program comprised of the use of a rodenticide and controlled burning. These two proposed actions would reduce attractants for birds such as habitat area and a food source (rodents for birds of prey). Therefore, this action, if implemented, would be expected to have beneficial impacts on BASH management.

5.3.5.4.3 Analysis of Cumulative Impacts

There could be an increase in the risk of bird/aircraft strikes from aircraft operations associated with the proposed action and the projects described above. Additionally, the animal and vegetation control project would have a beneficial impact on BASH risk and would partially offset the potential for cumulative impacts. Given that NAS Whidbey Island manages BASH currently and is proposing additional BASH management controls, the overall potential increase in strike risk would likely be minor and therefore there would be no significant cumulative impact.

5.3.6 Socioeconomics

The geographic study area for cumulative impacts on the regional economy is Island County. A summary of the relevant impacts of the Navy's proposed action, the relevant impacts of other projects, and the cumulative impacts of these projects combined is provided below.

5.3.6.1 Summary of Impacts from the Proposed Action

Impacts on the regional economy as a result of the proposed action would primarily be short-term, beneficial impacts resulting from increased temporary employment and expenditures on materials during construction of new and modified facilities. Implementation of Alternative 1 would result in a 1% increase in base personnel, which would be a minimal change in the number of permanent personnel employed at the air station or the air station's payroll. Implementation of Alternatives 2 or 3 would result in a 3.1% increase in base personnel. This would result in a small increase in payroll over the long term, but this increase would not be expected to have a significant impact on the overall regional economy.

5.3.6.2 Summary of Impacts from Other Projects

Projects that have the potential to cumulatively impact socioeconomics in combination with the proposed action include the Replacement of the P-3C Orion Aircraft with the P-8A

MMA EIS, City of Oak Harbor Water System Improvements, Clean Water Facilities Planning, construction of the NAS Whidbey Island petroleum, oil, and lubricants pipeline, and the fuel pier breakwater construction and finger pier demolition.

The construction associated with the P-8A MMA replacement would have a minor, short-term, beneficial impact on the economy of Island County. As stated in the Replacement of the P-3C Orion Aircraft with the P-8A MMA EIS, approximately $411.4 million in economic benefits would generated by one-time expenditures and total earning would decrease by $28.8 million. The short-term beneficial impact would result from the temporary increase in expenditures on temporary housing and goods and services by construction workers who would relocate to Island County for the duration of construction. As noted in Section 4.9, construction-related investments are considered one-time expenditures, and the positive economic impacts would no longer be multiplied once construction funds leave the regional economy through savings, taxes, or purchases of goods and services from outside the region.

The replacement of the City of Oak Harbor's two existing water treatment facilities under the City of Oak Harbor Water Systems Improvement project, the Clean Water Facilities Planning project, the NAS Whidbey Island petroleum, oil and lubricants pipeline, and the fuel pier breakwater construction and finger pier demolition would be expected to have a minor, short-term, beneficial impact on the economy of Island County during construction. This potential beneficial impact could be greater if a large percentage of the construction funds are spent on labor and materials purchased locally. A beneficial impact also would be expected to result from the temporary increase in expenditures on temporary housing and goods and services by construction workers who would relocate to Island County for the duration of construction. The projects would be expected to improve public water supply infrastructure, which is essential to the residents of Island County. Improvements to public infrastructure would be expected to enhance the quality of life of residents and would have the potential to create an incentive for more people to live and visit the region.

5.3.6.3 Analysis of Cumulative Impacts

The proposed action along with the proposed actions of the Replacement of the P-3C Orion Aircraft with the P-8A MMA EIS, City of Oak Harbor Water System Improvements, Clean Water Facilities Planning, construction of the NAS Whidbey Island petroleum, oil, and lubricants pipeline, and fuel pier breakwater construction and finger pier demolition would have a short-term, beneficial impact on the economy of Island County as a result of construction activities. This would result from the temporary increase in expenditures on temporary housing and goods and services by construction workers who would relocate to Island County for the duration of construction. City of Oak Harbor Water System Improvements and Clean Water Facilities Planning both would also have a minor long-term beneficial impact on the local economy by improving current public infrastructure.

The positive impacts on socioeconomics through the actions described above would be minor and short-term. Therefore these actions, along with the proposed action, would pose no significant cumulative economic impact.

6 Other Considerations

6.1 Unavoidable Adverse Effects

Under Alternatives 1, 2, and 3, there would be a change in the air emissions associated with replacing the Expeditionary VAQ EA-6B with the EA-18G VAQ squadrons. Total annual mobile source emissions of CO, are projected to increase, and total annual mobile source emissions of nitrogen oxides (NO_X), VOCs, SO_2, and PM_{10} are projected to decrease. Stationary source emissions of CO from the test cell are projected to increase, and emissions of NO_X, VOCs, SO_2, and PM_{10} from the test cell are projected to decrease. In addition, construction of the proposed facility improvements under each alternative would generate fugitive dust and equipment exhaust emissions for the duration of the 12-month construction period.

Replacing the Expeditionary VAQ EA-6B with the EA-18G would result in an overall increase in the number of VAQ aircraft at NAS Whidbey Island. Relocating reserve squadron VAQ 209 would result in an overall increase in aircraft and associated personnel stationed at NAS Whidbey Island. It is estimated that up to 250 military personnel and their dependents would be relocated to NAS Whidbey Island. This small increase in personnel would have negligible long-term impacts on the on-station and the regional population.

6.2 Relationship Between Short-Term Uses of the Environment and the Enhancement of Long-Term Productivity

NEPA requires consideration of the relationship between short-term uses of the environment and the impacts that such use could have on the maintenance and enhancement of long-term productivity of the particular concern. Such impacts include the possibility that choosing one alternative could reduce future flexibility to pursue other alternatives or that choosing a certain use could eliminate the possibility of other uses at the site.

Implementation of the proposed action would not result in any environmental impacts that would narrow the range of beneficial uses of the project site or vicinity. The location of the facilities proposed for modification is a developed military site within the industrial (flight line) area of the base. The proposed action would not represent a new short-term use and would not impact the productivity of the natural environment. In addition, biological productivity would not be affected because implementation of the proposed action would not result in significant direct, indirect, or cumulative impacts on any biological resources.

Under Alternatives 1, 2, and 3, short-term uses of the environment include the use of fossil fuel to power equipment for modifications and construction of facilities at NAS Whidbey Island and expenditures of public funds/resources to implement the aircraft replacement. These short-term uses would be offset by the productive maintenance of the existing expertise of the VAQ community at NAS Whidbey Island. The Expeditionary VAQ EA-18G would serve as the replacement for the aging fleet of Expeditionary VAQ EA-6B aircraft. Replacement of the aircraft and upgrades to facilities and functions would improve the long-term productivity of the Navy, specifically, the VAQ community. The proposed action would result in improvements to the aircraft but initially would require additional training of the aircrew and maintenance personnel as well as continued testing and maintenance of the aircraft and its components.

6.3 Irreversible and Irretrievable Commitments of Resources

NEPA (42 U.S.C. § 4332 Section 102(2)(C)(v) as implemented by CEQ regulation 40 CFR 1502.16) requires an analysis of significant, irreversible effects resulting from implementation of a proposed action. Resources that are irreversibly or irretrievably committed to a project are those that are typically used on a long-term or permanent basis; however, those used on a short-term basis that cannot be recovered (e.g., non-renewable resources such as metal, wood, fuel, paper, and other natural or cultural resources) also are irretrievable. Human labor is considered an irretrievable resource. All such resources are irretrievable in that they are used for a project and, thus, become unavailable for other purposes. An impact that is an irreversible or irretrievable commitment of resources is the destruction of natural resources that could limit the range of potential uses of that resource.

Implementation of the proposed action would result in less-than-significant irreversible commitments of building materials, vehicles, and equipment used during removal and installation activities, and human labor and other resources used for the proposed facilities modifications. Energy (electricity and natural gas), water and fuel consumption, as well as demand for services, would not increase greatly from implementation of the proposed action. The commitment of these resources would be undertaken in a regular and authorized manner and does not present significant impacts within this EA.

6.4 Relationship of the Proposed Action to Federal, State, and Local Plans, Policies, and Controls

6.4.1 Coastal Zone

NAS Whidbey Island is located within the state of Washington's coastal zone. The CZMA of 1972 (16 U.S.C .1451 *et seq.*, as amended) provides assistance to states, in cooperation with federal and local agencies, to develop land- and water-use programs in coastal zones. The State of Washington has developed and implemented a federally approved Coastal Zone Management Program describing current coastal legislation and enforceable policies. The Washington Coastal Zone Management Program provides management of the coastal zone within the 15 counties containing the state's coastal resources. It is implemented by the Washington State Department of Ecology through the Shorelands and Environmental Assistance Program. Under this program, activities that impact any land use, water use, or natural resource of the coastal zone must comply with enforceable policies: the Shoreline Management Act, the State Environmental Policy Act, the CAA, the Clean Water Act, the Energy Facility Site Evaluation Council, and the Ocean Resource Management Act.

When a state coastal management program is federally approved, federally proposed actions with the potential to affect the state's coastal uses or resources are subject to review under the CZMA Section 307 federal consistency determination requirement. Section 307 mandates that federal actions within a state's coastal zone (or outside the coastal zone, if the action affects land or water uses or natural resources within the coastal zone) be consistent to the maximum extent practicable with the enforceable policies of the state coastal management program. Federal agency actions include direct and indirect activities, federal approval activities, and federal financial assistance activities. Accordingly, federal agency activities under NEPA review that could affect the state's coastal zone must be consistent to the maximum extent practicable with the enforceable policies of the state's coastal management program unless compliance is otherwise prohibited by law.

Federal lands such as NAS Whidbey Island, which are "lands the use of which is by law subject solely to the discretion of the Federal Government, its officers, or agency," are statutorily excluded from the CZMA's definition of the "coastal zone" (16 U.S.C. Section 1453[1]). If, however, the proposed federal activity affects coastal uses or resources beyond the boundaries of the federal property (i.e., has spillover effects) or is located outside federal property, the CZMA Section 307 federal consistency requirement applies. The proposed project area is located within the watershed of the Strait of Juan de Fuca and, since the proposed action could potentially affect coastal uses or resources, the proposed action is subject to federal regulations and the enforceable policies of the Washington Coastal Zone Management Program. Therefore, the Navy prepared a Negative Determination on May 10, 2012 (see Appendix B).

Based on a comprehensive coastal consistency program and policy analysis, the Navy has determined that the proposed action would not affect the coastal resources or uses of Washington State. The Navy submitted a negative Coastal Consistency Determination on May 10, 2012. In a letter dated June 12, 2012, the Washington State Department of Ecology concurred with the Navy's negative determination. Copies of the Navy's negative determination and the Washington State Department of Ecology response are included in Appendix B.

6.4.2 Compliance of the Proposed Action with Federal, State, and Local Plans, Policies, and Controls

Table 6-1 summarizes the laws and implementing regulations applicable to the proposed action.

Table 6-1 Compliance of the Proposed Action with the Objectives of Federal, State, and Local Plans, Policies, and Controls

Regulation	Agency	Status of Compliance
National Environmental Policy Act (NEPA) (42 U.S.C. § 4321 *et seq.*)	U.S. Navy	This EA has been prepared in accordance with CEQ regulations implementing NEPA and Department of the Navy NEPA procedures.
Department of the Navy Procedures for Implementing NEPA (32 CFR 775)	U.S. Navy	The preparation of this EA and the provision for its review are being conducted in compliance with NEPA.
Coastal Zone Management Act (16 CFR § 1451 *et seq.*)	Washington Department of Ecology	The proposed action would not affect the coastal resources or uses of Washington State. In a letter dated June 12, 2012 the Washington State Department of Ecology concurred with the Navy's negative determination.
Clean Water Act (CWA), Section 401/402 (§§ 401-402, 33 U.S.C. § 1251 et seq.), Section 404 (§ 404, 33 U.S.C. § 1251 *et seq.*)	U.S. Environmental Protection Agency, U.S. Army Corps of Engineers	This project does not involve a discharge of dredged or fill materials and does not trigger the requirements of Sections 404/401 of the CWA.
Clean Air Act (CAA), as amended (42 U.S.C. § 7401 *et seq.*)	U.S. Environmental Protection Agency	In accordance with CAA regulations, the proposed action would not compromise air quality attainment status in Washington or conflict with attainment and maintenance goals established in its state implementation plan. Island County is an attainment area; therefore, a CAA conformity determination is not required.

Table 6-1 Compliance of the Proposed Action with the Objectives of Federal, State, and Local Plans, Policies, and Controls

Regulation	Agency	Status of Compliance
Endangered Species Act (16 U.S.C. § 1531)	U.S. Fish and Wildlife Service, NMFS	The proposed action may affect, but is not likely to adversely affect the marbled murrelet. The proposed action would have no effect on any other listed species. In a letter dated May 25, 2012, the USFWS concluded informal consultation pursuant to Section 7(a)(2) of the ESA of 1973, as amended (16 U.S.C. 1531 *et seq.)* and concurred with the Navy's determination the proposed action may affect but is not likely to adversely affect the marbled murrelet.
EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (EO 12898, 59 Federal Register 7629 [Section 1-101])	U.S. Navy	The proposed action would not result in any disproportionately high and adverse human health or environmental effects on minority and low-income populations.
EO 13045, Protection of Children from Environmental Health Risks and Safety Risks (EO 13045, 62 Federal Register 1985)	U.S. Navy	Children would not be disproportionately exposed to environmental health risks or safety risks by the proposed action.
National Historic Preservation Act (§ 106, 16 U.S.C. 470 *et seq*.)	U.S. Navy	The proposed action will have no adverse effect on National Register of Historic Places (NRHP)-eligible or listed historic and cultural resources. A letter of concurrence on this finding was received on July 3, 2012.
Executive Order 13175: Consultation and Coordination with Indian Tribal Governments	U.S. Navy	The Navy has determined there would be no significant impacts on tribal treaty resources, tribal rights or Indian lands; therefore, government-to-government consultation was not required. A letter was sent to the tribes on 27 June 2012 notifying them of the project and the Navy's effect determination.
Marine Mammal Protection Act (MMPA) (16 U.S.C Chapter 31)	U.S. Fish and Wildlife Service , NOAA Fisheries	The proposed action would not affect nor result in reasonably foreseeable "takes" of a marine mammal species by harassment, injury, or mortality as defined under the MMPA.

Table 6-1 Compliance of the Proposed Action with the Objectives of Federal, State, and Local Plans, Policies, and Controls

Regulation	Agency	Status of Compliance
Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712, as amended	U.S. Fish and Wildlife Service	The predicted change in noise levels would have no significant adverse effects on population of migratory bird species.

Key:
CAA = Clean Air Act
CEQ = Council on Environmental Quality
CFR = Code of Federal Regulations
CWA = Clean Water Act
EA = Environmental Assessment
EO = Executive Order
EPA = U.S. Environmental Protection Agency
NEPA = National Environmental Policy Act
NOAA = North American Oceanic and Atmospheric Administration
USC = United States Code

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Appendix A Biological Assessment

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Biological Assessment for the Expeditionary Electronic Attack Squadron Realignment and Transition at Naval Air Station Whidbey Island, Oak Harbor, Washington

Final

March 2012

Department of the Navy

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Final
Biological Assessment for the Expeditionary Electronic Attack Squadron Realignment and Transition at Naval Air Station Whidbey Island, Oak Harbor, Washington

UNITED STATES DEPARTMENT OF THE NAVY

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Lead Agency:
Department of the Navy

In accordance with Chief of Naval Operations Instruction 5090.1C, Change 1

BIOLOGICAL ASSESSMENT
EXPEDITIONARY ELECTRONIC ATTACK SQUADRON
REALIGNMENT AND TRANSITION
NAVAL AIR STATION WHIDBEY ISLAND
OAK HARBOR, WASHINGTON

March 2012

Executive Summary

This biological assessment (BA) was prepared in accordance with Section 7 of the federal Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531–1544, as amended). The document evaluates the potential impacts on fish, wildlife, and plant species protected under the Endangered Species Act (ESA) from the potential realignment and transition of the expeditionary electronic attack squadrons (expeditionary VAQ squadrons) at Naval Air Station Whidbey Island (NAS Whidbey Island), Oak Harbor, Washington.

The Navy is proposing to realign and transition up to four expeditionary VAQ squadrons from EA-6B Prowler aircraft to EA-18G Growler aircraft; add up to 11 EA-18G Growler aircraft to the Fleet Replacement Squadron (FRS); increase the number of aircrew, officers, and enlisted personnel stationed at the installation; and modify certain facilities at Ault Field to provide capacity for the new personnel and aircraft. Once transition to the Growler is complete, the number of aircraft operations is projected to be greater than the current 2010 baseline operations. However, there would be no change in the training syllabus or types of operations as currently conducted by the Expeditionary VAQ squadrons (arrivals, departures, or pattern operations), the locations of aircraft operations (flight tracks over land or water), or the current ratio of daytime to nighttime aircraft operations at Ault Field. With the proposed increase in aircraft, aircraft operations could increase total annual operations by 3 percent.

The EA-6B Prowler airframe is approaching the end of its service life. Failure to replace the EA-6B Prowler legacy aircraft by 2015 would affect combat readiness, potentially resulting in interruptions to operations and accruing costs for service-life extension of the EA-6B Prowler legacy aircraft. The proposed action is needed to provide sustainable and rapidly deployable electronic attack capability for overseas land bases in the interests of national security.

This document focuses on the potential effects of the proposed action on the marbled murrelet because air operations would be conducted over this species' habitat. Potential impacts would be related to a proposed increase in the number of flight operations and noise. ESA-listed fish and marine mammal species found within the marine waters would not be impacted by any increase in operations within the airspace above those marine waters or any sound transmitted underwater from flights within the airspace above the water. Because of the difference in acoustic properties of air and water, most of the acoustic energy generated from the aircraft would be reflected away from the water column (Richardson et al. 1995). Therefore, the transition of the EA-18G Growler squadrons would not impact fish or marine mammals in the action area and are not discussed in this BA.

The height at which the marbled murrelet flies and the speed of the aircraft would be the risk factors considered when assessing the likelihood of aircraft colliding with murrelets. It is assumed that flight altitudes of murrelets over marine waters next to Ault Field would be low as they descend from these altitudes to foraging sites. Alcid flight patterns in the marine environment are often closely associated with the surface of the water (USFWS 2010). Murrelets likely have adapted this behavior of low flight heights to optimize energy expenditure (increased lift from the interaction of air currents and wave action) or to stay near the water to escape from aerial predators through diving. Although data are lacking, it is assumed that flight altitude over water is generally less than 500 feet.

As such, the likelihood of collision between a marbled murrelet and an EA-18G on any given flight is largely determined by jet speed and the flight duration within 500 feet of the water. Unlike the EA-6B, the EA-18G departing from Ault Field typically ascends more rapidly at takeoff, thereby spending less time than the EA-6B (less than 10 seconds) to pass through the 0 to 500 foot range of highest collision risk.

Given the very short duration and rapid ascent of the EA-18G, the risk of collision risk is expected to be low for departing flights and lower than current operations of the EA-6B.

Approaching aircraft spend comparatively more time in murrelet airspace than departing aircraft as they descend on approach to Ault Field because they maintain lower flight altitudes and a more horizontal trajectory. As a result, arriving aircraft could pose more of a strike risk to marbled murrelets than departing aircraft.

Overall, the expected intersection of murrelet flight with the EA-18G airspace is expected to be infrequent and brief, given the murrelets low-flight patterns in the marine environment and the rapid ascent of the EA-18G from Ault Field. While there is potential for a marbled murrelet strike to occur, the risk is low, even with the planned increase in air operations associated with the transition from the EA-6B to EA-18G aircraft. Therefore, there is an extremely low likelihood of murrelet exposure to aircraft strikes and the overall risk of a strike can be discounted.

Currently, there are no studies documenting behavioral responses of marbled murrelets to aircraft noise or if they are habituated to such noise. Studies that have assessed the response of birds becoming habituated to aircraft noise have typically shown limited response. For example, the response of American black ducks (*Anas rubripes*), American wigeon (*A. americana*), gadwall (*A. strepera*), and American green-winged teal (*A. crecca carolinensis*) to exposure to low-level flying military aircraft at Piney and Cedar islands, North Carolina, was assessed. Investigators determined that the cost to each species was low because disruptions represented a low percentage of their time-activity budgets, only a small proportion of birds reacted to disturbance (approximately 2 percent), and the likelihood of resuming the activity disrupted by an aircraft disturbance event was high (64 percent) (Conomy et al. 1998a). Investigators concluded that levels of aircraft disturbance recorded were not adversely affecting the time-activity budgets of selected waterfowl species wintering at these islands. A second study, considered whether habituation was a possible proximate factor influencing the low proportion of free-ranging ducks reacting to military aircraft activities in a training range in coastal North Carolina during winters 1991 and 1992. Investigators conclude that initial exposure to aircraft noise elicited behavioral responses from black ducks, although with continued exposure to aircraft noise, black ducks became habituated (Conomy et al. 1998b).

While unable to definitively describe the magnitude of the acoustic effect from the EA-18G landing and take-off on individual murrelets, it is expected that individual marbled murrelets repeatedly exposed to the noise of the EA-18G taking off and landing could suffer incremental, deleterious effects as adrenal hormones, neurotransmitters, or immuno-cytokines released in response to this noise stressor. However, regardless of the response, it would be for a relatively short duration (up to 60 seconds) and because individuals in the area would become habituated to the noise, combined with noise from other ongoing air operations at the Naval Air Station Whidbey Island, noise is unlikely to have a significant long-term effect on an individual’s fitness.

Because of the difference in the acoustic properties of air and water, most of the acoustic energy generated from the aircraft would be reflected away from entering the water column; therefore, there would be no indirect effect on foraging habitat or reduction in the primary food stocks of marbled murrelets.

The project would create new impervious surface, approximately 9,200 square feet, generating approximately 123,800 gallons of rainfall runoff per year. The 9,200 square feet would include a stand-alone facility next to the existing flight simulator building. The proposed flight simulator building is on upland terrain, avoiding wetlands. Storm water runoff for the proposed construction, renovation, and modifications would be contained in existing storm water detention facilities, which have capacity to hold the runoff from the small area of proposed impervious surface. Best management practices along with utilizing the existing Ault Field drainage system, which includes oil/water separators throughout the airfield, would be used to maintain the existing water quality. Construction would adhere to existing National Pollutant Discharge Elimination System requirements for storm water and sediment control. This would prevent degradation of water quality in marine waters surrounding the installation, thereby avoiding impacts on the aquatic habitat of ESA-listed species.

The Navy has concluded from the information provided in this BA that the proposed action may affect, but is not likely adversely affect and is not likely to jeopardize, the continued existence of the marbled murrelet found within the action area.

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Acronyms and Abbreviations

AGL	above ground level
BA	biological assessment
BO	biological opinion
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
dB	decibel
dBA	decibel A-weighted
DNL	day-night average sound level
DPS	distinct population segment
ESA	Endangered Species Act
ESU	evolutionary significant unit
FRS	fleet replacement squadron
km	kilometer
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Command
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NWTRC	Northwest Training Range Complex
SEL	sound exposure level
U.S.C.	United States Code
U.S. Navy	United States Department of the Navy
USFWS	United States Fish and Wildlife Service
VAQ	expeditionary electronic attack squadrons

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1. Introduction

1.1 Background

This biological assessment (BA) analyzes the realignment and transition of the expeditionary electronic attack squadrons (expeditionary VAQ squadrons) at Naval Air Station Whidbey Island (NAS Whidbey Island), Oak Harbor, Washington (Figure 1-1). The purpose of the BA is to examine the effect of the proposed action on threatened and endangered species and to determine whether the proposed action will degrade or adversely modify designated critical habitat.

This BA was prepared in accordance with Section 7 of the federal Endangered Species Act (ESA) of 1973 (16 United States Code [U.S.C.] 1531–1544, as amended) and used the best scientific and commercial information available to assess the risks posed to the listed species and/or critical habitat(s) if the proposed action were to be implemented. The ESA requires that federal agencies "ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any listed species or result in the destructive or adverse modification of critical habitat of such species." The purpose of the ESA is to provide a means for conserving the ecosystem upon which threatened and endangered species depend and to provide a program for protecting these species.

Section 7(a)(2) of the ESA implementing regulations requires federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS), collectively known as "the services," regarding species protected under this act. The USFWS has jurisdiction over bull trout and all listed wildlife and terrestrial plant species, while NMFS oversees listed marine mammals, sea-based fish species, and several anadromous salmonid species.

This BA constitutes the U.S. Department of the Navy's analysis of potential effects on species protected under the ESA, as required by Section 7(a)(2) of the ESA implementing regulations.

The purpose of the BA is to:

- Meet the requirements of the ESA and the National Environmental Policy Act (42 U.S.C. 4321 et seq., implemented at 40 Code of Federal Regulations [CFR] parts 1500–1508).
- Evaluate the effects of the proposed action on listed species and/or their critical habitat that are known to be or could be present within the action area.
- Specify mitigation and conservation measures, as needed, for populations of listed species that occur in and around NAS Whidbey Island.

The ESA defines an *endangered species* as a species that is in danger of extinction throughout all or a major portion of its range. A *threatened species* is defined as any species that is likely to become an endangered species within the foreseeable future throughout all or a major portion of its range. *Critical habitat* is a specific area or type of area that is considered to be essential for the survival of a species, as designated by the USFWS or NMFS under the ESA.

Figure 1-1
Project Vicinity
VAQ Expeditionary Squadron Realignment and Transition
at NAS Whidbey Island Washington

1.2 Consultation History

On December 2, 2010, representatives from the Navy met with representative from the USFWS at the USFWS offices in Lacy, Washington. In addition, representatives from the Navy participated via telephone.

The USFWS expressed concern regarding the potential impact that changes to the VAQ may have on the marbled murrelet. According to the USWFS, the population of marbled murrelets in Puget Sound has decreased by 7.2 percent since 2009 and by almost 40 percent since 2001. The USWFS identified two stressors to marbled murrelet: potential impacts from acoustics and the risk of air strike. Of the two stressors, the USFWS acknowledged that acoustic impact was of more concern; in particular, a departing aircraft increases the risk of acoustic impacts more than its approach. The USFWS requested a sound analysis on how much surface area (over water) would be impacted by a single noise event.

The USFWS identified the need to evaluate marbled murrelet use of water, land/water, and land. The USFWS indicated that the risk of an aircraft strike could be greater during approach than departure, with the greatest likelihood of a strike at 500 feet or below, over marine waters. The USFWS referred to the U.S. Pacific Fleet's Northwest Training Range Complex in the Northern Pacific Coastal Waters off the States of Washington, Oregon and California and Activities in Puget Sound and Airspace over the State of Washington Biological Opinion (NWTRC BO; USFWS 2010) as a source of information on approximate aircraft flight elevations to and from Whidbey Island, and the (potential) interaction aircraft may have with murrelets in the area.

On December 8, 2011, representatives from the Navy met with the USFWS at the USFWS offices in Lacy, Washington. In addition, members from the Navy participated via telephone. The intention of this meeting was to provide the USFWS an updated description of the proposed action. The USFWS agreed that, due to the short duration of aircraft operations below 500 feet above ground level (agl), the bird strike hazard due to the proposed action can be discounted. The supporting analysis for this finding is detailed in the NWTRC BO (USFWS 2010).

The Navy discussed the current noise modeling effort and highlighted the data available from the model that could support the impact analysis. The USFWS explained that there is not a lot of detailed information available on the effects of acoustical disturbance from aircraft operations on the marbled murrelet and reiterated that this BA should consider the findings of the BO that the USFWS issued on the Explosive Handling Wharf project (USFWS 2011a).

The USFWS also explained that historically 92 decibels (dBA) sound exposure level (SEL) has been established as the disturbance threshold for airborne noise for the marbled murrelet (USFWS 2010, 2011a). The BO for the Explosive Handling Wharf stated the USFWS has previously evaluated the effects of sound-related disturbance in the terrestrial environment and determined that marbled murrelets could be adversely affected by sounds above 92 dBA (Livezey et al. 2007 *as cited in* USFWS 2011a). However, the USFWS acknowledged that there are no known studies or data available that evaluate the response of marbled murrelets (or other alcids) to elevated in-air sound in the marine environment. For projects in the marine environment, the USFWS assumes that marbled murrelet response to above-ambient sounds on the water is similar to those expected in the terrestrial environment.

Therefore, the USFWS would like to see a 92 dB SEL contour for air operations at Ault Field as well as an analysis of the frequency and duration of aircraft operations at > 92 dBA SEL. The USFWS requested the Navy's analysis consider the potential effects of the changes in aircraft operations as well as what effect long-term habituation to these noise events may have on the marbled murrelet.

1.3 Project Description

NAS Whidbey Island is located in Island County, Washington, on Whidbey Island in northern Puget Sound (Figure 1-1). The air station is in the north-central part of the island, adjacent to the town of Oak Harbor, and is divided into four distinct parcels: Ault Field, Lake Hancock, Outlying Landing Field Coupeville, and the Seaplane Base. The proposed action would occur at Ault Field, the training and operational center of NAS Whidbey Island. The remaining three parcels would not be affected by the proposed action and are therefore not discussed further.

NAS Whidbey Island has supported the expeditionary VAQ community for more than 30 years. It is currently home to VAQ squadrons operating the EA-6B Prowler and EA-18G Growler, maritime patrol squadrons and a reserve squadron operating the P-3 ("Orion"), fleet air reconnaissance squadrons operating the EP-3E ("Aries"), a C-9 squadron, and H-60 search-and-rescue helicopters.

The Navy proposes to realign and transition up to four expeditionary VAQ squadrons from EA-6B Prowler aircraft to EA-18G Growler aircraft; add up to 11 EA-18G Growler aircraft to the fleet replacement squadron (FRS); increase the number of aircrew, officers, and enlisted personnel stationed at the installation; and modify certain facilities at Ault Field to provide more space for the new personnel and proper configuration for the new aircraft.

The EA-18G Growler is a variant of the F/A-18F ("Super Hornet") strike-fighter aircraft, equipped with the same electronic weapons systems as the EA-6B Prowler. The primary types of mission training and readiness requirements for the EA-18G Growler are nearly identical to those for the EA-6B Prowler.

The EA-6B Prowler airframe is approaching the end of its service life. Failure to replace the EA-6B Prowler legacy aircraft by 2015 would affect combat readiness, potentially resulting in interruptions to operations and accruing costs for service-life extension of the aircraft. The proposed action is needed to provide sustainable and rapidly deployable electronic attack capability to overseas land bases in the interest of national security. The EA-18G are airborne electronic attack aircraft capable of suppressing enemy air defenses in support of strike aircraft and ground troops by interrupting enemy electronic activity and obtaining tactical electronic intelligence within the combat area. As the nation's only operational airborne electronic attack assets, these very unique Navy aircraft and their highly trained flight crews are low-density-high demand strategic national assets that have and continue to provide an essential umbrella of protection to U.S. and coalition ground forces while on deployment.

Building Facilities

The proposed action would provide the facilities and functions necessary to retain the expeditionary VAQ mission at NAS Whidbey Island and to realign and transition up to four expeditionary VAQ squadrons from EA-6B Prowler aircraft to EA-18G Growler aircraft. Each expeditionary VAQ EA-18G Growler squadron would consist of five aircraft; each existing EA-6B Prowler squadron includes four aircraft. In addition, the existing FRS (VAQ-129) would gain additional aircraft. In order to maintain expeditionary VAQ capability, the squadrons must transition to the EA-18G Growler by 2015. To achieve this, the Navy is proposing that the EA-6B squadrons remain operational at NAS Whidbey Island and transition to the EA-18G beginning in 2012 at a rate of about one squadron per year through 2014.

NAS Whidbey Island does not currently have adequate hangar space, flight line electrical distribution systems, or capacity in the flight simulators to support up to four EA-18G Growler squadrons. An environmental assessment (EA) is being prepared in accordance with the National Environmental Policy Act (NEPA) of 1969; the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR1500-1508); Navy procedures for implementing NEPA (32 CFR 775); and the Chief of Naval

Operations Instruction, OPNAVINST 5090.1C Change 1 to assess the potential environmental impacts associated with the Navy's proposed action to realign and transition up to four expeditionary VAQ squadrons from EA-6B (Prowler) aircraft to EA-18G (Growler) aircraft at NAS Whidbey Island. The proposed action includes expansion of the flightline electrical distribution system and construction, renovation, or modification of the following facilities and functions (see Figure 1-2). Potential impacts on ESA-listed species were based on the maximum construction footprint and air operations:

Hangar 10 (Building 2699). An approximately 32,500-square-foot addition to Hangar 10 would be constructed; this addition may connect Hangar 10 with Hangar 8 (Building 2642), but this is unlikely. Hangar 10's auxiliary buildings R-42, R-55, R-56, and 2705 would be demolished. Hangar 10's auxiliary buildings 2893 and 2894 would be relocated. The Hangar 10 addition would have aircraft power utilities (400 Hz) and would include secure spaces for mission planning, briefing, and debriefing functions. All construction would occur on existing impervious surface.

Flight Simulator Building (Building 2593). An approximately 9,200-square-foot building would be constructed next to the existing flight simulator building. This building would provide space for four additional tactical operational flight training systems and increase the overall amount of impervious surface at NAS Whidbey Island by 9,200 square feet.

Hangar 12 (Building 2737). An addition of up to 25,200 square-feet to Hangar 12 may be constructed. This construction would occur on an existing impervious surface.

Fewer officers and enlisted personnel would be required per EA-18G Growler squadron than are currently required per EA-6B Prowler squadron. The Naval Air Technical Training schoolhouse force structure is estimated to increase by five instructors and 20 additional students per year. The Electronic Attack Weapons School would add six officers and two enlisted personnel to fully staff the requirements.

Aircraft Operations

Ault Field includes both fixed- and rotary-wing aircraft operations. NAS Whidbey Island provides land-based support and training for all of the Navy's active duty EA-6B Prowler and EA-18G Growler aircraft squadrons and the Pacific Fleet P-3C (being replaced by P-8A MMA beginning in 2012). The air station serves as host to two air wings (Electronic Attack Wing Pacific and Patrol and Reconnaissance Wing Ten), a Fleet Logistics Support squadron, and NAS Whidbey Island Search and Rescue. The EA-18G and P-3C (to be replaced by P-8A MMA) aircraft platforms are the predominant aircraft flown at NAS Whidbey Island and are operated by Electronic Attack Wing Pacific and Patrol and Reconnaissance Wing Ten, respectively. The station also supports a Navy Reserve P-3C and C-9 squadron in addition to the air station's MH-60S search-and-rescue helicopters.

The airfield at Ault Field consists of two intersecting runways, Runway 07/25 and Runway 14/32. Both runways are 8,000 feet long and 200 feet wide. Ault Field is open 7 days per week, 24 hours per day. Runways 25 and 14 are the most frequently used runways at the station because of the prevailing wind direction and noise abatement procedures. Approximately 44 percent of the airfield operations are assigned to Runway 25, and 36 percent of the airfield operations are assigned to Runway 14. Runways 07 and 32 are used less frequently; 13 percent of the airfield operations are assigned to Runway 07, and 7 percent are assigned to Runway 32.

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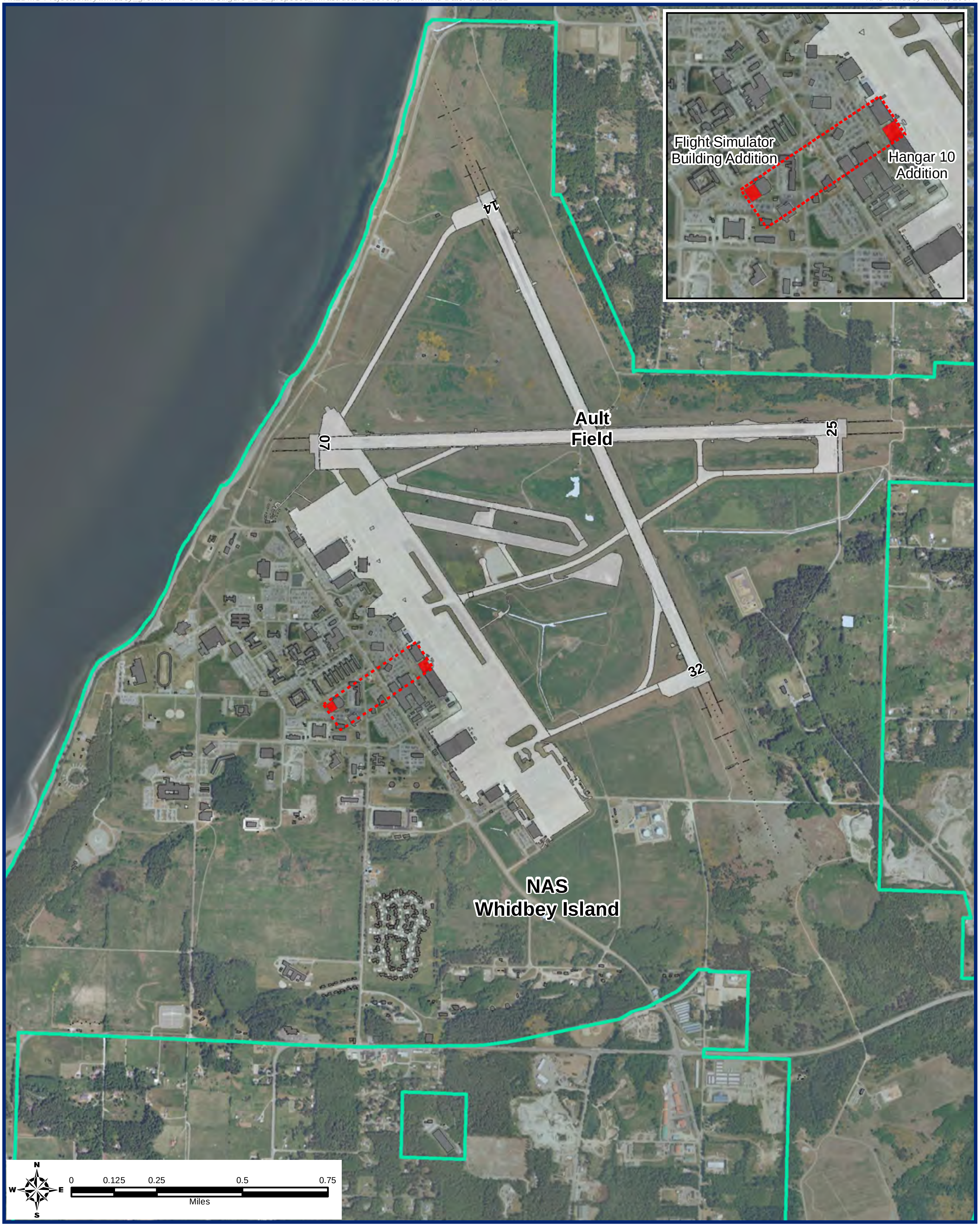
Source: ESRI, 2010; NAVFAC GeoRediness Center, 2006; NAS Whidbey Island, 2007.



Project Area
Construction
Runway and Airfield Surface Area
Building
NAS Whidbey Installation Area

Figure 1-2
Proposed Infrastructure Development Around Ault Field
VAQ Expeditionary Squadron Realignment and Transition
at NAS Whidbey Island Washington

In 2011, pilots performed approximately 70,600 aircraft operations (i.e., any takeoff or landing) annually at Ault Field (Wyle Laboratories, Inc. March 2012). Total operations performed by the transitioned and realigned expeditionary VAQ squadrons could increase the total annual operations at NAS Whidbey Island by about 3 percent, or approximately 2,180 EA-18G operations, once the installation has fully transitioned to the EA-18G, to a total of 72,735 aircraft operations. Of these total operations, approximately 19,000 currently conducted by EA-6B aircraft would be conducted by the EA-18G. However, there would be no change in the training syllabus or types of operations as currently conducted by the expeditionary VAQ squadrons (arrivals, departures, or pattern operations); the locations of aircraft operations (flight tracks over land or water); or the current ratio of daytime to nighttime aircraft operations at Ault Field.

Aircraft Noise

Noise exposure for military and commercial airfields is typically calculated using the day-night average sound level (DNL). The DNL noise metric is based on the number of operations that occur on an average annual day over a 24-hour period. The DNL metric includes a 10 dB penalty for nighttime operations (10:00 p.m. to 7:00 a.m.) because people are more sensitive to noise during normal sleeping hours, when ambient noise levels are lower. The DNL has been determined to be a reliable measure of community annoyance with aircraft noise and has become the standard metric used by many federal and state governmental agencies and organizations in the United States, such as the U.S. Environmental Protection Agency and the Federal Aviation Administration, for assessing aircraft noise. The DNL takes into account both the noise levels of all individual events that occur during a 24-hour period and the number of times those events occur. DNL noise zones have historically been used as the noise metric for NAS Whidbey Island.

The 24-hour averaged DNL noise zones are predominantly used to gauge noise impacts on the human environment. To better gauge impacts from single noise events on the natural environment, the SEL is used. SEL is an integrated noise metric representing all of the sound energy of a single noise event (in this case, a single aircraft overflight) but averaged to a duration of one second. Because it combines level and duration, SEL represents the best metric to compare noise levels from individual overflights.

In order to compare the representative noise of both the EA-6B and EA-18G, Table 1-1 shows representative SEL noise values for both aircraft for the four loudest types of operations and flight tracks at NAS Whidbey Island.

Table 1-1 Single-Event Sound Levels 500 Feet Offshore of NAS Whidbey Island

<table>
<tr><th>Aircraft Type</th><th>Closest Runway End</th><th>Distance from Shoreline (feet)*</th><th>Aircraft Altitude (ft MSL)</th><th>Example Flight Tracks</th><th>Description</th><th>Maximum SEL (dBA)</th></tr>
<tr><td rowspan="4">EA-6B</td><td rowspan="2">25</td><td rowspan="2">500</td><td>750</td><td>25D1</td><td>Standard Departure</td><td>133</td></tr>
<tr><td>337</td><td>07G1</td><td>Arrival to Runway 07</td><td>128</td></tr>
<tr><td rowspan="2">31</td><td rowspan="2">500</td><td>900</td><td>31D1</td><td>Standard Departure</td><td>130</td></tr>
<tr><td>401</td><td>13TN2</td><td>Arrival to Runway 13</td><td>124</td></tr>
<tr><td rowspan="4">EA-18G</td><td rowspan="2">25</td><td rowspan="2">500</td><td>1,622</td><td>25D1</td><td>Standard Departure</td><td>115</td></tr>
<tr><td>340</td><td>07G1</td><td>Arrival to Runway 07</td><td>127</td></tr>
<tr><td rowspan="2">31</td><td rowspan="2">500</td><td>2,163</td><td>31D1</td><td>Standard Departure</td><td>110</td></tr>
<tr><td>400</td><td>13TN2</td><td>Arrival to Runway 13</td><td>127</td></tr>
</table>

** on extended runway centerline*

EA-6B SELs range between 121 and 133 dB. EA-18G SELs range between 104 and 127 dB. For the arrival portions, the two aircraft are similar in SEL, as their differences are 3 dB or less, with the EA-18G having the greater SEL for arrivals from patterns to Runway 13. However, for departures from Runway 25 or 31, the EA-6B has SELs 18 to 23 dB greater than the EA-18G, primarily due to the lower altitude climb-out profile of the EA-6B.

The primary reason for the difference is that the EA-18G is a more powerful aircraft than the EA-6B, with a faster climb rate upon departure. Compared with the older EA-6B along the same flight track, the higher altitude of the EA-18G causes a reduction of between 18 to 23dB SEL upon departure. Even though the total operations would increase by 3 percent, the comparable overall noise exposure would decrease because on a single event basis the EA-18G SEL is on average 2 to 8 dB less than the EA-6B SEL for most types of operations.

A much smaller difference in sound exists during the approach phases of each aircraft. Upon arrival, the requirements for similar approach altitudes for both aircraft result in a much smaller differential in the SEL values. Since the flight profiles for both aircraft have similar altitudes for a given flight track, the EA-18G is between 1 dB SEL quieter, to 3 dB SEL louder, depending on the specific flight track (see Table 1-1).

How noises and human presence disturb nesting murrelets is not well known. There are few data concerning the murrelet's vulnerability to disturbance effects, except anecdotal researcher observations that indicate murrelets typically exhibit a limited, temporary behavioral response to noise disturbance at nest sites and are able to adapt to auditory stimuli (USFWS 2010). As such, the USFWS has previously evaluated the effects of sound-related disturbance in the terrestrial environment and determined that sea-based marbled murrelets could be adversely affected by sounds above 92 dBA.

As discussed in Section 1.2, during initial consultation with USFWS personnel, the agency requested that the Navy use the 92-dB SEL noise contour as the disturbance threshold for airborne noise for the marbled murrelet. Figure 1-3 shows the 92-dB SEL noise contours for the EA-18G for each of the representative flight tracks identified in Table 1-1. Both the EA-6B and EA-18G spend up to 20 seconds within the 92 dB SEL contour upon departure and up to 60 seconds upon arrival. The Proposed scenario would increase the number of average daily departure and arrivals exceeding 92 dB SEL by 20 percent (one event) to approximately six average daily events each. The Proposed scenario would not change the number of pattern flight operations exceeding 92 dB SEL by more than one event per day.

For a full discussion on air operations, flight tracks, and noise modeling please refer to Appendix A.

1.4 Impact Avoidance and Minimization Measures

Currently, take-off and landing flight tracks around Ault Field, particularly to the south-southeast, are over noise-sensitive areas (e.g., Oak Harbor). Accordingly, noise abatement procedures that dictate that "aircrews shall, to the maximum extent possible, employ prudent airmanship techniques to reduce aircraft noise impacts and to avoid noise sensitive areas" (U.S. Department of the Navy 2002) are implemented. When approaching Ault Field, weather depending, the EA-18G Growler ceiling is at least 2,300 feet agl at 3 miles visibility, although this may drop to 800 feet agl during cloud cover. And if necessary, when in a holding pattern, aircraft would be in pattern at 2,000 agl.

Aircraft departing from Ault Field typically require a rapid ascent at takeoff, with aircraft spending little time (up to approximately 10 seconds) in the 0 to 500 foot range (identified by the USFWS on December 2, 2010 as the highest potential elevation range for collision). Flight profiles for aircraft departing Runway 07 at NAS Whidbey Island indicate aircraft would reach 1,500 feet agl before passing over marine waters (Wyle 2012). This noise abatement procedure would result in sound pressure levels for departing air operations from Ault Field to be less than 110 dB SEL in marine waters where murrelets occur.

Storm water discharges can transport sediment and contaminants that degrade water quality and adversely affect fish and other aquatic/marine species and their habitat. The proposed construction, renovation, and modifications would create approximately 9,200 square feet of new impervious surface (the addition to the flight simulator building), increasing storm water runoff in the project area by approximately 123,800 gallons of rainfall runoff per year. All other development would occur on existing impervious surface, and would thus not increase the current level of storm water runoff in the area.

Because of the relatively small increase in impervious surface compared with the currently existing impervious surface at the base, storm water runoff would be contained in existing detention facilities. Best management practices (e.g., the use of bioswales and on-site drainages) and use of the existing Ault Field drainage system, which includes oil/water separators throughout the airfield, would maintain the existing water quality. Construction activities would adhere to existing National Pollutant Discharge Elimination System (NPDES) requirements for storm water and sediment control. This would prevent degradation of water quality in marine waters surrounding the installation, thereby avoiding impacting aquatic habitat and ESA-listed species using these habitats. Because ESA-listed marine species, including fish and marine mammals, would not likely be directly or indirectly impacted by storm water, storm water is not discussed further.

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Source: ESRI, 2010; NAVFAC GeoRediness Center, 2006; NAS Whidbey Island, 2007.

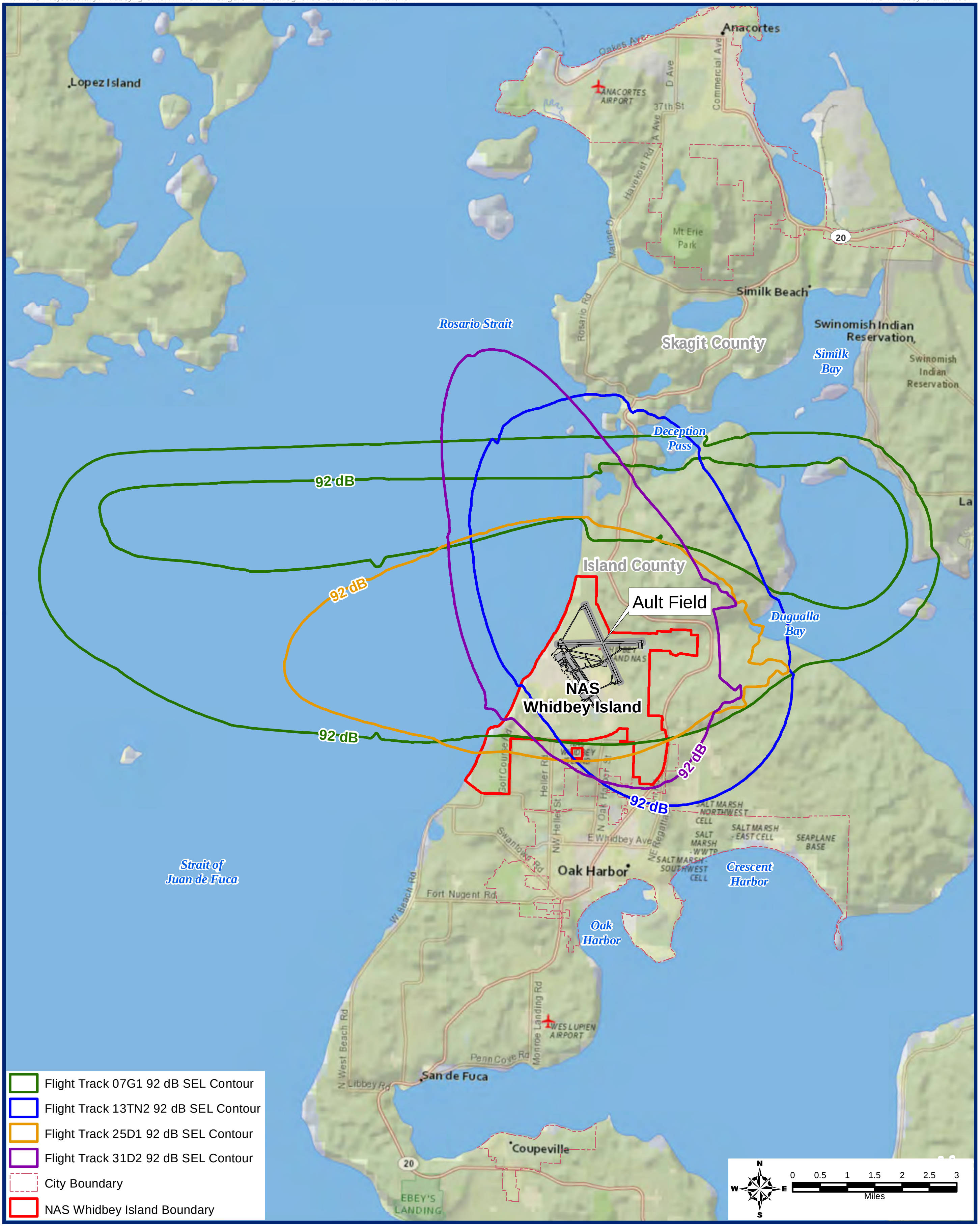

Figure 1-3

92 dB SEL Contours for Selected EA-18G Flight Tracks
VAQ Expeditionary Squadron Realignment and Transition
at NAS Whidbey Island Washington

1.5 Action Area

The action area is defined in the ESA as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR § 402.02). For this proposed Navy action, the action area is defined the 92 dBA SEL noise contour created by the EA-18G (Figure 1-4). This area includes the area of proposed construction, renovation, and modification of facilities; aircraft noise zones; and the imaginary surface between aircraft take-off and a 2,000-foot elevation.

The action area was estimated based on the following stressors:

- **Acoustic:** EA-18G Growler departures and approaches from and to NAS Whidbey Island would result in elevated sound levels (above-ambient conditions) below 2,000-feet elevation and within the 92 dB SEL threshold.

- **Strike Risk:** Changes in aircraft operations from aircraft departing and/or approaching NAS Whidbey Island below the 2,000-foot elevation may increase the potential for bird aircraft strike hazard, particularly with marbled murrelets.

The change in the types of aircraft operations could result in an increase in total annual operations of up to 3 percent over baseline conditions. Projected operations would consist primarily of direct arrivals and departures, with touch-and-go and ground control approach patterns the remaining operations.

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Source: ESRI, 2010; NAVFAC GeoRediness Center, 2006; NAS Whidbey Island, 2007.

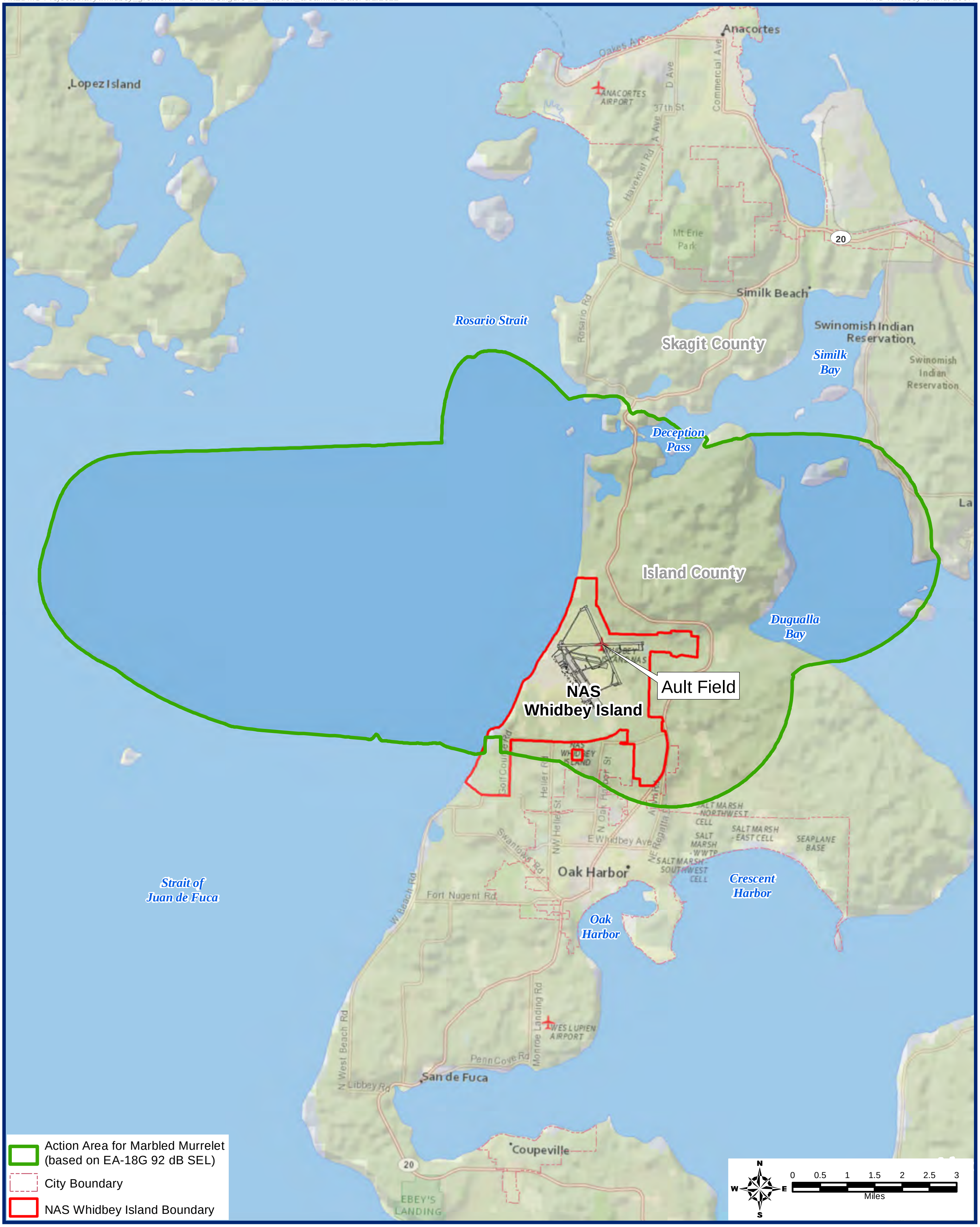

Figure 1-4
Action Area
VAQ Expeditionary Squadron Realignment and Transition
at NAS Whidbey Island Washington

2. Status/Presence of Listed Species and Designated Critical Habitat in the Action Area

2.1 Species and Critical Habitat(s) and Listing Status

According to the USFWS website[1], three listed species occur in Island County and may occur on or around NAS Whidbey Island: Golden Indian paintbrush (*Castilleja levisecta* [threatened]), marbled murrelet (*Brachyramphus marmoratus* [threatened]), and Coastal/Puget Sound distinct population segment (DPS) of bull trout (*Salvelinus confluentus* [threatened]) (USFWS 2011b).

Lists of threatened or endangered marine species that potentially occur within the action area were obtained from the NMFS website[2] (also see Appendix B). According to the NMFS, the following fish species may occur in the action area: Bocaccio DPS (*Sebastes paucispinis* [endangered]), canary rockfish DPS (*S. pinniger* [threatened]), yelloweye rockfish DPS (*S. ruberrimus* [threatened]), Puget Sound chinook salmon evolutionary significant unit (ESU) (*Oncorhynchus tshawytscha* [threatened]), Puget Sound steelhead ESU (*O. mykiss*[threatened]), southern eulachon DPS (*Thaleichthys pacificus* [threatened]), and the southern North American green sturgeon DPS (*Acipenser medirostris* [threatened]), humpback whale (*Megatera novaengliae* [endangered]), southern resident killer whale (*Orcinus orca*[endangered]), and the Steller sea lion (*Eumetopias jubatus* [threatened]).

No populations or individual occurrences of the golden Indian paintbrush have been identified on Ault Field. Furthermore, no suitable habitat to support the species occurs within the proposed construction area. Consequently, the proposed action would have no effect on this species, and it will not be discussed further in this document.

Aircraft overflights produce airborne noise, and some of this energy may be transmitted into the water. However, due to the difference in acoustic properties of air and water, most of the acoustic energy generated from the aircraft would be reflected away from entering the water column, as noise from atmospheric sources do not transmit well underwater (Richardson et al. 1995). Furthermore, the sound levels created by an aircraft would decline at increasing lateral distances from the aircraft's track or location and with increasing depth in the water. The underwater sounds, if any, propagated from the aircraft would decline rapidly after the aircraft has passed. It is unlikely that these airborne sound levels would cause physical damage or even behavioral effects on ESA-listed fish or marine mammals in waters off of Ault Field because these airborne sound levels have not been found to cause adverse effects on in-water species (Popper 2003; U.S. Department of the Navy 2008). Consequently, the proposed action would have no effect on these species, and they will not be discussed further in this document.

2.2 Marbled Murrelet

Of the ESA-listed species listed as occurring in and/or around Island County, the marbled murrelet is the only species that may be impacted by the proposed action.

Life History

This small alcid (less than 10 inches long) nests in either forested or rocky areas, depending on their location within its range. More specifically, the species breeds in forested areas on sea-facing slopes, cliffs on islands, and cliffs along the coast (Nelson 1997). During the breeding season, the murrelets are

[1] http://www.fws.gov/wafwo/speciesmap_new.html
[2] http://www.nwr.noaa.gov/Species-Lists.cfm

typically bound to their nesting sites. After breeding and during winter, marbled murrelets tend to disperse and move farther offshore. The highest concentrations of murrelets still tend to occur close to shore and within protected waters.

In Washington State, the marbled murrelet breeds exclusively in forested habitats (Nelson 1997). Within these habitats, the optimal habitat for the marbled murrelet includes:

- Greater number of potential nest platforms,
- Greater percentage of moss on dominant trees (trees 32 inches in diameter or larger),
- Lower density of moss on dominant trees (as compared to a randomly chosen site in the same habitat),
- Low elevation, and
- Presence of old-growth western hemlock (*Tsuga heterophylla*).

This species ranges from Alaska to western central California (Santa Cruz County), occurring mainly within 3 miles of shore. Distribution can vary due to coastline topography, river plumes, the presence of coastal forest, and season (Falxa et al. 2009). Presence of these birds within Washington State decreases with increasing stand elevation, distance inland, lichen cover, and canopy cover (Nelson 1997).

The marbled murrelet is considered an opportunistic feeder rather than a specialist, consuming prey that is most readily available at different times of the year. The marbled murrelet's foraging patterns vary seasonally. In the summer, it forages within 3 miles of the shore, generally preferring shallow water that is usually less than 200 feet deep. The foraging activity during this time is highest in areas of upwelling, shallow banks, mouths of bays, narrow passages between islands, over underwater sills, and within kelp beds. Winter foraging habitat is similar to summer foraging habitat. Murrelet individuals typically forage in stratified waters (e.g., tidal rips or river mouths) within 3 miles of the shore (Nelson 1997).

During summer, marbled murrelets in Puget Sound primarily forage on Pacific sand lance (*Ammodytes hexapterus*), Pacific herring (*Clupea pallasii*), and surf smelt (*Hypomesus pretiosus*) (Penttila 2007). In winter, their dominant prey includes krill (*Euphausia pacifica*), mysid shrimp (*Americamysis bahia*), amphipods, and Pacific herring (Nelson 1997).

Critical Habitat

Critical habitat was designated for the marbled murrelet in 1996, and includes approximately 1.5 million acres in Washington State. However, no lands/waters on or near Ault Field are designated as critical habitat.

Population Distribution in Washington State

There are two Conservation Zones for murrelets in Washington: Conservation Zone 1 includes the Strait of Juan de Fuca, Hood Canal, and the San Juan Islands; and Conservation Zone 2 includes the outer Washington coast. The proposed action would occur within Conservation Zone 1.

Marbled murrelets are distributed throughout the inland marine waters of Washington during the summer, with higher concentrations in the San Juan Islands, north Hood Canal, and the south coast of the Strait of Juan de Fuca. In the winter, there is a shift in concentration toward the more protected waters of the San Juan Islands, Hood Canal, Discovery Bay, Saratoga Passage, and Port Townsend (Strachan et al. 1995).

Presence at NAS Whidbey Island

According to a five-year review completed by the USFWS in 2009, the national marbled murrelet population has been declining (between 2.4 percent and 4.3 percent annually) (USFWS 2009). In the

Puget Sound region of northwest Washington State, the population estimate of marbled murrelets is 5,623 individuals (Falxa et al. 2009). This population has declined by 7.4 percent annually from 2001 to 2010 (WDFW 2011a). Previous monitoring data showed that the average density of marbled murrelets within the inland waters of Puget Sound was 11.78 per square mile in areas close to shore and 2.33 per square mile offshore (U.S. Department of Agriculture 2007).

Furthermore, surveys during the 2003 breeding season along the inner coastline of Whidbey Island (including Crescent Harbor) found that marbled murrelet densities were 3.7 per square mile (Miller et al. 2006), with marbled murrelets likely to occur in Crescent Harbor and Floral Point throughout the year because these alcids were also observed in these areas during winter (Nysewander et al. 2005; Falxa et al. 2009). Although this species has been observed foraging in the waters off Ault Field (U.S. Department of the Navy 2005), observations of murrelets at NAS Whidbey Island have been infrequent. This is further supported by the Washington Department of Fish and Wildlife’s Priority Habitat and Species database, which indicated that marbled murrelets are not present in the action area (U.S. Department of the Navy 1996; WDFW 2011b).

Marbled murrelets preferred habitat type, old-growth coniferous forests near coastal areas, which only occurs in small patches at NAS Whidbey Island. None of these small patches have been identified as supporting marbled murrelet nesting (U.S. Department of the Navy 2005). Also, no marbled murrelet occupancy sites are currently known to be present at Ault Field.

3. Environmental Setting

3.1 Habitat Conditions in Action Area

As described in Section 1.5, the action area for this project area is defined the 92 dBA SEL noise contour created by the EA-18G, including the imaginary surface between aircraft take- off and a 2,000-foot elevation.

The flightline area at Ault Field contains paved surfaces, maintained lawn, and landscaped areas with a limited amount of suitable habitat for wildlife. Additional habitats at Ault Field include grasslands, wet meadows, forests, coastal bluffs, beaches, dunes, freshwater wetlands, and marine and riparian habitats. The grasslands at Ault Field have little structural diversity and provide little habitat niches for relatively few wildlife species. Similarly, the wet meadows at Ault Field lack structural diversity and the hydrologic regime necessary to provide surface water year-round and thus attracts fewer species than areas with more complex wetland systems and deeper marsh and open water components. Wildlife that would be present in the Ault Field habitats includes migratory waterfowl, neotropical migratory songbirds, raptors, small burrowing mammals, and reptiles.

The Ault Field drainage ditches are approximately 2 to 10 feet wide with similar depth ranges. The ditches are periodically maintained and a major dredging project was completed in the mid-1990s to remove accumulated sediment and vegetation. The drainage channels are presently lined with emergent wetland and riparian vegetation or have exposed soil substrate. Some larger vegetation and debris are also present but are generally restricted to sections of the channels away from the runways. Vegetation undertakes are removed to reduce habitat that would attract birds that present a bird-aircraft strike hazard. Channel profiles of the airfield ditch system are generally smooth but do include several culverts, oil/water separators, and concrete baffle barriers in locations throughout the airfield (PWA, Inc. 2008).

The highest diversity of wildlife species at Ault Field occurs in the southwest portion of the installation, in the vicinity of Rocky Point. This area contains stands of mature forest, coastal bluffs, beach strand, native dune vegetation, and a large freshwater wetland. The Washington Department of Natural Resources has identified an approximately 1-mile-long coastal spit with native vegetation in this area as a significant native terrestrial plant community. It is dominated by three communities: dune wildrye, big-headed sedge, and sea thrift (U.S. Department of the Navy 1996).

Most streams in Island County are small, short coastal tributaries that flow intermittently due to precipitation patterns, lack of snow accumulation, soil conditions, and topography. They tend to be shallow, with relatively low discharge and reduced flows during the summer when precipitation is low. Wetlands and groundwater springs provide the headwaters and base flows. Low flows can cause salmon to be stranded; limit or impede salmon migration; and contribute to a decrease in dissolved oxygen, an increase in water temperature, and an increase in the concentration of pollutants. Furthermore, culverts, tide gates, dikes, and dams along many of these streams impede or prevent fish passage. Low flows and temperature also function as barriers to fish passage during certain times of the years, particularly during the summer.

Marine habitats are located on the western boundary of Ault Field and comprise intertidal and subtidal areas. Numerous marine fishes, terrestrial and aquatic mammals, and invertebrates occur on beaches and in adjacent waters associated with these habitats; however, there is no access to freshwater spawning and rearing habitats along the shores of Ault Field for anadromous species (U.S. Department of the Navy 2007).

Land adjacent to NAS Whidbey Island within Island County is rural, with large tracts of undeveloped forestland, agricultural land, and scattered residential subdivisions. Two state parks are located within a 2-mile radius of NAS Whidbey Island. Deception Pass State Park is located approximately 1 mile to the north of NAS Whidbey Island. Habitat at this state park includes old-growth forests, wetlands, sand dunes, cliffs, and freshwater and saltwater shoreline (Washington State Parks and Recreation Commission 2011a). Joseph Whidbey State Park is adjacent to the southwest boundary of NAS Whidbey Island and contains saltwater shoreline and forest (Washington State Parks and Recreation Commission 2011b).

4. Effects of the Action

This section is based on procedures listed in the *Consultation Handbook: Procedures for Conducting Consultation and Conference Activities under Section 7 of the Endangered Species Act* (U.S. Fish and Wildlife Service and National Marine Fisheries Service March 1998).

4.1 Determination of Effects

This section discusses potential beneficial actions, direct and indirect actions, interdependent and interrelated actions, and actions unrelated to the proposed action that may result in cumulative effect as a result of the proposed action. (For a more detailed discussion of types of effects, see U.S. Fish and Wildlife Service and National Marine Fisheries Service March 1998). These effects are defined as follows:

- **Beneficial** – Effects of an action that are wholly positive, without any adverse effects on a listed species or designated critical habitat. Determination that an action will have beneficial effects is a "may affect" situation.

- **Direct** – The direct or immediate effects of the project on the species or its habitat. Direct effects result from the agency action, including the effects of interrelated actions and interdependent actions.

- **Indirect** – Effects caused by or resulting from the proposed action that occur later in time and are reasonably certain to occur. Indirect effects may occur outside of the area directly affected by the action.

- **Interrelated and Interdependent** – Effects that result from an activity that is part of the proposed action and depends on the proposed action for its justification.

- **Cumulative** – Includes the effects of future, state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this BA. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA.

The effects assessment is based on the following factors:

- The dependency of the species on specific habitat components
- Habitat abundance
- Population levels of the species
- The degree of habitat impact
- The potential for mitigation of an adverse effect.

4.2 Marbled Murrelet

The action area is within Puget Sound encompassed by the murrelet recovery zone (Conservation Zone 1), as designated and described in the *Recovery Plan for the Marbled Murrelet* (U.S. Fish and Wildlife Service 1997b). Potential impacts on murrelets from the proposed action could include airstrikes and reaction to acoustic changes in air created by the EA-18G.

4.2.1 Direct Effects

While murrelets are aggressive feeders during a typical, 30-minute foraging bout, spending up to 22 minutes (72 percent) foraging (submerged), they also spend time on top of the water (not foraging) in any given day (U.S. Fish and Wildlife Service 2010). It is during the non-foraging period that this species could be exposed to potential direct effects of the proposed action. It is assumed that the marbled murrelets flight behavior is predominantly associated with foraging and flights to nest sites.

Airstrike

The Navy conducted a 3-year study of bird strikes involving naval aircraft in several operational areas around the U.S., from 2002 through 2004. The study found that Navy aircrews experience approximately 596 wildlife/aircraft strike events annually in the U.S., with most encounters involving songbirds (32 percent), seabirds (22 percent), shorebirds (18 percent), and raptors (17 percent) (U.S. Department of the Navy 2008). These data suggest that murrelets can be considered at risk of airstrike, with the proposed increase in number of air operations and the occurrence of lower level aircraft over marine waters, particularly during landing operations.

The height at which murrelets fly and the speed of the aircraft are considered risk factors when assessing the likelihood of aircraft collision with murrelets. It can be inferred from previous studies that murrelets generally fly lower and at slower speeds in foraging/courtship habitat, where they are often flying closer to the water surface than when transiting to nesting habitat over land (Nelson and Hamer 1995, Hamer Environmental 2009 *as cited in* USFWS August 10, 2010). As marbled murrelets transition from marine habitat to nesting habitat, it is assumed they gain altitude as they fly over shoreline areas to achieve the necessary heights in a tradeoff between obstacle avoidance, predator detection, and energy expenditure.

Therefore, it is assumed that flight altitudes of murrelets over marine waters next to Ault Field would be low, as they descend to foraging sites. Alcid flight patterns in the marine environment are often closely associated with the surface of the water (USFWS August 10, 2010). Murrelets likely have adapted this behavior of low flight levels to optimize energy expenditure (increased lift from the interaction of air currents and wave action) or to remain close to the water to escape from aerial predators by diving. Although data are lacking, it is assumed that flight altitude of murrelets over water is generally less than 500 feet.

As such, the likelihood of collision between a marbled murrelet and an EA-18G on any given flight is largely determined by the aircraft's speed and the duration of the flight below 500 feet when over water. Unlike the EA-6B, the EA-18G departing from Ault Field typically ascends more rapidly at takeoff, thereby spending less time than the EA-6B (less than 10 seconds) to pass through the 0 foot to 500 foot range of highest collision risk. For example, based on a standard departure, an EA-18G would reach 1,622 feet in altitude approximately 500 feet offshore, compared with the EA-6B, which, on the same flight track would only reach 750 feet in altitude. Given the very short duration of flight within less than 500 feet and the rapid ascent of the EA-18G, the collision risk would be expected to be low for departing flights and lower than current operations of the EA-6B.

The approach profiles for both the EA-6B and EA-18G are comparable, with similar air speed and decent rates for both aircraft. Approaching aircraft spend comparatively more time in murrelet airspace than departing aircraft as they descend on approach to Ault Field. Descending aircraft maintain lower flight altitudes and a more horizontal trajectory, resulting in a longer duration in murrelet airspace (up to 60 seconds). As a result, arriving aircraft could pose a greater strike risk to marbled murrelets than departing aircraft. However, since both the EA-6B and EA-18G have similar arrival flight profiles and operate at similar speeds, altitudes, and decent rates while approaching Ault Field, the potential for bird strike upon arrival by either aircraft is also similar.

The intersection of murrelet flight with the EA-18G airspace is expected to be infrequent and brief, given the murrelet's low flight patterns in the marine environment and the rapid ascent of the EA-18G from Ault Field. Furthermore, intersections of the murrelet and the EA-18G during the murrelets flight to nesting habitat would be limited. While murrelets are known to transit between foraging and nesting habitat at higher altitudes, the EA-18G would rapidly be at much higher altitudes than the bird as they leave the vicinity of Ault Field.

The Navy provided the USFWS approximately three years of site-specific bird/aircraft strike hazard data (2008 to 2010) for Whidbey Island (including Ault Field) for the August 10, 2010 BO for the NWTRC. No murrelets were detected among the 63 recorded strikes (John Mosher, U.S. Navy, pers. comm., 2010 *as cited in* USFWS 2010). These data suggest strike risk for this species is low. While there still is potential for a marbled murrelet strike to occur, the risk would be low, even with the planned 3 percent increase in air operations associated with the transition from the EA-6B to EA-18G aircraft.

Acoustic

In 2006, the Navy completed a comprehensive review of the literature assessing the potential impacts of aircraft noise on waterfowl. The focus of this review was on peer-reviewed literature. Human activity around seabirds may generally result in a temporary change in behavior of a bird, change in internal state (e.g., increase heart/breathing rate), or temporary/permanent displacement (see Burger 1981, Dunnet 1977, and Jehl and Cooper 1980 *as cited in* Manci et al. 1988; Nimon et al. 1995; and Harms 1996).

It was reported that aircraft overflights stimulate a response from seabirds. Brown (1990) completed an experiment on Australia's Great Barrier Reef using pre-recorded aircraft noise, with peak overflight levels of 65 dBA to 95 dBA, to nesting sea bird colonies. Results indicated that the crested tern (*Sterna bergii*) prepared to fly or flew off at exposures to noise of more than 85 dBA. However, these seabirds were not habituated to such noise, whereas marbled murrelet in marine environment adjacent to Ault Field have been exposed to and are now habituated to increased noise levels generated by aircraft take-off and landing since the base was first developed in the 1940s.

Currently, there are no studies documenting behavioral responses of marbled murrelets to aircraft noise or if they are habituated to such noise. Studies assessing habituation of birds to aircraft noise have typically shown limited response of the birds to aircraft overflights. In the early 1980s, the effect of low-altitude military training flights on the establishment, size, and reproductive success of wading bird colonies in Florida was assessed. Based on indirect evidence of distribution and turnover rates in relation to jet training routes (<500 feet agl) and military operations areas, military activity had no demonstrated effect on colony establishment or size on a statewide basis (Black et al. 1984 *as cited in* Manci et al. 1988). Furthermore, the findings from the Navy's 2006 review indicated waterfowl respond to noise from helicopters more than to fixed-wing aircraft, and more to slower fixed-winged aircraft (e.g.,, propeller-driven planes) than from fast-winged aircraft, e.g., jets (Ward et al. 1987, 1988; Fleming et al. 1996).

In the early 1990s, behavioral responses of wintering American black ducks (*Anas rubripes*), American wigeon (*A. americana*), gadwall (*A. strepera*), and American green-winged teal (*A. crecca carolinensis*) exposed to low-level flying military aircraft at Piney and Cedar islands, North Carolina, was assessed. Investigators determined that disruptions represented a low percentage of their time-activity budgets, only a small proportion of birds reacted to disturbance (approximately 2 percent), and the likelihood of resuming the activity disrupted by an aircraft disturbance event was high (64 percent) (Conomy et al. 1998a). Investigators concluded that recorded levels of aircraft disturbance were not adversely affecting the time-activity budgets of selected waterfowl species wintering at these islands.

A second study at the Piney and Cedar islands assessed whether habituation was a possible proximate factor influencing the low proportion of free-ranging ducks reacting to military aircraft activities in a training range in coastal North Carolina during winters 1991 and 1992. Captured, wild-strain American black ducks and wood ducks (*Aix sponsa*) were exposed to actual and simulated activities of jet aircraft. Investigators conclude that initial exposure to aircraft noise elicited behavioral responses from both black ducks and wood ducks, although with continued exposure of aircraft noise, black ducks became habituated. Wood ducks on the other hand did not exhibit the same pattern of response, suggesting that the ability of waterfowl to habituate to aircraft noise may be species specific (Conomy et al. 1998b).

The frequency, duration, and intensity of the murrelets exposure to the acoustic signature of the EA-18G aircraft depends upon the flight profile being performed. Depending on the flight operation, the 92 dB noise created by an EA-18G would be between 20 and 60 seconds in duration; the longer time period when aircraft are arriving at the airfield. This duration is comparable to that currently observed for the EA-6B operations.

Although the time an aircraft is transitioning the 92 dB SEL (or greater) contour is comparable between the two aircraft, due to the more powerful thrust of the EA-18G, it is more efficient reaching its desired altitude than the EA-6B. Introducing the EA-18G and removing the EA-6B from operation would significantly reduce (by 42 percent) the 92 dB noise contour area in the region. Reaching this desired altitude faster would thereby reduce the potential regional noise impact on the marbled murrelet population (Figure 4-1). The density of marbled murrelets per kilometer (km) next to NAS Whidbey Island is low (less than 5 birds per km). Furthermore, within the EA-6B 92 dB noise contour, the density of murrelets could range from 0 to 3 birds per km. Reducing noise contours by introducing the EA-18G, would further reduce the potential noise impacts on murrelets as their densities range from 0 to fewer than 1 bird per km in this noise contour (Marbled Murrelet Effectiveness Monitoring Module 2008; Flaxa et al. 2011).

While unable to definitively describe the magnitude of the acoustic effect from the EA-18G landing and take-off on individual murrelets, it is expected that the additive effect of the EA-18G's flight operations may result in "allostatic loading" (i.e., the cumulative wear and tear on an individual murrelets body as the adrenal hormones, neurotransmitters, or immuno-cytokines are released in response to an event). An allostatic load may come in the form of behavioral avoidance of continued exposure to the noise from the aircraft taking off or landing; or alternatively, such a stressor may induce a response that produces changes in heart rate, blood pressure, and gastrointestinal activity (Buchanan 2000; McEwen and Wingfield 2003; Korte et al. 2005).

Individual marbled murrelets repeatedly exposed to the noise of the EA-18G taking off and landing could be expected to suffer the incremental, deleterious effects as adrenal hormones, neurotransmitters, or immuno-cytokines are released in response to this stressor. However, regardless of the response, it would be for a relatively short duration (up to 60 seconds) and habituation, combined with other ongoing air operations at the station makes it unlikely that the noise would have a significant long-term effect on an individual's fitness.

Therefore, as population numbers of marbled murrelets are very low (less than 1 bird per square kilometer) within the 92dB noise contour of the EA-18G, individual marbled murrelets may be affected by this action; however, the action would not have community or population-level effect.

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Source: ESRI, 2010; NAVFAC GeoRediness Center, 2006;
NAS Whidbey Island, 2007.

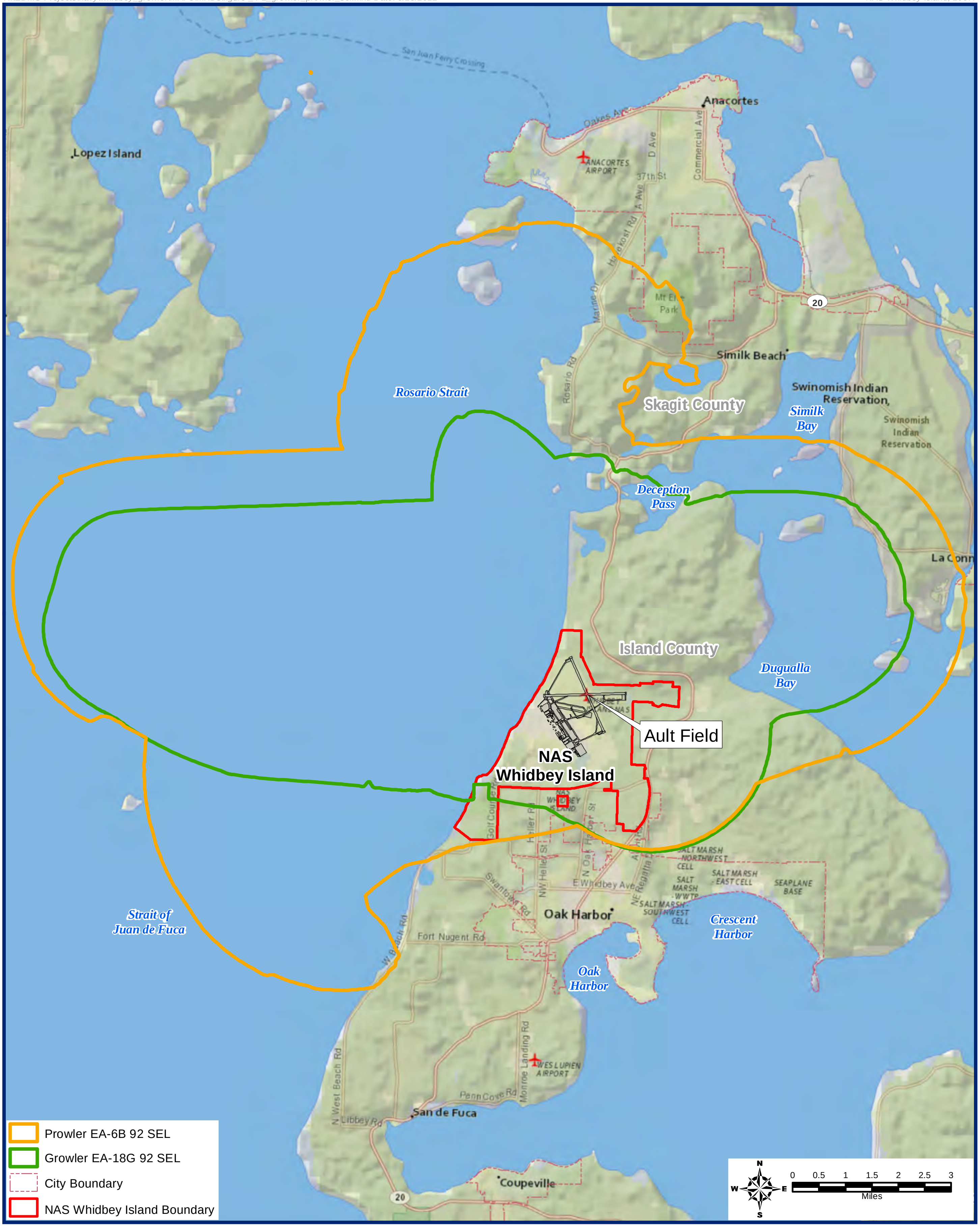

Figure 4-1
Comparison of the 92 dB SEL Contours for the EA-6B and the EA-18G
VAQ Expeditionary Squadron Realignment and Transition
at NAS Whidbey Island Washington

4.2.2 Indirect Effects

Replacement of the EA-6B Prowler with the EA-18G Growler, along with the increase in aircraft operations would not be expected to measurably change the existing underwater environment in the action area. Due to the difference in acoustic properties of air and water, most of the acoustic energy generated from the aircraft would be reflected away from the water column because noises from atmospheric sources do not transmit well under water (Richardson et al. 1995). Furthermore, the sound levels created by the EA-18G would decline at increasing lateral distances from the aircraft's flight track or location and any underwater sounds propagated from the aircraft would decline rapidly after the aircraft has passed. Therefore, there would be no indirect effect on foraging habitat or reduction in the primary food stocks of marbled murrelets.

4.2.3 Effects of Interrelated and Interdependent Actions

The introduction of the EA-18G Growler at NAS Whidbey Island would require constructing additional facilities for realignment of the squadrons. Marbled murrelets are found on the marine waters around Whidbey Island, spending approximately 80 percent of their time on the water, with the remaining time nesting in old growth forests. There is no habitat that supports this species at the proposed construction and renovation sites. Therefore, this species would not be affected by construction activities and there would be no interrelated and interdependent effects.

4.2.4 Determination of Effects

The above analysis indicates that the project **may affect but is not likely to adversely affect** the threatened marbled murrelet in the marine waters adjacent to Ault Field at NAS Whidbey Island.

4.3 Cumulative Effects

Under the ESA, cumulative effects are defined as effects of future local, state, or private (not federal) actions that are unrelated to the proposed project but that are reasonably certain to occur within the project action area.

Historically, seabird populations in Puget Sound, including the marbled murrelet, have sustained numerous impacts from pollution and human activities. Urban development is reasonably certain to occur within the action area and will likely result in increased stormwater and wastewater discharges. The murrelet's prey species in the action area may be negatively affected as a result of degraded water quality from these discharges. The severity of effects to murrelets will depend on the amount and concentration of contaminants discharged, which is determined by many factors (e.g., existence of stormwater Best Management Practices and time between rain events) and is likely to be more severe in urbanized areas. This type of human activity is expected to increase in the future. For example, Island County, which is part of the action area, is expected to increase in population by 40 percent between 2005 and 2030 (Washington Office of Financial Management 2010).

Continued expansion of commercial and private aircraft and ocean-going vessels near NAS Whidbey Island may also cause measurable effects. Small commercial and private aircraft may fly at low levels in the action area when the cloud ceiling is low. This may negatively impact murrelets in the area, causing them to startle or flush. A similar response may occur when small, recreational boats move through the action area.

5. Conclusions

The Navy proposes to transition up to four EA-6B Prowler squadrons and related personnel to EA-18G Growler squadrons; add up to 11 EA-18G Growler aircraft to the FRS; increase the number of aircrew, officers, and enlisted personnel stationed at the installation; and modify certain facilities at Ault Field to provide space for the new personnel and aircraft. The number of operations is projected to be greater than the baseline, with aircraft operations potentially increasing by up to 3 percent annually. However, there would be no change in the training syllabus or types of operations as currently conducted by the expeditionary VAQ squadrons (arrivals, departures, or pattern operations) or the locations of aircraft operations (flight tracks over land or water) at Ault Field. The change in aircraft would result in a net noise decrease during aircraft operations.

Underwater sound increases generated from the overflight of the EA-18G, combined with the ongoing aircraft operations originating from NAS Whidbey Island, would be negligible. Due to the difference in acoustic properties of air and water, most of the acoustic energy generated from the aircraft would be reflected away from the water column (Richardson et al. 1995). Therefore, the transition of the EA-18G Growler squadrons would not impact fish or marine mammals in the action area.

Based on the information provided in this BA, the Navy concludes that the proposed action is not likely to jeopardize the continued existence of the ESA-listed species in the action area. There would be **no effect** on the golden paintbrush, bull trout, boccaccio, canary rockfish, yelloweye rockfish, chinook salmon, steelhead, green sturgeon, southern eulachon, humpback whale, southern resident killer whale, or Steller sea lion. There would be **no effect** on any designated critical habitat.

The height at which murrelets fly above water and the speed of the aircraft are perhaps the most important risk factors to consider when assessing the likelihood of aircraft collision with murrelets. It is assumed that flight altitudes of murrelets over marine waters next to Ault Field would be low as they descend foraging sites. Alcid flight patterns in the marine environment are often closely associated with the surface of the water (U.S. Fish and Wildlife Service 2010). Although data are lacking, it is assumed that the murrelet flight altitude over water is generally less than 500 feet.

As such, the likelihood of collision between a marbled murrelet and an EA-18G on any given flight is largely determined by jet speed and the flight duration within 500 feet of the water. Unlike the EA-6B, the EA-18G departing from Ault Field typically ascends more rapidly at takeoff, thereby spending less time than the EA-6B (assumed to be less than 20 seconds) to pass through the 0 foot to 500 foot range of highest collision risk. Approaching aircraft spend comparatively more time in murrelet airspace than departing aircraft as they descend on approach to Ault Field. Descending aircraft maintain lower flight altitudes and a more horizontal trajectory, resulting in a longer duration in murrelet airspace (up to 60 seconds). As a result, arrival could pose more of a strike risk to marbled murrelets than departures.

The expected intersection of murrelet flight with the EA-18G airspace is expected to be infrequent and brief, given the murrelets low flight patterns in the marine environment and the rapid ascent of the EA-18G from Ault Field. While there is potential for a marbled murrelet strike to occur, the risk is very low, even with the planned increase in air operations associated with the change from the EA-6B to EA-18G aircraft. Therefore, there is an extremely low likelihood of murrelet exposure to aircraft strikes and the overall risk of a strike can be discounted.

Currently, there are no studies documenting behavioral responses of marbled murrelets to aircraft noise or if they are habituated to such noise. Studies that have assessed the response of other waterfowl to aircraft noise have typically shown limited response. Investigators concluded that selected waterfowl species exposed to low-level flying military aircrafts were not adversely affecting the time-activity budgets when wintering at Piney and Cedar islands, North Carolina. A second study at the Piney and Cedar islands evaluated habituation as a possible proximate factor influencing the low proportion of free-ranging ducks reacting to military aircraft activities. Investigators found that one species, the American black duck, became habituated to the aircraft noise over time.

Individual marbled murrelets repeatedly exposed to the noise of the EA-18G taking off and landing would be expected to suffer incremental, deleterious effects as adrenal hormones, neurotransmitters, or immuno-cytokines are released in response to this noise stressor. However, regardless of the response, it would be for a relatively short duration (up to 60 seconds) and because individuals in the area are habituated to the noise and other ongoing air operations at the station, the introduction of the EA-18G is unlikely to have a significant long-term effect on an individual's fitness.

Based on the information provided in this BA, the Navy concludes that the proposed action is not likely to jeopardize the continued existence of the threatened marbled murrelet in the action area; therefore, the project **may affect, but is not likely to adversely affect** the marbled murrelet in the marine waters next to Ault Field at NAS Whidbey Island.

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Appendix A
EA-18G Growler Noise Study

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Appendix B
Species Lists from USFWS and NMFS

Other ESA-Listed Species

Under the jurisdiction of NOAA Fisheries that may occur off Washington & Oregon:

- distinct population segment, or DPS, of bocaccio *(Sebastes paucispinis)* (E) in Puget Sound
- distinct population segment, or DPS, of canary rockfish *(Sebastes pinniger)* (T) in Puget Sound
- distinct population segment, or DPS, of yelloweye rockfish *(Sebastes ruberrimus)* (T) in Puget Sound
- southern distinct population segment, or DPS, of eulachon (Columbia River smelt) *(Thaleichthys pacificus)* (T)
- southern distinct population segment, or DPS, of north American green sturgeon (*Acipenser medirostris*) (T), listed in the NOAA Fisheries Southwest Region

(E) = Endangered
(T) = Threatened

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Page last updated: June 15, 2010

Northwest Regional Office

NOAA's National Marine Fisheries Service

ESA Salmon Listings | ESA Regulations & Permits | Salmon Habitat | Salmon Harvest & Hatcheries | Marine Mammals | Salmon & Hydropower | Salmon Recovery Planning | Groundfish & Halibut | Permits & Other Marine Species

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ESA-Listed Marine Mammals

Under the jurisdiction of NOAA Fisheries that may occur:

off Washington & Oregon

- Southern Resident killer whale (*Orcinus orca*) (E); critical habitat
- humpback whale *(Megaptera novaeangliae)* (E)
- blue whale *(Balaenoptera musculus)* (E)
- fin whale (*Balaenoptera physalus)* (E)
- sei whale (*Balaenoptera borealis)* (E)
- sperm whale *(Physeter macrocephalus)* (E)
- Steller sea lion *(Eumetopias jubatus)* (T); critical habitat

in Puget Sound

- Southern Resident killer whale *(Orcinus orca*) (E); critical habitat
- humpback whale *(Megaptera novaeangliae)* (E)
- Steller sea lion *(Eumetopias jubatus)* (T); critical habitat

(E) = Endangered
(T) = Threatened

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Page last updated: June 15, 2010

Endangered Species Act Status of West Coast Salmon & Steelhead

(Updated July 1, 2009)

Species[1]			Current Endangered Species Act Listing Status[2]	ESA Listing Actions Under Review
Sockeye Salmon (*Oncorhynchus nerka*)	1	Snake River	***Endangered***	
	2	Ozette Lake	***Threatened***	
	3	Baker River	*Not Warranted*	
	4	Okanogan River	*Not Warranted*	
	5	Lake Wenatchee	*Not Warranted*	
	6	Quinalt Lake	*Not Warranted*	
	7	Lake Pleasant	*Not Warranted*	
Chinook Salmon (*O. tshawytscha*)	8	Sacramento River Winter-run	***Endangered***	
	9	Upper Columbia River Spring-run	***Endangered***	
	10	Snake River Spring/Summer-run	***Threatened***	
	11	Snake River Fall-run	***Threatened***	
	12	Puget Sound	***Threatened***	
	13	Lower Columbia River	***Threatened***	
	14	Upper Willamette River	***Threatened***	
	15	Central Valley Spring-run	***Threatened***	
	16	California Coastal	***Threatened***	
	17	Central Valley Fall and Late Fall-run	***Species of Concern***	
	18	Upper Klamath-Trinity Rivers	*Not Warranted*	
	19	Oregon Coast	*Not Warranted*	
	20	Washington Coast	*Not Warranted*	
	21	Middle Columbia River spring-run	*Not Warranted*	
	22	Upper Columbia River summer/fall-run	*Not Warranted*	
	23	Southern Oregon and Northern California Coast	*Not Warranted*	
	24	Deschutes River summer/fall-run	*Not Warranted*	
Coho Salmon (*O. kisutch*)	25	Central California Coast	***Endangered***	
	26	Southern Oregon/Northern California	***Threatened***	
	27	Lower Columbia River	***Threatened***	• Critical habitat
	28	Oregon Coast	***Threatened***	
	29	Southwest Washington	*Undetermined*	
	30	Puget Sound/Strait of Georgia	***Species of Concern***	
	31	Olympic Peninsula	*Not Warranted*	
Chum Salmon (*O. keta*)	32	Hood Canal Summer-run	***Threatened***	
	33	Columbia River	***Threatened***	
	34	Puget Sound/Strait of Georgia	*Not Warranted*	
	35	Pacific Coast	*Not Warranted*	
Steelhead (*O. mykiss*)	36	Southern California	***Endangered***	
	37	Upper Columbia River	***Threatened***	
	38	Central California Coast	***Threatened***	
	39	South Central California Coast	***Threatened***	
	40	Snake River Basin	***Threatened***	
	41	Lower Columbia River	***Threatened***	
	42	California Central Valley	***Threatened***	
	43	Upper Willamette River	***Threatened***	
	44	Middle Columbia River	***Threatened***	
	45	Northern California	***Threatened***	
	46	Oregon Coast	***Species of Concern***	
	47	Southwest Washington	*Not Warranted*	
	48	Olympic Peninsula	*Not Warranted*	
	49	Puget Sound	***Threatened***	• Critical habitat
	50	Klamath Mountains Province	*Not Warranted*	
Pink Salmon (*O. gorbuscha*)	51	Even-year	*Not Warranted*	
	52	Odd-year	*Not Warranted*	

1 The ESA defines a "species" to include any distinct population segment of any species of vertebrate fish or wildlife. For Pacific salmon, NOAA Fisheries Service considers an evolutionarily significant unit, or "ESU," a "species" under the ESA. For Pacific steelhead, NOAA Fisheries Service has delineated distinct population segments (DPSs) for consideration as "species" under the ESA.

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CRITICAL HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN IN ISLAND COUNTY AS PREPARED BY THE U.S. FISH AND WILDLIFE SERVICE WASHINGTON FISH AND WILDLIFE OFFICE

(Revised August 1, 2011)

LISTED

Bull trout *(Salvelinus confluentus)* – Coastal-Puget Sound DPS [marine waters]
Marbled murrelet *(Brachyramphus marmoratus)* [marine waters]

Major concerns that should be addressed in your Biological Assessment of project impacts to listed animal species include:

1. Level of use of the project area by listed species.

2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.

3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

Castilleja levisecta (golden paintbrush)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed plant species include:

1. Distribution of taxon in project vicinity.

2. Disturbance (trampling, uprooting, collecting, etc.) of individual plants and loss of habitat.

3. Changes in hydrology where taxon is found.

DESIGNATED

Critical habitat for bull trout

PROPOSED

None

CANDIDATE

None

SPECIES OF CONCERN

Bald eagle *(Haliaeetus leucocephalus)*
Long-eared myotis *(Myotis evotis)*
Long-legged myotis *(Myotis volans)*
Northern goshawk *(Accipiter gentilis)*
Northern sea otter *(Enhydra lutris kenyoni)*
Olive-sided flycatcher *(Contopus cooperi)*
Pacific lamprey *(Lampetra tridentata)*
Pacific Townsend's big-eared bat *(Corynorhinus townsendii townsendii)*
Peregrine falcon *(Falco peregrinus)*
River lamprey *(Lampetra ayresi)*
Western toad *(Bufo boreas)*
Aster curtus (white-top aster)

Appendix B Agency Correspondence

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Appendix B, Agency Correspondence

TOC

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DEPARTMENT OF THE NAVY
NAVAL AIR STATION WHIDBEY ISLAND
3730 NORTH CHARLES PORTER AVENUE
OAK HARBOR, WASHINGTON 98278-5000

IN REPLY REFER TO:

5090
Ser N44/0433
April 4, 2012

Mr. Ken Berg
U.S. Fish and Wildlife Service
North Pacific Coast Ecoregion
Western Washington Office
510 Desmond Drive SE, Suite 102
Lacey, WA 98503-1273

Dear Mr. Berg:

Enclosed is a copy of the Biological Assessment (BA) for the Expeditionary Electronic Attack Squadron Realignment and Transition at Naval Air Station Whidbey Island, Oak Harbor, WA, for your review and concurrence. The proposed project is to realign and transition up to four expeditionary VAQ squadrons from EA-6B Prowler aircraft to EA-18G Growler aircraft, add up to 11 EA-18G Growler aircraft to the fleet replacement squadron (FRS), increase the number of aircrew, officers, and enlisted personnel stationed at the installation, and modify certain facilities at Ault Field to provide more space for the new personnel and proper configuration for the new aircraft.

Each expeditionary VAQ EA-18G Growler squadron would consist of five aircraft and the existing FRS (VAQ-129) would gain additional aircraft. In order to maintain expeditionary VAQ capability, the squadrons must transition to the EA-18G Growler by 2015. To achieve this, the Navy is proposing that the EA-6B squadrons remain operational at NAS Whidbey Island and transition to the EA-18G beginning in 2012 at a rate of about one squadron per year through 2014.

NAS Whidbey Island does not currently have adequate hangar space, flight line electrical distribution systems, or capacity in the flight simulators to support up to four EA-18G Growler squadrons. As a result, the proposed action also includes expansion of the flightline electrical distribution system and construction, renovation, or modification of several facilities and functions including: Hangar 10 (Building 2699), Flight Simulator Building (Building 2593), and Hangar 12 (Building 2737).

5090
Ser N44/0433
April 4, 2012

The Navy concludes that the project "may affect, but is not likely to adversely affect" the marbled murrelet (*Brachyramphus marmoratus)*. The Navy concludes that the project will have "no effect" on the bull trout (*Salvelinus confluentus*). We request your concurrence with our effect determination. Please direct any written response and any additional inquiries regarding the Biological Assessment for the project to Jackie Queen, at NAS Whidbey Island Public Works Department, 1115 W. Lexington Street Building 103 Oak Harbor, WA 98278 or by phone at (360)257-5320.

Sincerely,

A. Crain

A. CRAIN
Installation Environmental
Program Director
By direction of the
Commanding Officer

Enclosure: 1. Biological Assessment

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office
510 Desmond Dr. SE, Suite 102
Lacey, Washington 98503

In Reply Refer To:
01EWFW00-2012-I-0188

MAY 25 2012

Allison Crain, Installation Environmental Program Director
Department of the Navy
Naval Base Whidbey Island
ATTN: Jackie Queen
3730 North Charles Porter Avenue
Oak Harbor, Washington 98278

Dear Ms. Crain:

Subject: Expeditionary Electronic Attack Squadron Realignment and Transition, Naval Air Station Whidbey Island, Oak Harbor, Washington

This is in response to your April 4, 2012, letter requesting our concurrence with your determination that the proposed action in Oak Harbor, Island County, Washington, would "not likely adversely affect" federally listed species. A photocopy from your transmittal document(s) describing the proposed action is enclosed.

Specifically, you requested informal consultation pursuant to section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) for the federally listed species identified below (only those species that have been checked are addressed in this consultation request (See Enclosure).

☒ Marbled murrelet (*Brachyramphus marmoratus*)

Based on the information provided in and/or with your cover letter and any additional information, we have concluded that effects of the proposed action to the above-identified federally listed resources would be insignificant and/or discountable. Therefore, for the reasons identified in the enclosures to this letter, we concur with your determination that the proposed action is "not likely to adversely affect" the above-identified federally listed resources. This letter and its enclosures constitute a complete response of the U.S. Fish and Wildlife Service to your request for informal consultation.

This concludes consultation pursuant to the regulations implementing the Endangered Species Act (50 CFR 402.13). This project should be re-analyzed if new information reveals effects of the action that may affect listed species or critical habitat in a manner, or to an extent, not considered in this consultation. The project should also be re-analyzed if the action is subsequently modified in a manner that causes an effect to a listed species or critical habitat that was not considered in this consultation, and/or a new species is listed or critical habitat is designated that may be affected by this project.

Our review and concurrence with your effect determination is based on the implementation of the project as described. It is the responsibility of the Federal action agency to ensure that projects that they authorize or carry out are in compliance with the regulatory permit and/or the ESA, respectively. If a permittee or the Federal action agency deviates from the measures outlined in a permit or project description, the Federal action agency has the obligation to reinitiate consultation and comply with section 7(d).

If you have any questions about this letter or our joint responsibilities under the Endangered Species Act, please contact the consultation biologist identified below, of this office.

U.S. Fish and Wildlife Service Consultation Biologist(s):

☒ Nancy Brennan-Dubbs (360 / 753-5835)

Sincerely,

Martha L. Jensen

for Ken S. Berg, Manager
Washington Fish and Wildlife Office

Enclosures
Appendix 1 Checklist(s)

cc:
☒ WDOE, Bellevue, WA (R. Padgett)

U.S. FISH AND WILDLIFE SERVICE
WASHINGTON FISH AND WILDLIFE OFFICE

MARBLED MURRELET AND MARBLED MURRELET CRITICAL HABITAT ENDANGERED SPECIES ACT SECTION 7 INFORMAL CONSULTATION CONCURRENCE RATIONALE

Project Name: Expeditionary Electronic Attack Squadron Realignment and Transition, Naval Air Station Whidbey Island,

MARBLED MURRELET CRITICAL HABITAT

☒ The proposed project, including indirect effects, will not occur within marbled murrelet critical habitat.

DIRECT EFFECTS

Nesting Marbled Murrelets

The project will not result in the destruction or modification of suitable marbled murrelet nesting habitat and

☒ The project is more than 0.25 mile from suitable marbled murrelet nesting habitat and does not include blasting, low-elevation (< 500 ft) aircraft operations, impact pile driving, or other activities that could produce sound above 92 dB. Thus, nesting marbled murrelets and their young are extremely unlikely to be exposed to project stressors (sound and visual disturbance) while on the nest or in the nest stand. Therefore, the effects of the proposed action to nesting marbled murrelets would be insignificant and discountable.

Foraging

☒ The proposed project is not expected to result in sound pressure levels that would measurably affect marbled murrelets. Therefore, effects to marbled murrelets would be insignificant.

Turbidity and Other Environmental Contaminants

☒ The proposed project is not expected to release or introduce environmental contaminants into or adjacent to the aquatic environment in concentrations that would measurably effect marbled murrelets. Therefore, effects to marbled murrelets via direct exposure or uptake of contaminants will be insignificant.

INDIRECT EFFECTS

Disturbance (Foraging)

☒ The indirect effects associated with operation of the completed action and use of the facility are not expected to result in sound pressure levels above background; therefore, disturbance of marbled murrelets is not anticipated to be measurable. Thus, effects to marbled murrelets would be insignificant.

Contaminants

☒ Operation of the proposed action and use of the facility are not expected to release or introduce contaminants into the aquatic environments at concentrations that may result in measurable effects to marbled murrlets via their prey species. Therefore, these effects to marbled murrelets are insignificant.

Consulting Biologist: Nancy Brennan-Dubbs, FWS Project Biologist — Date: May 23, 2012

Concurrence approved by: Martha L. Jensen, Federal Activities Branch Supervisor — Date: 5/25/12

Note: The rationale expressed in this informal section 7 checklist represents our current understanding of the effects of some commonly permitted federal actions to marbled murrelet. This document does not express all possible rationale for insignificant or discountable effects to marbled murrelet. This document is subject to change at any time due to the collection of new information or the need to clarify our rationale. However, any future changes to this concurrence rationale document would not be expected to necessitate reinitiation on previously completed consultations. Please see the "reinitiation" paragraph of the cover letter for a discussion of reinitiation triggers.

1.3 Project Description

NAS Whidbey Island is located in Island County, Washington, on Whidbey Island in northern Puget Sound (Figure 1-1). The air station is in the north-central part of the island, adjacent to the town of Oak Harbor, and is divided into four distinct parcels: Ault Field, Lake Hancock, Outlying Landing Field Coupeville, and the Seaplane Base. The proposed action would occur at Ault Field, the training and operational center of NAS Whidbey Island. The remaining three parcels would not be affected by the proposed action and are therefore not discussed further.

NAS Whidbey Island has supported the expeditionary VAQ community for more than 30 years. It is currently home to VAQ squadrons operating the EA-6B Prowler and EA-18G Growler, maritime patrol squadrons and a reserve squadron operating the P-3 ("Orion"), fleet air reconnaissance squadrons operating the EP-3E ("Aries"), a C-9 squadron, and H-60 search-and-rescue helicopters.

The Navy proposes to realign and transition up to four expeditionary VAQ squadrons from EA-6B Prowler aircraft to EA-18G Growler aircraft; add up to 11 EA-18G Growler aircraft to the fleet replacement squadron (FRS); increase the number of aircrew, officers, and enlisted personnel stationed at the installation; and modify certain facilities at Ault Field to provide more space for the new personnel and proper configuration for the new aircraft.

The EA-18G Growler is a variant of the F/A-18F ("Super Hornet") strike-fighter aircraft, equipped with the same electronic weapons systems as the EA-6B Prowler. The primary types of mission training and readiness requirements for the EA-18G Growler are nearly identical to those for the EA-6B Prowler.

The EA-6B Prowler airframe is approaching the end of its service life. Failure to replace the EA-6B Prowler legacy aircraft by 2015 would affect combat readiness, potentially resulting in interruptions to operations and accruing costs for service-life extension of the aircraft. The proposed action is needed to provide sustainable and rapidly deployable electronic attack capability to overseas land bases in the interest of national security. The EA-18G are airborne electronic attack aircraft capable of suppressing enemy air defenses in support of strike aircraft and ground troops by interrupting enemy electronic activity and obtaining tactical electronic intelligence within the combat area. As the nation's only operational airborne electronic attack assets, these very unique Navy aircraft and their highly trained flight crews are low-density-high demand strategic national assets that have and continue to provide an essential umbrella of protection to U.S. and coalition ground forces while on deployment.

Building Facilities

The proposed action would provide the facilities and functions necessary to retain the expeditionary VAQ mission at NAS Whidbey Island and to realign and transition up to four expeditionary VAQ squadrons from EA-6B Prowler aircraft to EA-18G Growler aircraft. Each expeditionary VAQ EA-18G Growler squadron would consist of five aircraft; each existing EA-6B Prowler squadron includes four aircraft. In addition, the existing FRS (VAQ-129) would gain additional aircraft. In order to maintain expeditionary VAQ capability, the squadrons must transition to the EA-18G Growler by 2015. To achieve this, the Navy is proposing that the EA-6B squadrons continue to operate at NAS Whidbey Island and transition to the EA-18G beginning in 2012 at a rate of about one squadron per year through 2014.

NAS Whidbey Island does not currently have adequate hangar space, flight line electrical distribution systems, or capacity in the flight simulators to support up to four EA-18G Growler squadrons. An environmental assessment (EA) is being prepared in accordance with the National Environmental Policy Act (NEPA) of 1969; the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR1500-1508); Navy procedures for implementing NEPA (32 CFR 775); and the Chief of Naval

DEPARTMENT OF THE NAVY
NAVAL AIR STATION WHIDBEY ISLAND
3730 NORTH CHARLES PORTER AVENUE
OAK HARBOR, WASHINGTON 98278-5000

IN REPLY REFER TO:

5090
Ser N44/0614
May 10, 2012

Washington Department of Ecology
Shorelands and Environmental Assistance Program
Northwest Region
3190 160th Avenue SE
Bellevue, WA 98008-5452

Dear Geoff Tallent:

The United States Navy is preparing an Environmental Assessment to analyze the potential impacts of a proposed action which involves the transition of up to four EA-6B "Prowler" squadrons and related personnel to EA-18G "Growler" squadrons and potentially up to 11 EA-18G aircraft to the Fleet Replacement Squadron (FRS)at Naval Air Station Whidbey Island, Oak Harbor, WA. To comply with Subpart C of the National Oceanic and Atmospheric Administration, 15 CFR 930 and Coastal Zone Management Act §307(c)(1), the Navy is submitting a Coastal Zone Consistency Negative Determination (CCND) for Federal Facilities (enclosure (1)).

The transition involves increasing the number of aircrew, officers, and enlisted personnel stationed at the installation; and modifying certain facilities at Ault Field to provide capacity for the new personnel and proper configuration for the new aircraft. All facilities will be constructed in previously disturbed or grass covered areas and this proposed action will not alter the shoreline.

Pursuant to Section 307 of the Coastal Zone Management Act (CZMA), the Navy has determined that implementing the action alternative is not reasonably likely to affect use or natural resources, with Washington's Coastal Zone Management Program. The Navy requests your concurrence with our finding for a Negative Determination in accordance with CZMA and its implementing regulations.

5090
Ser N44/0614
May 10, 2012

To aid in your review, a copy of the CCND is included. For questions or additional information please contact Ms. Jackie Queen, (360)257-5320, or e-mail jackie.queen@navy.mil.

Sincerely,

Allison Crain

ALLISON CRAIN
Installation Environmental
Program Director
By direction of the
Commanding Officer

Enclosures:
1. Determination of Consistency
2. Project vicinity of VAQ Expeditionary Squadron realignment and transition at NAS Whidbey Island, WA
3. Proposed infrastructure development around Ault Field for VAQ Expeditionary Squadron realignment and transition at NAS Whidbey Island, WA

DEPARTMENT OF THE NAVY
COMMANDER, NAVY REGION, NORTHWEST

Coastal Zone Management Act of 1972
COASTAL CONSISTENCY Negative DETERMINATION
Environmental Assessment for Expeditionary Electronic Attack
Squadron Realignment and Transition
Naval Air Station Whidbey Island
Oak Harbor, Washington

[May 10, 2012]

Proposed Federal Agency Activity

To comply with Subpart C of the National Oceanic and Atmospheric Administration, Federal Consistency Regulation, 15 CFR 930 and Coastal Zone Management Act §307 (c) (1), as amended, the Department of Navy (Navy) is requesting concurrence on a Coastal Consistency "Negative Determination" for this action. The Department of Ecology (Ecology) is responsible for implementing Washington's program and is the lead agency that the Navy is requesting concurrence for activities undertaken by a Federal Agency and requiring Federal concurrence (United States Fish and Wildlife Service (USFWS)).

The Navy is proposing the realignment and transition of the expeditionary electronic attack squadrons (Expeditionary VAQ squadrons) at Naval Air Station Whidbey Island (NAS Whidbey Island), Oak Harbor, Washington. The Navy proposes to transition up to four EA-6B "Prowler" squadrons and related personnel to EA-18G "Growler" squadrons; add up to 11 EA-18G Growler aircraft to the Fleet Replacement Squadron (FRS); increase the number of aircrew, officers, and enlisted personnel stationed at the installation; and modify certain facilities at Ault Field to provide capacity for the new personnel and proper configuration for the new aircraft. The purpose of this action is to maintain Expeditionary VAQ capability at NAS Whidbey Island and is needed to provide sustainable and rapidly deployable electronic attack capability to overseas land bases in the interests of national security.

An ongoing Environmental Assessment analyzes the reasonably foreseeable environmental impacts of the alternatives on land use and coastal zone management; threatened and endangered species and other biological resources; water resources; noise; air quality; cultural resources; the regional economy; and environmental management. Navy has submitted a Biological

This Coastal Consistency Negative Determination is submitted under CZMA and its implementing regulations, and Chief of Naval Operations Instruction 5090.1C, "Navy Environmental and Natural Resources Program Manual."

Analysis of Enforceable Policies

Shoreline Management Act

The Shoreline Management Act designates preferred uses for protected shorelines and provides for the protection of shoreline natural resources and public access to shoreline areas. Protected shorelines include marine waters, streams with greater than 20 cubic feet per second of mean annual flow, lakes 20 acres or larger, upland areas that extend 200 feet landward from the edge of these waters, and wetlands and floodplains associated with any of these waters. Construction associated with the proposed activity would not occur within any protected shoreline as defined by the Shoreline Management Act. Further, the proposed activity will not interfere with public access to any shoreline areas. Therefore, the proposed activity would have no effect on a use or natural resources covered by this policy.

State Environmental Policy Act

The State Environmental Policy Act requires state and local agencies to consider the likely environmental consequences of a proposal before approving or denying the project. The potential environmental consequences of the proposed activity are being reviewed under the National Environmental Policy Act. State and local agencies will be provided an opportunity to review and comment on the environmental impacts of the proposed activity during the public review period of the Final EA. Consequently, a separate State Environmental Policy Act review is not required for the project.

Clean Air Act

The CAA is the primary federal statute governing the control of air quality. The CAA designates six pollutants as "criteria pollutants" for which National Ambient Air Quality Standards (NAAQS) have been established to protect public health and welfare.

Ocean Resource Management Act

The Ocean Resource Management Act regulates the lease of tidal or submerged lands. The proposed activity does not include any activities within Washington's tidal or submerged lands; therefore, the proposed activity would not be applicable to uses or natural resources covered by this policy.

Washington Coastal Management Program Consistency Review		
Statute	Scope	Consistency
Shoreline Management Act	Designates preferred uses for protected shorelines. Provides for the protection of shoreline natural resources and public access to shoreline areas.	NO EFFECT Construction associated with the proposed activity would not occur within any protected shoreline as defined by the Shoreline Management Act. Further, the proposed activity will not interfere with public access to any shoreline areas.
State Environmental Policy Act	Requires state and local agencies to consider the likely environmental consequences of a proposal before approving or denying the project.	NOT APPLICABLE The potential environmental consequences of the proposed activity are being reviewed under the National Environmental Policy Act. State and local agencies will be provided an opportunity to review and comment on the environmental impacts of the proposed activity. Consequently, a separate State Environmental Policy Act review is not required for the project.
Clean Air Act	The federal Clean Air Act defines the U.S. Environmental Protection Agency's responsibilities for	NO EFFECT The project is within an attainment area for all National Ambient Air Quality

Conclusion
Based on the foregoing analysis, the proposed federal activity is not reasonably likely to affect use or natural resources; therefore, the Navy requests your concurrence with our finding for a Negative Determination in accordance with CZMA and its implementing regulations.

Sincerely,

Allison Crain

ALLISON CRAIN
Installation Environmental
Program Director
By direction of the
Commanding Officer

Project Vicinity
VAQ Expeditionary Squadron Realignment and Transition
at NAS Whidbey Island Washington

Enclosure(2)

Project Area
Construction
Runway and Airfield Surface Area
Building
NAS Whidbey Installation Area

Proposed Infrastructure Development Around Ault Field
VAQ Expeditionary Squadron Realignment and Transition
at NAS Whidbey Island Washington

Enclosure(3)

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000

June 12, 2012

Allison Crain
Installation Environmental Program Director
Department of the Navy
Naval Air Station Whidbey Island
3730 N. Charles Porter Avenue
Oak Harbor, Washington 98278

**Re: Federal Consistency/Negative Determination
Expeditionary Electronic Attack Squadron Realignment and Transition, Naval Air Station Whidbey Island, Oak Harbor, Island County, Washington**

Dear Ms. Crain:

The Department of Ecology, Shorelands and Environmental Assistance Program received your Coastal Zone Consistency Negative Determination for the proposal to realign and transition the expeditionary electronic attack squadrons at Naval Air Station Whidbey Island.

Upon review of this proposal, Ecology concurs with your negative determination and assessment that the proposed action will have no effect upon Washington State coastal resources.

If you have any questions regarding this letter please contact Rebekah Padgett at (425) 649-7129.

Sincerely,

Erik Stockdale

Erik Stockdale, Unit Supervisor
Northwest Regional Office
Shorelands and Environmental Assistance Program

ES:rrp:cja

cc: Jackie Queen, U.S. Navy

e-cc: David Pater, Ecology
Loree' Randall, Ecology

Incoming
JUN 14 2012

DEPARTMENT OF THE NAVY
NAVAL AIR STATION WHIDBEY ISLAND
3730 NORTH CHARLES PORTER AVENUE
OAK HARBOR, WASHINGTON 98278-5000

IN REPLY REFER TO:

5090
Ser N44/0830
June 18, 2012

Mr. Nicholas Vann
Office of Archaeology and Historic Preservation
Department of Community Development
P. O. Box 48343
Olympia, WA 98504-8343

Dear Mr. Vann:

Pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulation, 36 CFR 800, the U.S. Navy requests your comment on a proposed expeditionary electronic attack squadron (VAQ) realignment and transition at Naval Air Station (NAS) Whidbey Island in Oak Harbor, WA. This action will have No Adverse Effect to historic properties.

The Navy proposes to retain its expeditionary VAQ mission at NAS Whidbey Island and, in doing so, will transition EA-6B "Prowler" squadrons and related personnel to EA-18G "Growler" squadrons. This action will include construction and demolition at Ault Field.

Currently, there are three EA-6B expeditionary VAQ squadrons and one EA-18G Fleet Replacement Squadron (FRS) located at NAS Whidbey Island. The Navy is preparing an Environmental Assessment for this undertaking that will address three alternatives and a No Action Alternative. The action alternatives are as follows:

a. Alternative 1. The three expeditionary squadrons at the installation would be transitioned from EA-6B aircraft to EA-18G aircraft and six EA-18G aircraft would be added to the FRS.

b. Alternative 2. The three expeditionary squadrons at the installation would be transitioned from EA-6B aircraft to EA-18G aircraft, a fourth expeditionary squadron consisting of five EA-18G aircraft would be added to the Fleet, and six EA-18G aircraft would be added to the FRS.

c. Alternative 3. The three expeditionary squadrons at the installation would be transitioned from EA-6B aircraft to EA-18G aircraft and 11 EA-18G aircraft would be added to the FRS.

Each of the action alternatives will increase the number of airplanes and personnel stationed at NAS Whidbey Island. Some modification of facilities would be necessary to provide capacity and proper configuration for the new EA-18G squadrons and additional FRS aircraft. Under the No Action Alternative, there would be no additional personnel located at the installation and no facility modifications.

Enclosure (1) is a figure showing the facility modifications that would occur under the three action alternatives. These modifications include:

a. Alternative 1

(1) Demolition of four auxiliary buildings (R-42, R-55, R-56, and 2705).

(2) Relocation of two auxiliary buildings (2893 and 2894) from their current locations between Buildings 2699 and 2642 (Hangar 8) to an as yet unidentified, but previously disturbed area, between Buildings 2699 and 2737 (Hangars 10 and 12 respectively).

(3) Construction of an approximately 32,500-square-foot addition to Building 2699 (Hangar 10) that will likely connect to Building 2642 (Hangar 8).

(4) Construction of an approximately 9,200-square-foot addition, with a covered walkway, for Building 2593 (Flight Simulator Building).

b. Alternative 2. Alternative 1 plus construction of an approximately 25,200-square-foot addition to Building 2737 (Hangar 12) would be constructed.

c. Alternative 3. Alternative 1 plus an approximately 4,300-square-foot addition to Building 2737 (Hangar 12) would be constructed.

The Area of Potential Effect (APE) for this undertaking is shown in enclosure (2). Of the ten buildings included in the action alternatives, four have been previously evaluated and determined not eligible for listing in the National Register of Historic Places (Reference Log # 012610-05-USN). These include 2593 (Flight Simulator), 2642 (Hangar 8), 2699 (Hangar 10), and 2737 (Hangar 12). Buildings 2705, 2983, and 2894 do not need evaluations as they are less than 50 years old, built in 1986, 2006, and 2006 respectively. Buildings R-42, R-55, and R-56 are temporary buildings and are not eligible to the National Register of Historic Places.

Ault Field has four historic properties: Hangars 1, 5 and 6, and the base theater. Hangars 1 and 5 are adjacent hangar 12 and are within the APE. Hangar 1 is scheduled for demolition in FY14 and all action alternatives assume that it will be demolished. Mitigation for that action was included in the memorandum of agreement regarding demolition activities signed between your office and the Navy on June 2, 2010. Hangar 6 and the theater are outside the APE for this action.

Under Action Alternative 2, the proposed addition to the northeast end of Hangar 12 would be approximately 25,200 square feet and would be visible in views from or of the rear of Hangar 5. Under Action Alternative 3, the proposed addition to the northeast end of Hangar 12 would be approximately 4,300 square feet and would be almost entirely screened in views from, or toward the rear of Hangar 5 by the northeastern doorway for Hangar 12.

The Navy has concluded that Action Alternatives 2 and 3 would have No Adverse Effect on Hangar 5 because the setting of this building has not been identified as contributing to the significance of this building and because changes to the setting, which would only be visible from, or toward the rear of the hangar, would not affect those architectural design qualities that make it eligible for listing in the NRHP.

The APE for this proposed undertaking is in an area of NAS Whidbey Island that is not sensitive for archaeological resources. In case of inadvertent discovery of Native American human remains or other archaeological resources during construction, the Navy will notify the appropriate tribal governments and Department of Archaeology & Historic Preservation as to the treatment of the remains and/or archaeological resources per applicable laws.

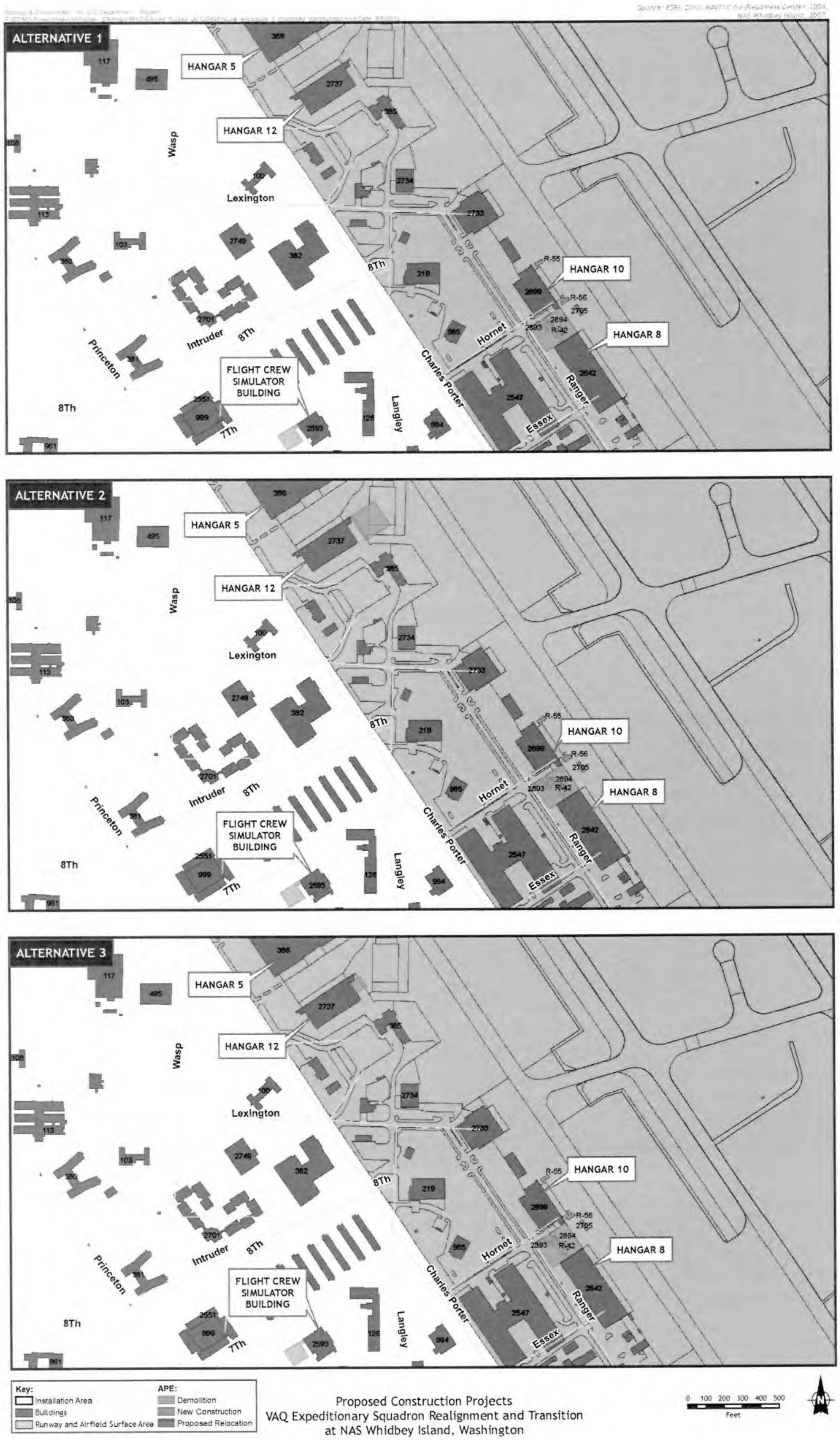
We look forward to receiving your comment. Please direct additional inquiries to Mr. Larry Moore, Cultural Resources Manager, at (360)257-6780 or email lawrence.moore1@navy.mil.

Sincerely,

Allison Crain

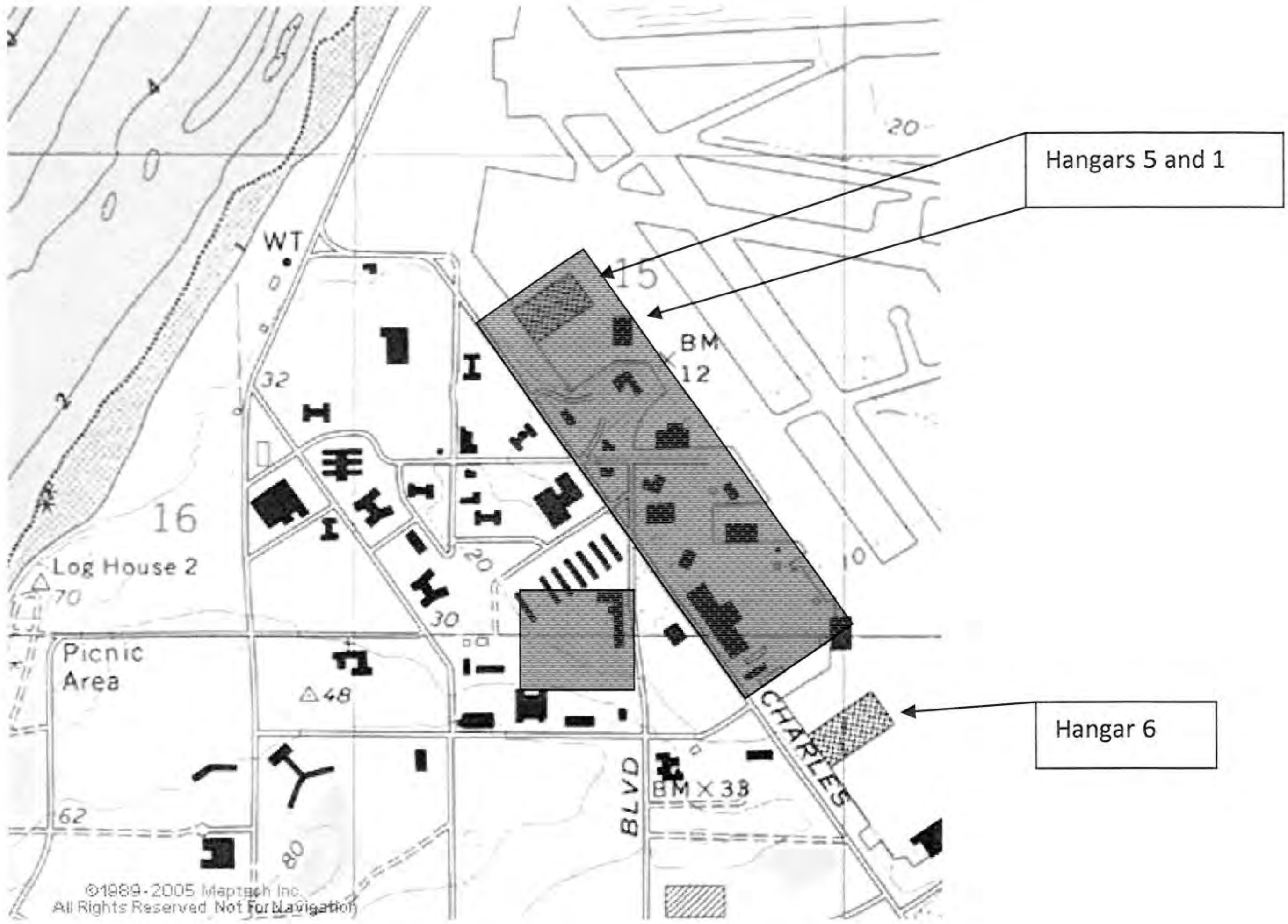
ALLISON CRAIN
Installation Environmental
Programs Director
By direction of the
Commanding Officer

Enclosures: 1. Figure showing the various Action Alternatives
2. Map showing the APE



Proposed Construction Projects
VAQ Expeditionary Squadron Realignment and Transition
at NAS Whidbey Island, Washington

Enclosure(1)



Area of Potential Effect is shown in light red. Reference is USGS Oak Harbor 7.5 map.

Enclosure(2)

STATE OF WASHINGTON

DEPARTMENT OF ARCHAEOLOGY & HISTORIC PRESERVATION

1063 S. Capitol Way, Suite 106 • Olympia, Washington 98501
Mailing address: PO Box 48343 • Olympia, Washington 98504-8343
(360) 586-3065 • Fax Number (360) 586-3067 • Website: www.dahp.wa.gov

July 3, 2012

Ms. Allison Crain
Installation Environmental Programs Director
U.S. Navy
Naval Air Station Whidbey Island
3730 North Charles Porter Avenue
Oak Harbor, Washington 98278-5000

In future correspondence please refer to:
Log: 070312-04-USN
Property: NAS Whidbey Island – Ault Field
Re: Proposed Expeditionary Electronic Attack Squadron (VAQ) Realignment

Dear Ms. Crain:

Thank you for contacting the Washington State Department of Archaeology and Historic Preservation (DAHP). The above referenced project has been reviewed on behalf of the State Historic Preservation Officer under provisions of Section 106 of the National Historic Preservation Act of 1966 (as amended) and 36 CFR Part 800. My review is based upon documentation contained in your communication.

First, I agree with the Area of Potential Effects (APE) as described in your consultation letter. I also concur that each of the proposed alternatives for new construction and non-historic structures will have "NO ADVERSE EFFECT" on National Register eligible or listed historic and cultural resources. I would appreciate being notified of the designated Alternative once it is selected. If additional information on the project becomes available, or if any archaeological resources are uncovered during construction, please halt work in the area of discovery and contact the appropriate Native American Tribes and DAHP for further consultation.

Thank you for the opportunity to review and comment. If you have any questions, please contact me.

Sincerely,

Nicholas Vann
Historical Architect
(360) 586-3079
Nicholas.Vann@dahp.wa.gov

cc: Larry Moore

DEPARTMENT OF THE NAVY
NAVAL AIR STATION WHIDBEY ISLAND
3730 NORTH CHARLES PORTER AVENUE
OAK HARBOR, WASHINGTON 98278-5000

IN REPLY REFER TO:

5090
Ser N44/0874
June 27, 2012

The Honorable Tom Wooten
The Samish Indian Nation
P.O. Box 217
Anacortes, WA 98221

Dear Chairman Wooten:

Subject: NAVY'S RELALIGNMENT AND TRANSITION OF THE EXPEDITIONARY ELECTRONIC ATTACK (VAQ) SQUADRONS AT NAVAL AIR STATION (NAS) WHIDBEY ISLAND IN OAK HARBOR, WA

Pursuant to the Navy's policy for American Indian/Alaska Native tribal government-to-government consultation, I would like to extend the opportunity to review the proposed action and to evaluate whether you believe there would be a potential to significantly affect tribal treaty harvest rights or cultural resources resulting from the implementation of the proposed action. A description of the proposed project is provided in enclosures (1) and (2).

Based upon the current scope of the proposed action, the preliminary assessment is that the Area of Potential Effect (APE) is in an area of NAS Whidbey Island that does not contain archaeological sites that are listed, or eligible for listing in, the National Register of Historic Places, and is considered not sensitive for archaeological resources. However, the Navy seeks your input in order to identify any historic properties that are of religious and cultural significance, protected tribal resources, or tribal rights or interests in Indian land within, or in the vicinity of, the APE for the proposed project that may be affected by this undertaking.

The Navy respectfully requests that you respond via written correspondence, and if appropriate, include map(s) showing the potentially affected area(s) and resources, within thirty (30) days of receipt of this letter.

5090
Ser N44/0874
June 27, 2012

If you would like to initiate government-to-government consultation, please provide the name(s) and title(s) of the tribal officials to contact to coordinate our first meeting. The Navy looks forward to discussing your questions and concerns about this proposed project.

If you have further questions or concerns, or require information regarding the proposed undertaking, please contact our Cultural Resources Program Manager, Mr. Lawrence Moore, at (360)257-6780 or lawrence.moore1@navy.mil.

Sincerely,

Allison Crain

ALLISON CRAIN
Installation Environmental
Programs Director
By direction of the
Commanding Officer

Enclosures: 1. Description of Proposed Undertaking
2. Diagram of various components of the Action Alternatives

Copy to:
Ms. Christine Woodward, Tribal Natural Resources
The Samish Indian Nation
P.O. Box 217
Anacortes, WA 98221

Ms. Jackie Ferry, Tribal Cultural Resources
The Samish Indian Nation
P.O. Box 217
Anacortes, WA 98221

DEPARTMENT OF THE NAVY
NAVAL AIR STATION WHIDBEY ISLAND
3730 NORTH CHARLES PORTER AVENUE
OAK HARBOR, WASHINGTON 98278-5000

IN REPLY REFER TO:

5090
Ser N44/0873
June 27, 2012

The Honorable Brian Cladoosby
The Swinomish Indian Tribal Community
11404 Moorage Way
La Conner, WA 98257

Dear Chairman Cladoosby:

Subject: NAVY'S RELALIGNMENT AND TRANSITION OF THE EXPEDITIONARY ELECTRONIC ATTACK (VAQ) SQUADRONS AT NAVAL AIR STATION (NAS) WHIDBEY ISLAND IN OAK HARBOR, WA

Pursuant to the Navy's policy for American Indian/Alaska Native tribal government-to-government consultation, I would like to extend the opportunity to review the proposed action and to evaluate whether you believe there would be a potential to significantly affect tribal treaty harvest rights or cultural resources resulting from the implementation of the proposed action. A description of the proposed project is provided in enclosures (1) and (2).

Based upon the current scope of the proposed action, the preliminary assessment is that the Area of Potential Effect (APE) is in an area of NAS Whidbey Island that does not contain archaeological sites that are listed, or eligible for listing in, the National Register of Historic Places, and is considered not sensitive for archaeological resources. However, the Navy seeks your input in order to identify any historic properties that are of religious and cultural significance, protected tribal resources, or tribal rights or interests in Indian land within, or in the vicinity of, the APE for the proposed project that may be affected by this undertaking.

The Navy respectfully requests that you respond via written correspondence, and if appropriate, include map(s) showing the potentially affected area(s) and resources, within thirty (30) days of receipt of this letter.

If you would like to initiate government-to-government consultation, please provide the name(s) and title(s) of the tribal officials to contact to coordinate our first meeting. The Navy looks forward to discussing your questions and concerns about this proposed project.

If you have further questions or concerns, or require information regarding the proposed undertaking, please contact our Cultural Resources Program Manager, Mr. Lawrence Moore, at (360)257-6780 or lawrence.moore1@navy.mil.

Sincerely,

Allison Crain

ALLISON CRAIN
Installation Environmental
Programs Director
By direction of the
Commanding Officer

Enclosures: 1. Description of Proposed Undertaking
2. Diagram of various components of the Action Alternatives

Copy to:
Ms. Emily Hutchinson, Tribal Attorney
The Swinomish Indian Tribal Community
11404 Moorage Way
La Conner, WA 98257

Mr. Larry Campbell, Tribal Historic Preservation Officer
Swinomish Indian Tribal Community
Cultural Resource Protection Office
11430 Moorage Way
La Conner, WA 98257

DEPARTMENT OF THE NAVY
NAVAL AIR STATION WHIDBEY ISLAND
3730 NORTH CHARLES PORTER AVENUE
OAK HARBOR, WASHINGTON 98278-5000

IN REPLY REFER TO:

5090
Ser N44/0875
June 27, 2012

The Honorable Jennifer Washington
Upper Skagit Indian Tribe
25944 Community Plaza
Sedro Woolley, WA 98284

Dear Chairman Washington:

Subject: NAVY'S RELALIGNMENT AND TRANSITION OF THE EXPEDITIONARY ELECTRONIC ATTACK (VAQ) SQUADRONS AT NAVAL AIR STATION (NAS) WHIDBEY ISLAND IN OAK HARBOR, WA

Pursuant to the Navy's policy for American Indian/Alaska Native tribal government-to-government consultation, I would like to extend the opportunity to review the proposed action and to evaluate whether you believe there would be a potential to significantly affect tribal treaty harvest rights or cultural resources resulting from the implementation of the proposed action. A description of the proposed project is provided in enclosures (1) and (2).

Based upon the current scope of the proposed action, the preliminary assessment is that the Area of Potential Effect (APE) is in an area of NAS Whidbey Island that does not contain archaeological sites that are listed, or eligible for listing in, the National Register of Historic Places, and is considered not sensitive for archaeological resources. However, the Navy seeks your input in order to identify any historic properties that are of religious and cultural significance, protected tribal resources, or tribal rights or interests in Indian land within, or in the vicinity of, the APE for the proposed project that may be affected by this undertaking.

The Navy respectfully requests that you respond via written correspondence, and if appropriate, include map(s) showing the potentially affected area(s) and resources, within thirty (30) days of receipt of this letter.

5090
Ser N44/0875
June 27, 2012

If you would like to initiate government-to-government consultation, please provide the name(s) and title(s) of the tribal officials to contact to coordinate our first meeting. The Navy looks forward to discussing your questions and concerns about this proposed project.

If you have further questions or concerns, or require information regarding the proposed undertaking, please contact our Cultural Resources Program Manager, Mr. Lawrence Moore, at (360)257-6780 or lawrence.moore1@navy.mil.

Sincerely,

Allison Crain

ALLISON CRAIN
Installation Environmental
Programs Director
By direction of the
Commanding Officer

Enclosures: 1. Description of Proposed Undertaking
2. Diagram of various components of the Action Alternatives

Copy to:
Mr. Scott Schuyler, Tribal Historic Preservation Officer
Upper Skagit Indian Tribe
25944 Community Plaza
Sedro Woolley, WA 98284

Mr. Jon-Paul Shannahan, Natural Resources
Upper Skagit Indian Tribe
25944 Community Plaza
Sedro Woolley, WA 98284

From: jackie ferry [mailto:jferry@samishtribe.nsn.us]
Sent: Monday, July 09, 2012 13:49
To: Moore, Lawrence E CIV NAVFAC NW, PRW4
Subject: Realignment and Transition of the Expeditionary Electronic Attack (VAQ) Squadrons

Hi Larry,

At this time, we have no cultural resources concerns with this project. If you'd prefer a mailed letter response, please let me know.

Thanks,

Jackie

Cultural Resources, Samish Indian Nation

P.O. Box 217, Anacortes, WA 98221

O: 360-293-6404 | M: 360-770-7784

Appendix C Noise Report

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AIRCRAFT NOISE STUDY FOR NAVAL AIR STATION WHIDBEY ISLAND AND OUTLYING LANDING FIELD COUPEVILLE, WASHINGTON

WR 10-22
October 2012

Prepared for:
Ecology and Environment, Inc.

Authors:
Patrick H. Kester
Joseph J. Czech

Aircraft Noise Study for Naval Air Station Whidbey Island and Outlying Landing Field Coupeville, Washington

Wyle Report WR 10-22
Contract Number N62470-10-D-3003
Job No. T57711.01
October 2012

Prepared for:

Ecology & Environment, Inc.
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Prepared by:

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Contents

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Acronyms & Abbreviations

ID	Definition
°F	degrees Fahrenheit
AAD	Annual Average Daily
AFE	Above Field Elevation
AFRL	Air Force Research Laboratory
AGL	Above Ground Level
AICUZ	Air Installations Compatible Use Zones
APZ	Accident Potential Zone
ASW	Anti-Submarine Warfare
ATAR	Air Traffic Activity Report
ATC	Air Traffic Control
CNO	Chief of Naval Operations
CY	Calendar Year
CZ	Clear Zone
dB	Decibel
dBA	A-Weighted Decibels
dBC	C-Weighted Decibels
DNL	Day-Night Average Sound Level
DoD	Department of Defense
DoN	Department of the Navy
E&E	Ecology & Environment, Inc.
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPR	Engine Pressure Ratio
ESHP	Effective Shaft Horsepower
FCLP	Field Carrier Landing Practice
FICON	Federal Interagency Committee On Noise
GCA	Ground Controlled Approach
GIS	Geographic Information Systems
Hz	Hertz
ID	Identification
IFR	Instrument Flight Rules
in Hg	inches of mercury
in-lbs	inch pounds (torque)
kts	Knots
L_{max}	Maximum Sound Level
MMA	Multi-mission Maritime Aircraft
MSL	Mean Sea Level
NAS	Naval Air Station
NASWI	Naval Air Station Whidbey Island
NAVFAC	Naval Facilities Engineering Command

ID	Definition
NC or %NC	Compressor RPM
NMAP	NOISEMAP
OLF	Outlying Landing Field
POI	Point of Interest
RH	Relative Humidity
RPM	Revolutions Per Minute
SEL	Sound Exposure Level
T&G	Touch-and-Go
TACAN	Tactical Area Navigation
U.S.	United States
VFR	Visual Flight Rules

Executive Summary

The primary purpose of this study is to present the results of the noise analysis for the proposed transitions of three expeditionary EA-6B Prowler squadrons to EA-18G Growler aircraft and addition of one reserve EA-18G squadron at Naval Air Station (NAS) Whidbey Island, Washington.

This report examines the aircraft noise for the Baseline conditions in Calendar Year 2011 (CY2011), the Proposed condition in 2016 (CY2016), and the Cumulative condition in 2018 (CY2018) on and in the vicinity of NAS Whidbey Island and Outlying Landing Field (OLF) Coupeville.

The study was conducted according to established Department of Defense (DoD) guidelines and best practices. It included extensive data collection, validation, and analysis and subject to a rigorous technical and quality assurance process. The noise analysis leveraged the DoD NOISEMAP suite of computer-based modeling tools to determine airfield noise exposure in terms of the Day-Night Average Sound Level (DNL).

The Baseline condition consists of approximately 70,500 annual flight operations at Ault Field of which approximately 45, 27, and 26 percent are conducted by the P-3C, EA-6B and EA-18G, respectively. Coupeville operations total 6,166 annually. The Proposed condition results in a net increase of approximately 2,200 operations at Ault Field by the reserve EA-18G. The EA-6B transition to EA-18G will have completed prior to the proposed condition. The addition of one reserve squadron of EA-18G would generally result in a decrease of up to 6 decibels (dB) in DNL exposure relative to the Baseline levels. Although the total operations increase slightly the decrease is due to the completion of the transition from the EA-6B to the relatively quieter EA-18G.

The Cumulative condition accounts for the Navy planned transition from the P-3 to the P-8. The noise analysis shows that the P-3 replacement by the P-8 would have minimal effect on the noise environment in the vicinity of NAS Whidbey Island because single-event noise levels of the P-3 and P-8 SELs are approximately 20 dB less than the EA-6B or EA-18G. The P-3/P-8 contribution to the overall DNL is minimal.

In addition, maximum sound levels and sound exposure levels are presented for four specific flight tracks in support of the Biological Assessment being conducted by Ecology and Environment, Inc.

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SECTION 1

Introduction

Throughout the United States (U.S.) and overseas, the Naval Facilities Engineering Command (NAVFAC) conducts aircraft noise surveys at various Naval and Marine Corps Air Stations and associated facilities. The noise exposure contours developed during these studies are integrated primarily into Air Installations Compatible Use Zones (AICUZ) studies or other environmental documents, such as Environmental Impact Statements (EIS). These environmental documents are employed by NAVFAC to promote the compatibility of Navy and Marine Corps activities with neighboring land uses. This report presents the noise survey's results for Naval Air Station (NAS) Whidbey Island (NASWI) and Naval Outlying Landing Field (OLF) Coupeville.

In support of an Environmental Assessment (EA) being conducted by Ecology & Environment, Inc., (E&E) the purpose of this report is to analyze and determine the aircraft noise environment at NASWI's Ault Field of three scenarios – Baseline, Proposed and Cumulative.

- The Baseline Scenario is an estimate of total operations during Calendar Year 2011 (CY2011) but with other modeling parameters based on the Preferred Alternative 5 from the Multi-Mission Maritime Aircraft (MMA) noise study (Amefia 2008) which, in turn, was primarily based on the 2004 noise study (Bremer et al).
- The Proposed Scenario transitions three expeditionary EA-6B squadrons to EA-18G aircraft and adds one reserve EA-18G squadron at NASWI.
- The Cumulative Scenario analyzes the same activities as the Proposed Scenario but also considers the transition of P-3C squadrons to P-8A aircraft.

This report is organized into seven primary sections, followed by two appendices. Section 2 presents an overview of the noise metrics and the technical tools used to conduct this analysis. Section 3 provides background on NASWI and a description of the operating environment. Sections 4, 5, and 6 describe the Baseline, Proposed and Cumulative Scenarios' operations data and noise exposure, respectively. Section 7 provides the single-event analysis. Appendix A presents the representative flight profiles for all modeled aircraft and Appendix B discusses the basics of noise and its effects on the environment.

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SECTION 2

Study Methodology and Data Collection

This section describes the data collection procedures and an overview of the noise analysis methodology, noise metrics and computerized noise models.

2.1 Data Collection

The primary purpose of this study is to estimate the noise exposure for the proposed and cumulative scenarios. In May of 2010, Wyle began the data collection phase which included a site visit to NASWI to gather and confirm the information needed to estimate noise exposure, including flight track utilization, flight profile data and operation counts (NAS Whidbey Island 2010). An additional follow-up site visit was conducted in May of 2011. Specific contact information is shown in Table 2-1. Following the 2011 site visit, data sources and operational assumptions were validated by U.S. Fleet Forces Command (Keys 2011).

Table 2-1 Points of Contact

Name	Title/Function	Organization	Phone	E-Mail
Dan Worra	NASWI OPSO	NASWI	(360) 257-2120	daniel.worra@navy.mil
Shirley Barraclough	AATCFO	NASWI	(360)757-1310	shirley.barraclough@navy.mil
William MacMillan	Airfield Manager	NASWI	(360) 257-5391	william.macmillan@navy.mil
Lt Troy Bertran	ATCFO	NASWI	(360) 257-1310	troy.bertran@navy.mil
Jennifer Meyer	CPLO	NASWI	(360) 257-8787	jennifer.s.meyer@navy.mil
Larry Frampton	Radar Branch Chief	NASWI	(360)257-2132	lawrence.frampton@navy.mil
Joseph McCullough	Tower Branch Chief	NASWI	(360)257-2132	joseph.mccullough@navy.mil
Mark VanOort	Airfield Facilities	NASWI OPS	(360) 257-5592	mark.vanoort@navy.mil
Brian Tyhuis	Planner	NASWI PW	(360) 257-1005	brian.tyhuis@navy.mil
Rich Nelaw	NRNW	NRNW	(360) 257-3315	richard.melaw@navy.mil
Sarah Ashleman	Planner	PWP Whidbey	(360) 257-1006	sarah.ashleman@navy.mil
Harvey Wicker	ATCFO	USN	(360) 257-1310	harvey.wicker@navy.mil
Curtis Holiway	CPRW-10 OPS O	CPRW-10	(360) 257-8663	curtis.holiway@navy.mil
Rick Rose	CVWP Facilities	CVWP	(360) 257-6060	richard.g.rose@navy.mil
Nathan Yarusso	CVWP OPS	CVWP	(360) 257-3903	nathan.yarusso@navy.mil
Tim Jackson	CVWP OPS	CVWP	(360) 257-8865	timothy.c.jackson1@navy.mil
Derick Leney	FITOIC	CVWP	(360) 257-6051	derek.leney@navy.mil
Jan Brandt	E & E PM	Ecology & Environment	(206) 624-9537	jbrandt@ene.com
Patrick Kester	Engineer (Noise)	Wyle	(310) 563-6636	patrick.kester@wyle.com
Joe Czech	Project Manager	Wyle	(310) 322-1763	joseph.czech@wyle.com

2.2 Noise Modeling

2.2.1 Noise Metrics

The Department of Defense (DoD) and the Federal Interagency Committee On Noise (FICON)[1] use three types of metrics to describe noise exposure:

1) A measure of the highest sound level occurring during an individual aircraft overflight (single event);

2) A combination of the maximum level of that single event with its duration; and

3) A description of the noise environment based on the cumulative flight and engine maintenance activity.

The DoD and the FICAN use Maximum Sound Level (L_{max}), Sound Exposure Level (SEL) and Day-Night Average Sound Level (DNL) for the aforementioned three types, respectively.

The metrics used to describe aircraft noise in this study are presented in terms of A-weighted decibels (dB), which de-emphasizes low-frequency noise, i.e., noise containing components less than 200 Hertz (Hz), to approximate the response and sensitivity of the human ear.

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

During an aircraft overflight, the noise level starts at the ambient or background noise level, rises to the maximum level as the aircraft flies closest to the observer, and returns to the background level as the aircraft recedes into the distance. At any given time during the event, the measured sound level is actually an average taken over one-eighth of a second. The variation in sound level with time is shown by the solid line in Figure 2-1. The maximum sound level, L_{max}, is the instantaneous maximum sound level measured/heard during the event. The L_{max} is important in judging the interference caused by a noise event with conversation, TV or radio listening, sleep, or other common activities. Although it provides some measure of the intrusiveness of the event, it does not completely describe the total event, because it does not include the period of time that the sound is heard.

The Sound Exposure Level, SEL, is a composite metric that represents all of the sound energy of the event and includes both the intensity of a sound and its duration. The SEL metric is the best metric to compare noise levels from overflights of different aircraft types. For sound from military aircraft overflights, the SEL is usually 5 to 10 dB greater than the L_{max}. For example, the L_{max} of the sample event in Figure 2-1 is 93.5 dB whereas the SEL is 102.7 dB.

[1] DoD is a member of FICON.

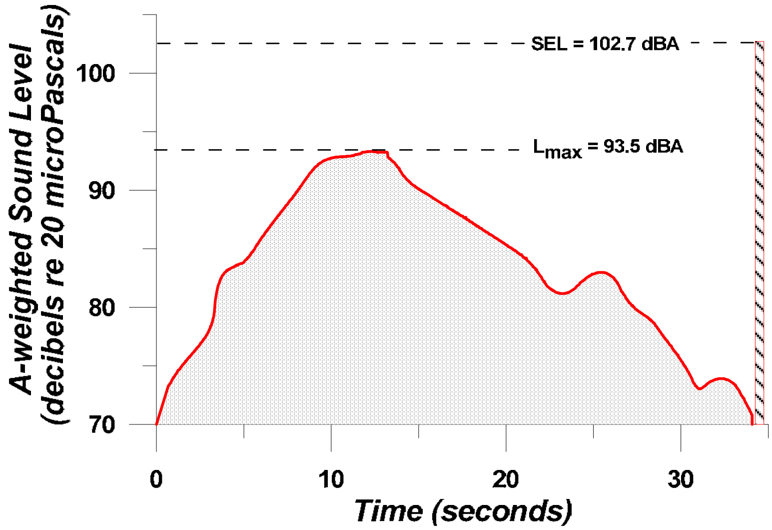

Figure 2-1 Example of Maximum Sound Level and Sound Exposure Level from an Individual Event

2.2.1.2 Day-Night Average Sound Level (DNL or L_{dn})

The Day-Night Average Sound Level, DNL, is a composite noise metric accounting for the sound energy of all noise events in a 24-hour period. In order to account for increased human sensitivity to noise at night, a 10 dB penalty is applied to nighttime events (10:00 p.m. to 7:00 a.m. time period). Noise-sensitive land uses, such as housing, schools, and medical facilities are considered as being compatible in areas where the DNL is less than 65 dB. Noise sensitive land uses are discouraged in areas where the DNL is between 65 and 69 dB, and strongly discouraged where the DNL is between 70 and 74 dB. At higher levels, i.e. greater than 75 dB, land use and related structures are not compatible and should be prohibited.

Because it is an energy-based quantity, DNL tends to be dominated by the noisier events. As a simple example, consider a case in which only one daytime aircraft overflight occurs over a 24-hour period, creating a sound level of 100 dB for 30 seconds. During the remaining 23 hours, 59 minutes and 30 seconds of the day, the ambient sound level is 50 dB. The resultant DNL would be 66 dB. In comparison, consider a second example that 10 such 30-second overflights occur during daytime hours instead, with the same ambient sound level of 50 dB during the remaining 23 hours and 55 minutes. The resultant DNL would be 76 dB. The energy averaging of noise over a 24-hour period does not ignore the louder single events and tends to emphasize both the sound levels and the number of those events.

Figure 2-2 graphically describes DNL using hourly average noise levels ($L_{eq(h)}$)for each hour of the day as an example. Note the $L_{eq(h)}$ for the hours between 10 pm and 7 am have a 10 dB penalty assigned. The DNL for the example noise distribution shown in Figure 2-2 is 65 dB.

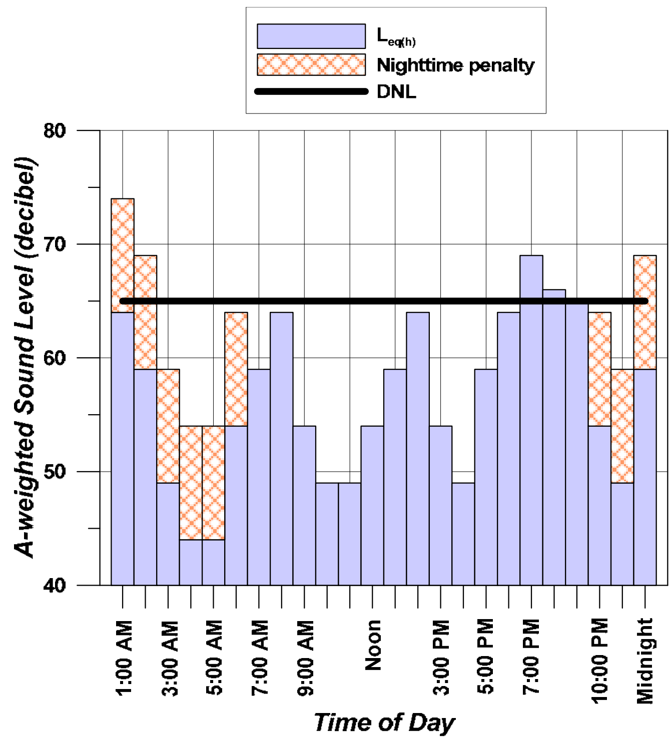

Figure 2-2 Example of Day-Night Average Sound Level Computed from Hourly Equivalent Sound Levels

2.2.2 Noise Models

This section describes the analysis tools used to calculate the noise levels contained in this report, namely, the NOISEMAP computer program. The program described below is most accurate and useful for comparing "before-and-after" noise levels that would result from alternative scenarios when calculations are made in a consistent manner. The program allows noise exposure prediction of such proposed actions without actual implementation and/or noise monitoring of those actions. The program also has the flexibility of calculating sound levels at specified points on the ground allowing the analysis of noise-sensitive receptors.

2.2.3.1 NOISEMAP

Analyses of aircraft noise exposure and compatible land uses around DoD airfield-like facilities are normally accomplished using a suite of computer-based programs, collectively called NOISEMAP (Czech and Plotkin 1998; Wasmer and Maunsell 2006a; Page et al 2008; Wasmer and Maunsell 2006b). NOISEMAP is the model for airbases and is most appropriate when the flight tracks are well defined, such as those near an airfield. NOISEMAP typically requires the entry of runway coordinates, airfield information, flight tracks, flight profiles along each flight track for each aircraft, numbers of daily flight operations, run-up coordinates, run-up profiles, and run-up operations. Flight and run-up profiles include the number of DNL daytime (0700-2200) and nighttime (2200-0700) events. The NOISEMAP process results in a "grid" file containing noise levels at different points of a user specified rectangular area. The spacing of the grid points for this study was 500 feet (ft). From the grid of points, lines of equal DNL (contours) of 60 dB through 85 dB (if applicable), in 5 dB increments, were plotted with the suite's NMPlot program

NOISEMAP can also compute DNL for specific points of interest, e.g., noise-sensitive receptors, and determine the primary contributors to the overall DNL at each point.

2.3 Impact and Geospatial Analysis

2.3.1 Topographical Data

The NOISEMAP suite of programs include the ability to account for atmospheric sound propagation effects over varying terrain, including hills and mountainous regions, as well as regions of varying acoustical impedance—for example, water around coastal regions. Even for flat terrain, the propagation algorithms are more robust than for excluding terrain. This feature is used in computing the noise levels presented in this analysis. By including terrain in the propagation calculations, the shielding effect of landforms can be included in the analysis. Acoustical impedance describes how sound is reflected or absorbed by the surface. Sound tends to travel farther over hard surfaces, such as pavement or water, than it does over soft surfaces, such as plowed earth or vegetation.

Elevation and impedance grid files were created from Geographic Information Systems (GIS) files of elevation contours for the land in the vicinity of NASWI and the OLF. The elevation and impedance grid files use point spacing of 300 feet. All areas on land were modeled with "soft" acoustical impedance (flow resistivity of 200 kPa-s/m^2) and all water surfaces were modeled with "hard" acoustical impedance (flow resistivity of 1 million kPa-s/m^2).

2.3.2 Exposure Calculation

Noise exposure is quantified by off-facility land acreage. Off-facility acreage, housing or population counts for this study were not part of the scope of work.

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SECTION 3

NAS Whidbey Island and OLF Coupeville

The following six sections discuss the regional and vicinity areas, the aviation users, climatic conditions, data collection efforts and historical flight operations.

3.1 Regional and Local Settings

Figure 3-1 shows the regional context of NASWI and OLF Coupeville as they are located approximately 50 miles north-northwest of Seattle, Washington. The boundaries of NASWI are depicted on the vicinity map in Figure 3-2. Ault Field borders the city of Oak Harbor to the south. OLF Coupeville, located 9.8 miles south-southeast of Ault Field and 3 miles southeast of the town of Coupeville, is used primarily for Field Carrier Landing Practice (FCLP).

The layout and vicinity of Ault Field are depicted in Figure 3-2. The elevation is 47 feet above Mean Sea Level (MSL). The magnetic declination, as of 2011, is 17.4 degrees east. Ault Field has two intersecting runways, Runway 07/25 and Runway 14/32:

- **Runway 07/25**
  - Length: 8,000 feet
  - Width: 200 feet
  - Magnetic Headings: 69°/249° (07/25)
  - Overruns: 1,000/700-foot overrun (07/25)
- **Runway 14/32**
  - Length: 8,000 feet
  - Width: 200 feet
  - Magnetic Headings: 137°/317° (14/32)
  - Overruns: 1,000/1,000-foot overrun (14/32)

The layout and vicinity of OLF Coupeville are depicted in Figure 3-2. The field elevation is 199 feet above MSL. The OLF has one concrete runway, Runway 14/32:

- **Runway 14/32**
  - Length: 5,400 feet
  - Width: 200 feet

Figure 3-1 Region of NAS Whidbey Island and OLF Coupeville

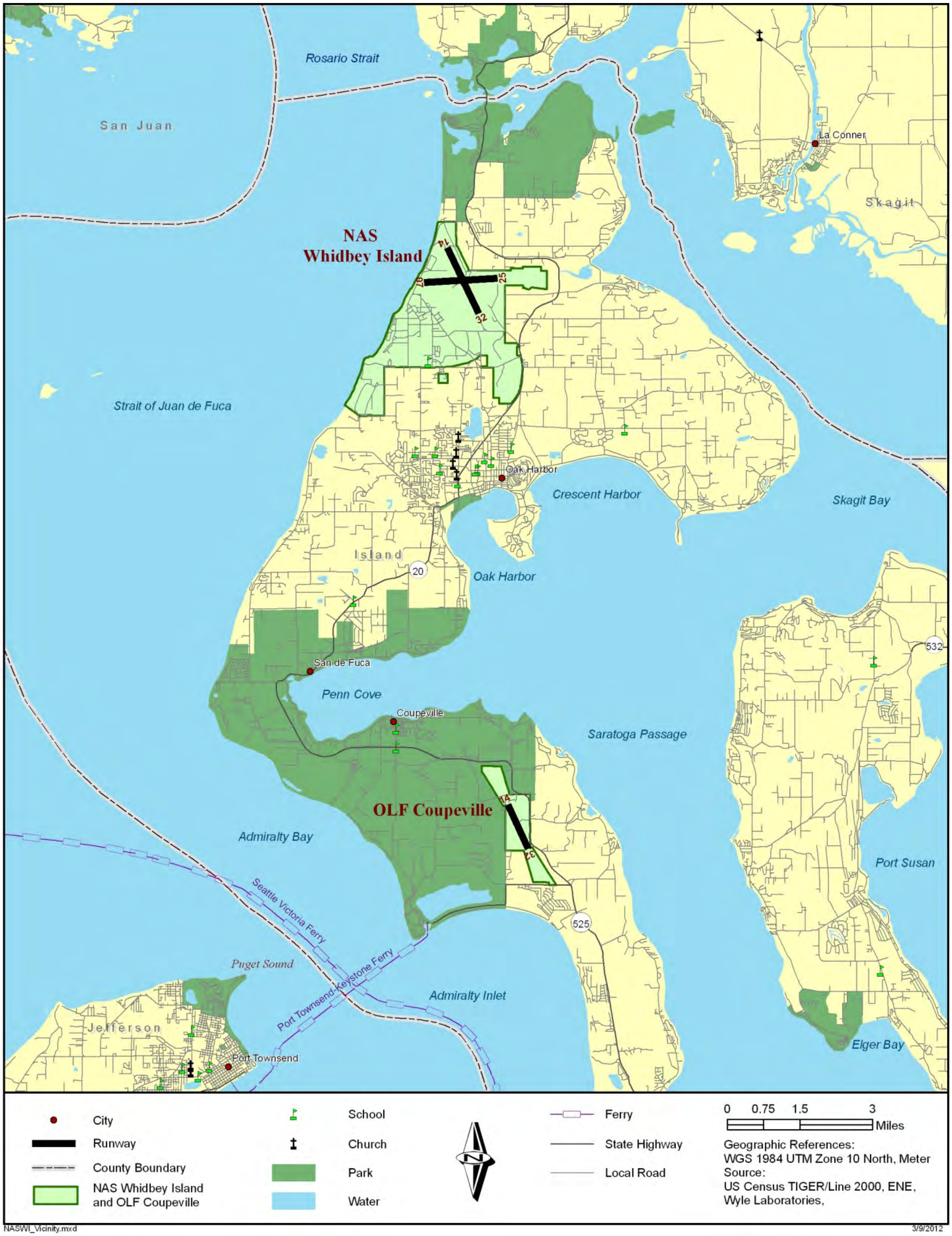

Figure 3-2 Vicinity of NAS Whidbey Island and OLF Coupeville

3.2 Aviation Users

The U.S. Navy is the primary user of Ault Field and the OLF facilities and runways. There are 19 active-duty squadrons, 2 reserve squadrons and several other tenants. The aircraft types currently operating at NASWI are:

- EA-18G Growler, electronic warfare jet,
- EA-6B Prowler, electronic warfare jet
- P-3C Orion, four engine turbo-prop for patrol and reconnaissance,
- C-9 Skytrain II, twin-engine jet based on a McDonnell Douglas DC-9 airliner, and
- Various transient aircraft types.

The EA-6B is in the process of being replaced by the EA-18G. Most P-3C aircraft will be replaced by the P-8A Poseidon which is a twin-engine jet based on a Boeing 737-800.

3.3 Climatic Data

Weather is an important factor in the propagation of noise and the computer model requires input of the average daily temperatures in degrees Fahrenheit (degrees F), percent relative humidity (percent RH) and station pressure in inches of mercury (in Hg) for each month of a year. Average monthly weather data was not available so the standard weather conditions of 59 degrees F, 70 percent relative humidity and atmospheric pressure of 29.92 in Hg were used for modeling.

SECTION 4

Baseline Scenario

Section 4.1 details the flight operations. Section 4.2 presents the runway/flight track utilization, flight profiles and derivation of annual average daily flight operations. Sections 4.3 and 4.4 contain the maintenance run-ups and resultant aircraft noise exposure.

4.1 Flight Operations

The first step in the noise analysis process is to determine the number of annual flight operations for the year studied. A flight operation is defined as a takeoff or landing of one aircraft with patterns counted as two operations per circuit. The counts in this report do not include transitions through the airspace above or near NASWI. The computer noise model requires input of flight operations by aircraft type, operation type, and temporal period (daytime hours of 0700-2200 and nighttime hours of 2200-0700).

The Baseline scenario for this study is defined as the operations during Calendar Year 2011 (Keys 2011) As 2011 was not yet completed when the analysis for this study was begun, the Baseline scenario (i.e., CY2011) was derived from a six-year average of the NASWI Air Traffic Activity Reports (ATAR) for CY2005 through CY2010. Baseline flight operations for Ault Field total 70,557 as presented in Table 4-1. The EA-6B is currently in the process of being replaced by the EA-18G. The Navy provided the numbers of NASWI-based Prowler and Growler aircraft for CY2011 as 40 and 39, respectively. This ratio was used to adjust the proportion of Prowler and Growler operations for the Baseline scenario.

Operation types include departures, straight-in arrivals, Tactical Air Navigation (TACAN) arrivals, overhead break arrivals, touch and go (T&G) patterns, FCLP patterns, Ground Control Approach (GCA) box patterns, depart and re-enter patterns, and Interfacility departures and arrivals between Ault Field and the OLF. The P-3C, EA-6B and EA-18G conduct the majority of the operations at Ault Field with 45, 27, and 26 percent, respectively. Approximately nine percent of Ault Field flight operations occur during the DNL nighttime (2200-0700).

The OLF only includes FCLPs and Interfacility departures/arrivals to/from Ault Field. The 5,396 annual OLF Coupeville FCLP operations were provided by NASWI. The interfacility operations between Ault Field and OLF Coupeville were determined using the average of 7 FCLP passes per sortie (Keys 2011). This results in 6,166 total flight operations at Coupeville for the Baseline scenario as shown in Table 4-2. The EA-6B and EA-18G are the only aircraft to use the OLF. The 9-hour DNL nighttime period (2200-0700) accounts for six percent of total flight operations at the OLF.

Table 4-1 Annual Baseline Flight Operations for NAS Whidbey Island (Ault Field)

Aircraft Type	VFR Departure			Interfacility Departure to Coupeville		
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total
EA-18G	1,796	117	1,913	179	11	190
EA-6B [3]	1,842	120	1,962	184	11	195
P-8A	-	-	-	-	-	-
P-3C	7,388	210	7,598	-	-	-
C-9	196	106	302	-	-	-
Transient [2]	152	82	234	-	-	-
Total	**11,374**	**635**	**12,009**	**363**	**22**	**385**

Aircraft Type	VFR Straight-in Arrival			IFR Straight-in Arrival			TACAN Arrival			Overhead Break Arrival			Interfacility Arrival from Coupeville		
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total
EA-18G	642	17	659	-	-	-	207	17	224	937	93	1,030	179	11	190
EA-6B [3]	658	18	676	-	-	-	212	18	230	961	95	1,056	184	11	195
P-8A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P-3C	5,173	147	5,320	1,108	31	1,139	1,108	31	1,139	-	-	-	-	-	-
C-9	196	106	302	-	-	-	-	-	-	-	-	-	-	-	-
Transient [2]	152	82	234	-	-	-	-	-	-	-	-	-	-	-	-
Total	**6,821**	**370**	**7,191**	**1,108**	**31**	**1,139**	**1,527**	**66**	**1,593**	**1,898**	**188**	**2,086**	**363**	**22**	**385**

Aircraft Type	Touch and Go [1]			FCLP [1]			Depart and Re-enter Pattern [1]			GCA Pattern [1]			Total		
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total
EA-18G	4,000	189	4,189	6,932	1,448	8,380	104	8	112	888	800	1,688	15,864	2,711	18,575
EA-6B [3]	4,103	194	4,297	7,109	1,486	8,595	106	8	114	910	820	1,730	16,269	2,781	19,050
P-8A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P-3C	11,947	227	12,174	-	-	-	-	-	-	4,328	162	4,490	31,052	808	31,860
C-9	-	-	-	-	-	-	-	-	-	-	-	-	392	212	604
Transient [2]	-	-	-	-	-	-	-	-	-	-	-	-	304	164	468
Total	**20,050**	**610**	**20,660**	**14,041**	**2,934**	**16,975**	**210**	**16**	**226**	**6,126**	**1,782**	**7,908**	**63,881**	**6,676**	**70,557**

Table 4-2 Annual Baseline Flight Operations for OLF Coupeville

Aircraft Type	Interfacility Arrival			FCLP [1]			Interfacility Departure			Total		
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total
EA-18G	179	11	190	2,510	154	2,664	179	11	190	2,868	176	3,044
EA-6B [3]	184	11	195	2,574	158	2,732	184	11	195	2,942	180	3,122
P-8A			-	-	-	-			-	-	-	-
P-3C			-	-	-	-			-	-	-	-
C-9			-	-	-	-			-	-	-	-
Transient [2]			-	-	-	-			-	-	-	-
Total	**363**	**22**	**385**	**5,084**	**312**	**5,396**	**363**	**22**	**385**	**5,810**	**356**	**6,166**

Notes:

(1) One circuit counted as two operations (1 takeoff and 1 landing)
(2) Modeled as P-3C
(3) EA-6B includes 3 Expeditionary Squadrons

4.2 Runway and Flight Track Utilization, Flight Profiles and Annual Average Daily Operations

The next step in the noise modeling process is assignment of flight operations to runways and flight tracks via utilization percentages for each aircraft type, operation type, and DNL time period. Tables A-1 through A-3 of Appendix A detail the modeled runway and flight track utilization percentages. Flight track and flight track utilization was initially based on the MMA study (Amefia 2008) and WR 04-26 and adjusted with guidance from NASWI personnel. Modeled flight tracks are depicted in Figures A-1 through A-17 in Appendix A.

Fixed-wing flight profiles consist of a combination of power settings, airspeeds and altitudes along each modeled flight track. This data defines the vertical profiles (altitude) and performance profile (power setting and airspeed) for each modeled aircraft. The representative profiles for each modeled aircraft type are contained in Appendix A. Fixed-wing departure profiles can be automatically modeled with a pre-flight run-up conducted at the runway threshold prior to brake release. The EA-6B includes a 1-second pre-flight run-up at military power. The EA-18G, modeled herein with a F/A-18E/F Super Hornet, includes a 1-second pre-flight run-up at either military or afterburner power depending on the departure profile type. No pre-flight run-ups were modeled for the P-3C or the P-8, the latter modeled as a Boeing 737-700. The C-9A departures include a 5-second pre-flight run-up at a power setting of 2 Engine Pressure Ratio (EPR).

The next step in the noise modeling process is the computation of the Annual Average Daily (AAD) day and night events for each profile. This is accomplished by dividing the track operations by 365 and further dividing closed-pattern operations (e.g., touch-and-go, depart and re-entry FCLP and GCA Box) by 2[2]. The resultant numbers of events are presented in Table B-4. There are approximately 130 AAD flight events modeled for the baseline scenario for the NAS and 10 AAD flight events for OLF.

4.3 Maintenance Run-Up Operations

Squadron and maintenance personnel conduct various types of tests on aircraft engines at one or more power settings for certain lengths of time. These tests are termed maintenance 'run-ups'. During these operations, engines remain in the airframe of the aircraft (i.e., "in-frame" run-up) or are removed from the airframe (i.e., "out-of-frame" run-up). Out-of-frame run-ups can only be conducted on apparatus designed for the engines (called "test stands").

Table 4-3 lists the modeled run-ups for the Baseline scenario. The EA-18G run-up operation counts were updated in this report to reflect new information provided by NASWI personnel (Dzubay 2010). Approximately 35 percent of the EA-18G run-ups would occur during the DNL nighttime period, however all run-ups conducted at night would be low power. The high power run-ups only occur during the DNL daytime period. The P-3C and the P-8 run-up operations are unchanged from MMA study (Amefia 2008).

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

Baseline EA-18G high power run-ups are conducted at the high power pad which is located just west of Runway 31 and aircraft are oriented parallel to Runway 31 as shown in Figure 4-1. EA-18G low power run-ups are conducted on the ramp in the southwest portion of the NASWI with aircraft oriented approximately perpendicular to Runway 31.

P-3C and P-8 low power run-ups would also be conducted on the southwest ramp while P-3C high power run-ups are conducted on the active runway near the threshold at Red Label Foxtrot and Red Label Delta with the aircraft oriented along the runway heading.

Table 4-3 Modeled Maintenance Run-up Operations at NAS Whidbey Island for Baseline Scenario

Aircraft Type	Engine Type	Run-up Type	Run-up ID	Magnetic Heading	Annual Events	Day (0700 - 2200)	Night (2200 - 0700)	Modeled Power Setting	Duration (Minutes)	No. of Engines Running
EA-6B	J52-P-408	Water Wash	Lo-Pwr (1)	045	445	65%	35%	65% RPM	25	1
								75% RPM	8	1
		Low power	Lo-Pwr (1)	045	1067	65%	35%	65% RPM	15	1
								80% RPM	15	1
		High Power	Hi-Pwr	315	4	100%	0%	65% RPM	16	1
								70% RPM	15	1
								95% RPM	10	1
EA-18G	F414-GE-400	Water Wash	Lo-Pwr (1)	045	86	45%	55%	65% NC	20	1
		Low power	Lo-Pwr (1)	045	2592	45%	55%	65% NC	15	1
								80% NC	15	1
		High Power	Hi-Pwr	315	10	100%	0%	65% NC	10	1
								80% NC	10	1
								90% NC	10	1
								96% NC	10	1
								A/B	3	1
P-3C	T56-A-14	Lo-Pwr	Lo-Pwr	126	1604	100%	0%	1000 ESHP	15	1
		Out-Of-Phase	Lo-Pwr	126	130			250 ESHP	30	4
								450 ESHP	10	4
								1000 ESHP	10	4
		Prop Dynamic Balance	Lo-Pwr	126	123			1500 ESHP	15	1
		High-PowerD	Red Label Delta	315	154			1500 ESHP	15	2
								2750 ESHP	15	2
								4300 ESHP	10	2
		High-PowerF	Red Label Foxtrot	-18	154			1500 ESHP	15	2
								2750 ESHP	15	2
								4300 ESHP	10	2
		Prop Dynamic Balancing	Hi-Pwr	315	123			1500 ESHP	15	1

Notes:

(1) Run-up events split equally between three Lo-Pwr run-up locations

Figure 4-1 Maintenance Run-up Locations at NAS Whidbey Island

4.4 Aircraft Noise Exposure

Using the data described in Sections 4.1 through 4.3, NOISEMAP was used to calculate and plot the 60 dB through 85 dB DNL contours for the Baseline AAD operations. Figure 4-2 shows the resulting DNL contours.

The 60 dB contour surrounding Ault Field extends approximately 7-9 miles from the runway endpoints. These lobes are primarily due to EA-6B and EA-18G on the approach portion of GCA patterns where aircraft are generally descending on a 3-degree glide slope through 3000 feet Above Ground Level (AGL) 10 miles from the runway. The 65 dB DNL contour extends nearly to the eastern shore of the mainland across Skagit Bay, the location where EA-18G flying GCA approaches descend down to 1000 feet AGL. The 65 dB DNL contour otherwise extends over land approximately 3 to 4 miles from the center of the airfield, the result of overlapping T&G and FCLP operations. The 80 dB and 85 dB DNL contours extend approximately 1.7 miles and 3,400 feet to the east outside the station boundary, respectively, due to the arrival portion of EA-6B and EA-18G T&G patterns on Runway 25.

The DNL contours at Coupeville are due to the OLF's FCLP operations. The 65 dB DNL extends northward to the southern shore of Penn Cove and approximately 2 miles south of the OLF's runway.

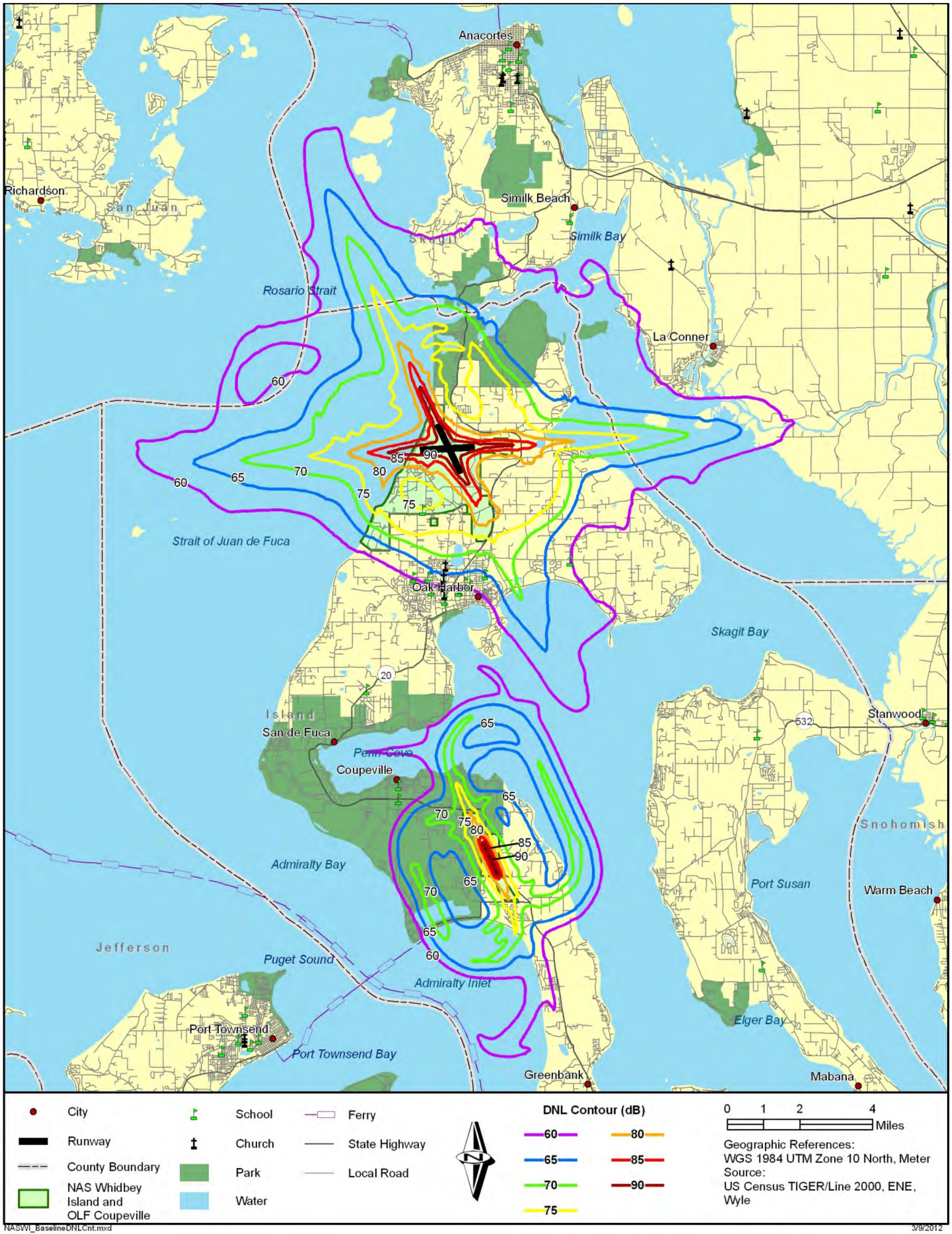

Figure 4-2 DNL Contours for Baseline AAD Aircraft Operations at NAS Whidbey Island

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SECTION 5

Proposed Scenario

Section 5.1 discusses flight operations by aircraft type. Section 5.2 discusses runway/helipad utilization, flight track utilization, flight profiles and daily operations by aircraft type. Section 5.3 describes maintenance run-up operations and Section 5.4 discusses the resultant average daily noise exposure.

5.1 Flight Operations

The Proposed scenario would be composed of the Baseline scenario plus the addition of VAQ-209, which is a reserve squadron of EA-18G aircraft, and the transition of 3 squadrons of EA-6B to EA-18G. This would result in the net addition of 2,178 annual flight operations (Keys 2011). The proposed EA-18G reserve squadron operations would occur at Ault Field with none occurring at OLF Coupeville. The Navy's ongoing transition from the EA-6B to the EA-18G is expected to complete prior to the Proposed Action.

Tables 5-1 and 5-2 show the resultant set of flight operations by category, aircraft type and period of day. Total annual flight operations for Ault Field would be 72,735. Total annual flight operations at the OLF would remain unchanged from Baseline with 6,166 operations. The EA-18G and P-3C would conduct the majority of the operations at Ault Field with 55 and 44 percent, respectively. Flight operations during the DNL nighttime period (10 p.m. to 7 a.m.) at Ault Field would increase 1 percent for a total of approximately 10 percent.

5.2 Runway and Flight Track Utilization, Flight Profiles and Annual Average Daily Operations

The expeditionary aircraft would use the same runway utilization, flight track utilization, and flight profiles within each operation type as the EA-18G aircraft in the Baseline scenario. The annual average daily flight events for the proposed expeditionary aircraft are shown in Table A-5 of Appendix A. The expeditionary aircraft would contribute approximately 4 AAD flight events to the total of 134 AAD flight events at Ault Field for the Proposed scenario.

5.3 Maintenance Run-Up Operations

The additional reserve EA-18G aircraft would conduct maintenance run-ups in the same manner and tempo as the currently based EA-18G and annual events have been estimated by scaling the baseline EA-18G run-ups operations by number of proposed aircraft. The resulting additional maintenance run-ups are shown in Table 5-3.

Table 5-1 Annual Flight Operations for Proposed Scenario at NAS Whidbey Island (Ault Field)

Aircraft Type	VFR Departure			Interfacility Departure to Coupeville		
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total
VAQ-209 EA-18G (3)	431	28	459			-
EA-18G	3,638	237	3,875	363	22	385
EA-6B			-			-
P-8A	-	-	-	-	-	-
P-3C	7,388	210	7,598	-	-	-
C-9	196	106	302	-	-	-
Transient (2)	152	82	234	-	-	-
Total	**11,805**	**663**	**12,468**	**363**	**22**	**385**

Aircraft Type	VFR Straight-in Arrival			IFR Straight-in Arrival			TACAN Arrival			Overhead Break Arrival			Interfacility Arrival from		
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total
VAQ-209 EA-18G (3)	187	13	200	-	-	-	44	3	47	198	15	213	-	-	-
EA-18G	1,300	35	1,335	-	-	-	419	35	454	1,898	188	2,086	363	22	385
EA-6B			-	-	-	-			-			-			-
P-8A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P-3C	5,173	147	5,320	1,108	31	1,139	1,108	31	1,139	-	-	-	-	-	-
C-9	196	106	302	-	-	-	-	-	-	-	-	-	-	-	-
Transient (2)	152	82	234	-	-	-	-	-	-	-	-	-	-	-	-
Total	**7,008**	**383**	**7,391**	**1,108**	**31**	**1,139**	**1,571**	**69**	**1,640**	**2,096**	**203**	**2,299**	**363**	**22**	**385**

Aircraft Type	Touch and Go (1)			FCLP (1)			Depart and Re-enter Pattern (1)			GCA Pattern (1)			Total		
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total
VAQ-209 EA-18G (3)	873	41	914	-	-	-	23	2	25	145	175	320	1,901	277	2,178
EA-18G	8,103	383	8,486	14,041	2,934	16,975	210	16	226	1,798	1,620	3,418	32,133	5,492	37,625
EA-6B			-			-			-			-	-	-	-
P-8A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P-3C	11,947	227	12,174	-	-	-	-	-	-	4,328	162	4,490	31,052	808	31,860
C-9	-	-	-	-	-	-	-	-	-	-	-	-	392	212	604
Transient (2)	-	-	-	-	-	-	-	-	-	-	-	-	304	164	468
Total	**20,923**	**651**	**21,574**	**14,041**	**2,934**	**16,975**	**233**	**18**	**251**	**6,271**	**1,957**	**8,228**	**65,782**	**6,953**	**72,735**

Table 5-2 Annual Flight Operations for Proposed Scenario at OLF Coupeville

Aircraft Type	Interfacility Arrival			FCLP (1)			Interfacility Departure			Total		
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total
VAQ-209 EA-18G (3)	-	-	-	-	-	-	-	-	-	-	-	-
EA-18G	363	22	385	5,084	312	5,396	363	22	385	2,868	176	6,166
EA-6B			-			-			-			-
P-8A			-	-	-	-			-	-	-	-
P-3C			-	-	-	-			-	-	-	-
C-9			-	-	-	-			-	-	-	-
Transient (2)			-	-	-	-			-	-	-	-
Total	**363**	**22**	**385**	**5,084**	**312**	**5,396**	**363**	**22**	**385**	**2,868**	**176**	**6,166**

Notes:

(1) One circuit counted as two operations (1 takeoff and 1 landing)
(2) Transient aircraft modeled as P-3C
(3) Assumed same ops tempo as baseline EA-18G;

Table 5-3 Annual Maintenance Run-up Operations at NAS Whidbey Island for the Proposed Scenario

Aircraft Type	Engine Type	Run-up Type	Run-up ID	Magnetic Heading	Annual Events	Day (0700 - 2200)	Night (2200 - 0700)	Modeled Power Setting	Duration (Minutes)	No. of Engines Running
EA-18G	F414-GE-400	Water Wash	Lo-Pwr (1)	045	195	45%	55%	65% NC	20	1
		Low power	Lo-Pwr (1)	045	3440	45%	55%	65% NC	15	1
								80% NC	15	1
		High Power	Hi-Pwr	315	18	100%	0%	65% NC	10	1
								80% NC	10	1
								90% NC	10	1
								96% NC	10	1
								A/B	3	1
P-3C	T56-A-14	Lo-Pwr	Lo-Pwr	126	1604	100%	0%	1000 ESHP	15	1
		Out-Of-Phase	Lo-Pwr	126	130			250 ESHP	30	4
								450 ESHP	10	4
								1000 ESHP	10	4
		Prop Dynamic Balance	Lo-Pwr	126	123			1500 ESHP	15	1
		High-PowerD	Red Label Delta	315	154			1500 ESHP	15	2
								2750 ESHP	15	2
								4300 ESHP	10	2
		High-PowerF	Red Label Foxtrot	-18	154			1500 ESHP	15	2
								2750 ESHP	15	2
								4300 ESHP	10	2
		Prop Dynamic Balancing	Hi-Pwr	315	123			1500 ESHP	15	1

Notes:

(1) Run-up events split equally between three Lo-Pwr run-up locations

5.4 Aircraft Noise Exposure

Using the data described in Sections 5.1 through 5.3, NOISEMAP was used to calculate and plot the 60 dB through 85 dB DNL contours for the Proposed AAD operations at NASWI. Figure 5-1 shows the resulting DNL contours.

The 60 dB contour surrounding Ault Field would extend approximately 6-8 miles from the runway endpoints. These lobes would be primarily due to EA-18G on the approach portion of GCA patterns. The 65 dB DNL contour would extend nearly to the eastern shore of the mainland across Skagit Bay, the location where aircraft flying GCA approaches would pass through 1000 feet AGL. The 65 dB DNL contour otherwise would extend over land approximately 3 to 4 miles from the center of the airfield, the result of overlapping T&G and FCLP flight tracks and operations. The 80 dB and 85 dB DNL contours would extend between 1.5 miles and 3,300 feet to the east outside the station boundary, respectively, due to the arrival portion of EA-18G T&G patterns on Runway 25.

The extent of the proposed 65 dB and 75 dB DNL contour lobes would decrease as much as one mile in length relative to the Baseline scenario as shown in Figure 5-2. Even though the total operations would increase by 3 percent the noise exposure would decrease because on a single event basis the EA-18G SEL is 2 to 8 dB less than the EA-6B SEL for most types of operations.

Similar to Ault Field, the noise exposure at the OLF would decrease by approximately 1 dB DNL for the Proposed scenario.

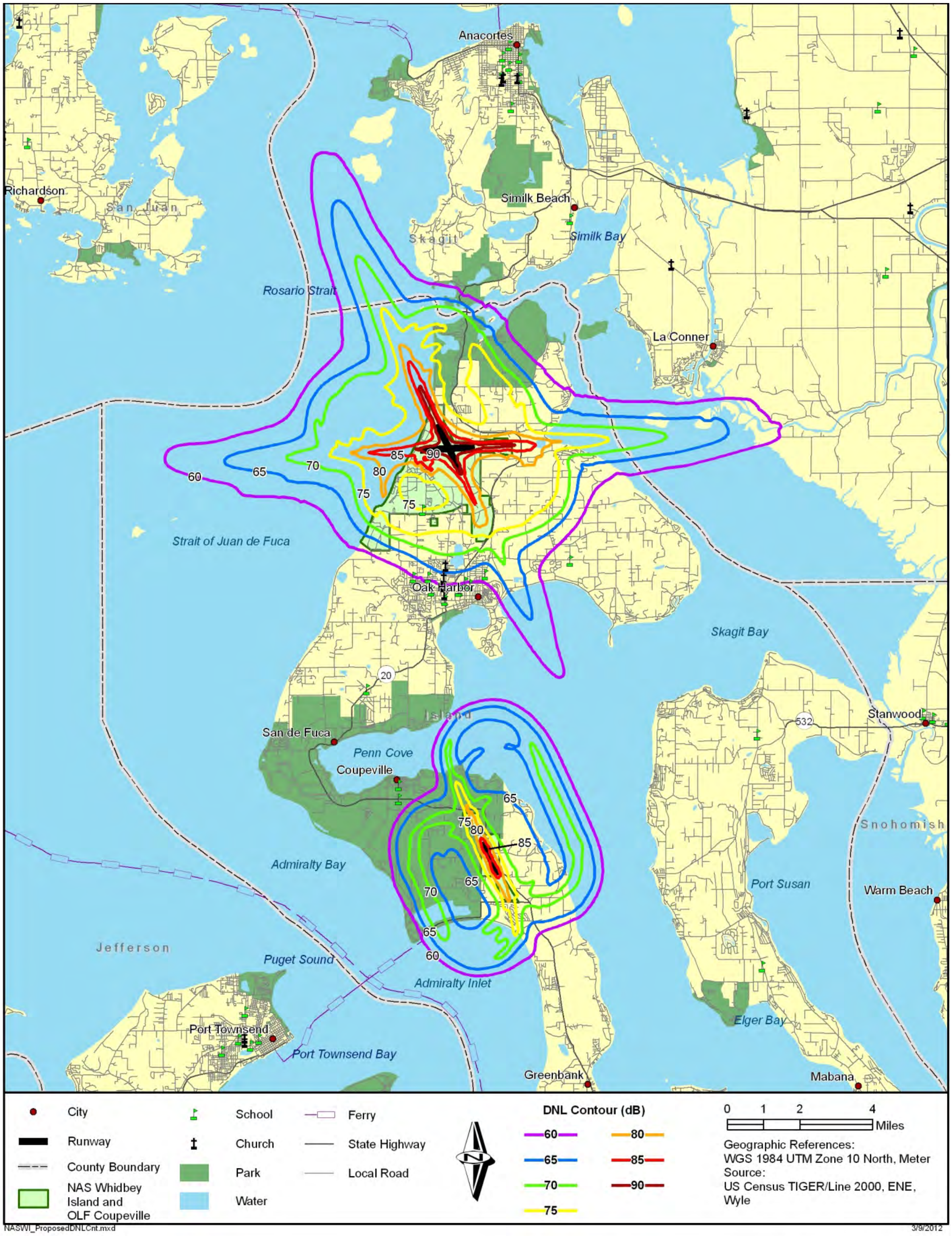

Figure 5-1 DNL Contours for Proposed Scenario AAD Aircraft Operations

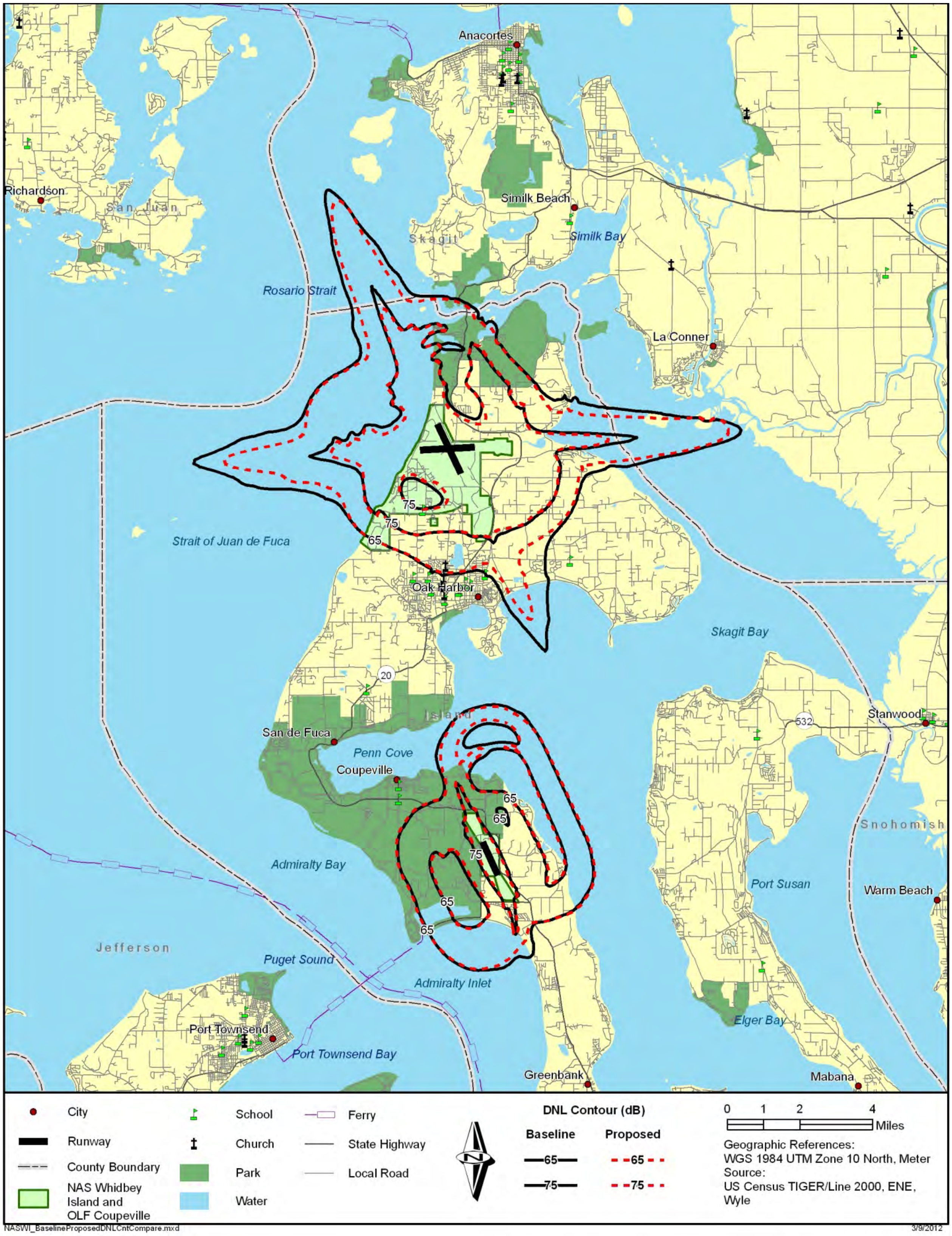

Figure 5-2 Comparison of Selected DNL Contours for Baseline and the Proposed Scenario

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SECTION 6

Cumulative Scenario

The Cumulative scenario considers the effect of the transition of P-3 to P-8 on the Proposed scenario. Section 6.1 discusses flight operations by aircraft type. Section 6.2 discusses runway/helipad utilization, flight track utilization, flight profiles and daily operations by aircraft type. Section 6.3 describes maintenance run-up operations and Section 6.4 discusses the resultant average daily noise exposure.

6.1 Flight Operations

The Cumulative scenario is composed of the Proposed scenario with the P-3 to P-8 transition. The P-8 basing at NASWI had been analyzed in the MMA study (Amefia 2008). To determine potential cumulative impacts for purpose of an EIS, this study analyzes the P-8 and remaining P-3 operations presented in the MMA Alternative 5 along with the Proposed scenario. This would result in a total of 77,830 annual operations at Ault Field as shown in Table 6-1, an increase of approximately 7,000 annual flight operations relative to the Baseline scenario. The EA-18G, and P-8A would conduct the majority of the operations at Ault Field with 51 and 34 percent respectively. The 9-hour nighttime period would account for approximately 8 percent of total flight operations at Ault Field, a decrease of 2 percent relative to the Proposed scenario.

Operations at OLF Coupeville would not change for the Cumulative scenario relative to the Proposed scenario.

6.2 Runway and Flight Track Utilization, Flight Profiles and Annual Average Daily Operations

The P-8 aircraft would use the same runway utilization and flight track utilization as the P-3C aircraft in the Baseline and Proposed scenarios. The 135 annual average daily flight events for the Cumulative scenario are shown in Table A-6 of Appendix A.

6.3 Maintenance Run-Up Operations

The P-8 would conduct maintenance run-up tests, including pressure and leak checks which would occur at either the primary high power location or on the ramp near the P-8 hanger. The resulting run-up events for the Cumulative scenario are shown in Table 6-3.

Table 6-1 Annual Flight Operation for Cumulative Scenario at NAS Whidbey Island (Ault Field)

Aircraft Type	VFR Departure			Interfacility Departure to Coupeville		
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total
VAQ-209 EA-18G (3)	431	28	459	-	-	-
EA-18G	3,638	237	3,875	363	22	385
EA-6B			-			-
P-8A	1,690	51	1,741	-	-	-
P-3C	621	19	640	-	-	-
C-9	196	106	302	-	-	-
Transient (2)	152	82	234	-	-	-
Total	**6,728**	**523**	**7,251**	**363**	**22**	**385**

Aircraft Type	VFR Straight-in Arrival			IFR Straight-in Arrival			TACAN Arrival			Overhead Break Arrival			Interfacility Arrival from Coupeville		
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total
VAQ-209 EA-18G (3)	187	13	200	-	-	-	44	3	47	198	15	213	-	-	-
EA-18G	1,300	35	1,335	-	-	-	419	35	454	1,898	188	2,086	363	22	385
EA-6B			-	-	-	-			-			-			-
P-8A	1,183	36	1,219	254	7	261	254	7	261	-	-	-	-	-	-
P-3C	432	13	445	95	3	98	94	3	97	-	-	-	-	-	-
C-9	196	106	302	-	-	-	-	-	-	-	-	-	-	-	-
Transient (2)	152	82	234	-	-	-	-	-	-	-	-	-	-	-	-
Total	**3,450**	**285**	**3,735**	**349**	**10**	**359**	**811**	**48**	**859**	**2,096**	**203**	**2,299**	**363**	**22**	**385**

Aircraft Type	Touch and Go (1)			FCLP (1)			Depart and Re-enter Pattern (1)			GCA Pattern (1)			Total		
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total
VAQ-209 EA-18G (3)	873	41	914	-	-	-	23	2	25	145	175	320	1,901	277	2,178
EA-18G	8,103	383	8,486	14,041	2,934	16,975	210	16	226	1,798	1,620	3,418	32,133	5,492	37,625
EA-6B			-			-			-			-	-	-	-
P-8A	19,292	-	19,292	-	-	-	-	-	-	3,858	-	3,858	26,531	101	26,632
P-3C	7,536	-	7,536	-	-	-	-	-	-	1,507	-	1,507	10,285	38	10,323
C-9	-	-	-	-	-	-	-	-	-	-	-	-	392	212	604
Transient (2)	-	-	-	-	-	-	-	-	-	-	-	-	304	164	468
Total	**35,804**	**424**	**36,228**	**14,041**	**2,934**	**16,975**	**233**	**18**	**251**	**7,308**	**1,795**	**9,103**	**71,546**	**6,284**	**77,830**

Table 6-2 Annual Flight Operations for Cumulative Scenario at OLF Coupeville

Aircraft Type	Interfacility Arrival			FCLP (1)			Interfacility Departure			Total		
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total
EA-18G(3)	-	-	-	-	-	-	-	-	-	-	-	-
EA-18G	363	22	385	5,084	312	5,396	363	22	385	5,810	356	6,166
EA-6B			-			-			-	-	-	-
P-8A			-	-	-	-			-	-	-	-
P-3C			-	-	-	-			-	-	-	-
C-9			-	-	-	-			-	-	-	-
Transient (2)			-	-	-	-			-	-	-	-
Total	**363**	**22**	**385**	**5,084**	**312**	**5,396**	**363**	**22**	**385**	**5,810**	**356**	**6,166**

Notes:

(1) One circuit counted as two operations (1 takeoff and 1 landing)
(2) Transient aircraft modeled as P-3C
(3) Assumed same ops tempo and baseline EA-18G;

Table 6-3 Annual Maintenance Run-up Operations at NAS Whidbey Island for Expeditionary and Reserve EA-18G for Cumulative Scenario

Aircraft Type	Engine Type	Run-up Type	Run-up ID	Magnetic Heading	Annual Events	Day (0700 - 2200)	Night (2200 - 0700)	Modeled Power Setting	Duration (Minutes)	No. of Engines Running
EA-18G	F414-GE-400	Water Wash	Lo-Pwr (1)	045	195	45%	55%	65% NC	20	1
		Low power	Lo-Pwr (1)	045	3440	45%	55%	65% NC	15	1
								80% NC	15	1
		High Power	Hi-Pwr	315	18	100%	0%	65% NC	10	1
								80% NC	10	1
								90% NC	10	1
								96% NC	10	1
								A/B	3	1
P-3C	T56-A-14	Lo-Pwr	Lo-Pwr	126	1604	100%	0%	1000 ESHP	15	1
		Out-Of-Phase	Lo-Pwr	126	130			250 ESHP	30	4
								450 ESHP	10	4
								1000 ESHP	10	4
		Prop Dynamic Balance	Lo-Pwr	126	123			1500 ESHP	15	1
		High-PowerD	Red Label Delta	315	154			1500 ESHP	15	2
								2750 ESHP	15	2
								4300 ESHP	10	2
		High-PowerF	Red Label Foxtrot	-18	154			1500 ESHP	15	2
								2750 ESHP	15	2
								4300 ESHP	10	2
		Prop Dynamic Balancing	Hi-Pwr	315	123			1500 ESHP	15	1
P-8A	CFM56-7B-24	Leak Check	Lo-Pwr	126	24	75%	25%	5400 Lbs	5	2
		Pressure Check	Lo-Pwr	126	12			5400 Lbs	12	2
		Leak Check	Hi-Pwr	67	24			5400 Lbs	5	2
		Pressure Check	Hi-Pwr	67	12			5400 Lbs	12	2

Notes:

(1) Run-up events split equally between three Lo-Pwr run-up locations

6.4 Aircraft Noise Exposure

Using the data described in Sections 6.1 through 6.3, NOISEMAP was used to calculate and plot the 60 dB through 85 dB DNL contours for the Baseline AAD operations at NASWI. Figure 6-1 shows the resulting DNL contours.

The SELs of the P-8 and P-3 would be approximately 20 dB less than the SELs for the EA-6B and EA-18G and would not contribute significantly to the overall aircraft noise environment. Thus, contours for the Cumulative scenario would be nearly identical to the contours for the Proposed scenario. The 60 dB contour surrounding Ault Field would extend approximately 6-8 miles from the runway endpoints. These lobes would be primarily due to EA-18G on the approach portion of GCA patterns. The 65 dB DNL contour would extend nearly to the eastern shore of the mainland across Skagit Bay, the location where aircraft flying GCA approaches would pass through 1000 feet AGL. The 65 dB DNL contour otherwise would extend over land approximately 3 to 4 miles from the center of the airfield, the result of overlapping T&G and FCLP flight tracks and operations. The 80 dB and 85 dB DNL contours would extend between 1.5 miles and 3,300 feet to the east outside the station boundary, respectively, due to the arrival portion of EA-18G T&G patterns on Runway 25.

The extent of the proposed 65 dB and 75 dB DNL contour lobes would decrease as much as one mile in length relative to the Baseline scenario as shown in Figure 5-2. Even though the total operations would increase by 3 percent the noise exposure would decrease because on a single event basis the EA-18G SEL is 2 to 8 dB less than the EA-6B SEL for most types of operations.

Similar to Ault Field, the noise exposure at the OLF would decrease slightly be approximately 1 dB DNL for the Proposed scenario relative to Baseline.

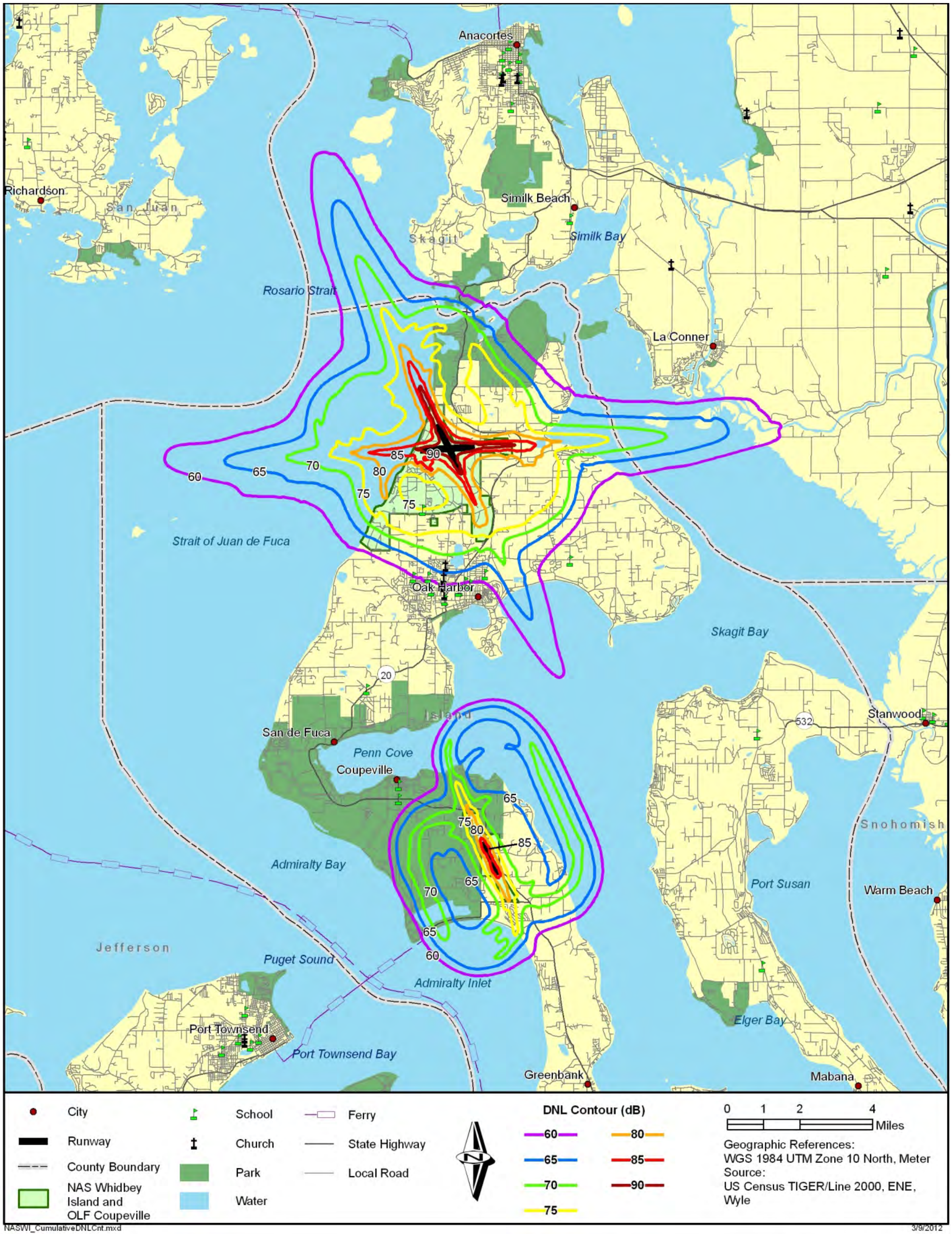


Figure 6-1 DNL Contours for the Cumulative Scenario AAD Aircraft Operations

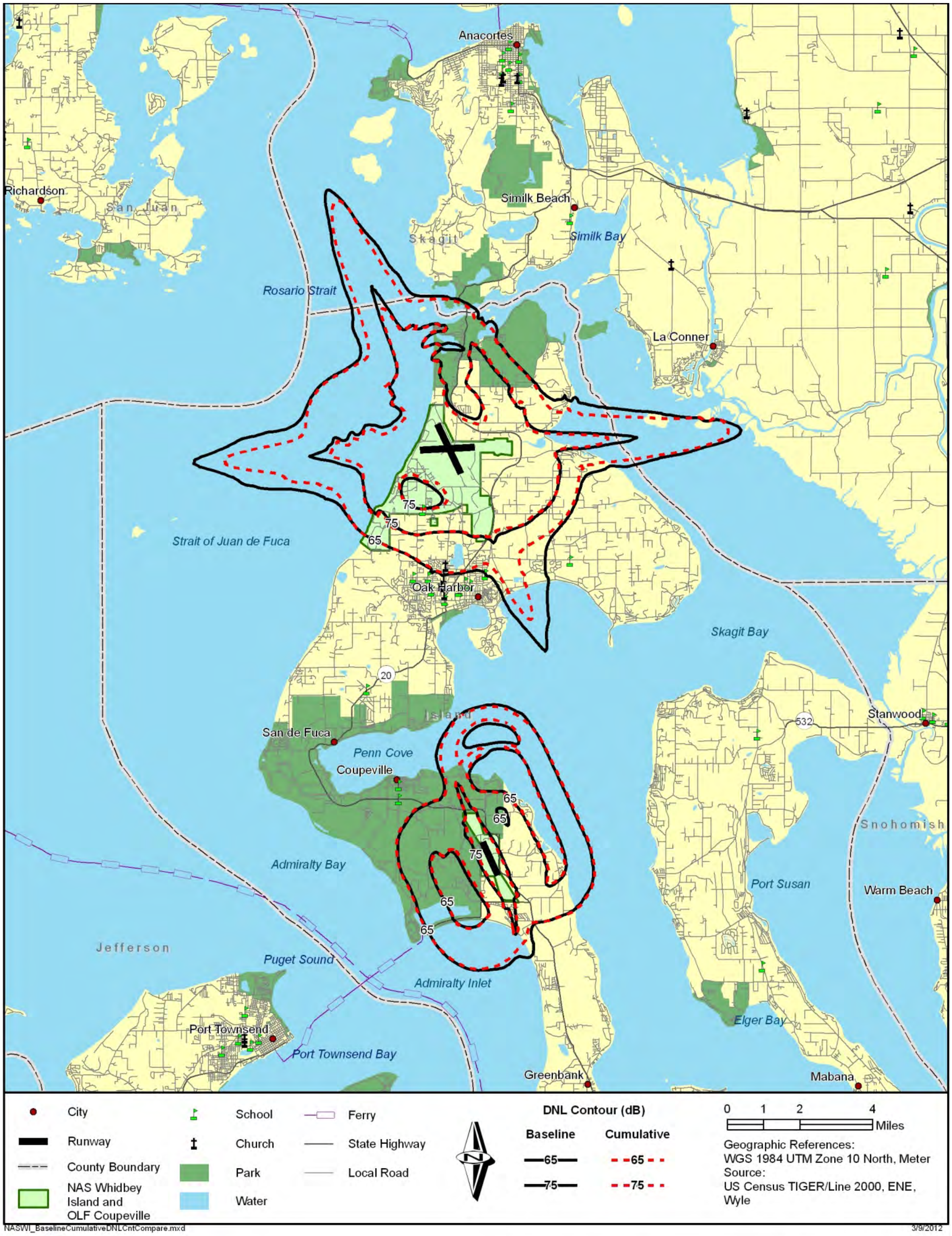


Figure 6-2 Comparison of Selected DNL Contours for Baseline and Cumulative Scenario

SECTION 7

Single Event Analysis

This section presents additional information in support of a biological assessment being performed by E&E (section 7.1) and additional information on the noise signature of the key aircraft (section 7.2).

7.1 Support for the Biological Assessment

The single events with the greatest SEL and L_{max} affecting the area approximately 500 feet offshore to the west of NASWI have been identified and are presented in Tables 7-1 and 7-2. EA-6B SELs range between 121 and 133 dB. EA-18G SELs range between 104 and 127 dB. For the arrival portions of closed patterns such as GCA Box and FCLP/T&G, the two aircraft are similar in SEL as their differences are 3 dB or less, with the EA-18G having the greater SEL for arrivals from patterns to Runway 13. However, for departures from Runway 25 or 31, the EA-6B has SELs 18 to 23 dB greater than the EA-18G primarily due to the lower altitude climb-out profile of the EA-6B.

Table 7-1 Greatest Single-Event Sound Levels Offshore of NASWI

Aircraft Type	Closest Runway End	Offshore Distance from Shoreline (feet)*	Approximate Aircraft Altitude (ft MSL)	Applicable Flight Track(s)	Representative Flight Profile ID	Description	Maximum SEL (dBA)	Maximum L_{max} (dBA)
EA-6B	25	500	750	25D1,2,3,4,5,6	107	Standard Departure	133	128
			350	07G1	181	Arrival portion of GCA Pattern to Runway 07	128	124
	31	500	900	31D1,2,3,4,5	120	Standard Departure	130	125
			400	13TN2	179NB	Arrival portion of FCLP pattern to Runway 13	124	121
EA-18G	25	500	1600	25D1,2,3,4,5,6	207A	Standard Departure	115	105
			350	07G1	281	Arrival portion of GCA Pattern to Runway 07	127	124
	31	500	2150	31D1,2,3,4,5	220B	Standard Departure	110	104
			400	13TN2	279NB	Arrival portion of FCLP pattern to Runway 13	127	123

* on extended runway centerline

Table 7-2 EA-18G Single-Event Sound Levels Relative to the EA-6B*

Closest Runway End	Flight Track(s)	Description	SEL (dBA)	L_{max} (dBA)
25	25D1,2,3,4,5,6	Standard Departure	-18	-23
	07G1	Arrival portion of GCA Pattern to Runway 07	-1	0
31	31D1,2,3,4,5	Standard Departure	-20	-21
	13TN2	Arrival portion of FCLP pattern to Runway 13	3	2

* negative values indicate EA-18G is less than the EA-6B

The numbers of average daily events for each of the four types of operations from Tables 7-1 and 7-2 are compiled in Table 7-3. All of the events listed in Table 7-3 would exceed 92 dB SEL offshore to the west of NASWI and represent the greatest single event types in terms of L_{max}. Additional operation types not tabulated may exceed 92 dB SEL in that location but did not have greater L_{max} and were not included. The Proposed scenario would increase the number of average daily departure events exceeding 92 dB SEL by 20 percent (1 event) to 6 average daily events. The Proposed scenario would not change the number of GCAs or FCLP/T&G events exceeding 92 dB SEL by more than 1 event.

Table 7-3 Representative Average Daily Events Exceeding 92 dB Sound Exposure Level Offshore to the West of NASWI

Operation Type	Flight Tracks	Baseline			Proposed
		EA-6B	EA-18G	Total	EA-18G (only)
Departures	25D1,2,3,4,5,6	2.3	2.3	4.6	5.2
	31D1,2,3,4,5	0.4	0.3	0.7	0.9
GCA Pattern - Arrival Portion	07G1,2,3	0.3	0.3	0.6	0.7
FCLP and T&G Pattern - Arrival Portion	13TN1,2,3 13TD1,2,3	6.3	6.2	12.5	13

* tracks/profiles with greatest Lmax

The 92 dB SEL contour has also been plotted for the representative flight profiles of Table 7-1 in Figures 7-1 and 7-2. The figures reflect the differences tabulated in Table 7-2. The EA-6B departure contours end at the end of the departure tracks' first turn while the EA-18G departure contours end near the beginning of the first turn. The contours for the patterns are similar in size and shape with the only noticeable difference is in the contours of the GCA Box operations with the EA-6B contours *outlining* the GCA Box area whereas the EA-18G's GCA Box contours *follow* the GCA track.

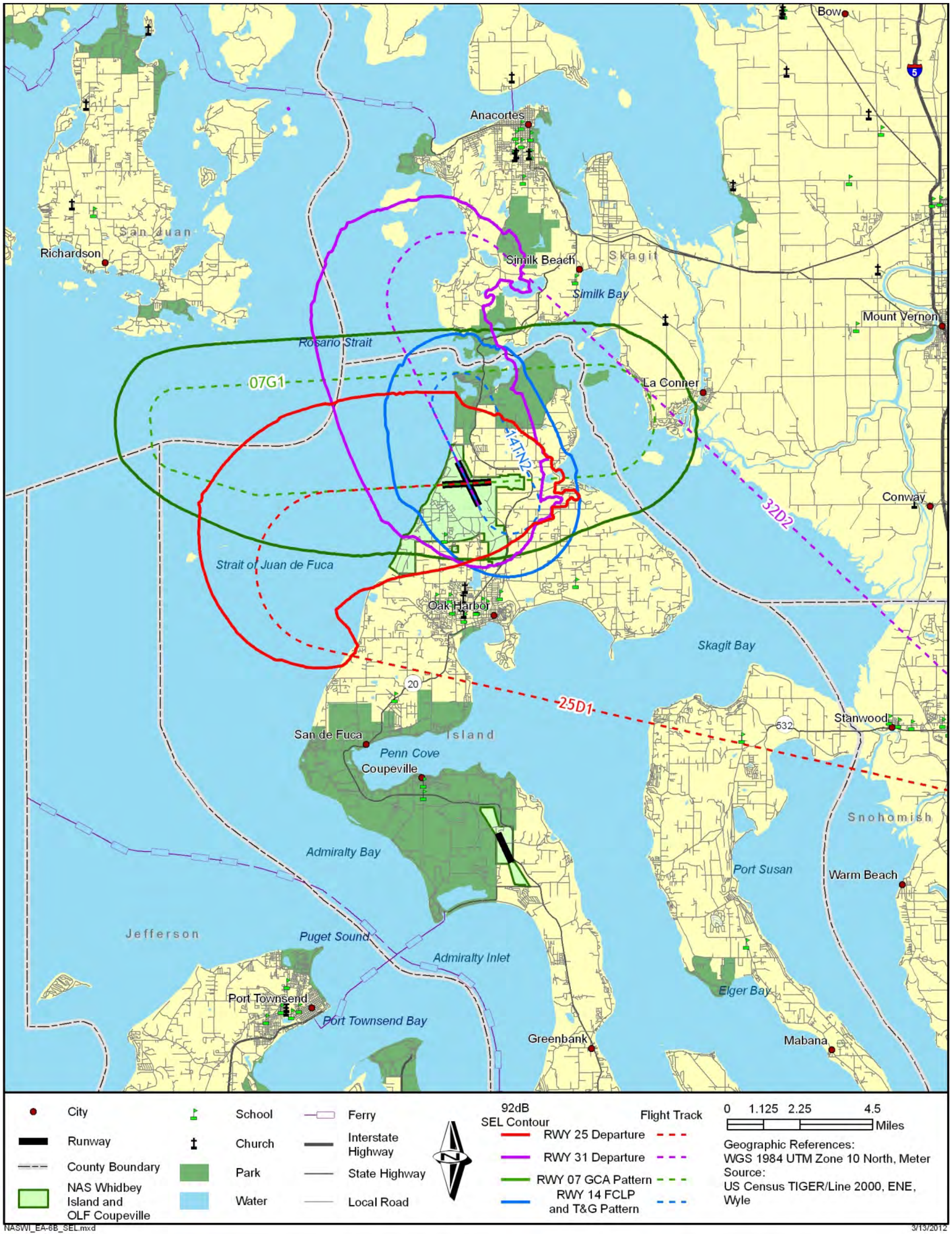


Figure 7-1 SEL Contours of 92 dB for Representative Flight Profiles of the EA-6B

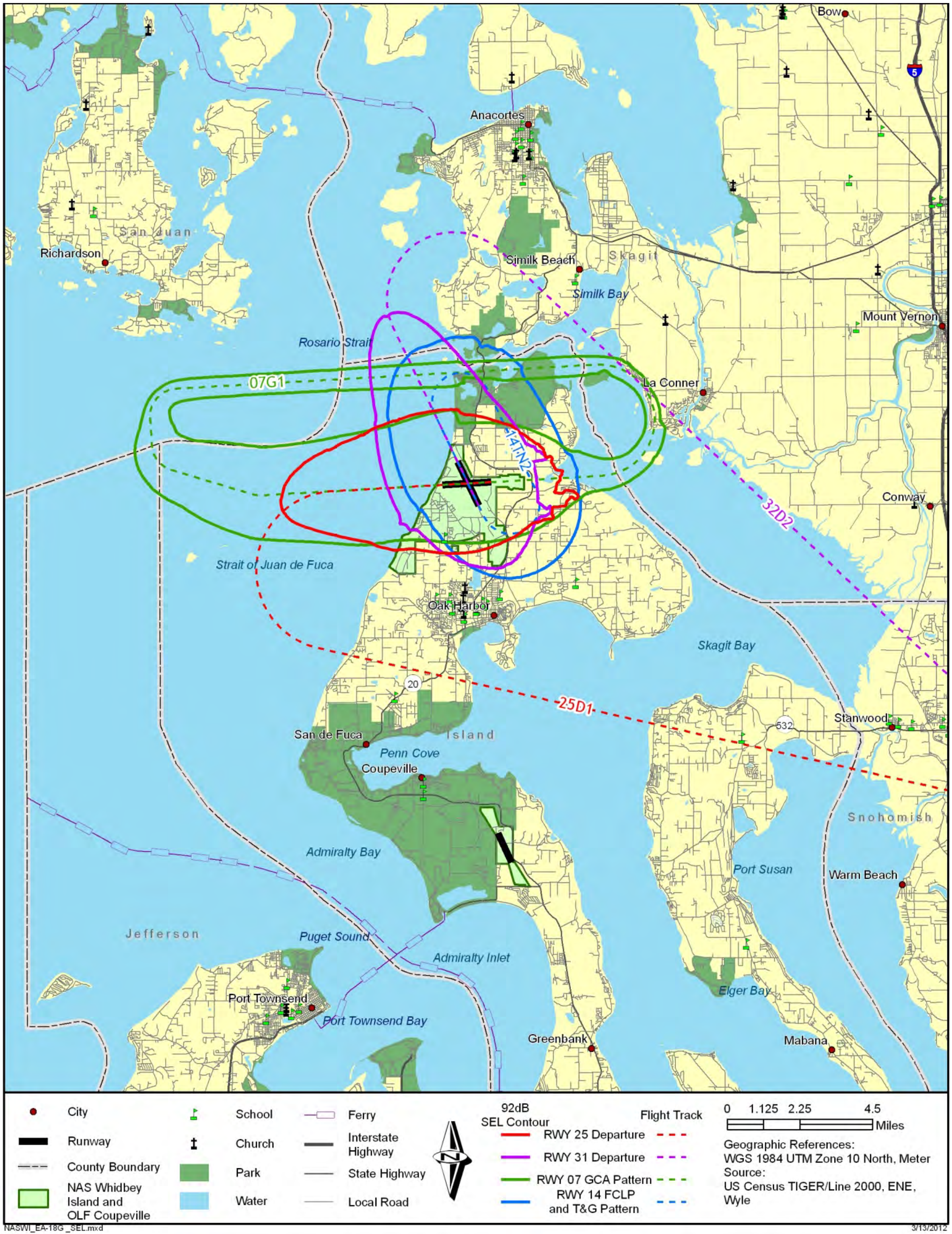
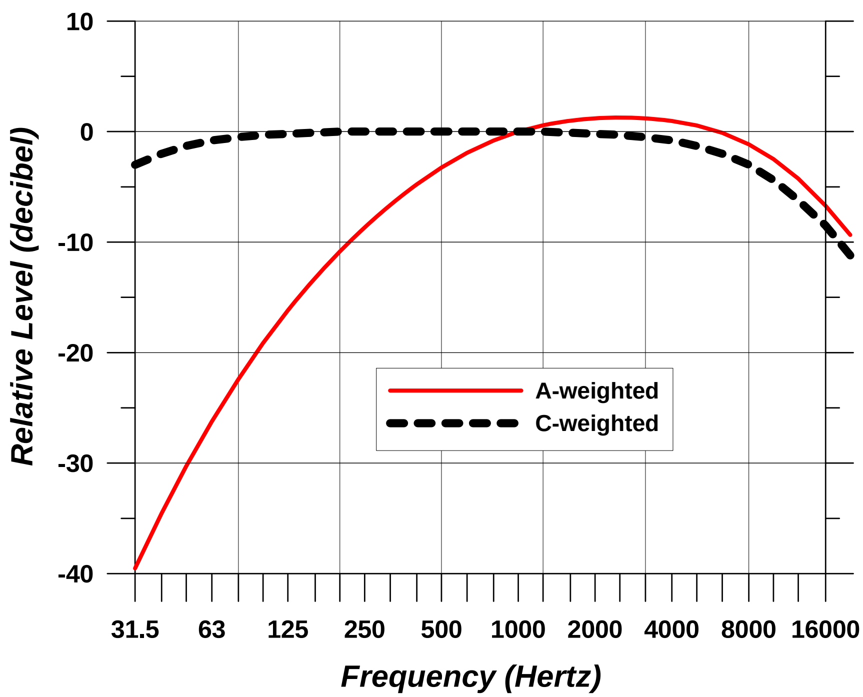


Figure 7-2 **SEL Contours of 92 dB for Representative Flight Profiles of the EA-18G**

7.2 Low-Frequency Noise

The sound levels in this report are in A-weighted decibels. Sound frequency is the number of times per second the air vibrates or oscillates per second and has units of Hertz (Hz). The normal human ear can detect sounds that range in frequency from about 20 Hz to about 15,000 Hz. All sounds in this wide range of frequencies, however, are not heard equally by the human ear, which is most sensitive to frequencies in the 1,000 to 4,000 Hz range. Weighting curves have been developed to correspond to the sensitivity and perception of different types of sound. A- and C-weightings are the two most common weightings and are shown in Figure 7-3. A-weighting accounts for frequency dependence by adjusting the very high and very low frequencies (below approximately 500 Hz and above approximately 10,000 Hz) to approximate the human ear's lower sensitivities to those frequencies. C-weighting is nearly flat throughout the range of audible frequencies, hardly de-emphasizing the low frequency sound while approximating the human ear's sensitivity to higher intensity sounds.



Source: ANSI S1.4A -1985 "Specification of Sound Level Meters"

Figure 7-3 Frequency Response Characteristics of A- and C-Weighting Networks

These two weightings are adequate to quantify most types of environmental noises. Aircraft noise is assessed for land use compatibility in terms of A-weighted decibels (of Day-Night Average Sound Level). To assess the potential for structural vibration, rattle or damage, C-weighting is utilized.

Normally, the most sensitive components of a structure to airborne noise are the windows and, infrequently, the plastered walls and ceilings. An evaluation of the peak sound pressures impinging on the structure is normally used to determine the possibility of damage. In general, with peak sound levels above 130 dBC, there is the possibility of the excitation of structural component resonances. While certain frequencies (such as 30 Hz for window breakage) may be of more concern than other frequencies, conservatively, only sounds lasting more than one second above a sound level of 130 dBC are potentially damaging to structural components (Committee on Hearing, Bioacoustics, and Biomechanics 1977).

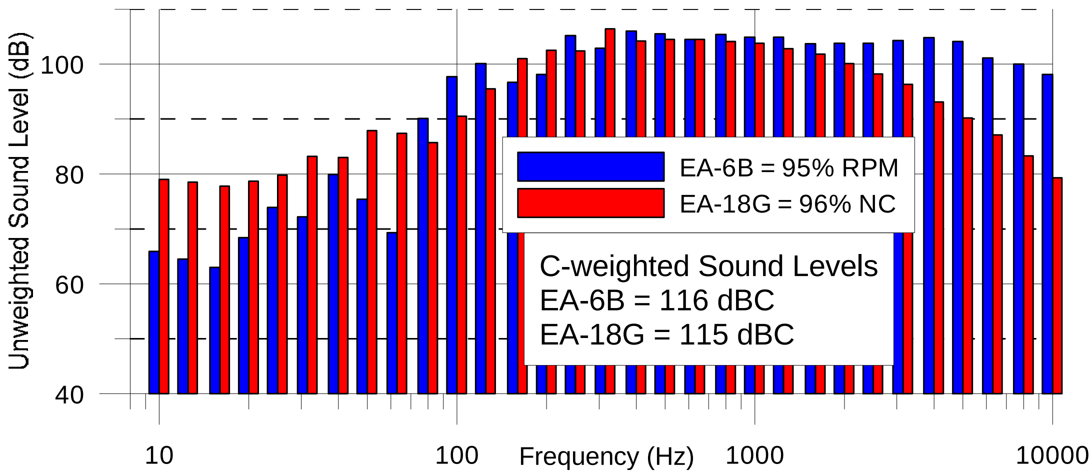
Noise-induced structural vibration may also cause annoyance to dwelling occupants because of induced secondary vibrations, or rattling of objects within the dwelling such as hanging pictures, dishes, plaques, and bric-a-brac. Window panes may also vibrate noticeably when exposed to high levels of airborne noise. In general, such noise-induced vibrations occur at peak sound levels of 110 dBC or greater. Assessments of noise exposure levels for compatible land use should address the potential for noise-induced secondary vibrations.

NASWI has received complaints of building rattle/vibration due to Growler events. Figure 7-4 shows the unweighted one-third octave band spectra from the acoustic reference database (Noisefile). It is important to note that the database's condition is for the aircraft at an altitude of 1000 ft AGL and the receiver located on the ground directly below the aircraft. The Growler's unweighted spectral levels are, on average, 11 dB greater than the Prowler during a Mil power takeoff passing through 1000 ft AGL for frequencies less than 50 Hz. For approaches and cruise power at 1000 ft AGL the frequency spectra of the two aircraft are similar for frequencies less than 50 Hz with average differences of 3 to 5 dB. With its increased low-frequency content, the Growler takeoff events have higher potential to cause noise-induced vibration.

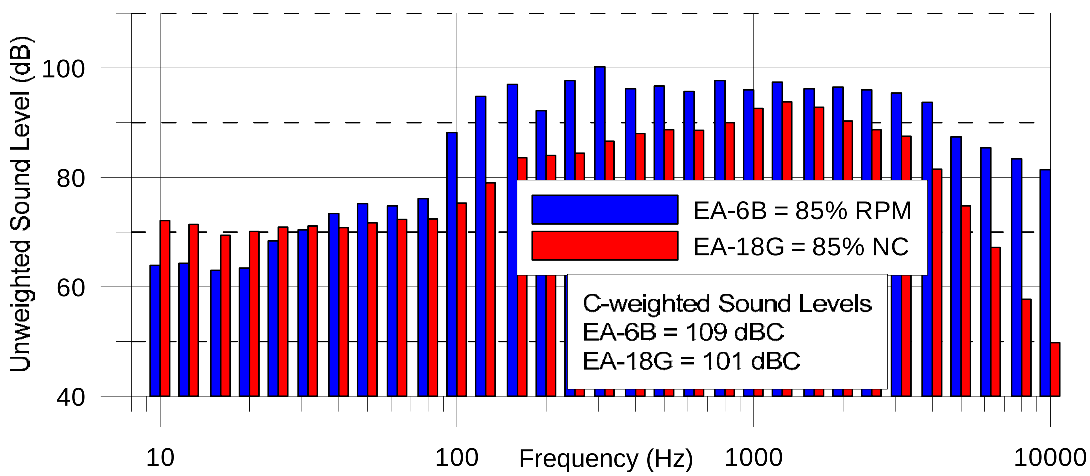
Using the acoustic reference data, the overall C-weighted sound levels for both aircraft for these three conditions are contained in Table 7-4. Due to the EA-6B's spectra sound levels, especially in frequencies minimally affected by the C-weighting, C-weighted sound levels for the EA-6B and EA-18G only differ by 1-2 dBC for the takeoff and approach conditions. In cruise flight, the C-weighted sound levels for the EA-6B are approximately 8 dBC greater than EA-18G. None of these conditions cause C-weighted sound levels to exceed 130 dBC and structural damage would not be expected, however, the takeoff condition has C-weighted sound levels greater than 110 dBC for both aircraft, creating an environment conducive to noise-induced vibration. Additional analysis is recommended to more accurately determine the potential for building rattle/vibration.

Table 7-4 C-weighted Sound Levels, 1000 ft AGL

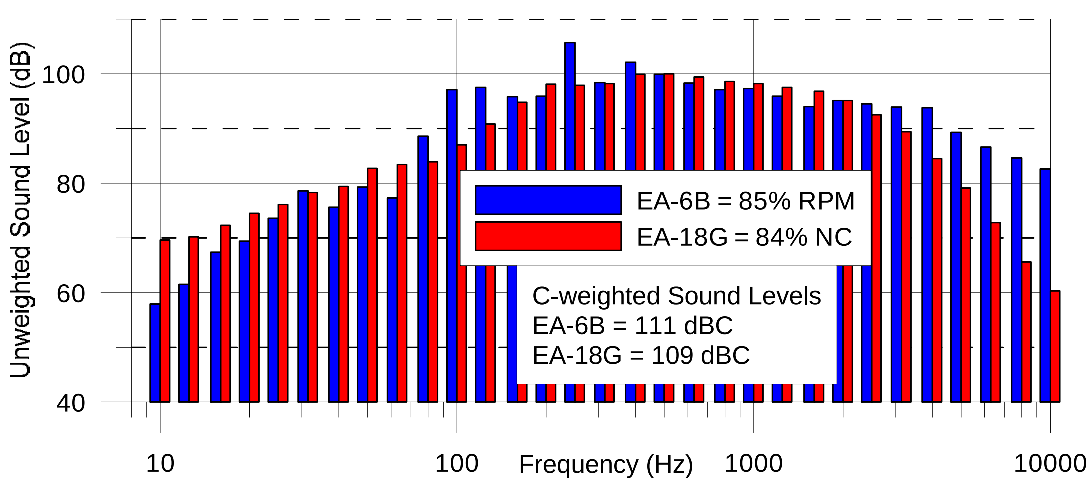
Condition	EA-6B	EA-18G	EA-18G Relative to EA-6B
Takeoff	116	115	-1
Approach (gear down)	111	109	-2
Cruise	109	101	-8



a) Takeoff



b) Cruise



c) Approach

Figure 7-4 Comparison of Sound Spectra for EA-6B and EA-18G (1000 ft AGL, 59°F, 70%RH)

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Appendix A

SUPPORTIVE TABULAR AND GRAPHIC DATA

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Table A-1 Runway and Flight Track Utilization at NASWI and Coupeville for EA-6B and EA-18G

Operation Type	Runway Utilization ID	Runway Utilization %	Direction split		Flight Track Utilization (%) Track ID	Description	Day (0700-2200)	Night (2200-0700)
Departure AB (80%) MIL (20%)	07	13%	East	70%	07D1	Short	50%	50%
					07D2	Center	35%	35%
					07D3	Long	15%	15%
			South	30%	07D4	Short	50%	50%
					07D5	Center	35%	35%
					07D6	Long	15%	15%
	25	44%	East	70%	25D1	Short	50%	50%
					25D2	Center	35%	35%
					25D3	Long	15%	15%
			South	30%	25D4	Short	50%	50%
					25D5	Center	35%	35%
					25D6	Long	15%	15%
	14	36%	East	70%	13D1	Short	50%	50%
					13D2	Center	35%	35%
					13D3	Long	15%	15%
			South	30%	13D4	Short	50%	50%
					13D5	Center	35%	35%
					13D6	Long	15%	15%
	32	7%	East	70%	31D1	Short	50%	50%
					31D2	Center	35%	35%
					31D3	Long	15%	15%
			South	30%	31D4	Short	50%	50%
					31D5	Center	35%	35%
					31D6	Long	15%	15%
Straight-in Arrival	07	13%	East	70%	07A4A	Short	50%	50%
					07A4B	Center	35%	35%
					07A4C	Long	15%	15%
			South	30%	07A5A	Short	50%	50%
					07A5B	Center	35%	35%
					07A5C	Long	15%	15%
	25	44%	East	70%	25A4	Short/Ctr/Long	100%	100%
			South	30%	25A5A	Short	50%	50%
					25A5B	Center	35%	35%
					25A5C	Long	15%	15%
	14	36%	East	70%	13A5A	Short	50%	50%
					13A5B	Center	35%	35%
					13A5C	Long	15%	15%
			South	30%	13A6A	Short	50%	50%
					13A6B	Center	35%	35%
					13A6C	Long	15%	15%
	32	7%	East	70%	31A5A	Short	50%	50%
					31A5B	Center	35%	35%
					31A5C	Long	15%	15%
			South	30%	31A6A	Short	50%	50%
					31A6B	Center	35%	35%
					31A6C	Long	15%	15%
High TACAN Arrival	07	13%			07AHT		100%	100%
	25	44%			25AHT		100%	100%
	14	36%			13AHT		100%	100%
	32	7%			31AHT		100%	100%

Table A-1 Runway and Flight Track Utilization at NASWI and Coupeville for EA-6B and EA-18G (continued)

Operation Type	Runway Utilization ID	Runway Utilization %	Direction split		Flight Track Utilization (%) Track ID	Description	Day (0700-2200)	Night (2200-0700)
Overhead Break Arrival	07	13%	East	90%	07OD1A	Short	33%	
					07OD1B	Center	33%	
					07OD1C	Long	34%	
			West	10%	07OD2A	Short	33%	
					07OD2B	Center	33%	
					07OD2C	Long	34%	
			East	90%	07ON1A	Short		33%
					07ON1B	Center		33%
					07ON1C	Long		34%
			West	10%	07ON2A	Short		33%
					07ON2B	Center		33%
					07ON2C	Long		34%
	25	44%	East	90%	25OD1A	Short	33%	
					25OD1B	Center	33%	
					25OD1C	Long	34%	
			West	10%	25OD2A	Short	33%	
					25OD2B	Center	33%	
					25OD2C	Long	34%	
			East	90%	25ON1A	Short		33%
					25ON1B	Center		33%
					25ON1C	Long		34%
			West	10%	25ON2A	Short		33%
					25ON2B	Center		33%
					25ON2C	Long		34%
	14	36%	East	90%	13OD1A	Short	33%	
					13OD1B	Center	33%	
					13OD1C	Long	34%	
			West	10%	13OD2A	Short	33%	
					13OD2B	Center	33%	
					13OD2C	Long	34%	
			East	90%	13ON1A	Short		33%
					13ON1B	Center		33%
					13ON1C	Long		34%
			West	10%	13ON2A	Short		33%
					13ON2B	Center		33%
					13ON2C	Long		34%
	32	7%	East	90%	31OD1A	Short	33%	
					31OD1B	Center	33%	
					31OD1C	Long	34%	
			West	10%	31OD2A	Short	33%	
					31OD2B	Center	33%	
					31OD2C	Long	34%	
			East	90%	31ON1A	Short		33%
					31ON1B	Center		33%
					31ON1C	Long		34%
			West	10%	31ON2A	Short		33%
					31ON2B	Center		33%
					31ON2C	Long		34%

Table A-1 Runway and Flight Track Utilization at NASWI and Coupeville for EA-6B and EA-18G (continued)

Operation Type	Runway Utilization		Direction split	Flight Track Utilization (%)			
	ID	%		Track ID	Description	Day (0700-2200)	Night (2200-0700)
Depart and Re-enter	07	13%		07DR		50%	50%
				07DL		50%	50%
	25	44%		25DR		50%	50%
				25DL		50%	50%
	14	36%		13DR		50%	50%
				13DL		50%	50%
	32	7%		31DR		50%	50%
				31DL		50%	50%
Touch and Go at Ault Field	07	13%	Daylight	07TD1	Short	13%	
				07TD2	Center	25%	
				07TD3	Long	13%	
			Darkness	07TN1	Short	12%	25%
				07TN2	Center	25%	50%
				07TN3	Long	12%	25%
	25	44%	Daylight	25TD1	Short	13%	
				25TD2	Center	25%	
				25TD3	Long	13%	
			Darkness	25TN1	Short	12%	25%
				25TN2	Center	25%	50%
				25TN3	Long	12%	25%
	14	36%	Daylight	13TD1	Short	13%	
				13TD2	Center	25%	
				13TD3	Long	13%	
			Darkness	13TN1	Short	12%	25%
				13TN2	Center	25%	50%
				13TN3	Long	12%	25%
	32	7%	Daylight	31TD1	Short	13%	
				31TD2	Center	25%	
				31TD3	Long	13%	
			Darkness	31TN1	Short	12%	25%
				31TN2	Center	25%	50%
				31TN3	Long	12%	25%
FCLP at Ault Field	07	13%	Daylight	07TD1	Short	13%	
				07TD2	Center	25%	
				07TD3	Long	13%	
			Darkness	07TN1	Short	12%	25%
				07TN2	Center	25%	50%
				07TN3	Long	12%	25%
	25	44%	Daylight	25TD1	Short	13%	
				25TD2	Center	25%	
				25TD3	Long	13%	
			Darkness	25TN1	Short	12%	25%
				25TN2	Center	25%	50%
				25TN3	Long	12%	25%
	14	36%	Daylight	13TD1	Short	13%	
				13TD2	Center	25%	
				13TD3	Long	13%	
			Darkness	13TN1	Short	12%	25%
				13TN2	Center	25%	50%
				13TN3	Long	12%	25%
	32	7%	Daylight	31TD1	Short	13%	
				31TD2	Center	25%	
				31TD3	Long	13%	
			Darkness	31TN1	Short	12%	25%
				31TN2	Center	25%	50%
				31TN3	Long	12%	25%

Table A-1 Runway and Flight Track Utilization at NASWI and Coupeville for EA-6B and EA-18G (concluded)

Operation Type	Runway Utilization		Direction split	Flight Track Utilization (%)			
	ID	%		Track ID	Description	Day (0700-2200)	Night (2200-0700)
GCA Pattern at Ault Field	07	13%		07G1	3 nm	50%	50%
				07G2	4 nm	20%	20%
				07G3	5 nm	30%	30%
	25	44%		25G1	3 nm	50%	50%
				25G2	4 nm	20%	20%
				25G3	5 nm	30%	30%
	14	36%		13G1	3 nm	50%	50%
				13G2	4 nm	20%	20%
				13G3	5 nm	30%	30%
	32	7%		31G1	3 nm	50%	50%
				31G2	4 nm	20%	20%
				31G3	5 nm	30%	30%
Interfacility Ault Field to Coupeville	7	13%		07WC14D	Interfacility to 14	50%	
				07WC14N			50%
				07WC32D	Interfacility to 32	50%	
				07WC32N			50%
	25	44%		25WC13D	Interfacility to 14	50%	
				25WC13N			50%
				25WC32D	Interfacility to 32	50%	
				25WC32N			50%
	14	36%		13WC14D	Interfacility to 14	50%	
				13WC14N			50%
				13WC32D	Interfacility to 32	50%	
				13WC32N			50%
	32	7%		31WC14D	Interfacility to 14	50%	
				31WC14N			50%
				31WC32D	Interfacility to 32	50%	
				31WC32N			50%
FCLP at Coupeville	14	50%		14TD1		13%	
				14TD2		25%	
				14TD3		13%	
				14TN1		12%	25%
				14TN2		25%	50%
				14TN3		12%	25%
	32	50%		32TD1		13%	
				32TD2		25%	
				32TD3		13%	
				32TN1		12%	25%
				32TN2		25%	50%
				32TN3		12%	25%
Interfacility Coupeville to Ault Field	14	50%		14CW07D	Interfacility to 07	25%	
				14CW07N			25%
				14CW13D	Interfacility to 25	25%	
				14CW13N			25%
				14CW25D	Interfacility to 13	25%	
				14CW25N			25%
				14CW31D	Interfacility to 31	25%	
				14CW31N			25%
	32	50%		32CW07D	Interfacility to 07	25%	
				32CW07N			25%
				32CW13D	Interfacility to 13	25%	
				32CW13N			25%
				32CW25D	Interfacility to 25	25%	
				32CW25N			25%
				32CW31D	Interfacility to 31	25%	
				32CW31N			25%

Table A-2 Runway and Flight Track Utilization at NASWI and Coupeville for C-9

Operation Type	Runway ID	Runway %	Direction split		Track ID	Description	Day (0700-2200)	Night (2200-0700)
Departure	07	13%	East	40%	07D1	Short	0%	0%
					07D2	Center	50%	50%
					07D3	Long	50%	50%
			South	60%	07D4	Short	0%	0%
					07D5	Center	50%	50%
					07D6	Long	50%	50%
	25	44%	East	40%	25D1	Short	0%	0%
					25D2	Center	50%	50%
					25D3	Long	50%	50%
			South	60%	25D4	Short	0%	0%
					25D5	Center	50%	50%
					25D6	Long	50%	50%
	14	36%	East	40%	14D1	Short	0%	0%
					14D2	Center	50%	50%
					14D3	Long	50%	50%
			South	60%	14D4	Short	0%	0%
					14D5	Center	50%	50%
					14D6	Long	50%	50%
	32	7%	East	40%	32D1	Short	0%	0%
					32D2	Center	50%	50%
					32D3	Long	50%	50%
			South	60%	32D4	Short	0%	0%
					32D5	Center	50%	50%
					32D6	Long	50%	50%
Straight-in Arrival	07	13%	East	40%	07A1	arrival	100%	100%
			South	60%	07A2	arrival	50%	50%
					07A3	arrival	50%	50%
	25	44%	East	40%	25A1	arrival	100%	100%
			South	60%	25A2	arrival	50%	50%
					25A3	arrival	50%	50%
	14	36%	East	40%	14A1	arrival	50%	50%
					14A2	arrival	50%	50%
			South	60%	14A3	arrival	50%	50%
					14A4	arrival	50%	50%
	32	7%	East	40%	32A1	arrival	50%	50%
					32A2	arrival	50%	50%
			South	60%	32A3	arrival	50%	50%
					32A4	arrival	50%	50%

Table A-3 Runway and Flight Track Utilization at NASWI and Coupeville for P-3 and P-8

Operation Type	Runway Utilization ID	Runway Utilization %	Flight Track Utilization (%) Track ID	Description	Day (0700-2200)	Night (2200-0700)
Departure	07	13%	07D1	Short		
			07D2	Center	20%	20%
			07D3	Long	20%	20%
			07D4	Short		
			07D5	Center	30%	30%
			07D6	Long	30%	30%
	25	44%	25D1	Short		
			25D2	Center	20%	20%
			25D3	Long	20%	20%
			25D4	Short		
			25D5	Center	30%	30%
			25D6	Long	30%	30%
	13	36%	13D1	Short		
			13D2	Center	20%	20%
			13D3	Long	20%	20%
			13D4	Short		
			13D5	Center	30%	30%
			13D6	Long	30%	30%
	31	7%	31D1	Short		
			31D2	Center	20%	20%
			31D3	Long	20%	20%
			31D4	Short		
			31D5	Center	30%	30%
			31D6	Long	30%	30%
Low TACAN Departure	07	13%	07DLT		100%	100%
	25	44%	25DLT		100%	100%
	13	36%	13DLT		100%	100%
	31	7%	31DLT		100%	100%
Straight-in Arrival (VFR)	07	13%	07A1		40%	40%
		13%	07A2		30%	30%
		13%	07A3		30%	30%
	25	44%	25A1		40%	40%
		44%	25A2		30%	30%
		44%	25A3		30%	30%
	13	36%	13A1		20%	20%
		36%	13A2		20%	20%
		36%	13A3		30%	30%
		36%	13A4		30%	30%
	31	7%	31A1		20%	20%
		7%	31A2		20%	20%
		7%	31A3		30%	30%
		7%	31A4		30%	30%

Table A-3 Runway and Flight Track Utilization at NASWI and Coupeville for P-3 and P-8 (concluded)

Operation Type	Runway Utilization		Flight Track Utilization (%)			
	ID	%	Track ID	Description	Day (0700-2200)	Night (2200-0700)
Straight-in Arrival (IFR)	07	13%	07A4B	Center	20%	20%
		13%	07A4C	Long	20%	20%
		13%	07A5B	Center	30%	30%
		13%	07A5C	Long	30%	30%
	25	44%	25A4	Short/Ctr/Long	40%	40%
		44%	25A5B	Center	30%	30%
		44%	25A5C	Long	30%	30%
	13	36%	13A5B	Center	20%	20%
		36%	13A5C	Long	20%	20%
		36%	13A6B	Center	30%	30%
		36%	13A6C	Long	30%	30%
	31	7%	31A5B	Center	20%	20%
		7%	31A5C	Long	20%	20%
		7%	31A6B	Center	30%	30%
		7%	31A6C	Long	30%	30%
Low TACAN Arrival	07	13%	07ALT		100%	100%
	25	44%	25ALT		100%	100%
	13	36%	13ALT		100%	100%
	31	7%	31ALT		100%	100%
Touch and Go at Ault Field	07	13%	07TN1	Short	25%	25%
		13%	07TN2	Center	50%	50%
		13%	07TN3	Long	25%	25%
	25	44%	25TN1	Short	25%	25%
		44%	25TN2	Center	50%	50%
		44%	25TN3	Long	25%	25%
	13	36%	13TN1	Short	25%	25%
		36%	13TN2	Center	50%	50%
		36%	13TN3	Long	25%	25%
	31	7%	31TN1	Short	25%	25%
		7%	31TN2	Center	50%	50%
		7%	31TN3	Long	25%	25%
GCA Pattern	07	13%	07G2	4 nm	50%	50%
		13%	07G3	5 nm	50%	50%
	25	44%	25G2	4 nm	50%	50%
		44%	25G3	5 nm	50%	50%
	13	36%	13G2	4 nm	50%	50%
		36%	13G3	5 nm	50%	50%
	31	7%	31G2	4 nm	50%	50%
		7%	31G3	5 nm	50%	50%

Table A-4 Modeled Average Daily Flight Events at NASWI and Coupeville for Baseline

Operation Type	Rwy ID	Flight Track	EA-6B			EA-18G			C-9			P-3			Total		
			Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total
Departure MIL	07	07D1	0.23	0.015	0.2446	0.0448	0.0029	0.0477			-				0.2744	0.0179	0.2923
		07D2	0.161	0.0105	0.1712	0.0313	0.002	0.0333	0.014	0.0076	0.0216	0.2503	0.0097	0.2600	0.4563	0.0298	0.4861
		07D3	0.069	0.0045	0.0734	0.0134	0.0009	0.0143	0.014	0.0076	0.0216	0.2503	0.0097	0.2600	0.3466	0.0227	0.3693
		07D4	0.098	0.0064	0.1048	0.0192	0.0013	0.0205			-				0.1176	0.0077	0.1253
		07D5	0.069	0.0045	0.0734	0.0134	0.0009	0.0143	0.021	0.0113	0.0322	0.3755	0.0145	0.3900	0.4787	0.0312	0.5099
		07D6	0.03	0.0019	0.0314	0.0058	0.0004	0.0062	0.021	0.0113	0.0322	0.3755	0.0145	0.3900	0.4317	0.0281	0.4598
	25	25D1	0.777	0.0506	0.8278	0.1516	0.0099	0.1615			-				0.9288	0.0605	0.9893
		25D2	0.544	0.0354	0.5794	0.1061	0.0069	0.1130	0.047	0.0256	0.0729	0.8472	0.0328	0.8800	1.5446	0.1007	1.6453
		25D3	0.233	0.0152	0.2484	0.0455	0.003	0.0485	0.047	0.0256	0.0729	0.8472	0.0328	0.8800	1.1732	0.0766	1.2498
		25D4	0.333	0.0217	0.3548	0.065	0.0042	0.0692			-				0.3981	0.0259	0.4240
		25D5	0.233	0.0152	0.2484	0.0455	0.003	0.0485	0.071	0.0383	0.1092	1.2708	0.0492	1.3201	1.6204	0.1057	1.7262
		25D6	0.1	0.0065	0.1064	0.0195	0.0013	0.0208	0.071	0.0383	0.1092	1.2708	0.0492	1.3201	1.4611	0.0953	1.5565
	14	14D1	0.636	0.0414	0.6773	0.124	0.0081	0.1321			-				0.7599	0.0495	0.8094
		14D2	0.445	0.029	0.4741	0.0868	0.0057	0.0925	0.039	0.0209	0.0596	0.6932	0.0268	0.7200	1.2638	0.0824	1.3462
		14D3	0.191	0.0124	0.2032	0.0372	0.0024	0.0396	0.039	0.0209	0.0596	0.6932	0.0268	0.7200	0.9599	0.0625	1.0224
		14D4	0.273	0.0178	0.2903	0.0531	0.0035	0.0566			-				0.3256	0.0213	0.3469
		14D5	0.191	0.0124	0.2032	0.0372	0.0024	0.0396	0.058	0.0314	0.0894	1.0398	0.0403	1.0800	1.3258	0.0865	1.4122
		14D6	0.082	0.0053	0.0871	0.0159	0.001	0.0169	0.058	0.0314	0.0894	1.0398	0.0403	1.0800	1.1955	0.078	1.2734
	32	32D1	0.124	0.0081	0.1317	0.0241	0.0016	0.0257			-				0.1477	0.0097	0.1574
		32D2	0.087	0.0056	0.0921	0.0169	0.0011	0.0180	0.008	0.0041	0.0116	0.1348	0.0052	0.1400	0.2457	0.016	0.2617
		32D3	0.037	0.0024	0.0395	0.0072	0.0005	0.0077	0.008	0.0041	0.0116	0.1348	0.0052	0.1400	0.1866	0.0122	0.1988
		32D4	0.053	0.0035	0.0565	0.0103	0.0007	0.0110			-				0.0633	0.0042	0.0675
		32D5	0.037	0.0024	0.0395	0.0072	0.0005	0.0077	0.011	0.0061	0.0174	0.2022	0.0078	0.2100	0.2578	0.0168	0.2746
		32D6	0.016	0.001	0.0169	0.0031	0.0002	0.0033	0.011	0.0061	0.0174	0.2022	0.0078	0.2100	0.2325	0.0151	0.2476
Departure Afterburner	07	07D1			-	0.1791	0.0117	0.1908			-				0.1791	0.0117	0.1908
		07D2			-	0.1254	0.0082	0.1336			-				0.1254	0.0082	0.1336
		07D3			-	0.0537	0.0035	0.0572			-				0.0537	0.0035	0.0572
		07D4			-	0.0768	0.005	0.0818			-				0.0768	0.005	0.0818
		07D5			-	0.0537	0.0035	0.0572			-				0.0537	0.0035	0.0572
		07D6			-	0.023	0.0015	0.0245			-				0.023	0.0015	0.0245
	25	25D1			-	0.6062	0.0395	0.6457			-				0.6062	0.0395	0.6457
		25D2			-	0.4243	0.0276	0.4519			-				0.4243	0.0276	0.4519
		25D3			-	0.1819	0.0118	0.1937			-				0.1819	0.0118	0.1937
		25D4			-	0.2598	0.0169	0.2767			-				0.2598	0.0169	0.2767
		25D5			-	0.1819	0.0118	0.1937			-				0.1819	0.0118	0.1937
		25D6			-	0.0779	0.0051	0.0830			-				0.0779	0.0051	0.0830
	14	14D1			-	0.496	0.0323	0.5283			-				0.496	0.0323	0.5283
		14D2			-	0.3472	0.0226	0.3698			-				0.3472	0.0226	0.3698
		14D3			-	0.1488	0.0097	0.1585			-				0.1488	0.0097	0.1585
		14D4			-	0.2126	0.0138	0.2264			-				0.2126	0.0138	0.2264
		14D5			-	0.1488	0.0097	0.1585			-				0.1488	0.0097	0.1585
		14D6			-	0.0638	0.0042	0.0680			-				0.0638	0.0042	0.0680
	32	32D1			-	0.0964	0.0063	0.1027			-				0.0964	0.0063	0.1027
		32D2			-	0.0675	0.0044	0.0719			-				0.0675	0.0044	0.0719
		32D3			-	0.0289	0.0019	0.0308			-				0.0289	0.0019	0.0308
		32D4			-	0.0413	0.0027	0.0440			-				0.0413	0.0027	0.0440
		32D5			-	0.0289	0.0019	0.0308			-				0.0289	0.0019	0.0308
		32D6			-	0.0124	0.0008	0.0132			-				0.0124	0.0008	0.0132
Low TACAN Departure	07	07DHT										1.4339	0.0555	1.4894	1.4339	0.0555	1.4894
	25	25DHT										4.8532	0.1879	5.0411	4.8532	0.1879	5.0411
	14	14DHT										3.9708	0.1538	4.1246	3.9708	0.1538	4.1246
	32	32DHT										0.7721	0.0299	0.8020	0.7721	0.0299	0.8020

Table A-4 Modeled Average Daily Flight Events at NASWI and Coupeville for Baseline (continued)

Operation Type	Rwy ID	Flight Track	EA-6B Day (0700-2200)	EA-6B Night (2200-0700)	EA-6B Total	EA-18G Day (0700-2200)	EA-18G Night (2200-0700)	EA-18G Total	C-9 Day (0700-2200)	C-9 Night (2200-0700)	C-9 Total	P-3 Day (0700-2200)	P-3 Night (2200-0700)	P-3 Total	Total Day (0700-2200)	Total Night (2200-0700)	Total Total
Straight-in Arrival (VFR)	07	07A1						-	0.0279	0.0151	0.0430	0.7586	0.0326	0.7913	0.7865	0.0477	0.8343
		07A2						-	0.0209	0.0113	0.0322	0.569	0.0245	0.5934	0.5899	0.0358	0.6256
		07A3						-	0.0209	0.0113	0.0322	0.569	0.0245	0.5934	0.5899	0.0358	0.6256
	25	25A1						-	0.0945	0.0511	0.1456	2.5677	0.1104	2.6781	2.6622	0.1615	2.8237
		25A2						-	0.0709	0.0383	0.1092	1.9258	0.0828	2.0086	1.9967	0.1211	2.1178
		25A3						-	0.0709	0.0383	0.1092	1.9258	0.0828	2.0086	1.9967	0.1211	2.1178
	14	14A1						-	0.0387	0.0209	0.0596	1.0504	0.0452	1.0956	1.0891	0.0661	1.1552
		14A2						-	0.0387	0.0209	0.0596	1.0504	0.0452	1.0956	1.0891	0.0661	1.1552
		14A3						-	0.058	0.0314	0.0894	1.5756	0.0678	1.6434	1.6336	0.0992	1.7328
		14A4						-	0.058	0.0314	0.0894	1.5756	0.0678	1.6434	1.6336	0.0992	1.7328
	32	32A1						-	0.0075	0.0041	0.0116	0.2042	0.0088	0.2130	0.2117	0.0129	0.2246
		32A2						-	0.0075	0.0041	0.0116	0.2042	0.0088	0.2130	0.2117	0.0129	0.2246
		32A3						-	0.0113	0.0061	0.0174	0.3064	0.0132	0.3195	0.3177	0.0193	0.3369
		32A4						-	0.0113	0.0061	0.0174	0.3064	0.0132	0.3195	0.3177	0.0193	0.3369
Straight-in Arrival (IFR)	07	07A4A	0.082	0.0022	0.0842	0.08	0.002	0.0821			-	0	0		0.162	0.0043	0.1663
		07A4B	0.0574	0.0016	0.0590	0.056	0.002	0.0575			-	0.0789	0.0022	0.0811	0.1923	0.0053	0.1976
		07A4C	0.0246	0.0007	0.0253	0.024	6E-04	0.0246			-	0.0789	0.0022	0.0811	0.1275	0.0035	0.1310
		07A5A	0.0352	0.001	0.0362	0.0343	9E-04	0.0352			-	0	0		0.0695	0.0019	0.0714
		07A5B	0.0246	0.0007	0.0253	0.024	6E-04	0.0246			-	0.1184	0.0033	0.1217	0.167	0.0046	0.1716
		07A5C	0.0105	0.0003	0.0108	0.0103	3E-04	0.0106			-	0.1184	0.0033	0.1217	0.1392	0.0039	0.1431
	25	25A4	0.5552	0.0152	0.5704	0.5417	0.014	0.5560			-	0.5343	0.0149	0.5492	1.6312	0.0444	1.6756
		25A5A	0.119	0.0033	0.1223	0.1161	0.003	0.1192			-	0	0		0.2351	0.0064	0.2415
		25A5B	0.0833	0.0023	0.0856	0.0813	0.002	0.0835			-	0.4007	0.0112	0.4119	0.5653	0.0157	0.5810
		25A5C	0.0357	0.001	0.0367	0.0348	9E-04	0.0357			-	0.4007	0.0112	0.4119	0.4712	0.0131	0.4843
	14	14A5A	0.2271	0.0062	0.2333	0.2216	0.006	0.2275			-	0	0		0.4487	0.0121	0.4608
		14A5B	0.159	0.0043	0.1633	0.1551	0.004	0.1592			-	0.2186	0.0061	0.2247	0.5327	0.0145	0.5472
		14A5C	0.0681	0.0019	0.0700	0.0665	0.002	0.0683			-	0.2186	0.0061	0.2247	0.3532	0.0098	0.3630
		14A6A	0.0973	0.0027	0.1000	0.095	0.003	0.0975			-	0	0		0.1923	0.0052	0.1975
		14A6B	0.0681	0.0019	0.0700	0.0665	0.002	0.0683			-	0.3278	0.0092	0.3370	0.4624	0.0129	0.4753
		14A6C	0.0292	0.0008	0.0300	0.0285	8E-04	0.0293			-	0.3278	0.0092	0.3370	0.3855	0.0108	0.3963
	32	32A5A	0.0442	0.0012	0.0454	0.0431	0.001	0.0442			-	0	0		0.0873	0.0023	0.0896
		32A5B	0.0309	0.0008	0.0317	0.0302	8E-04	0.0310			-	0.0425	0.0012	0.0437	0.1036	0.0028	0.1064
		32A5C	0.0133	0.0004	0.0137	0.0129	3E-04	0.0132			-	0.0425	0.0012	0.0437	0.0687	0.0019	0.0706
		32A6A	0.0189	0.0005	0.0194	0.0185	5E-04	0.0190			-	0	0		0.0374	0.001	0.0384
		32A6B	0.0133	0.0004	0.0137	0.0129	3E-04	0.0132			-	0.0637	0.0018	0.0655	0.0899	0.0025	0.0924
		32A6C	0.0057	0.0002	0.0059	0.0055	1E-04	0.0056			-	0.0637	0.0018	0.0655	0.0749	0.0021	0.0770
High TACAN Arrival	07	07AHT	0.0755	0.0064	0.0819	0.0737	0.006	0.0798			-	0	0		0.1492	0.0125	0.1617
	25	25AHT	0.2556	0.0217	0.2773	0.2495	0.021	0.2700			-	0	0		0.5051	0.0422	0.5473
	14	14AHT	0.2091	0.0178	0.2269	0.2042	0.017	0.2210			-	0	0		0.4133	0.0346	0.4479
	32	32AHT	0.0407	0.0035	0.0442	0.0397	0.003	0.0430			-	0	0		0.0804	0.0068	0.0872
Low TACAN Arrival	07	07ALT			-			-			-	0.3946	0.011	0.4057	0.3946	0.011	0.4057
	25	25ALT			-			-			-	1.3357	0.0374	1.3730	1.3357	0.0374	1.3730
	14	14ALT			-			-			-	1.0928	0.0306	1.1234	1.0928	0.0306	1.1234
	32	32ALT			-			-			-	0.2125	0.0059	0.2184	0.2125	0.0059	0.2184

Table A-4 Modeled Average Daily Flight Events at NASWI and Coupeville for Baseline (continued)

Operation Type	Rwy ID	Flight Track	EA-6B Day (0700-2200)	EA-6B Night (2200-0700)	EA-6B Total	EA-18G Day (0700-2200)	EA-18G Night (2200-0700)	EA-18G Total	C-9 Day (0700-2200)	C-9 Night (2200-0700)	C-9 Total	P-3 Day (0700-2200)	P-3 Night (2200-0700)	P-3 Total	Total Day (0700-2200)	Total Night (2200-0700)	Total Total
Overhead Break Arrival	07	07OD1A	0.1017	0	0.1017	0.0991	0	0.0991			-	0	0		0.2008	0	0.2008
		07OD1B	0.1017	0	0.1017	0.0991	0	0.0991			-	0	0		0.2008	0	0.2008
		07OD1C	0.1047	0	0.1047	0.1021	0	0.1021			-	0	0		0.2068	0	0.2068
		07OD2A	0.0113	0	0.0113	0.011	0	0.0110			-	0	0		0.0223	0	0.0223
		07OD2B	0.0113	0	0.0113	0.011	0	0.0110			-	0	0		0.0223	0	0.0223
		07OD2C	0.0116	0	0.0116	0.0113	0	0.0113			-	0	0		0.0229	0	0.0229
		07ON1A	0	0.01	0.0100	0	0.0098	0.0098			-	0	0		0	0.0198	0.0198
		07ON1B	0	0.01	0.0100	0	0.0098	0.0098			-	0	0		0	0.0198	0.0198
		07ON1C	0	0.0104	0.0104	0	0.0101	0.0101			-	0	0		0	0.0205	0.0205
		07ON2A	0	0.0011	0.0011	0	0.0011	0.0011			-	0	0		0	0.0022	0.0022
		07ON2B	0	0.0011	0.0011	0	0.0011	0.0011			-	0	0		0	0.0022	0.0022
		07ON2C	0	0.0012	0.0012	0	0.0011	0.0011			-	0	0		0	0.0023	0.0023
	25	25OD1A	0.3441	0	0.3441	0.3355	0	0.3355			-	0	0		0.6796	0	0.6796
		25OD1B	0.3441	0	0.3441	0.3355	0	0.3355			-	0	0		0.6796	0	0.6796
		25OD1C	0.3545	0	0.3545	0.3456	0	0.3456			-	0	0		0.7001	0	0.7001
		25OD2A	0.0382	0	0.0382	0.0373	0	0.0373			-	0	0		0.0755	0	0.0755
		25OD2B	0.0382	0	0.0382	0.0373	0	0.0373			-	0	0		0.0755	0	0.0755
		25OD2C	0.0394	0	0.0394	0.0384	0	0.0384			-	0	0		0.0778	0	0.0778
		25ON1A	0	0.034	0.0340	0	0.0333	0.0333			-	0	0		0	0.0673	0.0673
		25ON1B	0	0.034	0.0340	0	0.0333	0.0333			-	0	0		0	0.0673	0.0673
		25ON1C	0	0.035	0.0350	0	0.0343	0.0343			-	0	0		0	0.0693	0.0693
		25ON2A	0	0.0038	0.0038	0	0.0037	0.0037			-	0	0		0	0.0075	0.0075
		25ON2B	0	0.0038	0.0038	0	0.0037	0.0037			-	0	0		0	0.0075	0.0075
		25ON2C	0	0.0039	0.0039	0	0.0038	0.0038			-	0	0		0	0.0077	0.0077
	14	14OD1A	0.2815	0	0.2815	0.2745	0	0.2745			-	0	0		0.556	0	0.5560
		14OD1B	0.2815	0	0.2815	0.2745	0	0.2745			-	0	0		0.556	0	0.5560
		14OD1C	0.29	0	0.2900	0.2828	0	0.2828			-	0	0		0.5728	0	0.5728
		14OD2A	0.0313	0	0.0313	0.0305	0	0.0305			-	0	0		0.0618	0	0.0618
		14OD2B	0.0313	0	0.0313	0.0305	0	0.0305			-	0	0		0.0618	0	0.0618
		14OD2C	0.0322	0	0.0322	0.0314	0	0.0314			-	0	0		0.0636	0	0.0636
		14ON1A	0	0.0278	0.0278	0	0.0272	0.0272			-	0	0		0	0.055	0.0550
		14ON1B	0	0.0278	0.0278	0	0.0272	0.0272			-	0	0		0	0.055	0.0550
		14ON1C	0	0.0287	0.0287	0	0.0281	0.0281			-	0	0		0	0.0568	0.0568
		14ON2A	0	0.0031	0.0031	0	0.003	0.0030			-	0	0		0	0.0061	0.0061
		14ON2B	0	0.0031	0.0031	0	0.003	0.0030			-	0	0		0	0.0061	0.0061
		14ON2C	0	0.0032	0.0032	0	0.0031	0.0031			-	0	0		0	0.0063	0.0063
	32	32OD1A	0.0547	0	0.0547	0.0534	0	0.0534			-	0	0		0.1081	0	0.1081
		32OD1B	0.0547	0	0.0547	0.0534	0	0.0534			-	0	0		0.1081	0	0.1081
		32OD1C	0.0564	0	0.0564	0.055	0	0.0550			-	0	0		0.1114	0	0.1114
		32OD2A	0.0061	0	0.0061	0.0059	0	0.0059			-	0	0		0.012	0	0.0120
		32OD2B	0.0061	0	0.0061	0.0059	0	0.0059			-	0	0		0.012	0	0.0120
		32OD2C	0.0063	0	0.0063	0.0061	0	0.0061			-	0	0		0.0124	0	0.0124
		32ON1A	0	0.0054	0.0054	0	0.0053	0.0053			-	0	0		0	0.0107	0.0107
		32ON1B	0	0.0054	0.0054	0	0.0053	0.0053			-	0	0		0	0.0107	0.0107
		32ON1C	0	0.0056	0.0056	0	0.0055	0.0055			-	0	0		0	0.0111	0.0111
		32ON2A	0	0.0006	0.0006	0	0.0006	0.0006			-	0	0		0	0.0012	0.0012
		32ON2B	0	0.0006	0.0006	0	0.0006	0.0006			-	0	0		0	0.0012	0.0012
		32ON2C	0	0.0006	0.0006	0	0.0006	0.0006			-	0	0		0	0.0012	0.0012
Depart and Re-enter	07	07DR	0.0094	0.0007	0.0101	0.0093	0.0007	0.0100			-	0	0		0.0187	0.0014	0.0201
		07DL	0.0094	0.0007	0.0101	0.0093	0.0007	0.0100			-	0	0		0.0187	0.0014	0.0201
	25	25DR	0.0319	0.0024	0.0343	0.0313	0.0024	0.0337			-	0	0		0.0632	0.0048	0.0680
		25DL	0.0319	0.0024	0.0343	0.0313	0.0024	0.0337			-	0	0		0.0632	0.0048	0.0680
	14	14DR	0.0261	0.002	0.0281	0.0256	0.002	0.0276			-	0	0		0.0517	0.004	0.0557
		14DL	0.0261	0.002	0.0281	0.0256	0.002	0.0276			-	0	0		0.0517	0.004	0.0557
	32	32DR	0.0051	0.0004	0.0055	0.005	0.0004	0.0054			-	0	0		0.0101	0.0008	0.0109
		32DL	0.0051	0.0004	0.0055	0.005	0.0004	0.0054			-	0	0		0.0101	0.0008	0.0109

Table A-4 Modeled Average Daily Flight Events at NASWI and Coupeville for Baseline (continued)

Operation Type	Rwy ID	Flight Track	EA-6B Day (0700-2200)	EA-6B Night (2200-0700)	EA-6B Total	EA-18G Day (0700-2200)	EA-18G Night (2200-0700)	EA-18G Total	C-9 Day (0700-2200)	C-9 Night (2200-0700)	C-9 Total	P-3 Day (0700-2200)	P-3 Night (2200-0700)	P-3 Total	Total Day (0700-2200)	Total Night (2200-0700)	Total
Touch and Go at Ault Field	07	07TD1	0.0925	0	0.0925	0.0901	0	0.0901			-	0	0		0.1826	0	0.1826
		07TD2	0.1849	0	0.1849	0.1803	0	0.1803			-	0	0		0.3652	0	0.3652
		07TD3	0.0925	0	0.0925	0.0901	0	0.0901			-	0	0		0.1826	0	0.1826
		07TN1	0.0902	0.0086	0.0988	0.0879	0.0084	0.0963			-	0.532	0.0101	0.5420	0.71	0.0271	0.7371
		07TN2	0.1804	0.0173	0.1977	0.1759	0.0168	0.1927			-	1.064	0.0202	1.0840	1.4201	0.0543	1.4744
		07TN3	0.0902	0.0086	0.0988	0.0879	0.0084	0.0963			-	0.532	0.0101	0.5420	0.71	0.0271	0.7371
	25	25TD1	0.3129	0	0.3129	0.3051	0	0.3051			-	0	0		0.618	0	0.6180
		25TD2	0.6259	0	0.6259	0.6102	0	0.6102			-	0	0		1.2361	0	1.2361
		25TD3	0.3129	0	0.3129	0.3051	0	0.3051			-	0	0		0.618	0	0.6180
		25TN1	0.3053	0.0292	0.3345	0.2977	0.0285	0.3262			-	1.8	0.0342	1.8344	2.4032	0.0919	2.4951
		25TN2	0.6106	0.0585	0.6691	0.5953	0.057	0.6523			-	3.601	0.0684	3.6689	4.8064	0.1839	4.9903
		25TN3	0.3053	0.0292	0.3345	0.2977	0.0285	0.3262			-	1.8	0.0342	1.8344	2.4032	0.0919	2.4951
	14	14TD1	0.256	0	0.2560	0.2496	0	0.2496			-	0	0		0.5056	0	0.5056
		14TD2	0.5121	0	0.5121	0.4992	0	0.4992			-	0	0		1.0113	0	1.0113
		14TD3	0.256	0	0.2560	0.2496	0	0.2496			-	0	0		0.5056	0	0.5056
		14TN1	0.2498	0.0239	0.2737	0.2435	0.0233	0.2668			-	1.473	0.028	1.5009	1.9662	0.0752	2.0414
		14TN2	0.4996	0.0478	0.5474	0.4871	0.0466	0.5337			-	2.946	0.056	3.0018	3.9325	0.1504	4.0829
		14TN3	0.2498	0.0239	0.2737	0.2435	0.0233	0.2668			-	1.473	0.028	1.5009	1.9662	0.0752	2.0414
	32	32TD1	0.0498	0	0.0498	0.0485	0	0.0485			-	0	0		0.0983	0	0.0983
		32TD2	0.0996	0	0.0996	0.0971	0	0.0971			-	0	0		0.1967	0	0.1967
		32TD3	0.0498	0	0.0498	0.0485	0	0.0485			-	0	0		0.0983	0	0.0983
		32TN1	0.0486	0.0047	0.0533	0.0474	0.0045	0.0519			-	0.286	0.0054	0.2918	0.3824	0.0146	0.3970
		32TN2	0.0971	0.0093	0.1064	0.0947	0.0091	0.1038			-	0.573	0.0109	0.5837	0.7646	0.0293	0.7939
		32TN3	0.0486	0.0047	0.0533	0.0474	0.0045	0.0519			-	0.286	0.0054	0.2918	0.3824	0.0146	0.3970
FCLP at Ault Field	07	07TD1	0.1602	0	0.1602	0.1562	0	0.1562			-	0	0		0.3164	0	0.3164
		07TD2	0.3204	0	0.3204	0.3124	0	0.3124			-	0	0		0.6328	0	0.6328
		07TD3	0.1602	0	0.1602	0.1562	0	0.1562			-	0	0		0.3164	0	0.3164
		07TN1	0.1563	0.0662	0.2225	0.1524	0.0645	0.2169			-	0	0		0.3087	0.1307	0.4394
		07TN2	0.3126	0.1323	0.4449	0.3048	0.1289	0.4337			-	0	0		0.6174	0.2612	0.8786
		07TN3	0.1563	0.0662	0.2225	0.1524	0.0645	0.2169			-	0	0		0.3087	0.1307	0.4394
	25	25TD1	0.5422	0	0.5422	0.5287	0	0.5287			-	0	0		1.0709	0	1.0709
		25TD2	1.0844	0	1.0844	1.0574	0	1.0574			-	0	0		2.1418	0	2.1418
		25TD3	0.5422	0	0.5422	0.5287	0	0.5287			-	0	0		1.0709	0	1.0709
		25TN1	0.529	0.2239	0.7529	0.5158	0.2182	0.7340			-	0	0		1.0448	0.4421	1.4869
		25TN2	1.058	0.4478	1.5058	1.0317	0.4364	1.4681			-	0	0		2.0897	0.8842	2.9739
		25TN3	0.529	0.2239	0.7529	0.5158	0.2182	0.7340			-	0	0		1.0448	0.4421	1.4869
	14	14TD1	0.4436	0	0.4436	0.4326	0	0.4326			-	0	0		0.8762	0	0.8762
		14TD2	0.8872	0	0.8872	0.8652	0	0.8652			-	0	0		1.7524	0	1.7524
		14TD3	0.4436	0	0.4436	0.4326	0	0.4326			-	0	0		0.8762	0	0.8762
		14TN1	0.4328	0.1832	0.6160	0.4221	0.1785	0.6006			-	0	0		0.8549	0.3617	1.2166
		14TN2	0.8657	0.3664	1.2321	0.8441	0.357	1.2011			-	0	0		1.7098	0.7234	2.4332
		14TN3	0.4328	0.1832	0.6160	0.4221	0.1785	0.6006			-	0	0		0.8549	0.3617	1.2166
	32	32TD1	0.0863	0	0.0863	0.0841	0	0.0841			-	0	0		0.1704	0	0.1704
		32TD2	0.1725	0	0.1725	0.1682	0	0.1682			-	0	0		0.3407	0	0.3407
		32TD3	0.0863	0	0.0863	0.0841	0	0.0841			-	0	0		0.1704	0	0.1704
		32TN1	0.0842	0.0356	0.1198	0.0821	0.0347	0.1168			-	0	0		0.1663	0.0703	0.2366
		32TN2	0.1683	0.0712	0.2395	0.1641	0.0694	0.2335			-	0	0		0.3324	0.1406	0.4730
		32TN3	0.0842	0.0356	0.1198	0.0821	0.0347	0.1168			-	0	0		0.1663	0.0703	0.2366
GCA Pattern at Ault Field	07	07G1	0.081	0.073	0.1540	0.0791	0.0712	0.1503			-	0	0		0.1601	0.1442	0.3043
		07G2	0.0324	0.0292	0.0616	0.0316	0.0285	0.0601			-	0.385	0.0144	0.3998	0.4494	0.0721	0.5215
		07G3	0.0486	0.0438	0.0924	0.0474	0.0427	0.0901			-	0.385	0.0144	0.3998	0.4814	0.1009	0.5823
	25	25G1	0.2742	0.2471	0.5213	0.2676	0.2411	0.5087			-	0	0		0.5418	0.4882	1.0300
		25G2	0.1097	0.0988	0.2085	0.107	0.0964	0.2034			-	1.304	0.0488	1.3532	1.521	0.244	1.7651
		25G3	0.1645	0.1483	0.3128	0.1606	0.1447	0.3053			-	1.304	0.0488	1.3532	1.6294	0.3418	1.9713
	14	14G1	0.2244	0.2022	0.4266	0.219	0.1973	0.4163			-	0	0		0.4434	0.3995	0.8429
		14G2	0.0898	0.0809	0.1707	0.0876	0.0789	0.1665			-	1.067	0.0399	1.1071	1.2446	0.1997	1.4443
		14G3	0.1346	0.1213	0.2559	0.1314	0.1184	0.2498			-	1.067	0.0399	1.1071	1.3332	0.2796	1.6128
	32	32G1	0.0436	0.0393	0.0829	0.0426	0.0384	0.0810			-	0	0		0.0862	0.0777	0.1639
		32G2	0.0175	0.0157	0.0332	0.017	0.0153	0.0323			-	0.208	0.0078	0.2153	0.242	0.0388	0.2808
		32G3	0.0262	0.0236	0.0498	0.0255	0.023	0.0485			-	0.208	0.0078	0.2153	0.2592	0.0544	0.3136

Table A-4 Modeled Average Daily Flight Events at NASWI and Coupeville for Baseline (concluded)

Operation Type	Rwy ID	Flight Track	EA-6B Day (0700-2200)	EA-6B Night (2200-0700)	EA-6B Total	EA-18G Day (0700-2200)	EA-18G Night (2200-0700)	EA-18G Total	C-9 Day (0700-2200)	C-9 Night (2200-0700)	C-9 Total	P-3 Day (0700-2200)	P-3 Night (2200-0700)	P-3 Total	Total Day (0700-2200)	Total Night (2200-0700)	Total Total
Interfacility Ault Field to Coupeville	7	07WC14D	0.0328	0	0.0328	0.0319	0	0.0319			-	0	0		0.0647	0	0.0647
		07WC14N	0	0.002	0.0020	0	0.002	0.0020			-	0	0		0	0.004	0.0040
		07WC32D	0.0328	0	0.0328	0.0319	0	0.0319			-	0	0		0.0647	0	0.0647
		07WC32N	0	0.002	0.0020	0	0.002	0.0020			-	0	0		0	0.004	0.0040
	25	25WC14D	0.1109	0	0.1109	0.1079	0	0.1079			-	0	0		0.2188	0	0.2188
		25WC14N	0	0.0066	0.0066	0	0.0066	0.0066			-	0	0		0	0.0132	0.0132
		25WC32D	0.1109	0	0.1109	0.1079	0	0.1079			-	0	0		0.2188	0	0.2188
		25WC32N	0	0.0066	0.0066	0	0.0066	0.0066			-	0	0		0	0.0132	0.0132
	14	14WC14D	0.0907	0	0.0907	0.0883	0	0.0883			-	0	0		0.179	0	0.1790
		14WC14N	0	0.0054	0.0054	0	0.0054	0.0054			-	0	0		0	0.0108	0.0108
		14WC32D	0.0907	0	0.0907	0.0883	0	0.0883			-	0	0		0.179	0	0.1790
		14WC32N	0	0.0054	0.0054	0	0.0054	0.0054			-	0	0		0	0.0108	0.0108
	32	32WC14D	0.0176	0	0.0176	0.0172	0	0.0172			-	0	0		0.0348	0	0.0348
		32WC14N	0	0.0011	0.0011	0	0.0011	0.0011			-	0	0		0	0.0022	0.0022
		32WC32D	0.0176	0	0.0176	0.0172	0	0.0172			-	0	0		0.0348	0	0.0348
		32WC32N	0	0.0011	0.0011	0	0.0011	0.0011			-	0	0		0	0.0022	0.0022
FCLP at Coupeville	14	14TD1	0.2231	0	0.2231	0.2175	0	0.2175			-	0	0		0.4406	0	0.4406
		14TD2	0.4462	0	0.4462	0.4351	0	0.4351			-	0	0		0.8813	0	0.8813
		14TD3	0.2231	0	0.2231	0.2175	0	0.2175			-	0	0		0.4406	0	0.4406
		14TN1	0.2177	0.0271	0.2448	0.2122	0.0264	0.2386			-	0	0		0.4299	0.0535	0.4834
		14TN2	0.4353	0.0541	0.4894	0.4245	0.0527	0.4772			-	0	0		0.8598	0.1068	0.9666
		14TN3	0.2177	0.0271	0.2448	0.2122	0.0264	0.2386			-	0	0		0.4299	0.0535	0.4834
	32	32TD1	0.2231	0	0.2231	0.2175	0	0.2175			-	0	0		0.4406	0	0.4406
		32TD2	0.4462	0	0.4462	0.4351	0	0.4351			-	0	0		0.8813	0	0.8813
		32TD3	0.2231	0	0.2231	0.2175	0	0.2175			-	0	0		0.4406	0	0.4406
		32TN1	0.2177	0.0271	0.2448	0.2122	0.0264	0.2386			-	0	0		0.4299	0.0535	0.4834
		32TN2	0.4353	0.0541	0.4894	0.4245	0.0527	0.4772			-	0	0		0.8598	0.1068	0.9666
		32TN3	0.2177	0.0271	0.2448	0.2122	0.0264	0.2386			-	0	0		0.4299	0.0535	0.4834
Interfacility Coupeville to Ault Field	14	14CW07D	0.063	0	0.0630	0.0613	0	0.0613			-	0	0		0.1243	0	0.1243
		14CW07N	0	0.0038	0.0038	0	0.0038	0.0038			-	0	0		0	0.0076	0.0076
		14CW14D	0.063	0	0.0630	0.0613	0	0.0613			-	0	0		0.1243	0	0.1243
		14CW14N	0	0.0038	0.0038	0	0.0038	0.0038			-	0	0		0	0.0076	0.0076
		14CW25D	0.063	0	0.0630	0.0613	0	0.0613			-	0	0		0.1243	0	0.1243
		14CW25N	0	0.0038	0.0038	0	0.0038	0.0038			-	0	0		0	0.0076	0.0076
		14CW32D	0.063	0	0.0630	0.0613	0	0.0613			-	0	0		0.1243	0	0.1243
		14CW32N	0	0.0038	0.0038	0	0.0038	0.0038			-	0	0		0	0.0076	0.0076
	32	32CW07D	0.063	0	0.0630	0.0613	0	0.0613			-	0	0		0.1243	0	0.1243
		32CW07N	0	0.0038	0.0038	0	0.0038	0.0038			-	0	0		0	0.0076	0.0076
		32CW14D	0.063	0	0.0630	0.0613	0	0.0613			-	0	0		0.1243	0	0.1243
		32CW14N	0	0.0038	0.0038	0	0.0038	0.0038			-	0	0		0	0.0076	0.0076
		32CW25D	0.063	0	0.0630	0.0613	0	0.0613			-	0	0		0.1243	0	0.1243
		32CW25N	0	0.0038	0.0038	0	0.0038	0.0038			-	0	0		0	0.0076	0.0076
		32CW32D	0.063	0	0.0630	0.0613	0	0.0613			-	0	0		0.1243	0	0.1243
		32CW32N	0	0.0038	0.0038	0	0.0038	0.0038			-	0	0		0	0.0076	0.0076
Departure			5.0467	0.3287	5.3754	4.9204	0.3208	5.2412	0.5372	0.2906	0.8278	20.658	0.7997	21.4575	31.162	1.7398	32.9019
Straight-in VFR			0	0	-	0	0	-	0.537	0.2904	0.8274	14.589	0.6276	15.2164	15.126	0.918	16.0438
Straight-in IFR			1.8026	0.0496	1.8522	1.7588	0.0465	1.8053	0	0	-	3.0355	0.0849	3.1205	6.5969	0.181	6.7780
TACAN Arrival			0.5809	0.0494	0.6303	0.5671	0.0467	0.6138	0	0	-	3.0356	0.0849	3.1205	4.1836	0.181	4.3646
Overhead Break Arrival			2.6329	0.2602	2.8931	2.5671	0.2546	2.8217	0	0	-	0	0	-	5.2	0.5148	5.7148
Touch and Go at Ault Field			5.6204	0.2657	5.8861	5.4794	0.2589	5.7383	0	0	-	16.366	0.3109	16.6767	27.466	0.8355	28.3011
FCLP at Ault Field			9.7383	2.0355	11.7738	9.4959	1.9835	11.4794	0	0	-	0	0	-	19.234	4.019	23.2532
Depart and Re-enter			0.145	0.011	0.1560	0.1424	0.011	0.1534	0	0	-	0	0	-	0.2874	0.022	0.3094
GCA Pattern at Ault Field			1.2465	1.1232	2.3697	1.2164	1.0959	2.3123	0	0	-	5.9288	0.2218	6.1507	8.3917	2.4409	10.8327
Interfacility from Ault Field to Coupeville			0.504	0.0302	0.5342	0.4906	0.0302	0.5208	0	0	-	0	0	-	0.9946	0.0604	1.0550
FCLP at Coupeville			3.5262	0.2166	3.7428	3.438	0.211	3.6490	0	0	-	0	0	-	6.9642	0.4276	7.3918
Interfacility from Coupeville to Ault Field			0.504	0.0304	0.5344	0.4904	0.0304	0.5208	0	0	-	0	0	-	0.9944	0.0608	1.0552
Total			31.348	4.4005	35.748	30.567	4.2895	34.856	1.0742	0.581	1.6552	63.612	2.1298	65.7425	126.6	11.401	138.002

Table A-5 Modeled Average Daily Flight Events at NASWI and Coupeville for Proposed

Operation Type	Rwy	Flight Track	EA-18G			C-9			P-3			Total		
	ID		Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total
Departure MIL	07	07D1	0.1015	0.0066	0.1081			-				0.1015	0.0066	0.1081
		07D2	0.0709	0.0045	0.0754	0.014	0.0076	0.0216	0.2503	0.0097	0.2600	0.3352	0.0218	0.3570
		07D3	0.0304	0.002	0.0324	0.014	0.0076	0.0216	0.2503	0.0097	0.2600	0.2947	0.0193	0.3140
		07D4	0.0435	0.0029	0.0464			-				0.0435	0.0029	0.0464
		07D5	0.0304	0.002	0.0324	0.0209	0.0113	0.0322	0.3755	0.0145	0.3900	0.4268	0.0278	0.4546
		07D6	0.0131	0.0009	0.0140	0.0209	0.0113	0.0322	0.3755	0.0145	0.3900	0.4095	0.0267	0.4362
	25	25D1	0.3434	0.0224	0.3658			-				0.3434	0.0224	0.3658
		25D2	0.2403	0.0156	0.2559	0.0473	0.0256	0.0729	0.8472	0.0328	0.8800	1.1348	0.074	1.2088
		25D3	0.1031	0.0068	0.1099	0.0473	0.0256	0.0729	0.8472	0.0328	0.8800	0.9976	0.0652	1.0628
		25D4	0.1472	0.0095	0.1567			-				0.1472	0.0095	0.1567
		25D5	0.1031	0.0068	0.1099	0.0709	0.0383	0.1092	1.2708	0.0492	1.3201	1.4448	0.0943	1.5392
		25D6	0.0442	0.0029	0.0471	0.0709	0.0383	0.1092	1.2708	0.0492	1.3201	1.3859	0.0904	1.4764
	14	14D1	0.2809	0.0183	0.2992			-				0.2809	0.0183	0.2992
		14D2	0.1966	0.0129	0.2095	0.0387	0.0209	0.0596	0.6932	0.0268	0.7200	0.9285	0.0606	0.9891
		14D3	0.0843	0.0054	0.0897	0.0387	0.0209	0.0596	0.6932	0.0268	0.7200	0.8162	0.0531	0.8693
		14D4	0.1203	0.0079	0.1282			-				0.1203	0.0079	0.1282
		14D5	0.0843	0.0054	0.0897	0.058	0.0314	0.0894	1.0398	0.0403	1.0800	1.1821	0.0771	1.2591
		14D6	0.036	0.0023	0.0383	0.058	0.0314	0.0894	1.0398	0.0403	1.0800	1.1338	0.074	1.2077
	32	32D1	0.0546	0.0036	0.0582			-				0.0546	0.0036	0.0582
		32D2	0.0383	0.0025	0.0408	0.0075	0.0041	0.0116	0.1348	0.0052	0.1400	0.1806	0.0118	0.1924
		32D3	0.0163	0.0011	0.0174	0.0075	0.0041	0.0116	0.1348	0.0052	0.1400	0.1586	0.0104	0.1690
		32D4	0.0233	0.0016	0.0249			-				0.0233	0.0016	0.0249
		32D5	0.0163	0.0011	0.0174	0.0113	0.0061	0.0174	0.2022	0.0078	0.2100	0.2298	0.015	0.2448
		32D6	0.007	0.0005	0.0075	0.0113	0.0061	0.0174	0.2022	0.0078	0.2100	0.2205	0.0144	0.2349
Departure Afterburner	07	07D1	0.4057	0.0265	0.4322			-				0.4057	0.0265	0.4322
		07D2	0.284	0.0186	0.3026			-				0.284	0.0186	0.3026
		07D3	0.1216	0.0079	0.1295			-				0.1216	0.0079	0.1295
		07D4	0.174	0.0113	0.1853			-				0.174	0.0113	0.1853
		07D5	0.1216	0.0079	0.1295			-				0.1216	0.0079	0.1295
		07D6	0.0521	0.0034	0.0555			-				0.0521	0.0034	0.0555
	25	25D1	1.373	0.0895	1.4625			-				1.373	0.0895	1.4625
		25D2	0.961	0.0625	1.0235			-				0.961	0.0625	1.0235
		25D3	0.412	0.0267	0.4387			-				0.412	0.0267	0.4387
		25D4	0.5884	0.0383	0.6267			-				0.5884	0.0383	0.6267
		25D5	0.412	0.0267	0.4387			-				0.412	0.0267	0.4387
		25D6	0.1764	0.0116	0.1880			-				0.1764	0.0116	0.1880
	14	14D1	1.1234	0.0732	1.1966			-				1.1234	0.0732	1.1966
		14D2	0.7864	0.0512	0.8376			-				0.7864	0.0512	0.8376
		14D3	0.337	0.022	0.3590			-				0.337	0.022	0.3590
		14D4	0.4815	0.0313	0.5128			-				0.4815	0.0313	0.5128
		14D5	0.337	0.022	0.3590			-				0.337	0.022	0.3590
		14D6	0.1445	0.0095	0.1540			-				0.1445	0.0095	0.1540
	32	32D1	0.2183	0.0143	0.2326			-				0.2183	0.0143	0.2326
		32D2	0.1529	0.01	0.1629			-				0.1529	0.01	0.1629
		32D3	0.0655	0.0043	0.0698			-				0.0655	0.0043	0.0698
		32D4	0.0935	0.0061	0.0996			-				0.0935	0.0061	0.0996
		32D5	0.0655	0.0043	0.0698			-				0.0655	0.0043	0.0698
		32D6	0.0281	0.0018	0.0299			-				0.0281	0.0018	0.0299
Low TACAN Departure	07	07DHT							1.4339	0.0555	1.4894	1.4339	0.0555	1.4894
	25	25DHT							3.9708	0.1538	5.0411	3.9708	0.1538	5.0411
	14	14DHT							4.8532	0.1879	4.1246	4.8532	0.1879	4.1246
	32	32DHT							0.7721	0.0299	0.8020	0.7721	0.0299	0.8020

Table A-5 Modeled Average Daily Flight Events at NASWI and Coupeville for Proposed (continued)

Operation Type	Rwy ID	Flight Track	EA-18G			C-9			P-3			Total		
			Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total
Straight-in Arrival (VFR)	07	07A1			-	0.0279	0.0151	0.0430	0.7586	0.0326	0.7913	0.7865	0.0477	0.8343
		07A2			-	0.0209	0.0113	0.0322	0.569	0.0245	0.5934	0.5899	0.0358	0.6256
		07A3			-	0.0209	0.0113	0.0322	0.569	0.0245	0.5934	0.5899	0.0358	0.6256
	25	25A1			-	0.0945	0.0511	0.1456	2.5677	0.1104	2.6781	2.6622	0.1615	2.8237
		25A2			-	0.0709	0.0383	0.1092	1.9258	0.0828	2.0086	1.9967	0.1211	2.1178
		25A3			-	0.0709	0.0383	0.1092	1.9258	0.0828	2.0086	1.9967	0.1211	2.1178
	14	14A1			-	0.0387	0.0209	0.0596	1.0504	0.0452	1.0956	1.0891	0.0661	1.1552
		14A2			-	0.0387	0.0209	0.0596	1.0504	0.0452	1.0956	1.0891	0.0661	1.1552
		14A3			-	0.058	0.0314	0.0894	1.5756	0.0678	1.6434	1.6336	0.0992	1.7328
		14A4			-	0.058	0.0314	0.0894	1.5756	0.0678	1.6434	1.6336	0.0992	1.7328
	32	32A1			-	0.0075	0.0041	0.0116	0.2042	0.0088	0.2130	0.2117	0.0129	0.2246
		32A2			-	0.0075	0.0041	0.0116	0.2042	0.0088	0.2130	0.2117	0.0129	0.2246
		32A3			-	0.0113	0.0061	0.0174	0.3064	0.0132	0.3195	0.3177	0.0193	0.3369
		32A4			-	0.0113	0.0061	0.0174	0.3064	0.0132	0.3195	0.3177	0.0193	0.3369
Straight-in Arrival (IFR)	07	07A4A	0.1811	0.0051	0.1862			-				0.1811	0.0051	0.1862
		07A4B	0.1267	0.0036	0.1303			-	0.0789	0.0022	0.0811	0.2056	0.0058	0.2114
		07A4C	0.0543	0.0014	0.0557			-	0.0789	0.0022	0.0811	0.1332	0.0036	0.1368
		07A5A	0.0776	0.0022	0.0798			-				0.0776	0.0022	0.0798
		07A5B	0.0543	0.0014	0.0557			-	0.1184	0.0033	0.1217	0.1727	0.0047	0.1774
		07A5C	0.0233	0.0007	0.0240			-	0.1184	0.0033	0.1217	0.1417	0.004	0.1457
	25	25A4	1.226	0.0345	1.2605			-	0.5343	0.0149	0.5492	1.7603	0.0494	1.8097
		25A5A	0.2628	0.0075	0.2703			-				0.2628	0.0075	0.2703
		25A5B	0.184	0.0053	0.1893			-	0.4007	0.0112	0.4119	0.5847	0.0165	0.6012
		25A5C	0.0788	0.0022	0.0810			-	0.4007	0.0112	0.4119	0.4795	0.0134	0.4929
	14	14A5A	0.5015	0.0142	0.5157			-				0.5015	0.0142	0.5157
		14A5B	0.351	0.0099	0.3609			-	0.2186	0.0061	0.2247	0.5696	0.016	0.5856
		14A5C	0.1505	0.0043	0.1548			-	0.2186	0.0061	0.2247	0.3691	0.0104	0.3795
		14A6A	0.215	0.006	0.2210			-				0.215	0.006	0.2210
		14A6B	0.1505	0.0043	0.1548			-	0.3278	0.0092	0.3370	0.4783	0.0135	0.4918
		14A6C	0.0645	0.0019	0.0664			-	0.3278	0.0092	0.3370	0.3923	0.0111	0.4034
	32	32A5A	0.0975	0.0027	0.1002			-				0.0975	0.0027	0.1002
		32A5B	0.0683	0.0019	0.0702			-	0.0425	0.0012	0.0437	0.1108	0.0031	0.1139
		32A5C	0.0292	0.0007	0.0299			-	0.0425	0.0012	0.0437	0.0717	0.0019	0.0736
		32A6A	0.0419	0.0012	0.0431			-				0.0419	0.0012	0.0431
		32A6B	0.0292	0.0007	0.0299			-	0.0637	0.0018	0.0655	0.0929	0.0025	0.0954
		32A6C	0.0124	0.0002	0.0126			-	0.0637	0.0018	0.0655	0.0761	0.002	0.0781
High TACAN Arrival	07	07AHT	0.1668	0.0147	0.1815			-				0.1668	0.0147	0.1815
	25	25AHT	0.5647	0.0495	0.6142			-				0.5647	0.0495	0.6142
	14	14AHT	0.4621	0.0406	0.5027			-				0.4621	0.0406	0.5027
	32	32AHT	0.0898	0.008	0.0978			-				0.0898	0.008	0.0978
Low TACAN Arrival	07	07ALT			-			-	0.3946	0.011	0.4057	0.3946	0.011	0.4057
	25	25ALT			-			-	1.3357	0.0374	1.3730	1.3357	0.0374	1.3730
	14	14ALT			-			-	1.0928	0.0306	1.1234	1.0928	0.0306	1.1234
	32	32ALT			-			-	0.2125	0.0059	0.2184	0.2125	0.0059	0.2184

Table A-5 Modeled Average Daily Flight Events at NASWI and Coupeville for Proposed (continued)

Operation Type	Rwy ID	Flight Track	EA-18G Day (0700-2200)	EA-18G Night (2200-0700)	EA-18G Total	C-9 Day (0700-2200)	C-9 Night (2200-0700)	C-9 Total	P-3 Day (0700-2200)	P-3 Night (2200-0700)	P-3 Total	Total Day (0700-2200)	Total Night (2200-0700)	Total Total
Overhead Break Arrival	07	07OD1A	0.2243		0.2243			-				0.2243		0.2243
		07OD1B	0.2243		0.2243			-				0.2243		0.2243
		07OD1C	0.2311		0.2311			-				0.2311		0.2311
		07OD2A	0.0249		0.0249			-				0.0249		0.0249
		07OD2B	0.0249		0.0249			-				0.0249		0.0249
		07OD2C	0.0256		0.0256			-				0.0256		0.0256
		07ON1A		0.0237	0.0237			-					0.0237	0.0237
		07ON1B		0.0237	0.0237			-					0.0237	0.0237
		07ON1C		0.0244	0.0244			-					0.0244	0.0244
		07ON2A		0.0027	0.0027			-					0.0027	0.0027
		07ON2B		0.0027	0.0027			-					0.0027	0.0027
		07ON2C		0.0027	0.0027			-					0.0027	0.0027
	25	25OD1A	0.7593		0.7593			-				0.7593		0.7593
		25OD1B	0.7593		0.7593			-				0.7593		0.7593
		25OD1C	0.7822		0.7822			-				0.7822		0.7822
		25OD2A	0.0844		0.0844			-				0.0844		0.0844
		25OD2B	0.0844		0.0844			-				0.0844		0.0844
		25OD2C	0.0869		0.0869			-				0.0869		0.0869
		25ON1A		0.0804	0.0804			-					0.0804	0.0804
		25ON1B		0.0804	0.0804			-					0.0804	0.0804
		25ON1C		0.0828	0.0828			-					0.0828	0.0828
		25ON2A		0.0089	0.0089			-					0.0089	0.0089
		25ON2B		0.0089	0.0089			-					0.0089	0.0089
		25ON2C		0.0092	0.0092			-					0.0092	0.0092
	14	14OD1A	0.6212		0.6212			-				0.6212		0.6212
		14OD1B	0.6212		0.6212			-				0.6212		0.6212
		14OD1C	0.64		0.6400			-				0.64		0.6400
		14OD2A	0.069		0.0690			-				0.069		0.0690
		14OD2B	0.069		0.0690			-				0.069		0.0690
		14OD2C	0.0711		0.0711			-				0.0711		0.0711
		14ON1A		0.0657	0.0657			-					0.0657	0.0657
		14ON1B		0.0657	0.0657			-					0.0657	0.0657
		14ON1C		0.0678	0.0678			-					0.0678	0.0678
		14ON2A		0.0072	0.0072			-					0.0072	0.0072
		14ON2B		0.0072	0.0072			-					0.0072	0.0072
		14ON2C		0.0075	0.0075			-					0.0075	0.0075
	32	32OD1A	0.1209		0.1209			-				0.1209		0.1209
		32OD1B	0.1209		0.1209			-				0.1209		0.1209
		32OD1C	0.1245		0.1245			-				0.1245		0.1245
		32OD2A	0.0134		0.0134			-				0.0134		0.0134
		32OD2B	0.0134		0.0134			-				0.0134		0.0134
		32OD2C	0.0138		0.0138			-				0.0138		0.0138
		32ON1A		0.0128	0.0128			-					0.0128	0.0128
		32ON1B		0.0128	0.0128			-					0.0128	0.0128
		32ON1C		0.0133	0.0133			-					0.0133	0.0133
		32ON2A		0.0014	0.0014			-					0.0014	0.0014
		32ON2B		0.0014	0.0014			-					0.0014	0.0014
		32ON2C		0.0014	0.0014			-					0.0014	0.0014
Depart and Re-enter	07	07DR	0.0207	0.0016	0.0223			-				0.0207	0.0016	0.0223
		07DL	0.0207	0.0016	0.0223			-				0.0207	0.0016	0.0223
	25	25DR	0.0569	0.0045	0.0614			-				0.0569	0.0045	0.0614
		25DL	0.0569	0.0045	0.0614			-				0.0569	0.0045	0.0614
	14	14DR	0.0696	0.0054	0.0750			-				0.0696	0.0054	0.0750
		14DL	0.0696	0.0054	0.0750			-				0.0696	0.0054	0.0750
	32	32DR	0.0111	0.0009	0.0120			-				0.0111	0.0009	0.0120
		32DL	0.0111	0.0009	0.0120			-				0.0111	0.0009	0.0120

Table A-5 Modeled Average Daily Flight Events at NASWI and Coupeville for Proposed (continued)

Operation Type	Rwy	Flight Track	EA-18G			C-9			P-3			Total		
	ID		Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total
Touch and Go at Ault Field	07	07TD1	0.2004		0.2004			-				0.2004		0.2004
		07TD2	0.401		0.4010			-				0.401		0.4010
		07TD3	0.2004		0.2004			-				0.2004		0.2004
		07TN1	0.1955	0.0189	0.2144			-	0.5319	0.0101	0.5420	0.7274	0.029	0.7564
		07TN2	0.3912	0.0377	0.4289			-	1.0638	0.0202	1.0840	1.455	0.0579	1.5129
		07TN3	0.1955	0.0189	0.2144			-	0.5319	0.0101	0.5420	0.7274	0.029	0.7564
	25	25TD1	0.6786		0.6786			-				0.6786		0.6786
		25TD2	1.3571		1.3571			-				1.3571		1.3571
		25TD3	0.6786		0.6786			-				0.6786		0.6786
		25TN1	0.6621	0.064	0.7261			-	1.8002	0.0342	1.8344	2.4623	0.0982	2.5605
		25TN2	1.324	0.128	1.4520			-	3.6005	0.0684	3.6689	4.9245	0.1964	5.1209
		25TN3	0.6621	0.064	0.7261			-	1.8002	0.0342	1.8344	2.4623	0.0982	2.5605
	14	14TD1	0.5551		0.5551			-				0.5551		0.5551
		14TD2	1.1103		1.1103			-				1.1103		1.1103
		14TD3	0.5551		0.5551			-				0.5551		0.5551
		14TN1	0.5416	0.0523	0.5939			-	1.4729	0.028	1.5009	2.0145	0.0803	2.0948
		14TN2	1.0834	0.1046	1.1880			-	2.9458	0.056	3.0018	4.0292	0.1606	4.1898
		14TN3	0.5416	0.0523	0.5939			-	1.4729	0.028	1.5009	2.0145	0.0803	2.0948
	32	32TD1	0.1079		0.1079			-				0.1079		0.1079
		32TD2	0.216		0.2160			-				0.216		0.2160
		32TD3	0.1079		0.1079			-				0.1079		0.1079
		32TN1	0.1054	0.0101	0.1155			-	0.2864	0.0054	0.2918	0.3918	0.0155	0.4073
		32TN2	0.2106	0.0204	0.2310			-	0.5728	0.0109	0.5837	0.7834	0.0313	0.8147
		32TN3	0.1054	0.0101	0.1155			-	0.2864	0.0054	0.2918	0.3918	0.0155	0.4073
FCLP at Ault Field	07	07TD1	0.3168		0.3168			-				0.3168		0.3168
		07TD2	0.6335		0.6335			-				0.6335		0.6335
		07TD3	0.3168		0.3168			-				0.3168		0.3168
		07TN1	0.3091	0.1307	0.4398			-				0.3091	0.1307	0.4398
		07TN2	0.6181	0.2612	0.8793			-				0.6181	0.2612	0.8793
		07TN3	0.3091	0.1307	0.4398			-				0.3091	0.1307	0.4398
	25	25TD1	1.0722		1.0722			-				1.0722		1.0722
		25TD2	2.1444		2.1444			-				2.1444		2.1444
		25TD3	1.0722		1.0722			-				1.0722		1.0722
		25TN1	1.046	0.4421	1.4881			-				1.046	0.4421	1.4881
		25TN2	2.0923	0.8841	2.9764			-				2.0923	0.8841	2.9764
		25TN3	1.046	0.4421	1.4881			-				1.046	0.4421	1.4881
	14	14TD1	0.8773		0.8773			-				0.8773		0.8773
		14TD2	1.7546		1.7546			-				1.7546		1.7546
		14TD3	0.8773		0.8773			-				0.8773		0.8773
		14TN1	0.856	0.3616	1.2176			-				0.856	0.3616	1.2176
		14TN2	1.7118	0.7233	2.4351			-				1.7118	0.7233	2.4351
		14TN3	0.856	0.3616	1.2176			-				0.856	0.3616	1.2176
	32	32TD1	0.1706		0.1706			-				0.1706		0.1706
		32TD2	0.3411		0.3411			-				0.3411		0.3411
		32TD3	0.1706		0.1706			-				0.1706		0.1706
		32TN1	0.1665	0.0703	0.2368			-				0.1665	0.0703	0.2368
		32TN2	0.3328	0.1406	0.4734			-				0.3328	0.1406	0.4734
		32TN3	0.1665	0.0703	0.2368			-				0.1665	0.0703	0.2368
GCA Pattern at Ault Field	07	07G1	0.1759	0.1599	0.3358			-				0.1759	0.1599	0.3358
		07G2	0.0703	0.064	0.1343			-	0.3854	0.0144	0.3998	0.4557	0.0784	0.5341
		07G3	0.1054	0.0959	0.2013			-	0.3854	0.0144	0.3998	0.4908	0.1103	0.6011
	25	25G1	0.5952	0.5414	1.1366			-				0.5952	0.5414	1.1366
		25G2	0.238	0.2165	0.4545			-	1.3043	0.0488	1.3532	1.5423	0.2653	1.8077
		25G3	0.3572	0.325	0.6822			-	1.3043	0.0488	1.3532	1.6615	0.3738	2.0354
	14	14G1	0.4871	0.4431	0.9302			-				0.4871	0.4431	0.9302
		14G2	0.1948	0.1772	0.3720			-	1.0672	0.0399	1.1071	1.262	0.2171	1.4791
		14G3	0.2922	0.2659	0.5581			-	1.0672	0.0399	1.1071	1.3594	0.3058	1.6652
	32	32G1	0.0947	0.0862	0.1809			-				0.0947	0.0862	0.1809
		32G2	0.0378	0.0344	0.0722			-	0.2075	0.0078	0.2153	0.2453	0.0422	0.2875
		32G3	0.0567	0.0517	0.1084			-	0.2075	0.0078	0.2153	0.2642	0.0595	0.3237

Table A-5 Modeled Average Daily Flight Events at NASWI and Coupeville for Proposed (concluded)

Operation Type	Rwy ID	Flight Track	EA-18G Day (0700-2200)	EA-18G Night (2200-0700)	EA-18G Total	C-9 Day (0700-2200)	C-9 Night (2200-0700)	C-9 Total	P-3 Day (0700-2200)	P-3 Night (2200-0700)	P-3 Total	Total Day (0700-2200)	Total Night (2200-0700)	Total
Interfacility Ault Field to Coupeville	7	07WC14D	0.0647		0.0647			-				0.0647		0.0647
		07WC14N		0.0041	0.0041			-					0.0041	0.0041
		07WC32D	0.0647		0.0647			-				0.0647		0.0647
		07WC32N		0.0041	0.0041			-					0.0041	0.0041
	25	25WC14D	0.2188		0.2188			-				0.2188		0.2188
		25WC14N		0.0134	0.0134			-					0.0134	0.0134
		25WC32D	0.2188		0.2188			-				0.2188		0.2188
		25WC32N		0.0134	0.0134			-					0.0134	0.0134
	14	14WC14D	0.1791		0.1791			-				0.1791		0.1791
		14WC14N		0.0109	0.0109			-					0.0109	0.0109
		14WC32D	0.1791		0.1791			-				0.1791		0.1791
		14WC32N		0.0109	0.0109			-					0.0109	0.0109
	32	32WC14D	0.0349		0.0349			-				0.0349		0.0349
		32WC14N		0.0022	0.0022			-					0.0022	0.0022
		32WC32D	0.0349		0.0349			-				0.0349		0.0349
		32WC32N		0.0022	0.0022			-					0.0022	0.0022
FCLP at Coupeville	14	14TD1	0.4411		0.4411			-				0.4411		0.4411
		14TD2	0.8824		0.8824			-				0.8824		0.8824
		14TD3	0.4411		0.4411			-				0.4411		0.4411
		14TN1	0.4303	0.0535	0.4838			-				0.4303	0.0535	0.4838
		14TN2	0.8609	0.1068	0.9677			-				0.8609	0.1068	0.9677
		14TN3	0.4303	0.0535	0.4838			-				0.4303	0.0535	0.4838
	32	32TD1	0.4411		0.4411			-				0.4411		0.4411
		32TD2	0.8824		0.8824			-				0.8824		0.8824
		32TD3	0.4411		0.4411			-				0.4411		0.4411
		32TN1	0.4303	0.0535	0.4838			-				0.4303	0.0535	0.4838
		32TN2	0.8609	0.1068	0.9677			-				0.8609	0.1068	0.9677
		32TN3	0.4303	0.0535	0.4838			-				0.4303	0.0535	0.4838
Interfacility Coupeville to Ault Field	14	14CW07D	0.1243		0.1243			-				0.1243		0.1243
		14CW07N		0.0077	0.0077			-					0.0077	0.0077
		14CW14D	0.1243		0.1243			-				0.1243		0.1243
		14CW14N		0.0077	0.0077			-					0.0077	0.0077
		14CW25D	0.1243		0.1243			-				0.1243		0.1243
		14CW25N		0.0077	0.0077			-					0.0077	0.0077
		14CW32D	0.1243		0.1243			-				0.1243		0.1243
		14CW32N		0.0077	0.0077			-					0.0077	0.0077
	32	32CW07D	0.1243		0.1243			-				0.1243		0.1243
		32CW07N		0.0077	0.0077			-					0.0077	0.0077
		32CW14D	0.1243		0.1243			-				0.1243		0.1243
		32CW14N		0.0077	0.0077			-					0.0077	0.0077
		32CW25D	0.1243		0.1243			-				0.1243		0.1243
		32CW25N		0.0077	0.0077			-					0.0077	0.0077
		32CW32D	0.1243		0.1243			-				0.1243		0.1243
		32CW32N		0.0077	0.0077			-					0.0077	0.0077
Departure			11.145	0.7264	11.8711	0.5372	0.2906	0.8278	20.658	0.7997	21.4575	32.34	1.8167	34.1564
Straight-in VFR					-	0.537	0.2904	0.8274	14.589	0.6276	15.2164	15.126	0.918	16.0438
Straight-in IFR			3.9804	0.1119	4.0923			-	3.0355	0.0849	3.1205	7.0159	0.1968	7.2128
TACAN Arrival			1.2834	0.1128	1.3962			-	3.0356	0.0849	3.1205	4.319	0.1977	4.5167
Overhead Break Arrival			5.81	0.6147	6.4247			-			-	5.81	0.6147	6.4247
Touch and Go at Ault Field			12.187	0.5813	12.7681			-	16.366	0.3109	16.6767	28.553	0.8922	29.4448
FCLP at Ault Field			19.258	4.0186	23.2762			-			-	19.258	4.0186	23.2762
Depart and Re-enter			0.3166	0.0248	0.3414			-			-	0.3166	0.0248	0.3414
GCA Pattern at Ault Field			2.7053	2.4612	5.1665			-	5.9288	0.2218	6.1507	8.6341	2.683	11.3172
Interfacility from Ault Field to Coupeville			0.995	0.0612	1.0562			-			-	0.995	0.0612	1.0562
FCLP at Coupeville			6.9722	0.4276	7.3998			-			-	6.9722	0.4276	7.3998
Interfacility from Coupeville to Ault Field			0.9944	0.0616	1.0560			-			-	0.9944	0.0616	1.0560
Total			65.646	9.2021	74.8485	1.0742	0.581	1.6552	63.612	2.1298	65.7425	130.33	11.913	142.246

Table A-6 Modeled Average Daily Flight Events at NASWI and Coupeville for Cumulative

Operation Type	Rwy ID	Flight Track	EA-18G Day (0700-2200)	EA-18G Night (2200-0700)	EA-18G Total	C-9 Day (0700-2200)	C-9 Night (2200-0700)	C-9 Total	P-3 Day (0700-2200)	P-3 Night (2200-0700)	P-3 Total	P-8 Day (0700-2200)	P-8 Night (2200-0700)	P-8 Total	Total Day (0700-2200)	Total Night (2200-0700)	Total Total
Departure MIL	07	07D1	0.1015	0.0066	0.1080			-			-			-	0.1015	0.0066	0.1080
		07D2	0.0709	0.0045	0.0754	0.0140	0.0076	0.0215	0.0257	0.0034	0.0291	0.0561	0.0017	0.0578	0.1667	0.0172	0.1838
		07D3	0.0304	0.0020	0.0324	0.0140	0.0076	0.0215	0.0257	0.0034	0.0291	0.0561	0.0017	0.0578	0.1261	0.0147	0.1408
		07D4	0.0435	0.0029	0.0464			-			-			-	0.0435	0.0029	0.0464
		07D5	0.0304	0.0020	0.0324	0.0209	0.0113	0.0323	0.0385	0.0050	0.0435	0.0842	0.0025	0.0867	0.1740	0.0209	0.1949
		07D6	0.0131	0.0009	0.0140	0.0209	0.0113	0.0323	0.0385	0.0050	0.0435	0.0842	0.0025	0.0867	0.1568	0.0197	0.1765
	25	25D1	0.3434	0.0224	0.3658			-			-			-	0.3434	0.0224	0.3658
		25D2	0.2403	0.0156	0.2559	0.0473	0.0256	0.0728	0.0869	0.0113	0.0982	0.1899	0.0057	0.1956	0.5644	0.0582	0.6226
		25D3	0.1031	0.0068	0.1099	0.0473	0.0256	0.0728	0.0869	0.0113	0.0982	0.1899	0.0057	0.1956	0.4271	0.0494	0.4765
		25D4	0.1472	0.0095	0.1567			-			-			-	0.1472	0.0095	0.1567
		25D5	0.1031	0.0068	0.1099	0.0709	0.0383	0.1092	0.1303	0.0170	0.1473	0.2848	0.0086	0.2934	0.5890	0.0707	0.6598
		25D6	0.0442	0.0029	0.0471	0.0709	0.0383	0.1092	0.1303	0.0170	0.1473	0.2848	0.0086	0.2934	0.5301	0.0669	0.5970
	14	14D1	0.2809	0.0183	0.2992			-			-			-	0.2809	0.0183	0.2992
		14D2	0.1966	0.0129	0.2095	0.0387	0.0209	0.0596	0.0711	0.0093	0.0804	0.1554	0.0047	0.1601	0.4618	0.0478	0.5096
		14D3	0.0843	0.0054	0.0897	0.0387	0.0209	0.0596	0.0711	0.0093	0.0804	0.1554	0.0047	0.1601	0.3494	0.0403	0.3898
		14D4	0.1203	0.0079	0.1282			-			-			-	0.1203	0.0079	0.1282
		14D5	0.0843	0.0054	0.0897	0.0580	0.0314	0.0894	0.1066	0.0139	0.1205	0.2331	0.0070	0.2401	0.4820	0.0577	0.5397
		14D6	0.0360	0.0023	0.0383	0.0580	0.0314	0.0894	0.1066	0.0139	0.1205	0.2331	0.0070	0.2401	0.4337	0.0545	0.4882
	32	32D1	0.0546	0.0036	0.0582			-			-			-	0.0546	0.0036	0.0582
		32D2	0.0383	0.0025	0.0408	0.0075	0.0041	0.0116	0.0138	0.0018	0.0156	0.0302	0.0009	0.0311	0.0898	0.0093	0.0991
		32D3	0.0163	0.0011	0.0174	0.0075	0.0041	0.0116	0.0138	0.0018	0.0156	0.0302	0.0009	0.0311	0.0678	0.0079	0.0757
		32D4	0.0233	0.0016	0.0249			-			-			-	0.0233	0.0016	0.0249
		32D5	0.0163	0.0011	0.0174	0.0113	0.0061	0.0174	0.0207	0.0027	0.0234	0.0453	0.0014	0.0467	0.0936	0.0113	0.1049
		32D6	0.0070	0.0005	0.0075	0.0113	0.0061	0.0174	0.0207	0.0027	0.0234	0.0453	0.0014	0.0467	0.0843	0.0107	0.0949
Departure Afterburner	07	07D1	0.4057	0.0265	0.4322			-			-			-	0.4057	0.0265	0.4322
		07D2	0.2840	0.0186	0.3026			-			-			-	0.2840	0.0186	0.3026
		07D3	0.1216	0.0079	0.1296			-			-			-	0.1216	0.0079	0.1296
		07D4	0.1740	0.0113	0.1853			-			-			-	0.1740	0.0113	0.1853
		07D5	0.1216	0.0079	0.1296			-			-			-	0.1216	0.0079	0.1296
		07D6	0.0521	0.0034	0.0555			-			-			-	0.0521	0.0034	0.0555
	25	25D1	1.3730	0.0895	1.4625			-			-			-	1.3730	0.0895	1.4625
		25D2	0.9610	0.0625	1.0236			-			-			-	0.9610	0.0625	1.0236
		25D3	0.4120	0.0267	0.4387			-			-			-	0.4120	0.0267	0.4387
		25D4	0.5884	0.0383	0.6267			-			-			-	0.5884	0.0383	0.6267
		25D5	0.4120	0.0267	0.4387			-			-			-	0.4120	0.0267	0.4387
		25D6	0.1764	0.0116	0.1880			-			-			-	0.1764	0.0116	0.1880
	14	14D1	1.1234	0.0732	1.1966			-			-			-	1.1234	0.0732	1.1966
		14D2	0.7864	0.0512	0.8376			-			-			-	0.7864	0.0512	0.8376
		14D3	0.3370	0.0220	0.3590			-			-			-	0.3370	0.0220	0.3590
		14D4	0.4815	0.0313	0.5128			-			-			-	0.4815	0.0313	0.5128
		14D5	0.3370	0.0220	0.3590			-			-			-	0.3370	0.0220	0.3590
		14D6	0.1445	0.0095	0.1540			-			-			-	0.1445	0.0095	0.1540
	32	32D1	0.2183	0.0143	0.2326			-			-			-	0.2183	0.0143	0.2326
		32D2	0.1529	0.0100	0.1629			-			-			-	0.1529	0.0100	0.1629
		32D3	0.0655	0.0043	0.0698			-			-			-	0.0655	0.0043	0.0698
		32D4	0.0935	0.0061	0.0997			-			-			-	0.0935	0.0061	0.0997
		32D5	0.0655	0.0043	0.0698			-			-			-	0.0655	0.0043	0.0698
		32D6	0.0281	0.0018	0.0299			-			-			-	0.0281	0.0018	0.0299
Low TACAN Departure	07	07DHT							0.1470	0.0192	0.1662	0.3214	0.0097	0.3311	0.4684	0.0289	0.4973
	25	25DHT							0.4975	0.0650	0.5625	1.0878	0.0328	1.1206	1.5853	0.0978	1.6831
	14	14DHT							0.4071	0.0532	0.4603	0.8900	0.0269	0.9169	1.2971	0.0801	1.3772
	32	32DHT							0.0792	0.0103	0.0895	0.1731	0.0052	0.1783	0.2523	0.0155	0.2678

Table A-6 Modeled Average Daily Flight Events at NASWI and Coupeville for Cumulative (continued)

Operation Type	Rwy ID	Flight Track	EA-18G Day (0700-2200)	EA-18G Night (2200-0700)	EA-18G Total	C-9 Day (0700-2200)	C-9 Night (2200-0700)	C-9 Total	P-3 Day (0700-2200)	P-3 Night (2200-0700)	P-3 Total	P-8 Day (0700-2200)	P-8 Night (2200-0700)	P-8 Total	Total Day (0700-2200)	Total Night (2200-0700)	Total Total
Straight-in Arrival (VFR)	07	07A1			-	0.0279	0.0151	0.0430	0.0778	0.0113	0.0891	0.1685	0.0051	0.1736	0.2742	0.0315	0.3057
		07A2			-	0.0209	0.0113	0.0323	0.0583	0.0085	0.0668	0.1264	0.0038	0.1302	0.2056	0.0236	0.2293
		07A3			-	0.0209	0.0113	0.0323	0.0583	0.0085	0.0668	0.1264	0.0038	0.1302	0.2056	0.0236	0.2293
	25	25A1			-	0.0945	0.0511	0.1456	0.2632	0.0382	0.3014	0.5704	0.0174	0.5878	0.9281	0.1067	1.0348
		25A2			-	0.0709	0.0383	0.1092	0.1974	0.0286	0.2260	0.4278	0.0130	0.4408	0.6961	0.0799	0.7760
		25A3			-	0.0709	0.0383	0.1092	0.1974	0.0286	0.2260	0.4278	0.0130	0.4408	0.6961	0.0799	0.7760
	14	14A1			-	0.0387	0.0209	0.0596	0.1077	0.0156	0.1233	0.2334	0.0071	0.2405	0.3798	0.0436	0.4234
		14A2			-	0.0387	0.0209	0.0596	0.1077	0.0156	0.1233	0.2334	0.0071	0.2405	0.3798	0.0436	0.4234
		14A3			-	0.0580	0.0314	0.0894	0.1615	0.0234	0.1849	0.3500	0.0107	0.3607	0.5695	0.0655	0.6350
		14A4			-	0.0580	0.0314	0.0894	0.1615	0.0234	0.1849	0.3500	0.0107	0.3607	0.5695	0.0655	0.6350
	32	32A1			-	0.0075	0.0041	0.0116	0.0209	0.0030	0.0239	0.0454	0.0014	0.0468	0.0738	0.0085	0.0823
		32A2			-	0.0075	0.0041	0.0116	0.0209	0.0030	0.0239	0.0454	0.0014	0.0468	0.0738	0.0085	0.0823
		32A3			-	0.0113	0.0061	0.0174	0.0314	0.0046	0.0360	0.0681	0.0021	0.0702	0.1108	0.0128	0.1236
		32A4			-	0.0113	0.0061	0.0174	0.0314	0.0046	0.0360	0.0681	0.0021	0.0702	0.1108	0.0128	0.1236
Straight-in Arrival (IFR)	07	07A4A	0.1811	0.0051	0.1861			-			-			-	0.1811	0.0051	0.1861
		07A4B	0.1267	0.0036	0.1304			-	0.0081	0.0008	0.0089	0.0181	0.0005	0.0186	0.1529	0.0049	0.1579
		07A4C	0.0543	0.0014	0.0558			-	0.0081	0.0008	0.0089	0.0181	0.0005	0.0186	0.0805	0.0027	0.0833
		07A5A	0.0776	0.0022	0.0798			-			-			-	0.0776	0.0022	0.0798
		07A5B	0.0543	0.0014	0.0558			-	0.0121	0.0011	0.0132	0.0271	0.0007	0.0278	0.0935	0.0032	0.0968
		07A5C	0.0233	0.0007	0.0240			-	0.0121	0.0011	0.0132	0.0271	0.0007	0.0278	0.0625	0.0025	0.0650
	25	25A4	1.2260	0.0345	1.2605			-	0.0548	0.0052	0.0600	0.1225	0.0034	0.1259	1.4033	0.0431	1.4464
		25A5A	0.2628	0.0075	0.2702			-			-			-	0.2628	0.0075	0.2702
		25A5B	0.1840	0.0053	0.1893			-	0.0411	0.0039	0.0450	0.0919	0.0025	0.0944	0.3170	0.0117	0.3287
		25A5C	0.0788	0.0022	0.0809			-	0.0411	0.0039	0.0450	0.0919	0.0025	0.0944	0.2118	0.0086	0.2203
	14	14A5A	0.5015	0.0142	0.5158			-			-			-	0.5015	0.0142	0.5158
		14A5B	0.3510	0.0099	0.3609			-	0.0224	0.0021	0.0245	0.0501	0.0014	0.0515	0.4235	0.0134	0.4369
		14A5C	0.1505	0.0043	0.1548			-	0.0224	0.0021	0.0245	0.0501	0.0014	0.0515	0.2230	0.0078	0.2308
		14A6A	0.2150	0.0060	0.2210			-			-			-	0.2150	0.0060	0.2210
		14A6B	0.1505	0.0043	0.1548			-	0.0336	0.0032	0.0368	0.0752	0.0021	0.0773	0.2593	0.0096	0.2689
		14A6C	0.0645	0.0019	0.0664			-	0.0336	0.0032	0.0368	0.0752	0.0021	0.0773	0.1733	0.0072	0.1805
	32	32A5A	0.0975	0.0027	0.1002			-			-			-	0.0975	0.0027	0.1002
		32A5B	0.0683	0.0019	0.0703			-	0.0044	0.0004	0.0048	0.0097	0.0003	0.0100	0.0824	0.0026	0.0851
		32A5C	0.0292	0.0007	0.0299			-	0.0044	0.0004	0.0048	0.0097	0.0003	0.0100	0.0433	0.0014	0.0447
		32A6A	0.0419	0.0012	0.0431			-			-			-	0.0419	0.0012	0.0431
		32A6B	0.0292	0.0007	0.0299			-	0.0065	0.0006	0.0071	0.0146	0.0004	0.0150	0.0503	0.0017	0.0520
		32A6C	0.0124	0.0002	0.0127			-	0.0065	0.0006	0.0071	0.0146	0.0004	0.0150	0.0335	0.0012	0.0348
High TACAN Arrival	07	07AHT	0.1668	0.0147	0.1815			-			-			-	0.1668	0.0147	0.1815
	25	25AHT	0.5647	0.0495	0.6142			-			-			-	0.5647	0.0495	0.6142
	14	14AHT	0.4621	0.0406	0.5027			-			-			-	0.4621	0.0406	0.5027
	32	32AHT	0.0898	0.0080	0.0978			-			-			-	0.0898	0.0080	0.0978
Low TACAN Arrival	07	07ALT			-			-	0.0405	0.0038	0.0443	0.0905	0.0025	0.0930	0.1310	0.0063	0.1373
	25	25ALT			-			-	0.1369	0.0129	0.1498	0.3062	0.0084	0.3146	0.4431	0.0213	0.4644
	14	14ALT			-			-	0.1120	0.0106	0.1226	0.2505	0.0069	0.2574	0.3625	0.0175	0.3800
	32	32ALT			-			-	0.0218	0.0021	0.0239	0.0487	0.0013	0.0500	0.0705	0.0034	0.0739

Table A-6 Modeled Average Daily Flight Events at NASWI and Coupeville for Cumulative (continued)

Operation Type	Rwy	Flight Track	EA-18G			C-9			P-3			P-8			Total		
	ID		Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total
Overhead Break Arrival	07	07OD1A	0.2243	-	0.2243			-			-			-	0.2243	-	0.2243
		07OD1B	0.2243	-	0.2243			-			-			-	0.2243	-	0.2243
		07OD1C	0.2311	-	0.2311			-			-			-	0.2311	-	0.2311
		07OD2A	0.0249	-	0.0249			-			-			-	0.0249	-	0.0249
		07OD2B	0.0249	-	0.0249			-			-			-	0.0249	-	0.0249
		07OD2C	0.0256	-	0.0256			-			-			-	0.0256	-	0.0256
		07ON1A	-	0.0237	0.0237			-			-			-	-	0.0237	0.0237
		07ON1B	-	0.0237	0.0237			-			-			-	-	0.0237	0.0237
		07ON1C	-	0.0244	0.0244			-			-			-	-	0.0244	0.0244
		07ON2A	-	0.0027	0.0027			-			-			-	-	0.0027	0.0027
		07ON2B	-	0.0027	0.0027			-			-			-	-	0.0027	0.0027
		07ON2C	-	0.0027	0.0027			-			-			-	-	0.0027	0.0027
	25	25OD1A	0.7593	-	0.7593			-			-			-	0.7593	-	0.7593
		25OD1B	0.7593	-	0.7593			-			-			-	0.7593	-	0.7593
		25OD1C	0.7822	-	0.7822			-			-			-	0.7822	-	0.7822
		25OD2A	0.0844	-	0.0844			-			-			-	0.0844	-	0.0844
		25OD2B	0.0844	-	0.0844			-			-			-	0.0844	-	0.0844
		25OD2C	0.0869	-	0.0869			-			-			-	0.0869	-	0.0869
		25ON1A	-	0.0804	0.0804			-			-			-	-	0.0804	0.0804
		25ON1B	-	0.0804	0.0804			-			-			-	-	0.0804	0.0804
		25ON1C	-	0.0828	0.0828			-			-			-	-	0.0828	0.0828
		25ON2A	-	0.0089	0.0089			-			-			-	-	0.0089	0.0089
		25ON2B	-	0.0089	0.0089			-			-			-	-	0.0089	0.0089
		25ON2C	-	0.0092	0.0092			-			-			-	-	0.0092	0.0092
	14	14OD1A	0.6212	-	0.6212			-			-			-	0.6212	-	0.6212
		14OD1B	0.6212	-	0.6212			-			-			-	0.6212	-	0.6212
		14OD1C	0.6400	-	0.6400			-			-			-	0.6400	-	0.6400
		14OD2A	0.0690	-	0.0690			-			-			-	0.0690	-	0.0690
		14OD2B	0.0690	-	0.0690			-			-			-	0.0690	-	0.0690
		14OD2C	0.0711	-	0.0711			-			-			-	0.0711	-	0.0711
		14ON1A	-	0.0657	0.0657			-			-			-	-	0.0657	0.0657
		14ON1B	-	0.0657	0.0657			-			-			-	-	0.0657	0.0657
		14ON1C	-	0.0678	0.0678			-			-			-	-	0.0678	0.0678
		14ON2A	-	0.0072	0.0072			-			-			-	-	0.0072	0.0072
		14ON2B	-	0.0072	0.0072			-			-			-	-	0.0072	0.0072
		14ON2C	-	0.0075	0.0075			-			-			-	-	0.0075	0.0075
	32	32OD1A	0.1209	-	0.1209			-			-			-	0.1209	-	0.1209
		32OD1B	0.1209	-	0.1209			-			-			-	0.1209	-	0.1209
		32OD1C	0.1245	-	0.1245			-			-			-	0.1245	-	0.1245
		32OD2A	0.0134	-	0.0134			-			-			-	0.0134	-	0.0134
		32OD2B	0.0134	-	0.0134			-			-			-	0.0134	-	0.0134
		32OD2C	0.0138	-	0.0138			-			-			-	0.0138	-	0.0138
		32ON1A	-	0.0128	0.0128			-			-			-	-	0.0128	0.0128
		32ON1B	-	0.0128	0.0128			-			-			-	-	0.0128	0.0128
		32ON1C	-	0.0133	0.0133			-			-			-	-	0.0133	0.0133
		32ON2A	-	0.0014	0.0014			-			-			-	-	0.0014	0.0014
		32ON2B	-	0.0014	0.0014			-			-			-	-	0.0014	0.0014
		32ON2C	-	0.0014	0.0014			-			-			-	-	0.0014	0.0014
Depart and Re-enter	07	07DR	0.0207	0.0016	0.0223			-			-			-	0.0207	0.0016	0.0223
		07DL	0.0207	0.0016	0.0223			-			-			-	0.0207	0.0016	0.0223
	25	25DR	0.0569	0.0045	0.0614			-			-			-	0.0569	0.0045	0.0614
		25DL	0.0569	0.0045	0.0614			-			-			-	0.0569	0.0045	0.0614
	14	14DR	0.0696	0.0054	0.0750			-			-			-	0.0696	0.0054	0.0750
		14DL	0.0696	0.0054	0.0750			-			-			-	0.0696	0.0054	0.0750
	32	32DR	0.0111	0.0009	0.0120			-			-			-	0.0111	0.0009	0.0120
		32DL	0.0111	0.0009	0.0120			-			-			-	0.0111	0.0009	0.0120

Table A-6 Modeled Average Daily Flight Events at NASWI and Coupeville for Cumulative (continued)

Operation Type	Rwy ID	Flight Track	EA-18G Day (0700-2200)	EA-18G Night (2200-0700)	EA-18G Total	C-9 Day (0700-2200)	C-9 Night (2200-0700)	C-9 Total	P-3 Day (0700-2200)	P-3 Night (2200-0700)	P-3 Total	P-8 Day (0700-2200)	P-8 Night (2200-0700)	P-8 Total	Total Day (0700-2200)	Total Night (2200-0700)	Total Total
Touch and Go at Ault Field	07	07TD1	0.2004	-	0.2004			-			-			-	0.2004	-	0.2004
		07TD2	0.4010	-	0.4010			-			-			-	0.4010	-	0.4010
		07TD3	0.2004	-	0.2004			-			-			-	0.2004	-	0.2004
		07TN1	0.1955	0.0189	0.2144			-	0.3355	-	0.3355	0.8589	-	0.8589	1.3899	0.0189	1.4088
		07TN2	0.3912	0.0377	0.4289			-	0.6710	-	0.6710	1.7178	-	1.7178	2.7800	0.0377	2.8177
		07TN3	0.1955	0.0189	0.2144			-	0.3355	-	0.3355	0.8589	-	0.8589	1.3899	0.0189	1.4088
	25	25TD1	0.6786	-	0.6786			-			-			-	0.6786	-	0.6786
		25TD2	1.3571	-	1.3571			-			-			-	1.3571	-	1.3571
		25TD3	0.6786	-	0.6786			-			-			-	0.6786	-	0.6786
		25TN1	0.6621	0.0640	0.7261			-	1.1356	-	1.1356	2.9070	-	2.9070	4.7047	0.0640	4.7687
		25TN2	1.3240	0.1280	1.4520			-	2.2711	-	2.2711	5.8140	-	5.8140	9.4091	0.1280	9.5371
		25TN3	0.6621	0.0640	0.7261			-	1.1356	-	1.1356	2.9070	-	2.9070	4.7047	0.0640	4.7687
	14	14TD1	0.5551	-	0.5551			-			-			-	0.5551	-	0.5551
		14TD2	1.1103	-	1.1103			-			-			-	1.1103	-	1.1103
		14TD3	0.5551	-	0.5551			-			-			-	0.5551	-	0.5551
		14TN1	0.5416	0.0523	0.5939			-	0.9291	-	0.9291	2.3785	-	2.3785	3.8492	0.0523	3.9015
		14TN2	1.0834	0.1046	1.1880			-	1.8582	-	1.8582	4.7569	-	4.7569	7.6985	0.1046	7.8031
		14TN3	0.5416	0.0523	0.5939			-	0.9291	-	0.9291	2.3785	-	2.3785	3.8492	0.0523	3.9015
	32	32TD1	0.1079	-	0.1079			-			-			-	0.1079	-	0.1079
		32TD2	0.2160	-	0.2160			-			-			-	0.2160	-	0.2160
		32TD3	0.1079	-	0.1079			-			-			-	0.1079	-	0.1079
		32TN1	0.1054	0.0101	0.1155			-	0.1807	-	0.1807	0.4625	-	0.4625	0.7486	0.0101	0.7587
		32TN2	0.2106	0.0204	0.2311			-	0.3613	-	0.3613	0.9250	-	0.9250	1.4969	0.0204	1.5174
		32TN3	0.1054	0.0101	0.1155			-	0.1807	-	0.1807	0.4625	-	0.4625	0.7486	0.0101	0.7587
FCLP at Ault Field	07	07TD1	0.3168	-	0.3168			-			-			-	0.3168	-	0.3168
		07TD2	0.6335	-	0.6335			-			-			-	0.6335	-	0.6335
		07TD3	0.3168	-	0.3168			-			-			-	0.3168	-	0.3168
		07TN1	0.3091	0.1307	0.4397			-			-			-	0.3091	0.1307	0.4397
		07TN2	0.6181	0.2612	0.8793			-			-			-	0.6181	0.2612	0.8793
		07TN3	0.3091	0.1307	0.4397			-			-			-	0.3091	0.1307	0.4397
	25	25TD1	1.0722	-	1.0722			-			-			-	1.0722	-	1.0722
		25TD2	2.1444	-	2.1444			-			-			-	2.1444	-	2.1444
		25TD3	1.0722	-	1.0722			-			-			-	1.0722	-	1.0722
		25TN1	1.0460	0.4421	1.4881			-			-			-	1.0460	0.4421	1.4881
		25TN2	2.0923	0.8841	2.9764			-			-			-	2.0923	0.8841	2.9764
		25TN3	1.0460	0.4421	1.4881			-			-			-	1.0460	0.4421	1.4881
	14	14TD1	0.8773	-	0.8773			-			-			-	0.8773	-	0.8773
		14TD2	1.7546	-	1.7546			-			-			-	1.7546	-	1.7546
		14TD3	0.8773	-	0.8773			-			-			-	0.8773	-	0.8773
		14TN1	0.8560	0.3616	1.2177			-			-			-	0.8560	0.3616	1.2177
		14TN2	1.7118	0.7233	2.4351			-			-			-	1.7118	0.7233	2.4351
		14TN3	0.8560	0.3616	1.2177			-			-			-	0.8560	0.3616	1.2177
	32	32TD1	0.1706	-	0.1706			-			-			-	0.1706	-	0.1706
		32TD2	0.3411	-	0.3411			-			-			-	0.3411	-	0.3411
		32TD3	0.1706	-	0.1706			-			-			-	0.1706	-	0.1706
		32TN1	0.1665	0.0703	0.2368			-			-			-	0.1665	0.0703	0.2368
		32TN2	0.3328	0.1406	0.4734			-			-			-	0.3328	0.1406	0.4734
		32TN3	0.1665	0.0703	0.2368			-			-			-	0.1665	0.0703	0.2368
GCA Pattern at Ault Field	07	07G1	0.1759	0.1599	0.3358			-			-			-	0.1759	0.1599	0.3358
		07G2	0.0703	0.0640	0.1343			-	0.1342	-	0.1342	0.3435	-	0.3435	0.5480	0.0640	0.6120
		07G3	0.1054	0.0959	0.2013			-	0.1342	-	0.1342	0.3435	-	0.3435	0.5831	0.0959	0.6790
	25	25G1	0.5952	0.5414	1.1366			-			-			-	0.5952	0.5414	1.1366
		25G2	0.2380	0.2165	0.4545			-	0.4542	-	0.4542	1.1627	-	1.1627	1.8549	0.2165	2.0714
		25G3	0.3572	0.3250	0.6821			-	0.4542	-	0.4542	1.1627	-	1.1627	1.9741	0.3250	2.2990
	14	14G1	0.4871	0.4431	0.9302			-			-			-	0.4871	0.4431	0.9302
		14G2	0.1948	0.1772	0.3720			-	0.3716	-	0.3716	0.9513	-	0.9513	1.5177	0.1772	1.6949
		14G3	0.2922	0.2659	0.5581			-	0.3716	-	0.3716	0.9513	-	0.9513	1.6151	0.2659	1.8810
	32	32G1	0.0947	0.0862	0.1810			-			-			-	0.0947	0.0862	0.1810
		32G2	0.0378	0.0344	0.0722			-	0.0723	-	0.0723	0.1850	-	0.1850	0.2951	0.0344	0.3295
		32G3	0.0567	0.0517	0.1084			-	0.0723	-	0.0723	0.1850	-	0.1850	0.3140	0.0517	0.3657

Table A-6 Modeled Average Daily Flight Events at NASWI and Coupeville for Cumulative (concluded)

Operation Type	Rwy ID	Flight Track	EA-18G Day (0700-2200)	EA-18G Night (2200-0700)	EA-18G Total	C-9 Day (0700-2200)	C-9 Night (2200-0700)	C-9 Total	P-3 Day (0700-2200)	P-3 Night (2200-0700)	P-3 Total	P-8 Day (0700-2200)	P-8 Night (2200-0700)	P-8 Total	Total Day (0700-2200)	Total Night (2200-0700)	Total Total
Interfacility Ault Field to Coupeville	7	07WC14D	0.0647	-	0.0647			-			-			-	0.0647	-	0.0647
		07WC14N	-	0.0041	0.0041			-			-			-	-	0.0041	0.0041
		07WC32D	0.0647		0.0647			-			-			-	0.0647	-	0.0647
		07WC32N		0.0041	0.0041			-			-			-	-	0.0041	0.0041
	25	25WC14D	0.2188	-	0.2188			-			-			-	0.2188	-	0.2188
		25WC14N	-	0.0134	0.0134			-			-			-	-	0.0134	0.0134
		25WC32D	0.2188	-	0.2188			-			-			-	0.2188	-	0.2188
		25WC32N	-	0.0134	0.0134			-			-			-	-	0.0134	0.0134
	14	14WC14D	0.1791	-	0.1791			-			-			-	0.1791	-	0.1791
		14WC14N	-	0.0109	0.0109			-			-			-	-	0.0109	0.0109
		14WC32D	0.1791	-	0.1791			-			-			-	0.1791	-	0.1791
		14WC32N	-	0.0109	0.0109			-			-			-	-	0.0109	0.0109
	32	32WC14D	0.0349	-	0.0349			-			-			-	0.0349	-	0.0349
		32WC14N	-	0.0022	0.0022			-			-			-	-	0.0022	0.0022
		32WC32D	0.0349	-	0.0349			-			-			-	0.0349	-	0.0349
		32WC32N	-	0.0022	0.0022			-			-			-	-	0.0022	0.0022
FCLP at Coupeville	14	14TD1	0.4411	-	0.4411			-			-			-	0.4411	-	0.4411
		14TD2	0.8824	-	0.8824			-			-			-	0.8824	-	0.8824
		14TD3	0.4411	-	0.4411			-			-			-	0.4411	-	0.4411
		14TN1	0.4303	0.0535	0.4838			-			-			-	0.4303	0.0535	0.4838
		14TN2	0.8609	0.1068	0.9677			-			-			-	0.8609	0.1068	0.9677
		14TN3	0.4303	0.0535	0.4838			-			-			-	0.4303	0.0535	0.4838
	32	32TD1	0.4411	-	0.4411			-			-			-	0.4411	-	0.4411
		32TD2	0.8824	-	0.8824			-			-			-	0.8824	-	0.8824
		32TD3	0.4411	-	0.4411			-			-			-	0.4411	-	0.4411
		32TN1	0.4303	0.0535	0.4838			-			-			-	0.4303	0.0535	0.4838
		32TN2	0.8609	0.1068	0.9677			-			-			-	0.8609	0.1068	0.9677
		32TN3	0.4303	0.0535	0.4838			-			-			-	0.4303	0.0535	0.4838
Interfacility Coupeville to Ault Field	14	14CW07D	0.1243	-	0.1243			-			-			-	0.1243	-	0.1243
		14CW07N	-	0.0077	0.0077			-			-			-	-	0.0077	0.0077
		14CW14D	0.1243	-	0.1243			-			-			-	0.1243	-	0.1243
		14CW14N	-	0.0077	0.0077			-			-			-	-	0.0077	0.0077
		14CW25D	0.1243	-	0.1243			-			-			-	0.1243	-	0.1243
		14CW25N	-	0.0077	0.0077			-			-			-	-	0.0077	0.0077
		14CW32D	0.1243	-	0.1243			-			-			-	0.1243	-	0.1243
		14CW32N	-	0.0077	0.0077			-			-			-	-	0.0077	0.0077
	32	32CW07D	0.1243	-	0.1243			-			-			-	0.1243	-	0.1243
		32CW07N	-	0.0077	0.0077			-			-			-	-	0.0077	0.0077
		32CW14D	0.1243	-	0.1243			-			-			-	0.1243	-	0.1243
		32CW14N	-	0.0077	0.0077			-			-			-	-	0.0077	0.0077
		32CW25D	0.1243	-	0.1243			-			-			-	0.1243	-	0.1243
		32CW25N	-	0.0077	0.0077			-			-			-	-	0.0077	0.0077
		32CW32D	0.1243	-	0.1243			-			-			-	0.1243	-	0.1243
		32CW32N	-	0.0077	0.0077			-			-			-	-	0.0077	0.0077
Departure			11.1447	0.7266	11.8713	0.5370	0.2904	0.8274	2.1180	0.2765	2.3945	4.6303	0.1396	4.7699	18.4300	1.4331	19.8631
Straight-in VFR			-	-	-	0.5370	0.2904	0.8274	1.4954	0.2169	1.7123	3.2411	0.0987	3.3398	5.2735	0.6060	5.8795
Straight-in IFR			3.9805	0.1122	4.0928	-	-	-	0.3112	0.0294	0.3406	0.6959	0.0192	0.7151	4.9876	0.1608	5.1485
TACAN Arrival			1.2835	0.1127	1.3962	-	-	-	0.3112	0.0294	0.3406	0.6959	0.0191	0.7150	2.2906	0.1612	2.4518
Overhead Break Arrival			5.8099	0.6146	6.4244	-	-	-	-	-	-	-	-	-	5.8099	0.6146	6.4244
Touch and Go at Ault Field			12.1867	0.5814	12.7681	-	-	-	10.3234	-	10.3234	26.4275	-	26.4275	48.9376	0.5814	49.5190
FCLP at Ault Field			19.2577	4.0186	23.2763	-	-	-	-	-	-	-	-	-	19.2577	4.0186	23.2763
Depart and Re-enter			0.3167	0.0247	0.3414	-	-	-	-	-	-	-	-	-	0.3167	0.0247	0.3414
GCA Pattern at Ault Field			2.7054	2.4611	5.1665	-	-	-	2.0646	-	2.0646	5.2850	-	5.2850	10.0550	2.4611	12.5161
Interfacility from Ault Field to Coupeville			0.9949	0.0612	1.0561	-	-	-	-	-	-	-	-	-	0.9949	0.0612	1.0561
FCLP at Coupeville			6.9723	0.4275	7.3998	-	-	-	-	-	-	-	-	-	6.9723	0.4275	7.3998
Interfacility from Coupeville to Ault Field			0.9945	0.0616	1.0561	-	-	-	-	-	-	-	-	-	0.9945	0.0616	1.0561
Total			65.6468	9.2021	74.8489	1.0740	0.5808	1.6548	16.6238	0.5522	17.1760	40.9757	0.2766	41.2523	124.3203	10.6118	134.9320

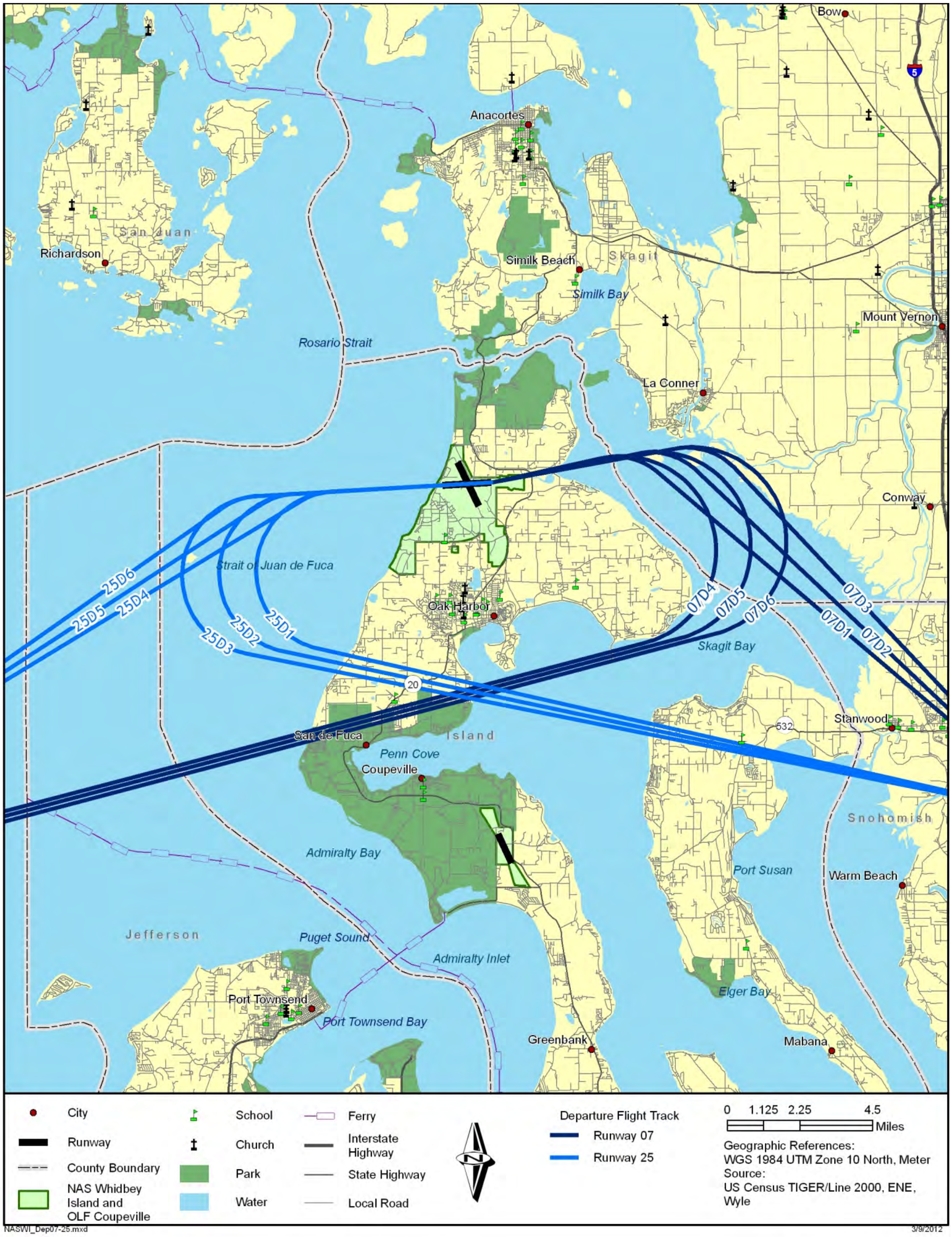


Figure A-1 Modeled Average Daily Departure Flight Tracks on Runway 07/25 at NAS Whidbey Island

Figure A-2 Modeled Average Daily Departure Flight Tracks on Runway 14/32 at NAS Whidbey Island

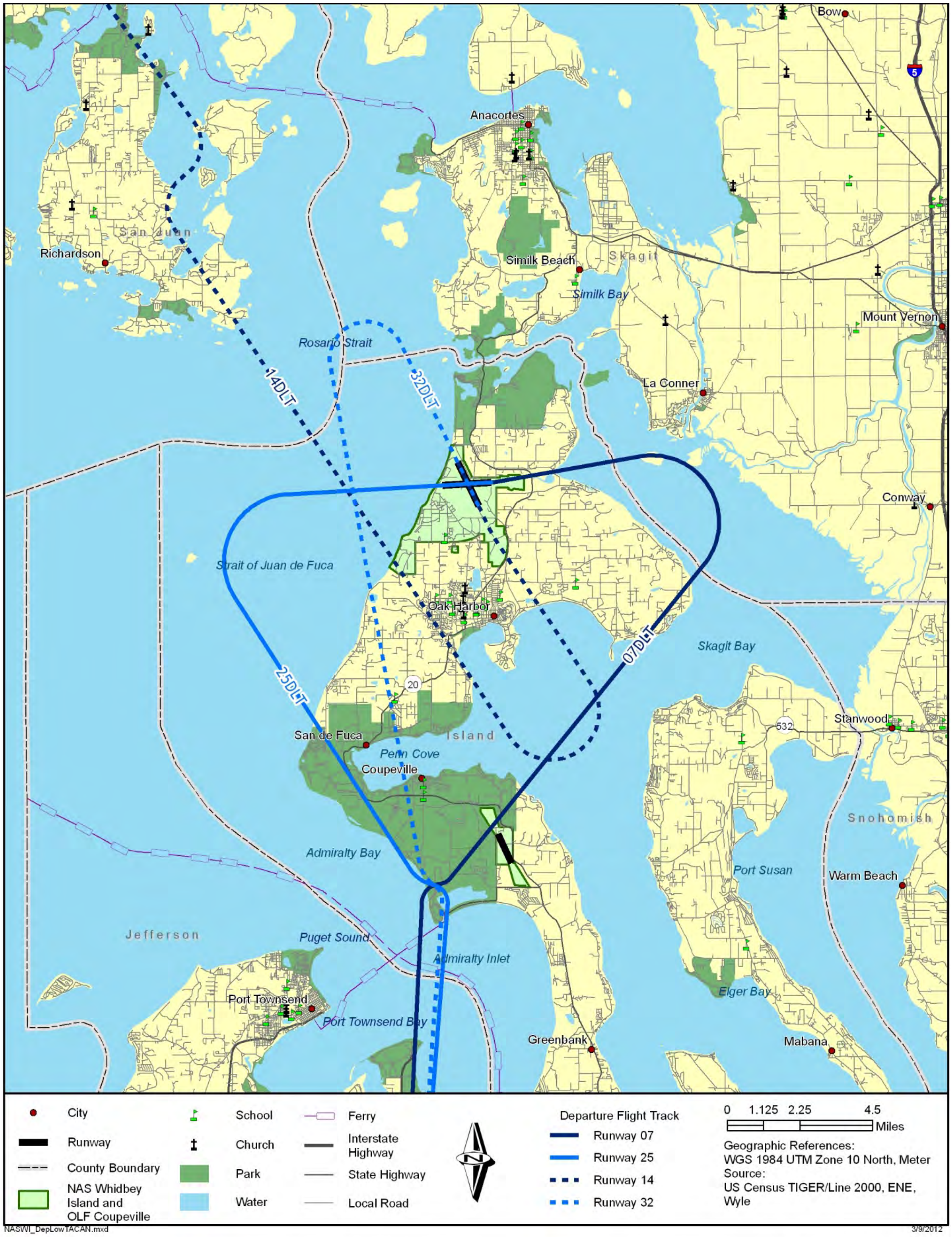


Figure A-3 Modeled Average Daily Low-TACAN Departure Flight Tracks at NAS Whidbey Island

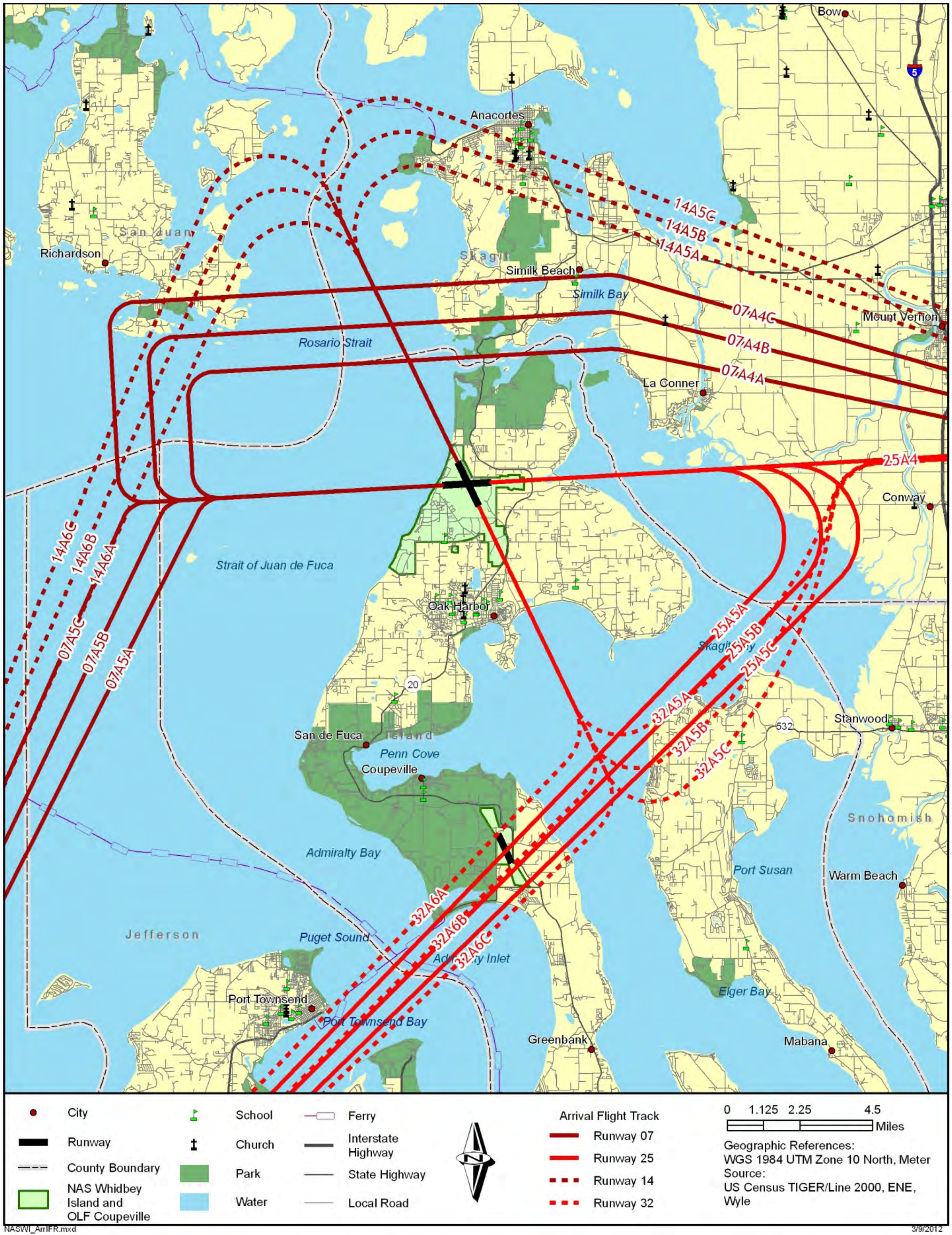


Figure A-4 Modeled Average Daily Straight-In IFR Arrival Flight Tracks at NAS Whidbey Island

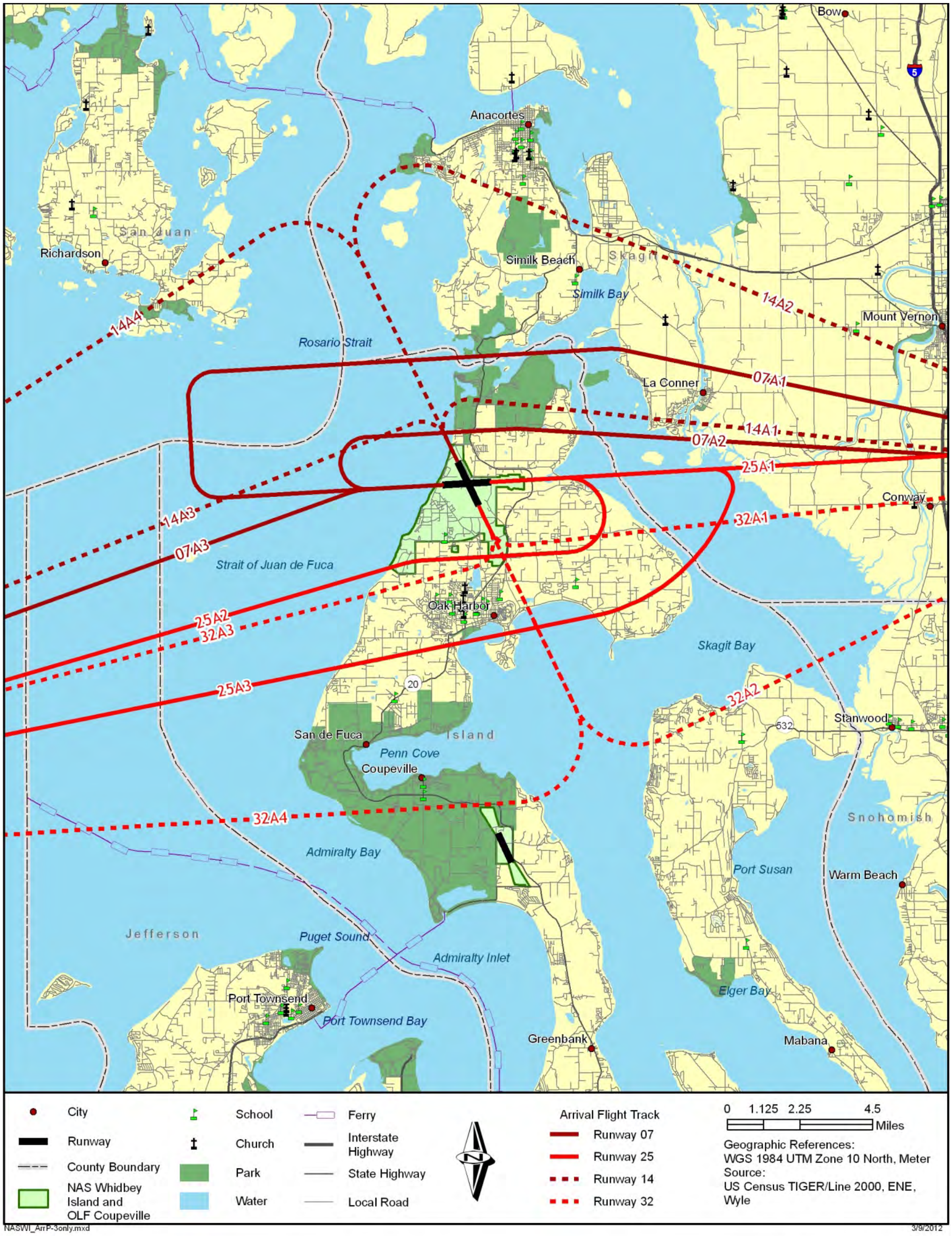


Figure A-5 Modeled Average Daily Straight-In VFR Arrival Flight Tracks at NAS Whidbey Island

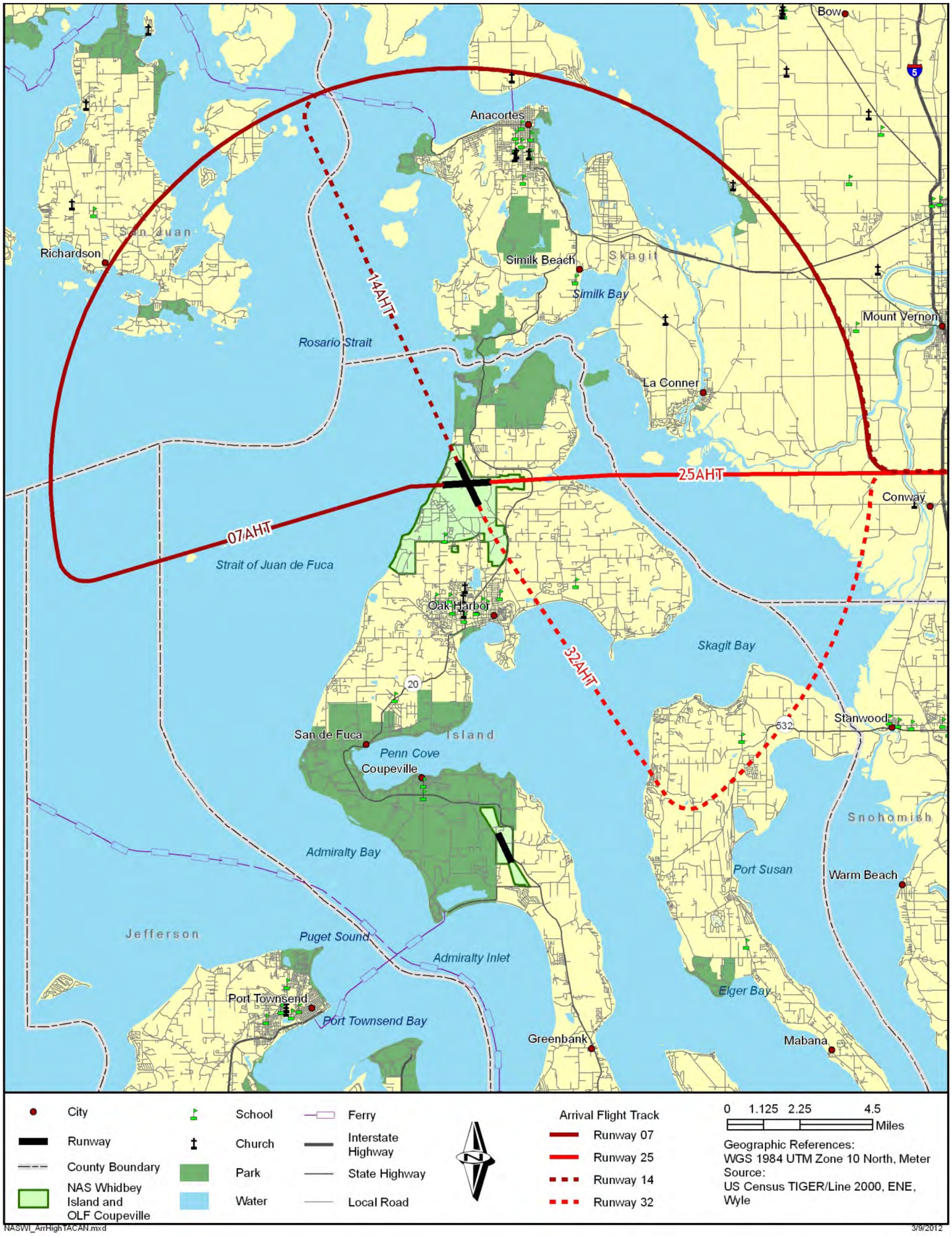


Figure A-6 Modeled Average Daily High-TACAN Arrival Flight Tracks at NAS Whidbey Island

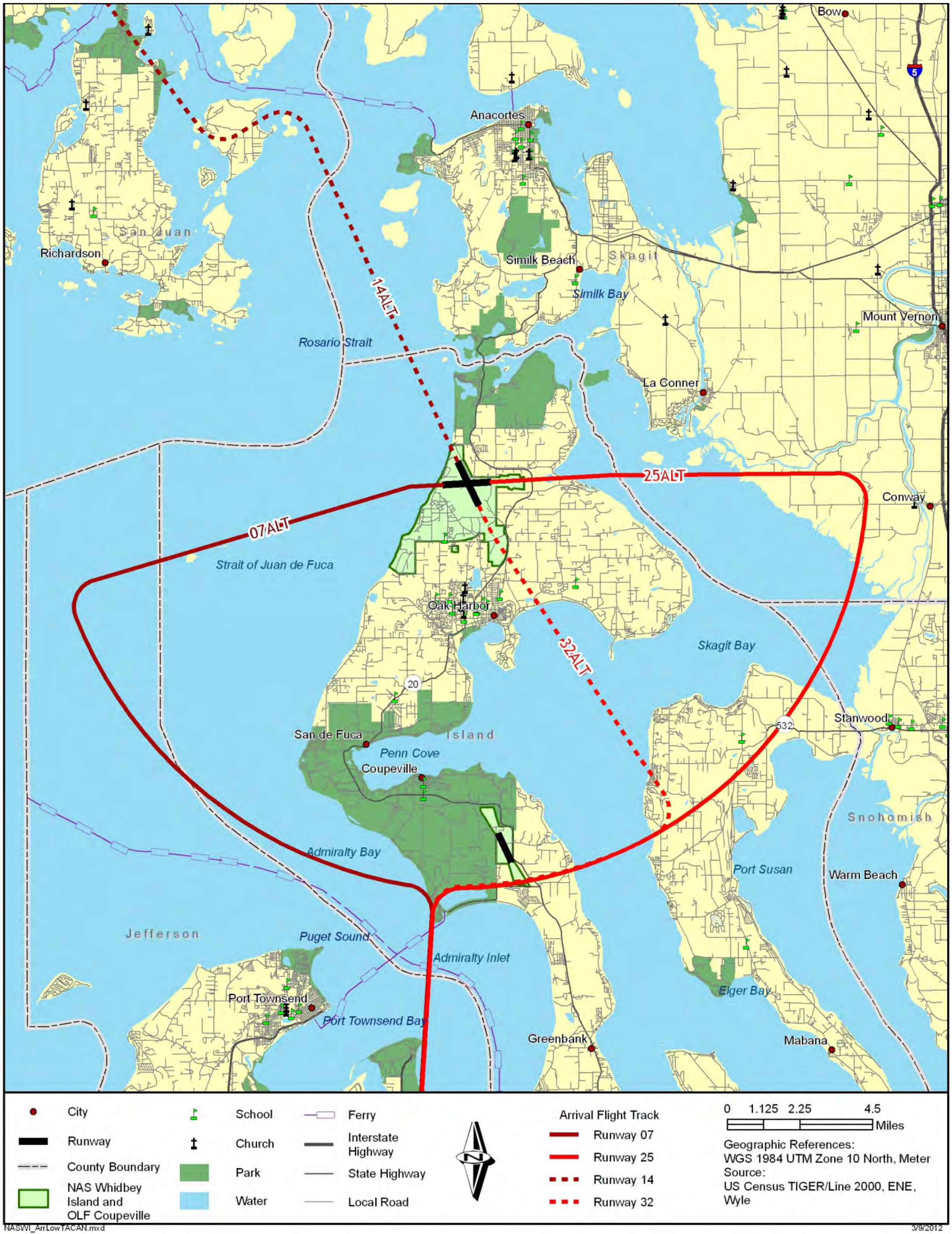


Figure A-7 Modeled Average Daily Low-TACAN Arrival Flight Tracks at NAS Whidbey Island

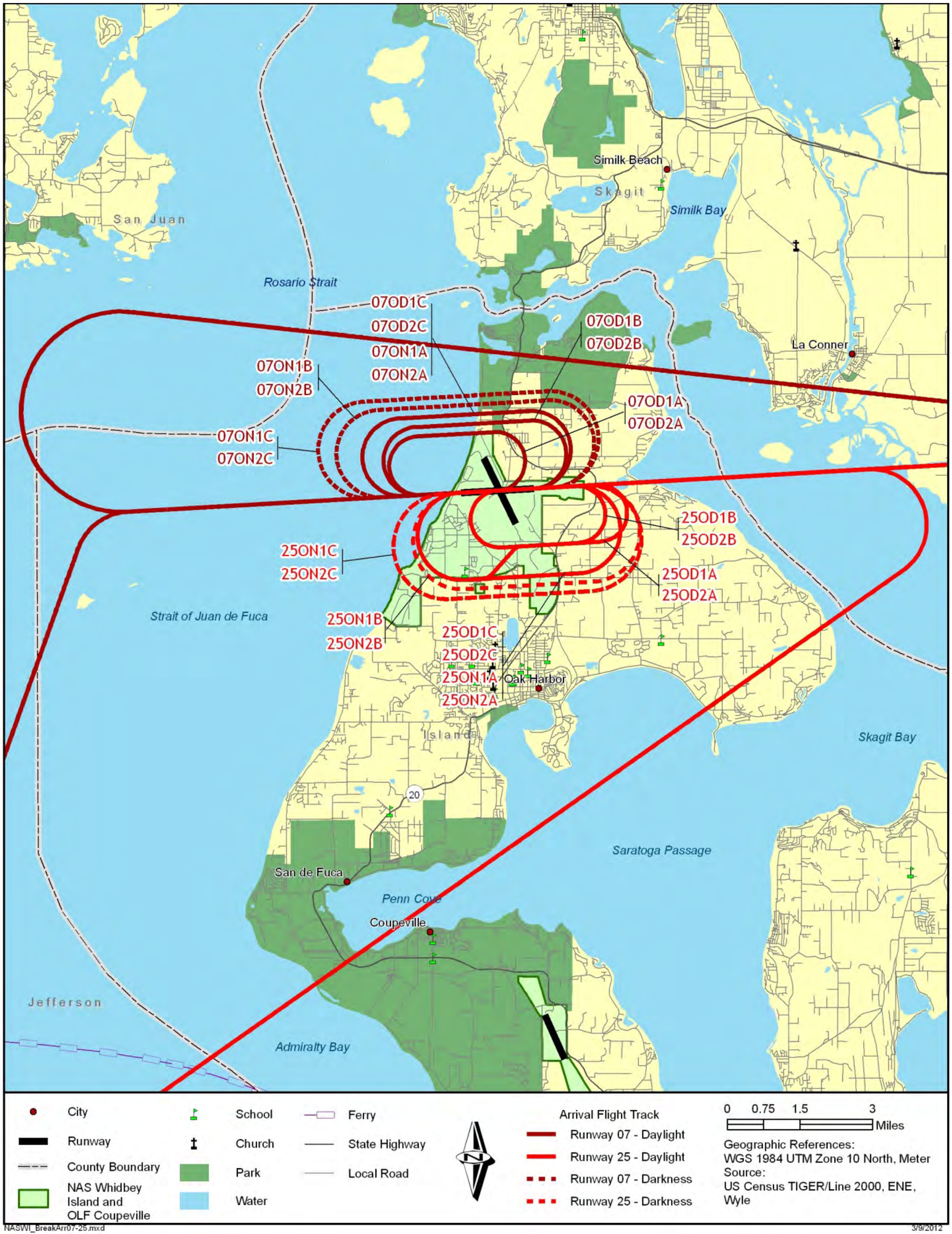


Figure A-8 Modeled Average Daily Overhead Break Arrival Flight Tracks on Runway 07/25 at NAS Whidbey Island

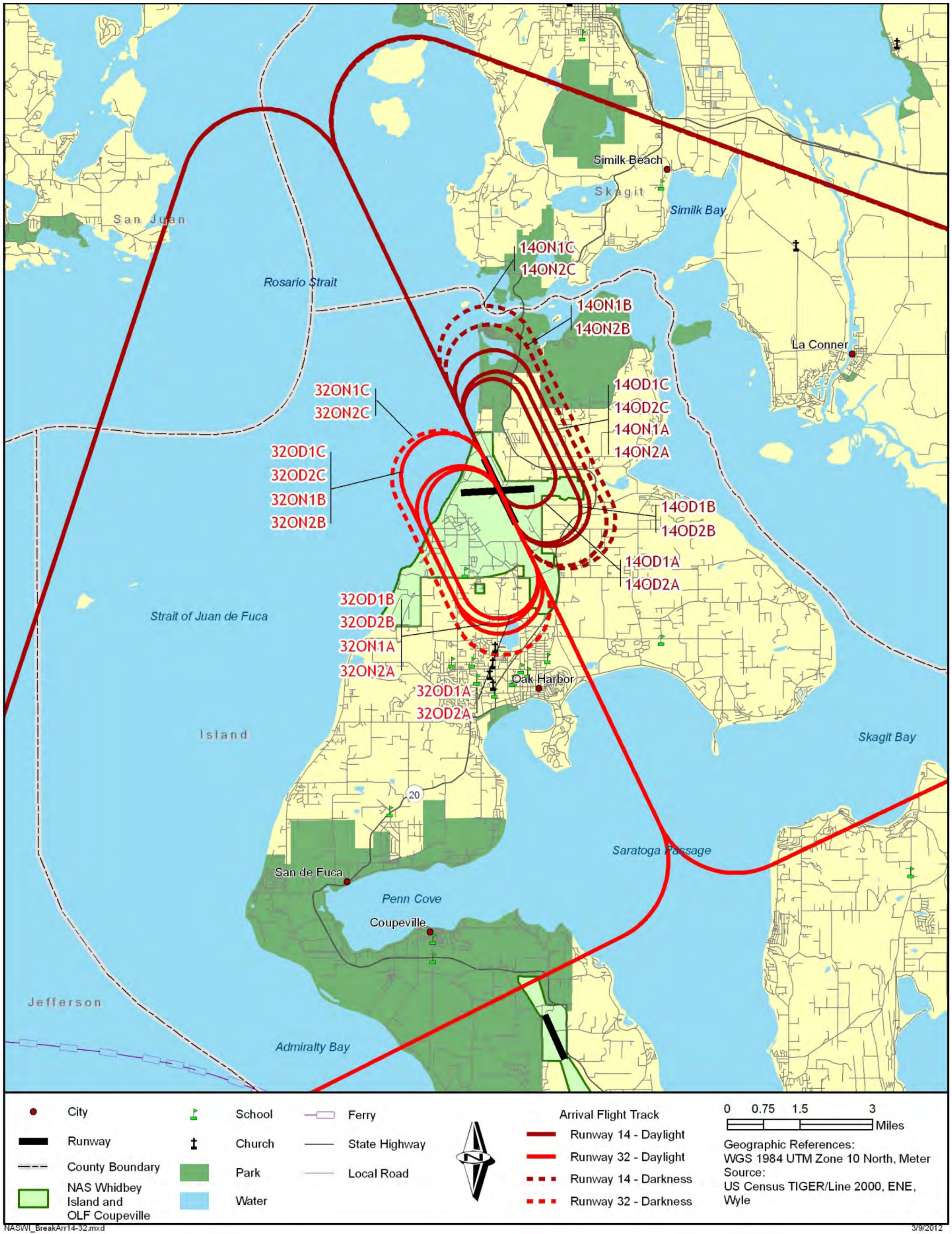


Figure A-9 Modeled Average Daily Overhead Break Arrival Flight Tracks on Runway 14/32 at NAS Whidbey Island

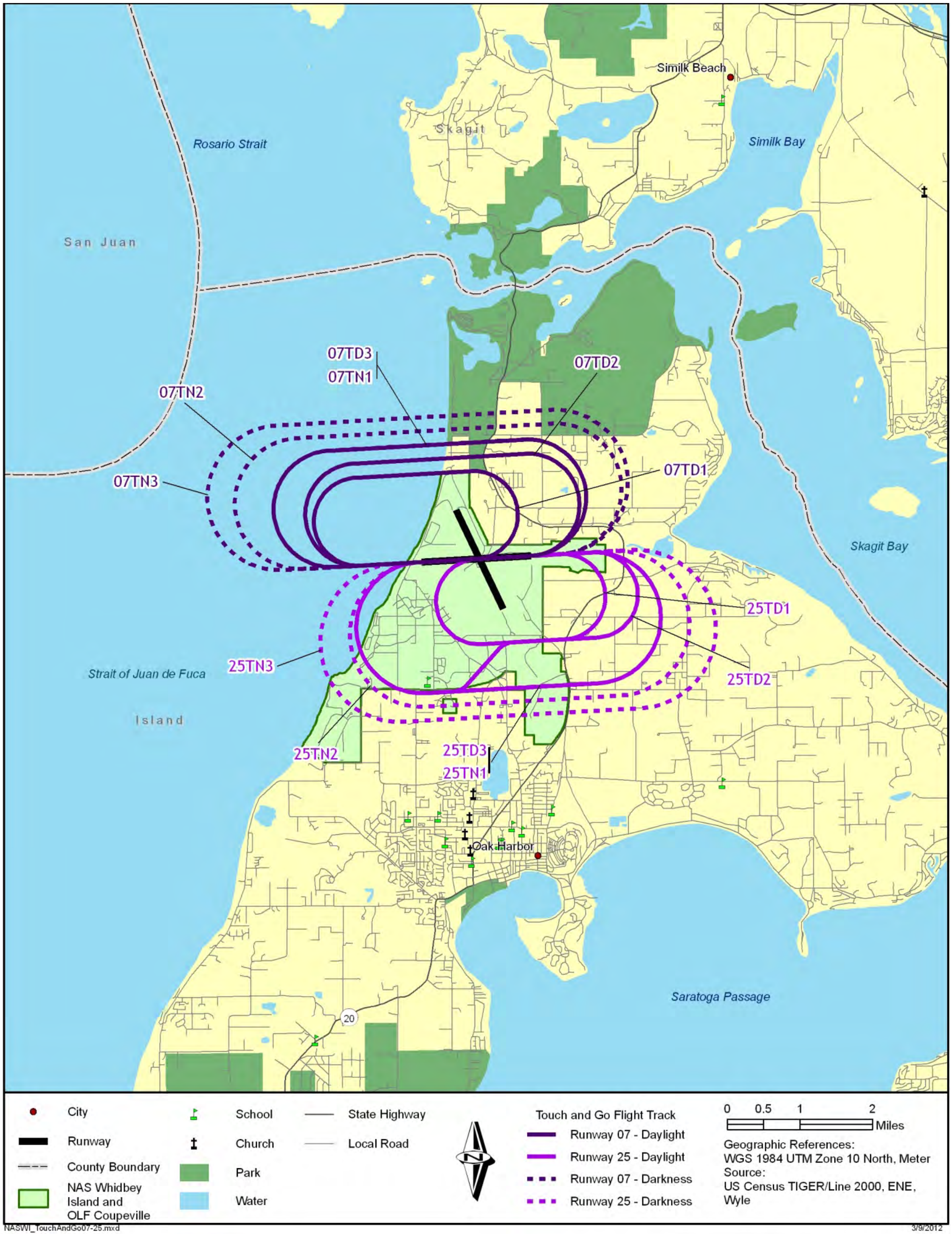


Figure A-10 Modeled Average Daily Tower Pattern Flight Tracks on Runway 07/25 at NAS Whidbey Island

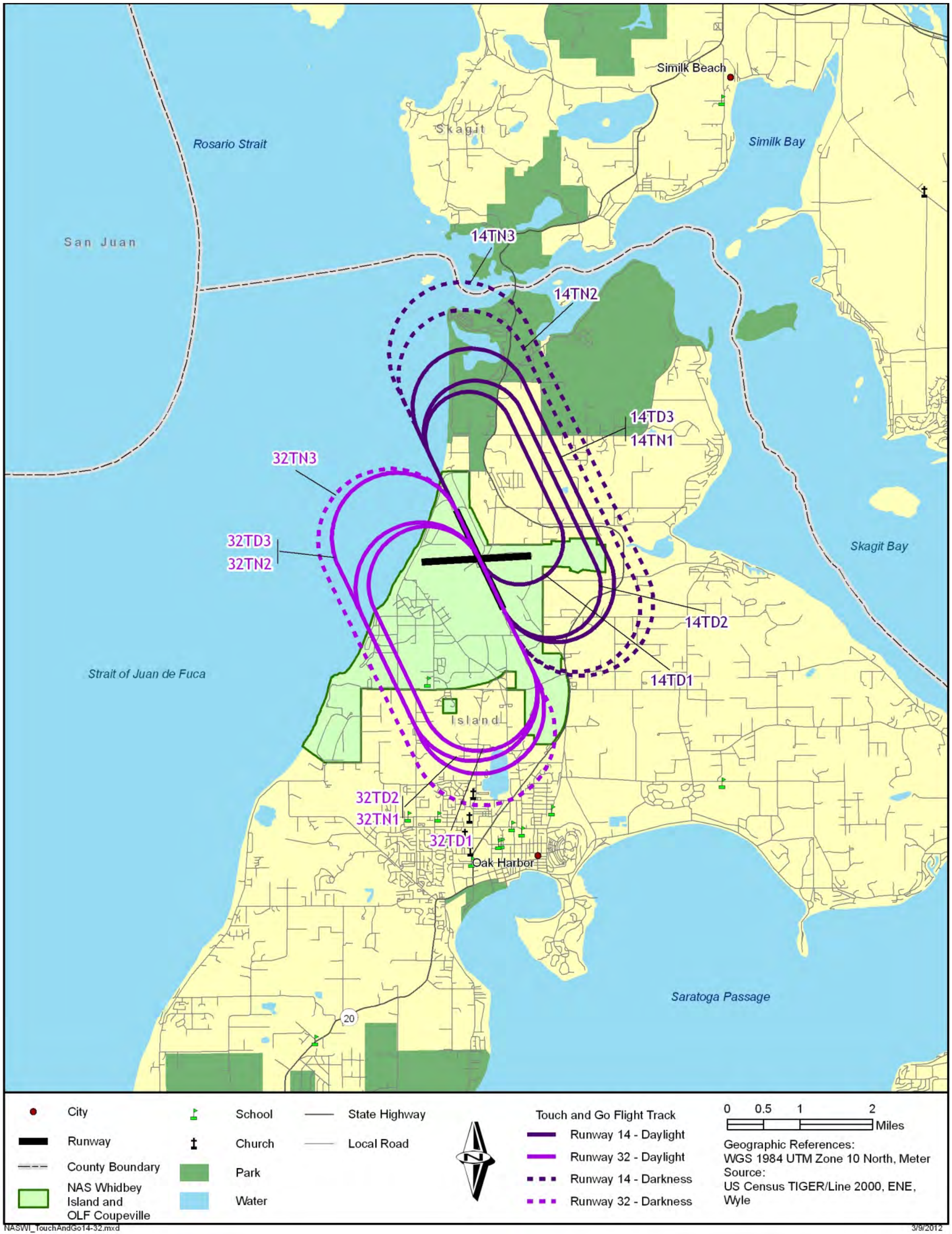


Figure A-11 Modeled Average Daily Tower Pattern Flight Tracks on Runway 14/32 at NAS Whidbey Island

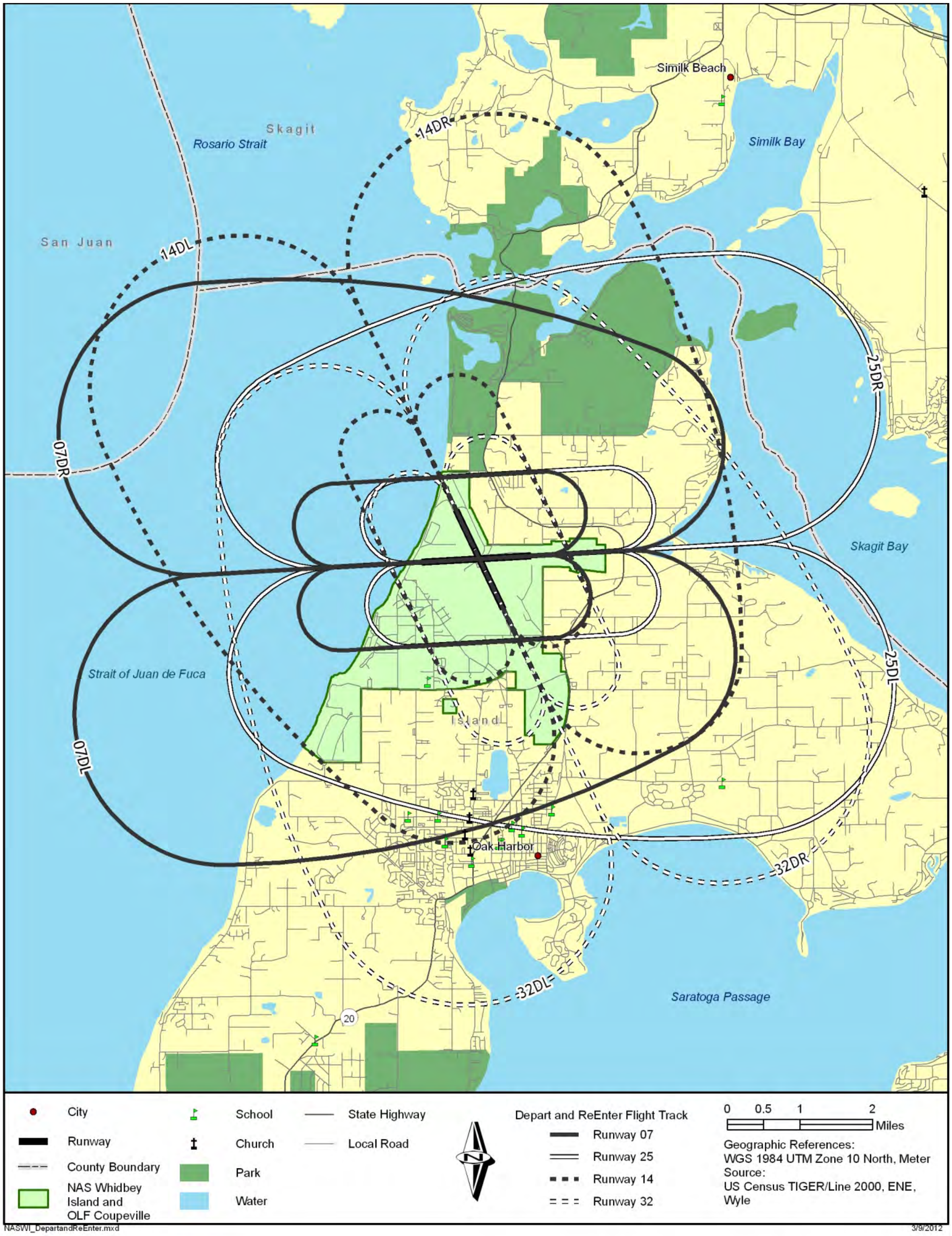


Figure A-12 Modeled Average Daily Depart and ReEnter Flight Tracks at NAS Whidbey Island

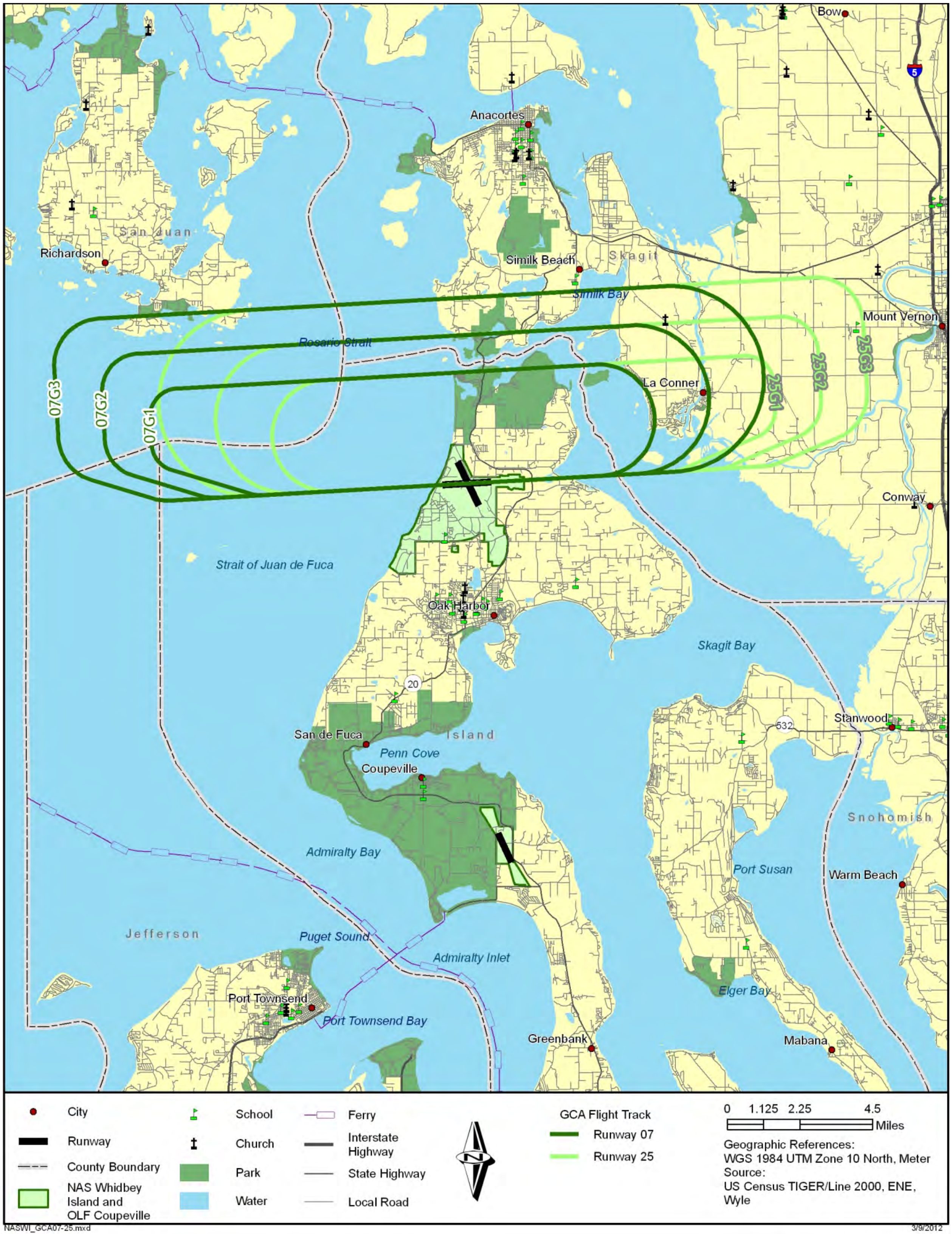


Figure A-13 Modeled Average Daily GCA Box Flight Tracks on Runway 07/25 at NAS Whidbey Island

Figure A-14 Modeled Average Daily GCA Box Flight Tracks on Runway 14/32 at NAS Whidbey Island

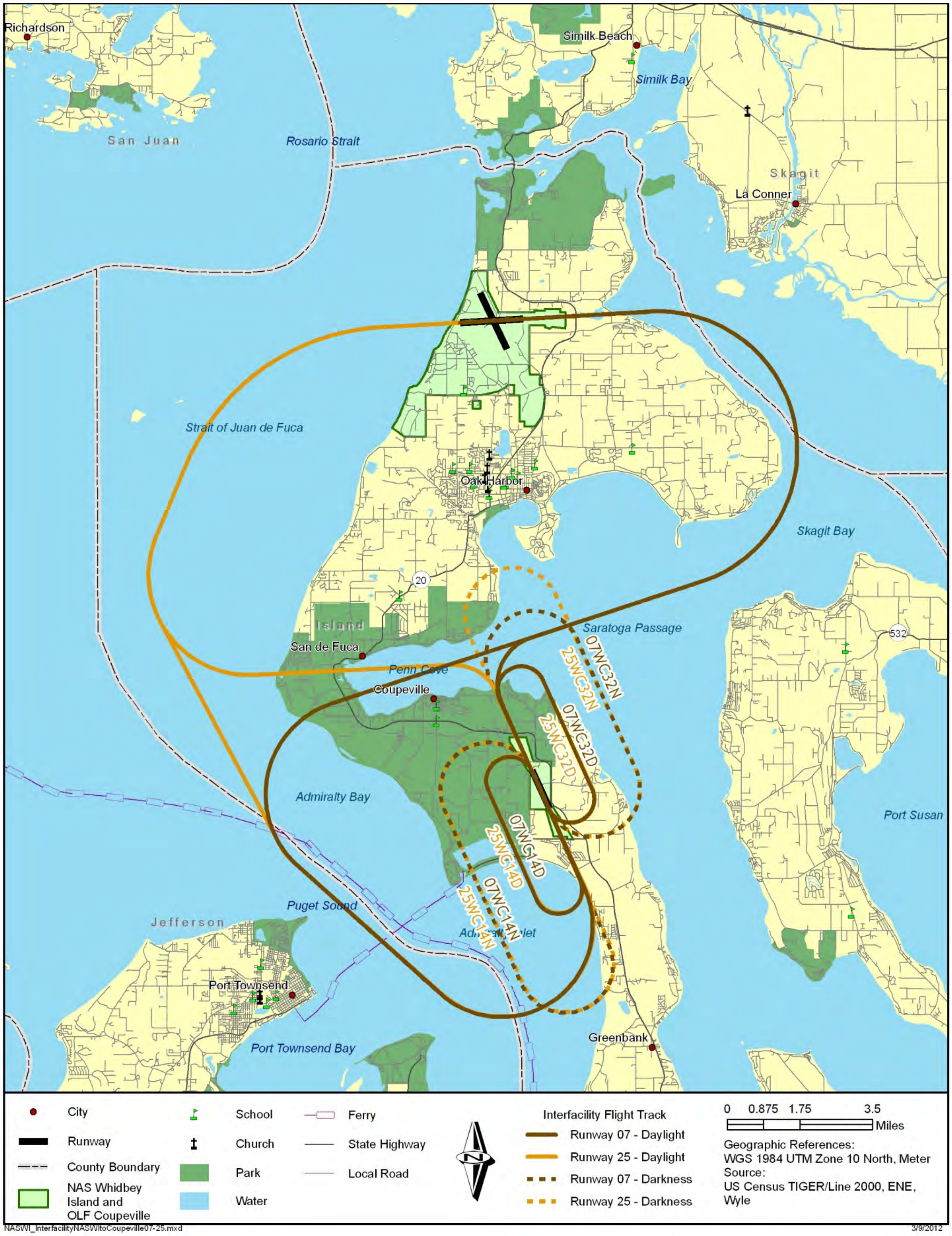


Figure A-15 Modeled Average Daily Interfacility Flight Tracks – NAS Whidbey Island Runway 07/25 to OLF Coupeville

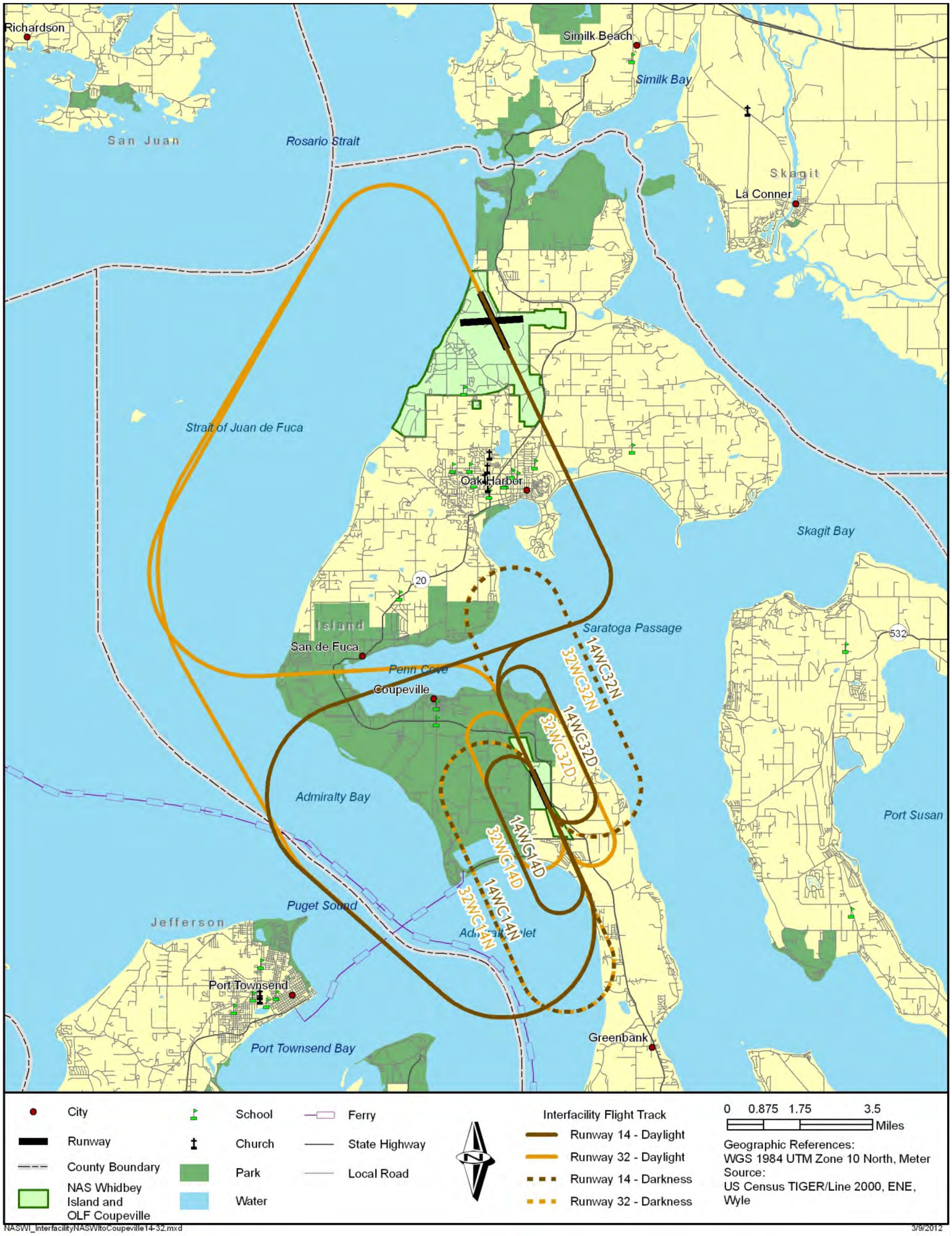


Figure A-16 Modeled Average Daily Interfacility Flight Tracks – NAS Whidbey Island Runway 14/32 to OLF Coupeville

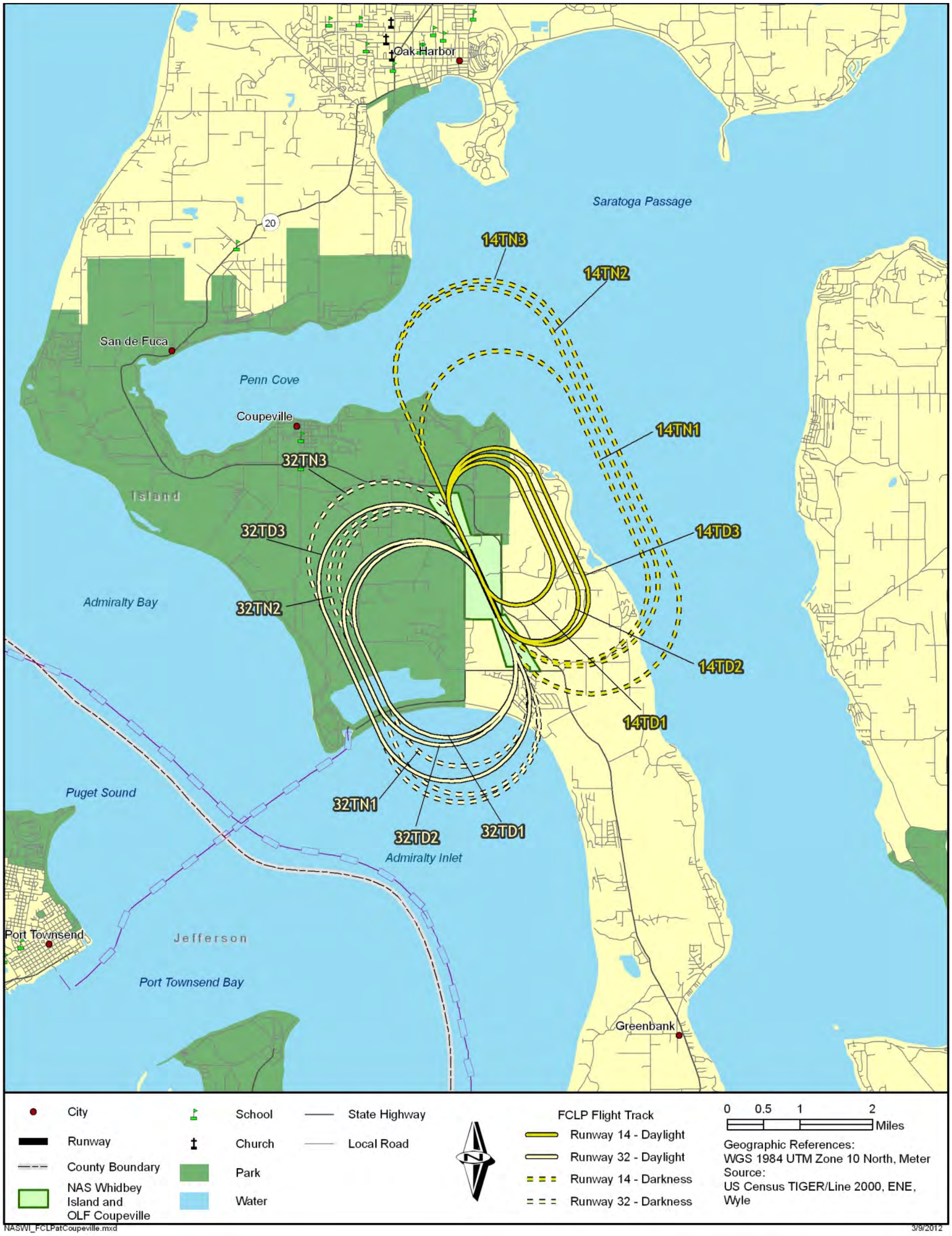


Figure A-17 Modeled Average Daily FCLP Flight Tracks at OLF Coupeville

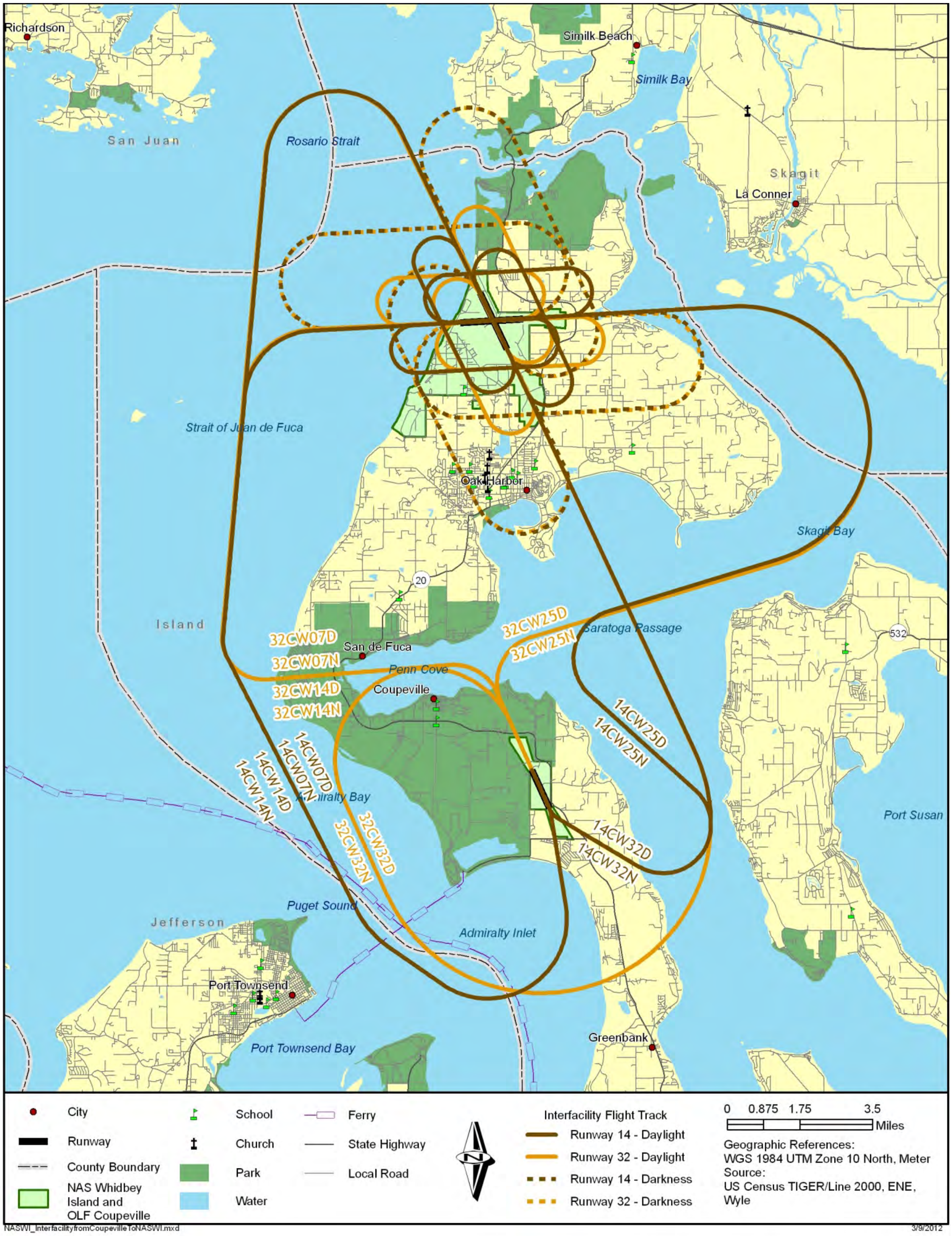


Figure A-18 Modeled Average Daily Interfacility Flight Tracks – OLF Coupeville to NAS Whidbey Island

This appendix provides scaled plots of individual flight profiles for each modeled aircraft type representative of each type of applicable flight operation. The following navigational aids are depicted on the maps:

- NUW – TACAN

The flight profiles are shown in the following order:

Profile Pages	Aircraft
A-44 - A-55	EA-6B
A-56 - A-69	EA-18G
A-70 - A-76	P-3C
A-77 - A-83	P-8A
A-84 - A-85	C-9A

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

Column Heading	Description
Point	Sequence letter along flight track denoting change in flight parameters
Distance (feet)	Distance along flight track from runway threshold in feet
Height (feet)	Altitude of aircraft in feet Above Ground Level (AGL*) or relative to Mean Sea Level (MSL)
Power (Appropriate Unit)	Engine power setting and Drag Configuration/Interpolation Code (defines sets of interpolation code in NOISEMAP (F for FIXED, P for PARALLEL, V for VARIABLE))
Speed (kts)	Indicated airspeed of aircraft in knots

*AGL in this appendix corresponds to Above Field Elevation (AFE). Ault Field elevation is 47 ft MSL and all 'AGL' altitudes shown in this appendix would be converted to MSL by adding 47 feet.

Ault Field elevation = 47 ft MSL

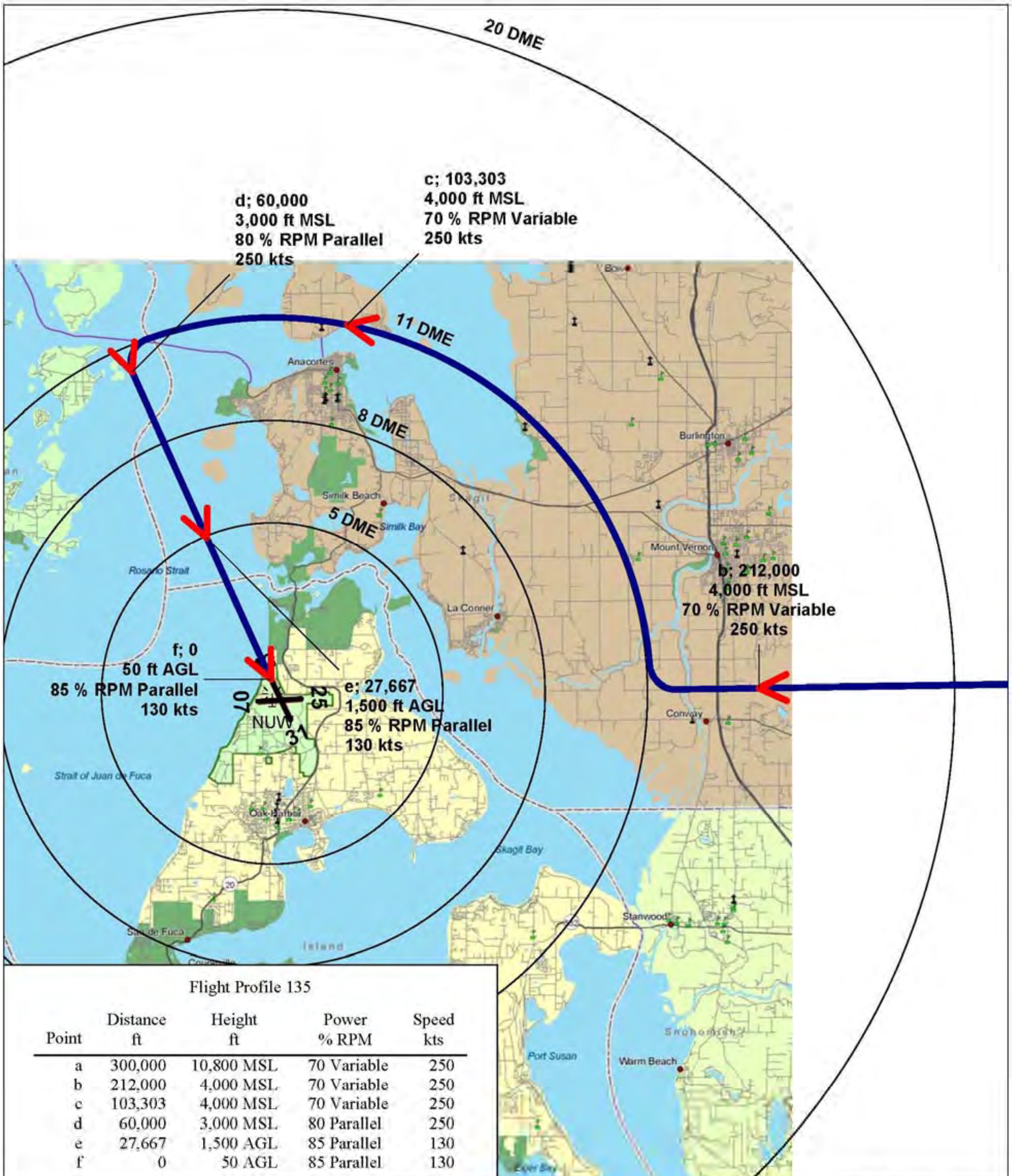
OLF Coupeville elevation = 199 ft MSL

Flight Profile 127

Point	Distance ft	Height ft	Power % RPM	Speed kts
a	240,000	25,000 MSL	84 Variable	300
b	120,000	10,000 MSL	75 Variable	300
c	60,000	3,000 MSL	80 Variable	300
d	24,629	1,500 AGL	80 Parallel	250
e	18,228	1,000 AGL	85 Parallel	130
f	0	50 AGL	85 Parallel	130

Flight Profile 127
Based EA-6B
on Runway 25, Flight Track 25A4 - IFR Arrival Short Center Long East

Scale in Feet 1:220,000 (1 inch = 18,400 feet)



Flight Profile 135

Point	Distance ft	Height ft	Power % RPM	Speed kts
a	300,000	10,800 MSL	70 Variable	250
b	212,000	4,000 MSL	70 Variable	250
c	103,303	4,000 MSL	70 Variable	250
d	60,000	3,000 MSL	80 Parallel	250
e	27,667	1,500 AGL	85 Parallel	130
f	0	50 AGL	85 Parallel	130

Flight Profile 135
Based EA-6B
on Runway 13, Flight Track 13AHT - HI-TACAN Arrival

0 20,000 40,000 60,000 80,000 100,000

Scale in Feet 1:330,000 (1 inch = 27,500 feet)

Flight Profile 141B

Point	Distance ft	Height ft	Power % RPM	Speed kts
a	300,000	24,000 AGL	68 Variable	328
b	167,905	10,000 AGL	70 Variable	350
c	95,591	3,000 AGL	79 Variable	270
d	77,062	1,500 AGL	86 Variable	300
e	43,370	1,500 AGL	88 Variable	300
f	21,971	1,000 AGL	71 Parallel	197
g	14,166	1,000 AGL	85 Parallel	139
h	9,526	549 AGL	81 Parallel	141
i	4,553	289 AGL	77 Parallel	129
j	0	50 AGL	78 Parallel	126

Flight Profile 141B

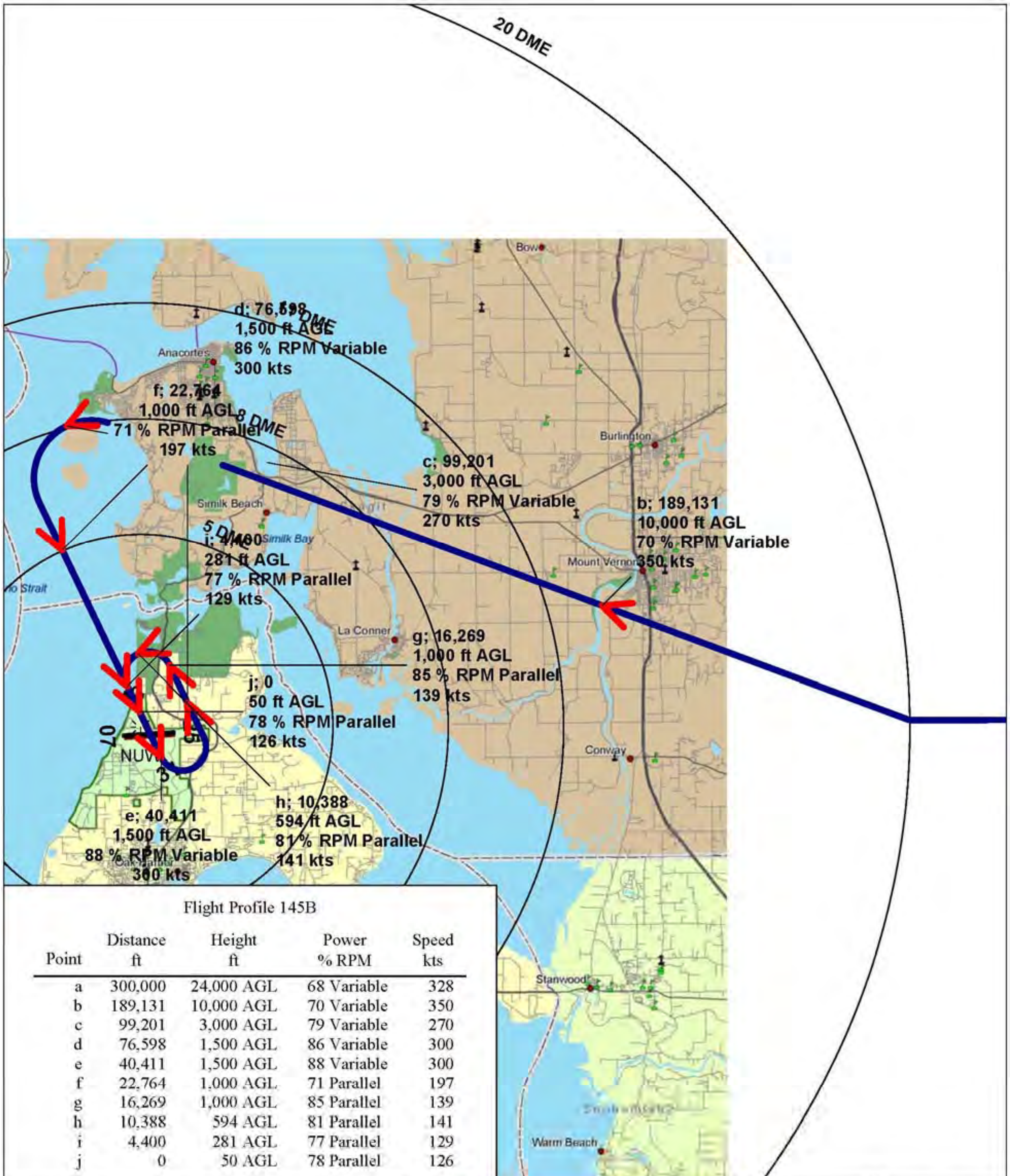
Based EA-6B

on Runway 25, Flight Track 25OD1B - OvHd Day Arrival from East Center

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

Scale in Feet 1:120,000 (1 inch = 10,000 feet)

N



Flight Profile 145B

Point	Distance ft	Height ft	Power % RPM	Speed kts
a	300,000	24,000 AGL	68 Variable	328
b	189,131	10,000 AGL	70 Variable	350
c	99,201	3,000 AGL	79 Variable	270
d	76,598	1,500 AGL	86 Variable	300
e	40,411	1,500 AGL	88 Variable	300
f	22,764	1,000 AGL	71 Parallel	197
g	16,269	1,000 AGL	85 Parallel	139
h	10,388	594 AGL	81 Parallel	141
i	4,400	281 AGL	77 Parallel	129
j	0	50 AGL	78 Parallel	126

Flight Profile 145B

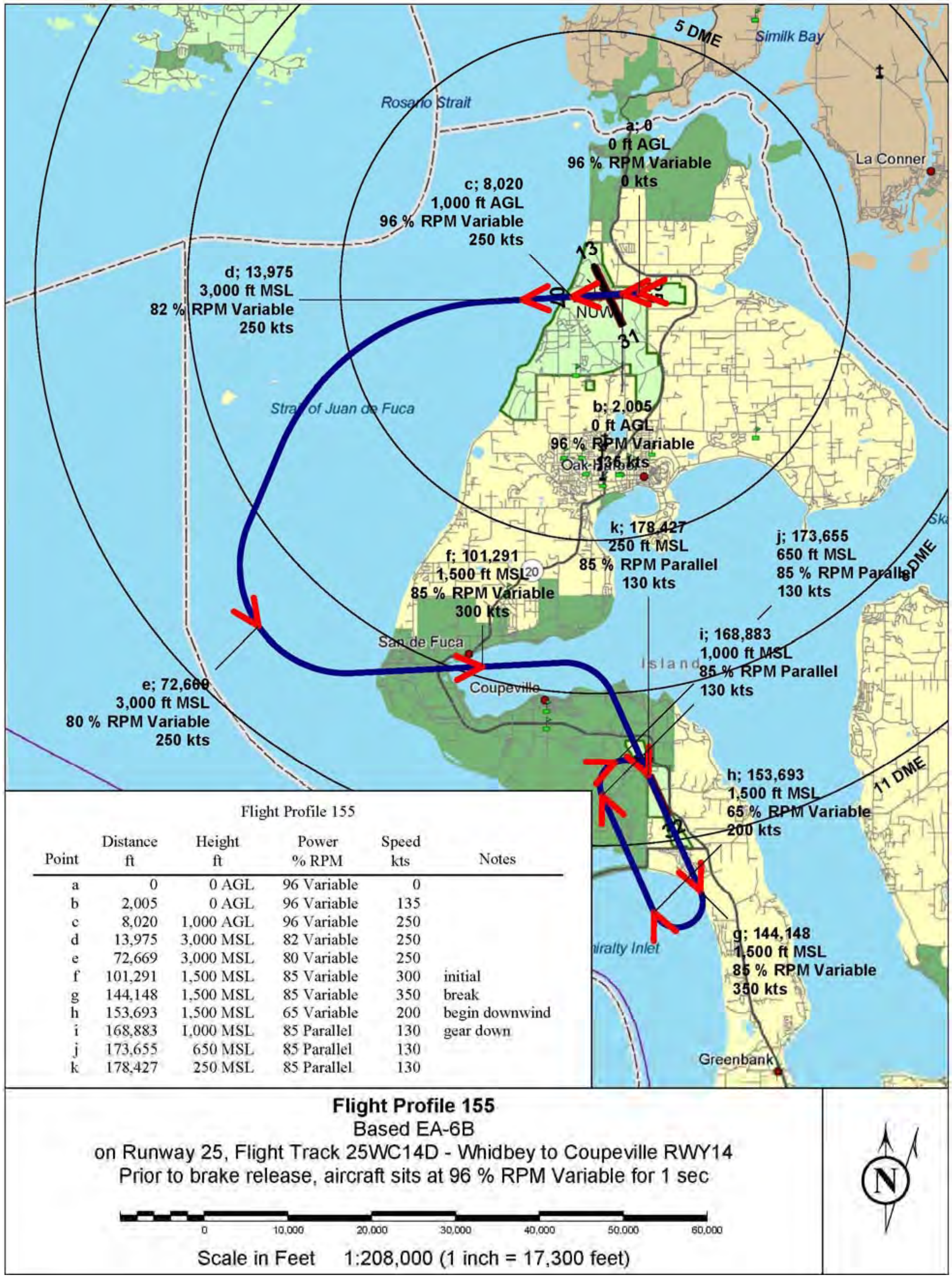
Based EA-6B

on Runway 13, Flight Track 13OD1B - EA-6B OvHd Day Arrival from East Center

0 10,000 20,000 30,000 40,000 50,000 60,000 70,000 80,000 90,000 100,000

Scale in Feet 1:292,000 (1 inch = 24,400 feet)

N

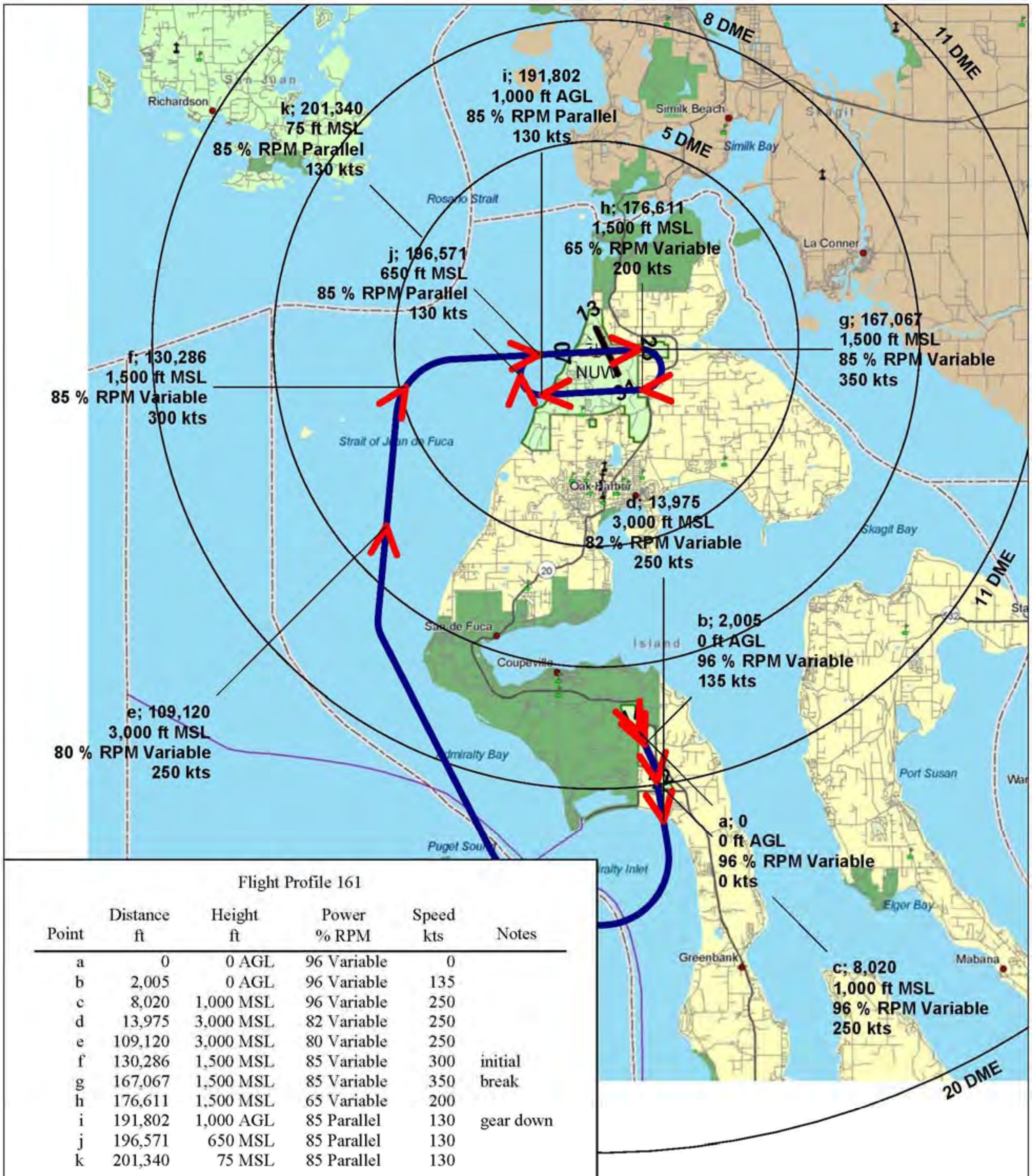


Flight Profile 155

Point	Distance ft	Height ft	Power % RPM	Speed kts	Notes
a	0	0 AGL	96 Variable	0	
b	2,005	0 AGL	96 Variable	135	
c	8,020	1,000 AGL	96 Variable	250	
d	13,975	3,000 MSL	82 Variable	250	
e	72,669	3,000 MSL	80 Variable	250	
f	101,291	1,500 MSL	85 Variable	300	initial
g	144,148	1,500 MSL	85 Variable	350	break
h	153,693	1,500 MSL	65 Variable	200	begin downwind
i	168,883	1,000 MSL	85 Parallel	130	gear down
j	173,655	650 MSL	85 Parallel	130	
k	178,427	250 MSL	85 Parallel	130	

Flight Profile 155
Based EA-6B
on Runway 25, Flight Track 25WC14D - Whidbey to Coupeville RWY14
Prior to brake release, aircraft sits at 96 % RPM Variable for 1 sec

Scale in Feet 1:208,000 (1 inch = 17,300 feet)



Flight Profile 161

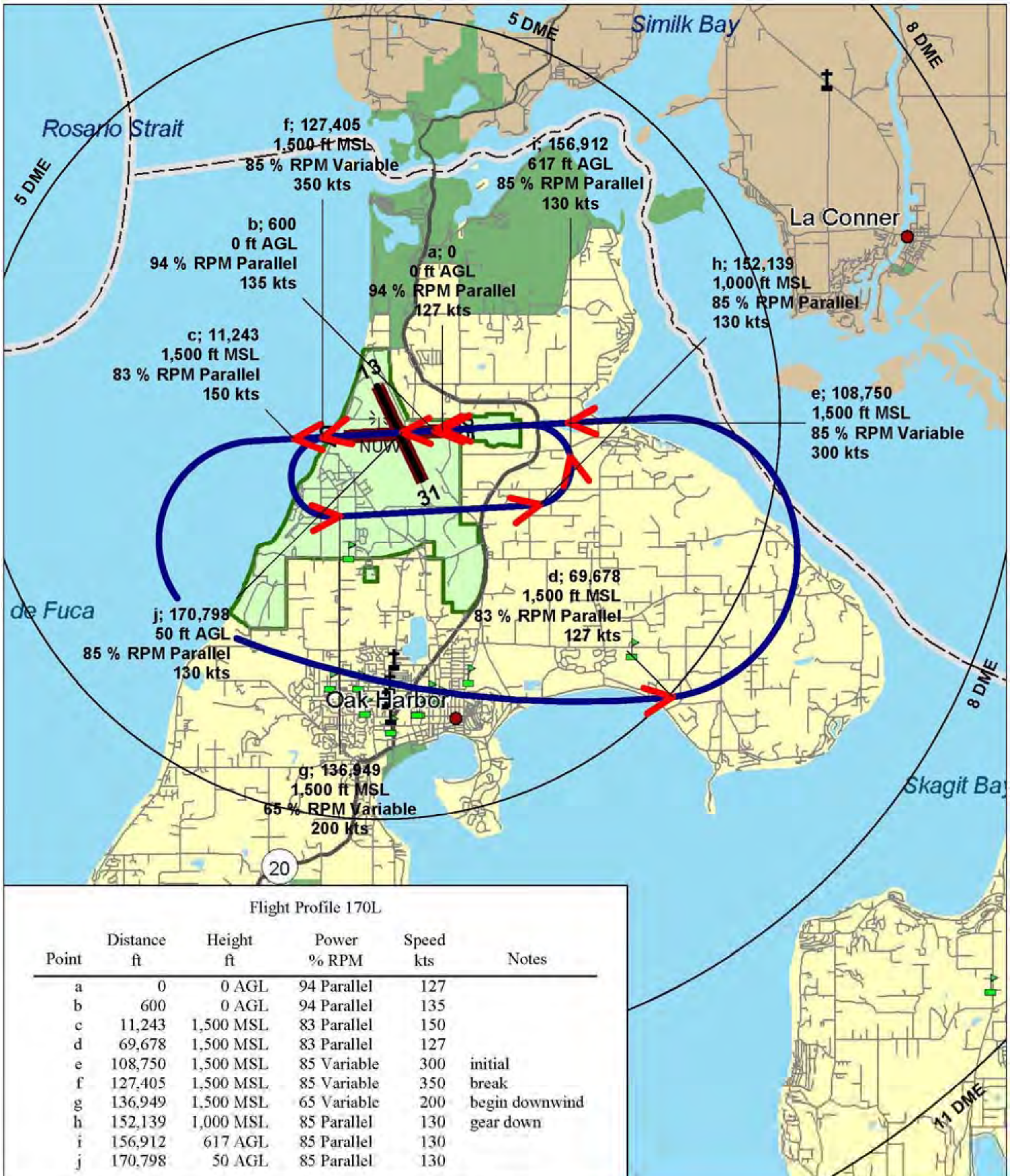
Point	Distance ft	Height ft	Power % RPM	Speed kts	Notes
a	0	0 AGL	96 Variable	0	
b	2,005	0 AGL	96 Variable	135	
c	8,020	1,000 MSL	96 Variable	250	
d	13,975	3,000 MSL	82 Variable	250	
e	109,120	3,000 MSL	80 Variable	250	
f	130,286	1,500 MSL	85 Variable	300	initial
g	167,067	1,500 MSL	85 Variable	350	break
h	176,611	1,500 MSL	65 Variable	200	
i	191,802	1,000 AGL	85 Parallel	130	gear down
j	196,571	650 MSL	85 Parallel	130	
k	201,340	75 MSL	85 Parallel	130	

Flight Profile 161
Based EA-6B
on Runway 14, Flight Track 14CW07D - Coupeville to Whidbey RWY07
Prior to brake release, aircraft sits at 96 % RPM Variable for 1 sec

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

Scale in Feet 1:285,000 (1 inch = 23,700 feet)

N



Flight Profile 170L

Point	Distance ft	Height ft	Power % RPM	Speed kts	Notes
a	0	0 AGL	94 Parallel	127	
b	600	0 AGL	94 Parallel	135	
c	11,243	1,500 MSL	83 Parallel	150	
d	69,678	1,500 MSL	83 Parallel	127	
e	108,750	1,500 MSL	85 Variable	300	initial
f	127,405	1,500 MSL	85 Variable	350	break
g	136,949	1,500 MSL	65 Variable	200	begin downwind
h	152,139	1,000 MSL	85 Parallel	130	gear down
i	156,912	617 AGL	85 Parallel	130	
j	170,798	50 AGL	85 Parallel	130	

Flight Profile 170L
Based EA-6B
on Runway 25, Flight Track 25DL - Depart and ReEnter

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

Scale in Feet 1:140,000 (1 inch = 11,700 feet)

N

Flight Profile 174DB

Point	Distance ft	Height ft	Power % RPM	Speed kts
a	0	0 AGL	94 Parallel	127
b	600	0 AGL	94 Parallel	135
c	7,500	1,000 AGL	83 Parallel	150
d	37,160	1,000 AGL	83 Parallel	127
e	43,244	427 AGL	80 Parallel	134
f	51,399	0 AGL	85 Parallel	127

Flight Profile 174DB
Based EA-6B
on Runway 25, Flight Track 25TD2 - Tower Pattern Day - Center

Flight Profile 178DB

Point	Distance ft	Height ft	Power % RPM	Speed kts
a	0	0 AGL	94 Parallel	127
b	600	0 AGL	94 Parallel	135
c	7,500	1,000 AGL	83 Parallel	150
d	33,612	1,000 AGL	83 Parallel	127
e	43,244	427 AGL	80 Parallel	134
f	51,399	0 AGL	85 Parallel	127

Flight Profile 178DB
Based EA-6B
on Runway 25, Flight Track 25TD2 - Tower Pattern Day - Center

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

Scale in Feet 1:53,000 (1 inch = 4,410 feet)

Flight Profile 184

Point	Distance ft	Height ft	Power % RPM	Speed kts	Notes
a	0	0 AGL	96 Variable	130	
b	600	0 AGL	96 Variable	130	
c	13,975	3,000 MSL	82 Variable	230	
d	135,306	3,000 MSL	82 Parallel	230	gear down
e	156,057	3,000 MSL	84 Parallel	130	
f	170,131	1,000 AGL	84 Parallel	130	
g	185,690	0 AGL	84 Parallel	130	

Flight Profile 184
Based EA-6B
on Runway 25, Flight Track 25G1 - 3NM Wide GCA Box

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

Scale in Feet 1:162,000 (1 inch = 13,500 feet)

N

Flight Profile 193DB

Point	Distance ft	Height ft	Power % RPM	Speed kts	Notes
a	0	200 MSL	94 Parallel	130	
b	600	200 MSL	94 Parallel	130	
c	7,495	1,000 MSL	83 Parallel	130	
d	23,061	1,000 MSL	83 Parallel	130	end downwind
e	27,903	600 MSL	80 Parallel	130	
f	35,473	200 MSL	85 Parallel	130	

Flight Profile 193DB

Based EA-6B

on Runway 14, Flight Track 14TD2 - EA-6B Coupeville Pattern Day - Center

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

Scale in Feet 1:108,000 (1 inch = 9,020 feet)

N

Flight Profile 193NB

Point	Distance ft	Height ft	Power % RPM	Speed kts	Notes
a	0	200 MSL	94 Parallel	130	
b	600	200 MSL	94 Parallel	130	
c	7,500	1,000 MSL	83 Parallel	130	
d	41,267	1,000 MSL	83 Parallel	130	end downwind
e	60,934	600 MSL	80 Parallel	130	
f	71,883	200 MSL	85 Parallel	130	

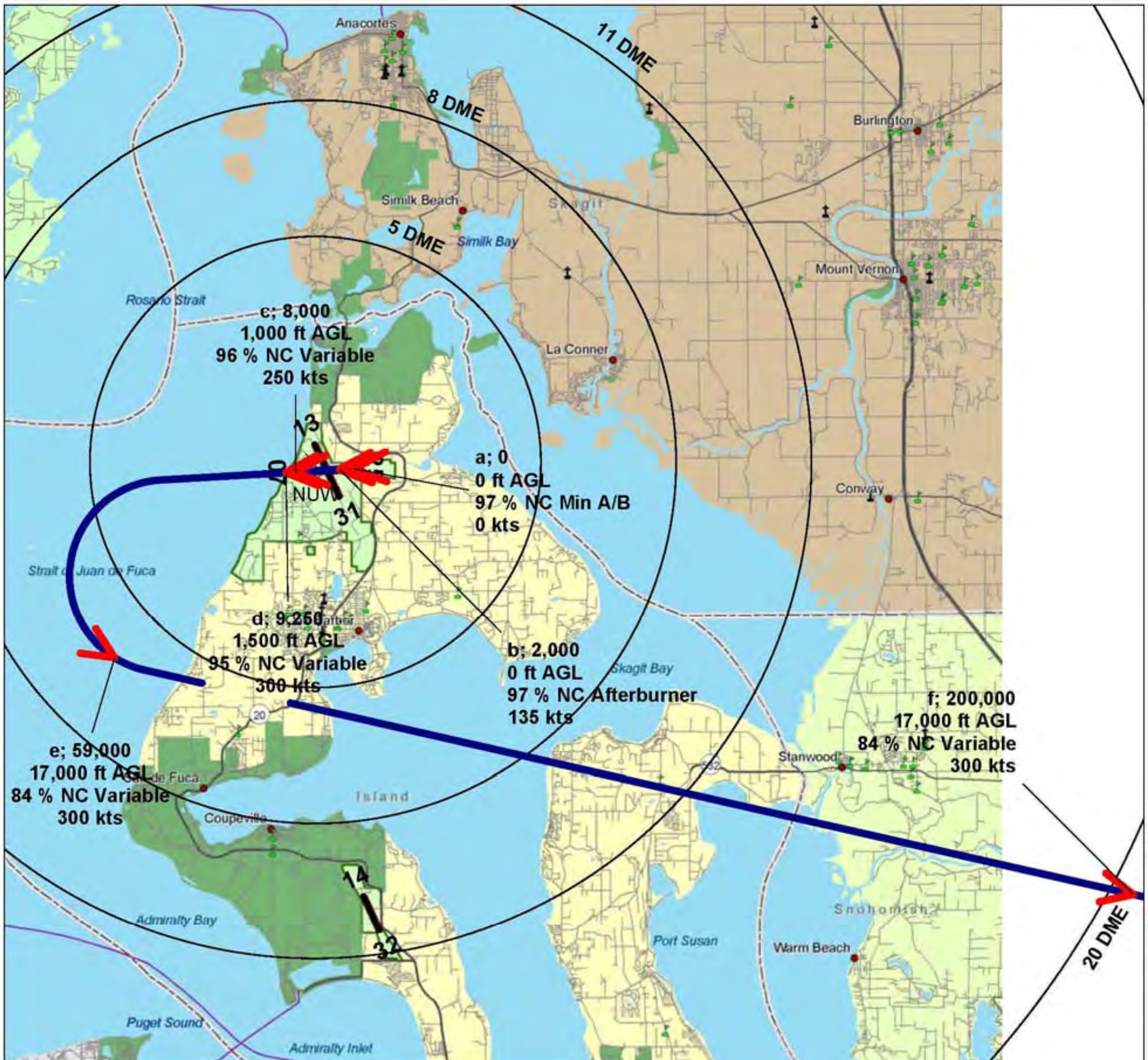
Flight Profile 193NB

Based EA-6B

on Runway 14, Flight Track 14TN2 - EA-6B Coupeville Pattern Night - Center

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

Scale in Feet 1:117,000 (1 inch = 9,760 feet)



Flight Profile 207A

Point	Distance ft	Height ft	Power % NC	Speed kts
a	0	0 AGL	97 Min A/B	0
b	2,000	0 AGL	97 Afterburner	135
c	8,000	1,000 AGL	96 Variable	250
d	9,250	1,500 AGL	95 Variable	300
e	59,000	17,000 AGL	84 Variable	300
f	200,000	17,000 AGL	84 Variable	300

Flight Profile 207A

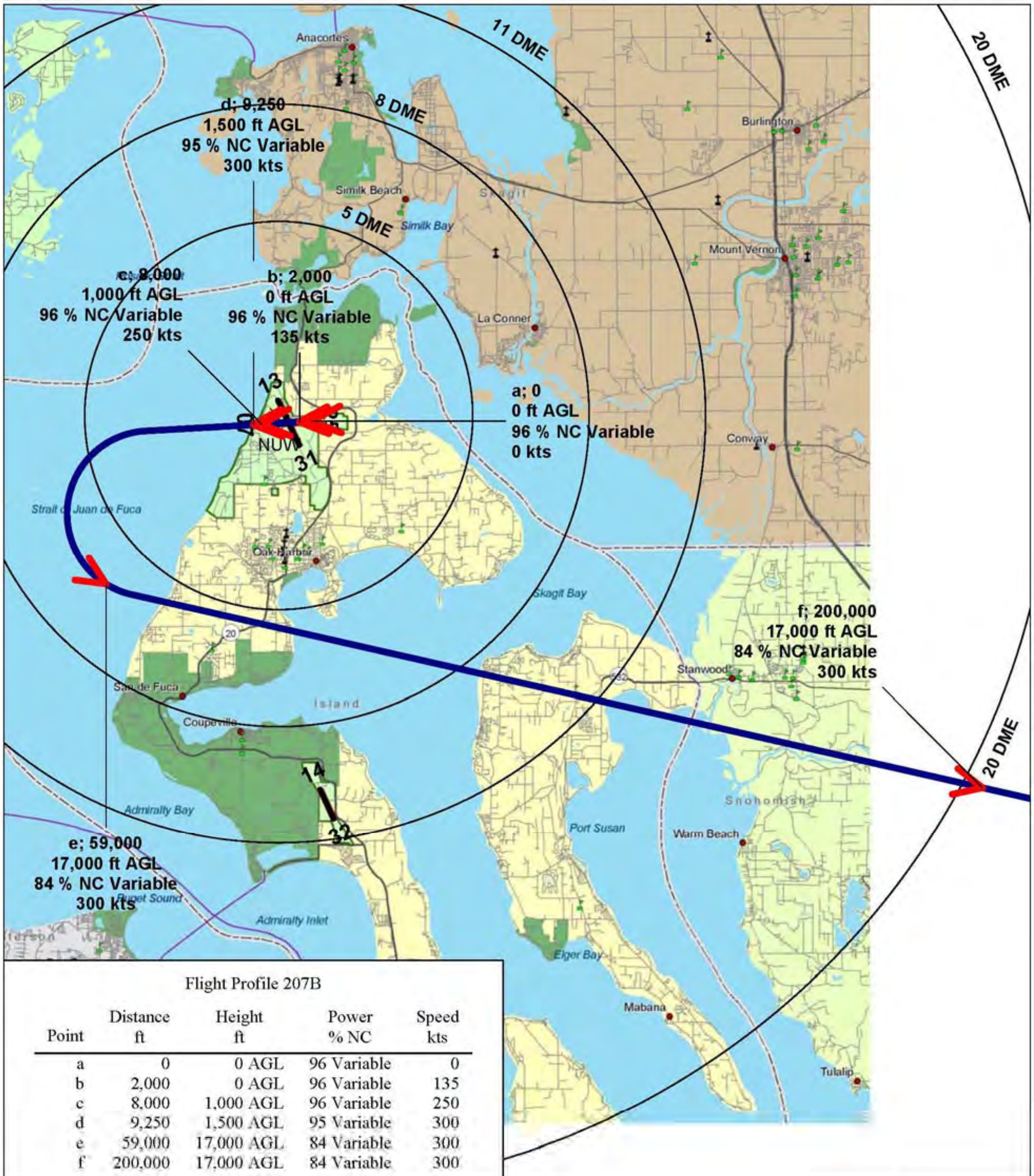
Based EA-18G

on Runway 25, Flight Track 25D1 - Departure to East

Prior to brake release, aircraft sits at 97 % NC Min A/B for 1 sec

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

Scale in Feet 1:283,000 (1 inch = 23,600 feet)



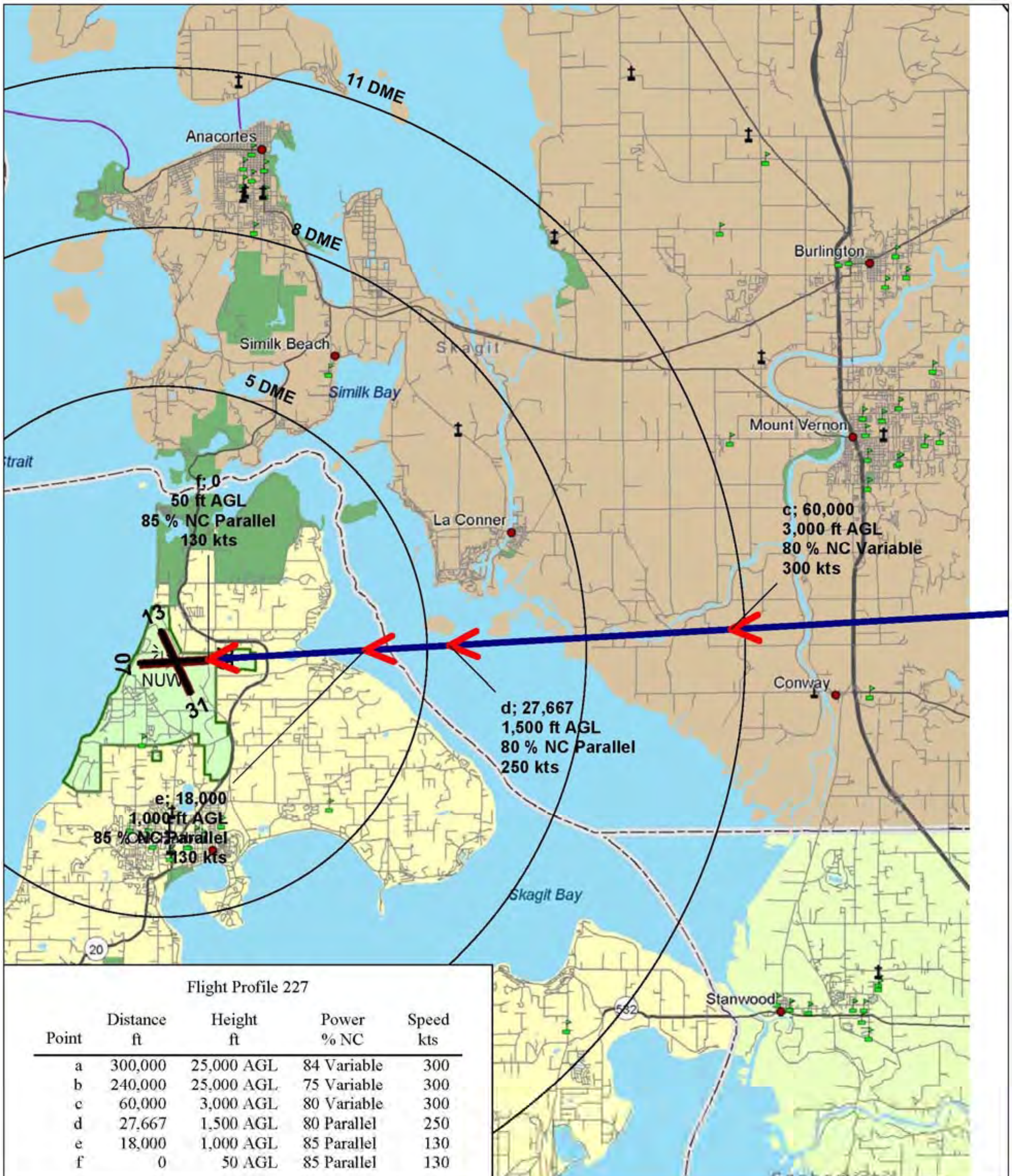
Flight Profile 207B

Point	Distance ft	Height ft	Power % NC	Speed kts
a	0	0 AGL	96 Variable	0
b	2,000	0 AGL	96 Variable	135
c	8,000	1,000 AGL	96 Variable	250
d	9,250	1,500 AGL	95 Variable	300
e	59,000	17,000 AGL	84 Variable	300
f	200,000	17,000 AGL	84 Variable	300

Flight Profile 207B
Based EA-18G
on Runway 25, Flight Track 25D1 - Departure to East
Prior to brake release, aircraft sits at 96 % NC Variable for 1 sec

0 10,000 20,000 30,000 40,000 50,000 60,000 70,000 80,000 90,000 100,000

Scale in Feet 1:297,000 (1 inch = 24,700 feet)



Flight Profile 227

Point	Distance ft	Height ft	Power % NC	Speed kts
a	300,000	25,000 AGL	84 Variable	300
b	240,000	25,000 AGL	75 Variable	300
c	60,000	3,000 AGL	80 Variable	300
d	27,667	1,500 AGL	80 Parallel	250
e	18,000	1,000 AGL	85 Parallel	130
f	0	50 AGL	85 Parallel	130

Flight Profile 227

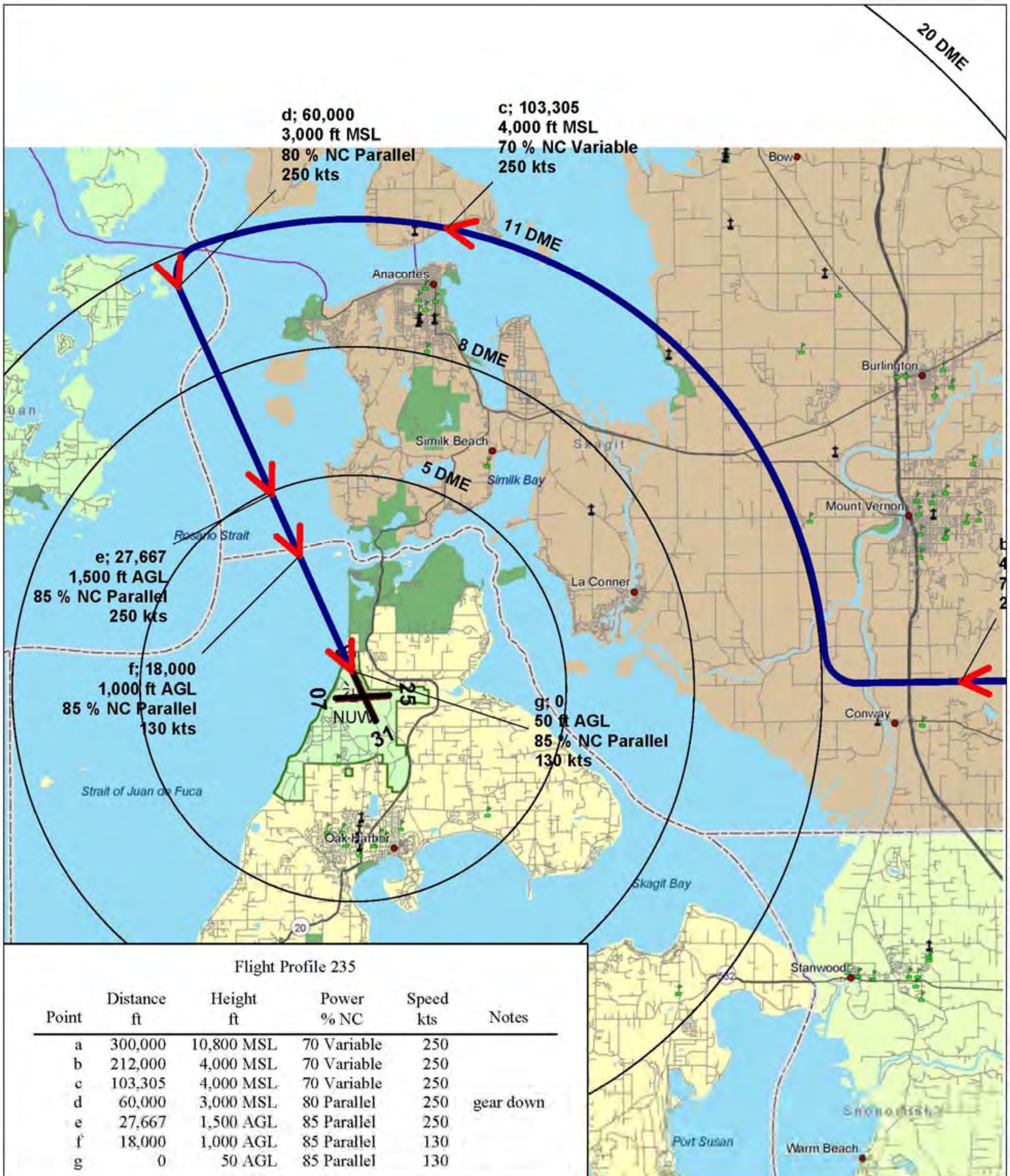
Based EA-18G

on Runway 25, Flight Track 25A4 - IFR Arrival Short Center Long East

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

Scale in Feet 1:213,000 (1 inch = 17,700 feet)

N



Flight Profile 235

Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	300,000	10,800 MSL	70 Variable	250	
b	212,000	4,000 MSL	70 Variable	250	
c	103,305	4,000 MSL	70 Variable	250	
d	60,000	3,000 MSL	80 Parallel	250	gear down
e	27,667	1,500 AGL	85 Parallel	250	
f	18,000	1,000 AGL	85 Parallel	130	
g	0	50 AGL	85 Parallel	130	

Flight Profile 235
Based EA-18G
on Runway 13, Flight Track 13AHT - HI-TACAN Arrival

Scale in Feet 1:264,000 (1 inch = 22,000 feet)

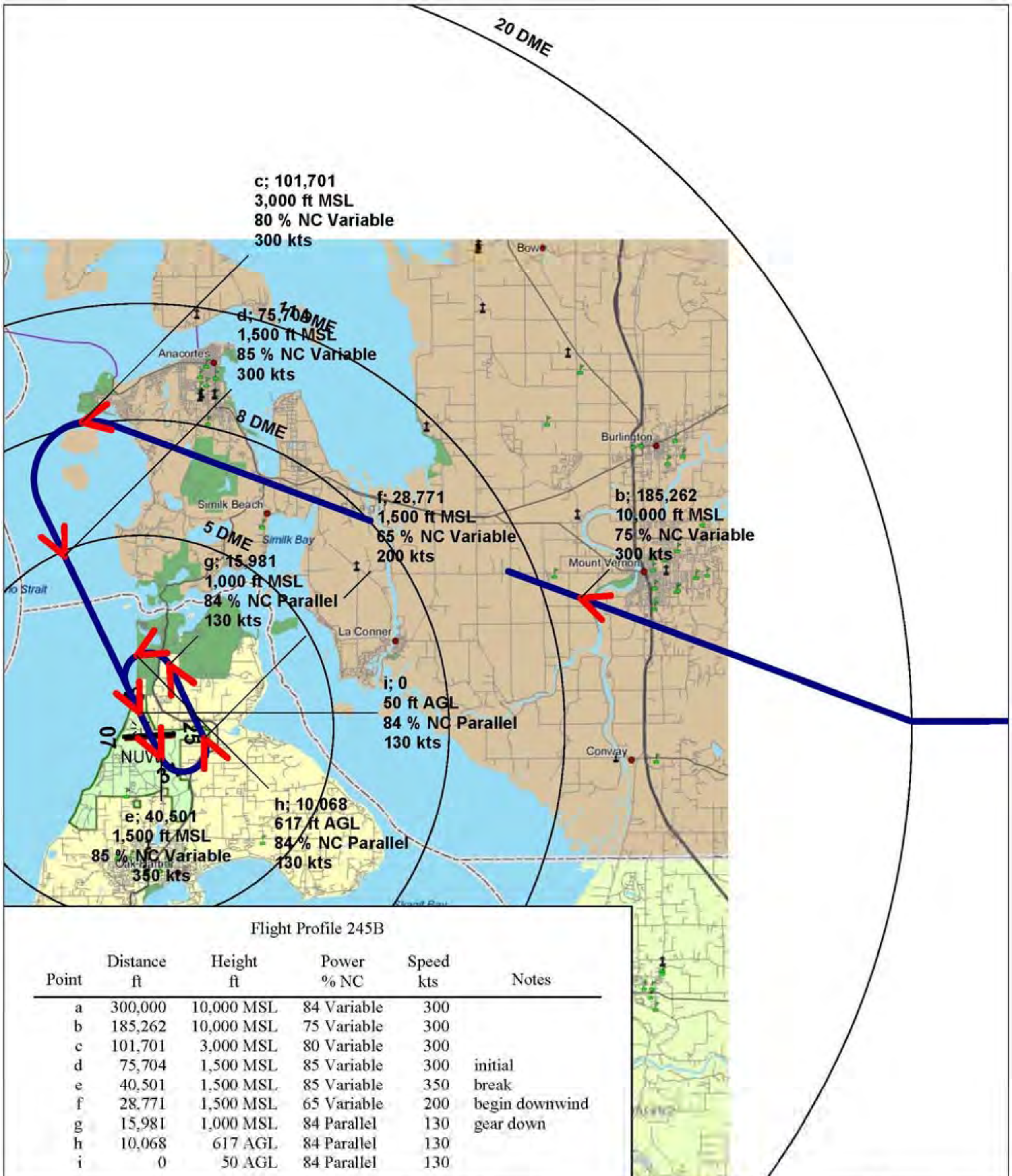
Flight Profile 241B

Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	300,000	10,000 MSL	84 Variable	300	
b	167,905	10,000 MSL	75 Variable	300	
c	98,722	3,000 MSL	80 Variable	300	
d	76,764	1,500 MSL	85 Variable	300	initial
e	43,348	1,500 MSL	85 Variable	350	break
f	28,558	1,500 MSL	65 Variable	200	begin downwind
g	16,948	1,000 MSL	84 Parallel	130	gear down
h	9,500	617 AGL	84 Parallel	130	
i	0	50 AGL	84 Parallel	130	

Flight Profile 241B
Based EA-18G
on Runway 25, Flight Track 25OD1B - OvHd Day Arrival from East Center

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

Scale in Feet 1:194,000 (1 inch = 16,100 feet)

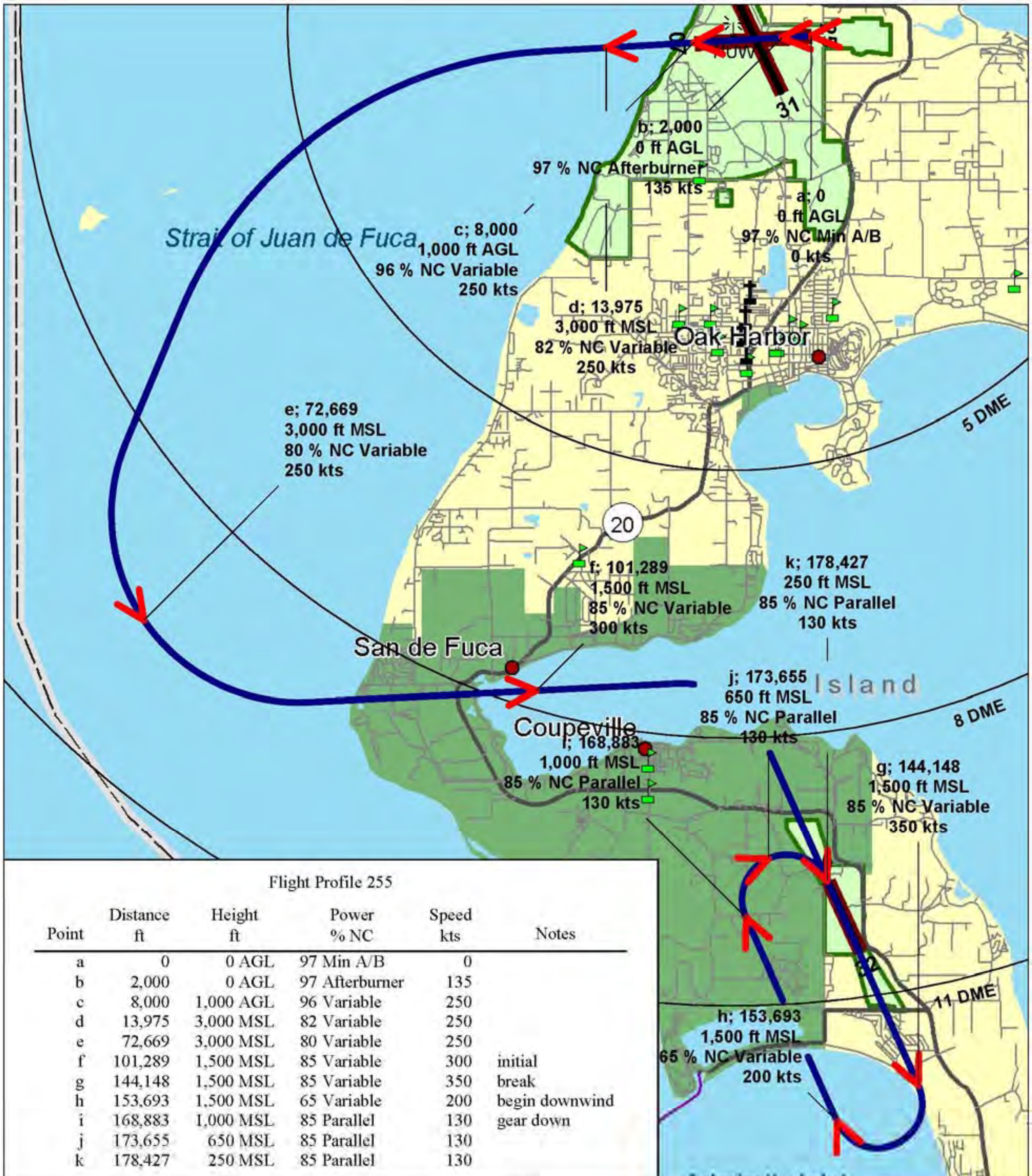


Flight Profile 245B

Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	300,000	10,000 MSL	84 Variable	300	
b	185,262	10,000 MSL	75 Variable	300	
c	101,701	3,000 MSL	80 Variable	300	
d	75,704	1,500 MSL	85 Variable	300	initial
e	40,501	1,500 MSL	85 Variable	350	break
f	28,771	1,500 MSL	65 Variable	200	begin downwind
g	15,981	1,000 MSL	84 Parallel	130	gear down
h	10,068	617 AGL	84 Parallel	130	
i	0	50 AGL	84 Parallel	130	

Flight Profile 245B
Based EA-18G
on Runway 13, Flight Track 13OD1B - EA-6B OvHd Day Arrival from East Center

Scale in Feet 1:292,000 (1 inch = 24,400 feet)



Flight Profile 255

Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	0	0 AGL	97 Min A/B	0	
b	2,000	0 AGL	97 Afterburner	135	
c	8,000	1,000 AGL	96 Variable	250	
d	13,975	3,000 MSL	82 Variable	250	
e	72,669	3,000 MSL	80 Variable	250	
f	101,289	1,500 MSL	85 Variable	300	initial
g	144,148	1,500 MSL	85 Variable	350	break
h	153,693	1,500 MSL	65 Variable	200	begin downwind
i	168,883	1,000 MSL	85 Parallel	130	gear down
j	173,655	650 MSL	85 Parallel	130	
k	178,427	250 MSL	85 Parallel	130	

Flight Profile 255

Based EA-18G

on Runway 25, Flight Track 25WC14D - Whidbey to Coupeville RWY14

Prior to brake release, aircraft sits at 97 % NC Min A/B for 1 sec

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

Scale in Feet 1:129,000 (1 inch = 10,700 feet)

N

Flight Profile 261

Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	0	0 AGL	96 Variable	0	
b	2,000	0 AGL	96 Variable	135	
c	8,000	1,000 MSL	96 Variable	250	
d	13,975	3,000 MSL	82 Variable	250	
e	61,387	3,000 MSL	80 Variable	250	
f	114,610	3,000 MSL	80 Variable	250	
g	132,904	1,500 MSL	85 Variable	300	initial
h	167,067	1,500 MSL	85 Variable	350	break
i	176,611	1,500 MSL	65 Variable	200	begin downwind
j	191,802	1,000 MSL	85 Parallel	130	gear down
k	196,571	650 MSL	85 Parallel	130	
l	201,340	75 MSL	85 Parallel	130	

Flight Profile 261

Based EA-18G

on Runway 14, Flight Track 14CW07D - Coupeville to Whidbey RWY07

Prior to brake release, aircraft sits at 96 % NC Variable for 1 sec

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

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

N

Flight Profile 271L

Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	0	0 AGL	96 Variable	130	
b	400	0 AGL	96 Variable	130	
c	1,000	300 AGL	90 Variable	145	
d	11,243	1,500 AGL	84 Variable	300	
e	69,678	1,500 AGL	81 Variable	300	
f	103,594	1,500 AGL	85 Variable	300	initial
g	127,405	1,500 AGL	85 Variable	350	break
h	136,949	1,500 AGL	65 Variable	200	begind downwind
i	152,139	1,000 AGL	84 Parallel	130	gear down
j	156,912	617 AGL	84 Parallel	130	
k	170,798	50 AGL	84 Parallel	130	

Flight Profile 271L
Based EA-18G
on Runway 25, Flight Track 25DL - Depart and ReEnter

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

Scale in Feet 1:117,000 (1 inch = 9,740 feet)

N

Flight Profile 274DB

Point	Distance ft	Height ft	Power % NC	Speed kts
a	0	0 AGL	96 Variable	130
b	400	0 AGL	96 Variable	130
c	1,000	300 AGL	90 Parallel	145
d	7,495	1,000 AGL	84 Parallel	130
e	34,175	1,000 AGL	81 Parallel	130
f	41,899	500 AGL	84 Parallel	130
g	51,399	0 AGL	84 Parallel	130

Flight Profile 274DB

Based EA-18G

on Runway 25, Flight Track 25TD2 - Tower Pattern Day - Center

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

Flight Profile 278DB

Point	Distance ft	Height ft	Power % NC	Speed kts
a	0	0 AGL	96 Variable	130
b	400	0 AGL	96 Variable	130
c	1,000	300 AGL	90 Parallel	145
d	7,495	1,000 AGL	84 Parallel	130
e	33,984	1,000 AGL	81 Parallel	130
f	41,899	500 AGL	84 Parallel	130
g	51,399	0 AGL	84 Parallel	130

Flight Profile 278DB
Based EA-18G
on Runway 25, Flight Track 25TD2 - Tower Pattern Day - Center

Flight Profile 284

Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	0	0 AGL	96 Variable	130	
b	400	0 AGL	96 Variable	130	
c	13,975	3,000 AGL	82 Variable	230	
d	135,306	3,000 AGL	82 Parallel	230	gear down
e	147,021	3,000 AGL	84 Parallel	130	
f	170,473	1,000 AGL	84 Parallel	130	
g	185,690	0 AGL	84 Parallel	130	

Flight Profile 284
Based EA-18G
on Runway 25, Flight Track 25G1 - 3NM Wide GCA Box

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

Scale in Feet 1:162,000 (1 inch = 13,500 feet)

N

Flight Profile 293DB

Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	0	200 MSL	96 Variable	130	
b	400	200 MSL	96 Variable	130	
c	1,000	500 MSL	90 Parallel	145	
d	7,495	1,000 MSL	84 Parallel	130	
e	23,061	1,000 MSL	82 Parallel	130	end downwind
f	27,231	600 MSL	84 Parallel	130	catch 3 deg glide slope
g	35,473	200 MSL	84 Parallel	130	

Flight Profile 293DB
Based EA-18G
on Runway 14, Flight Track 14TD2 - EA-6B Coupeville Pattern Day - Center

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

Scale in Feet 1:93,500 (1 inch = 7,790 feet)

Flight Profile 293NB

Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	0	200 MSL	96 Variable	130	
b	400	200 MSL	96 Variable	130	
c	1,000	500 MSL	90 Parallel	145	
d	7,495	1,000 MSL	84 Parallel	130	
e	41,267	1,000 MSL	82 Parallel	130	end downwind
f	61,200	600 MSL	84 Parallel	130	catch 3 deg glide slope
g	71,883	200 MSL	84 Parallel	130	

Flight Profile 293NB

Based EA-18G

on Runway 14, Flight Track 14TN2 - EA-6B Coupeville Pattern Night - Center

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

Scale in Feet 1:237,000 (1 inch = 19,700 feet)

Flight Profile 307

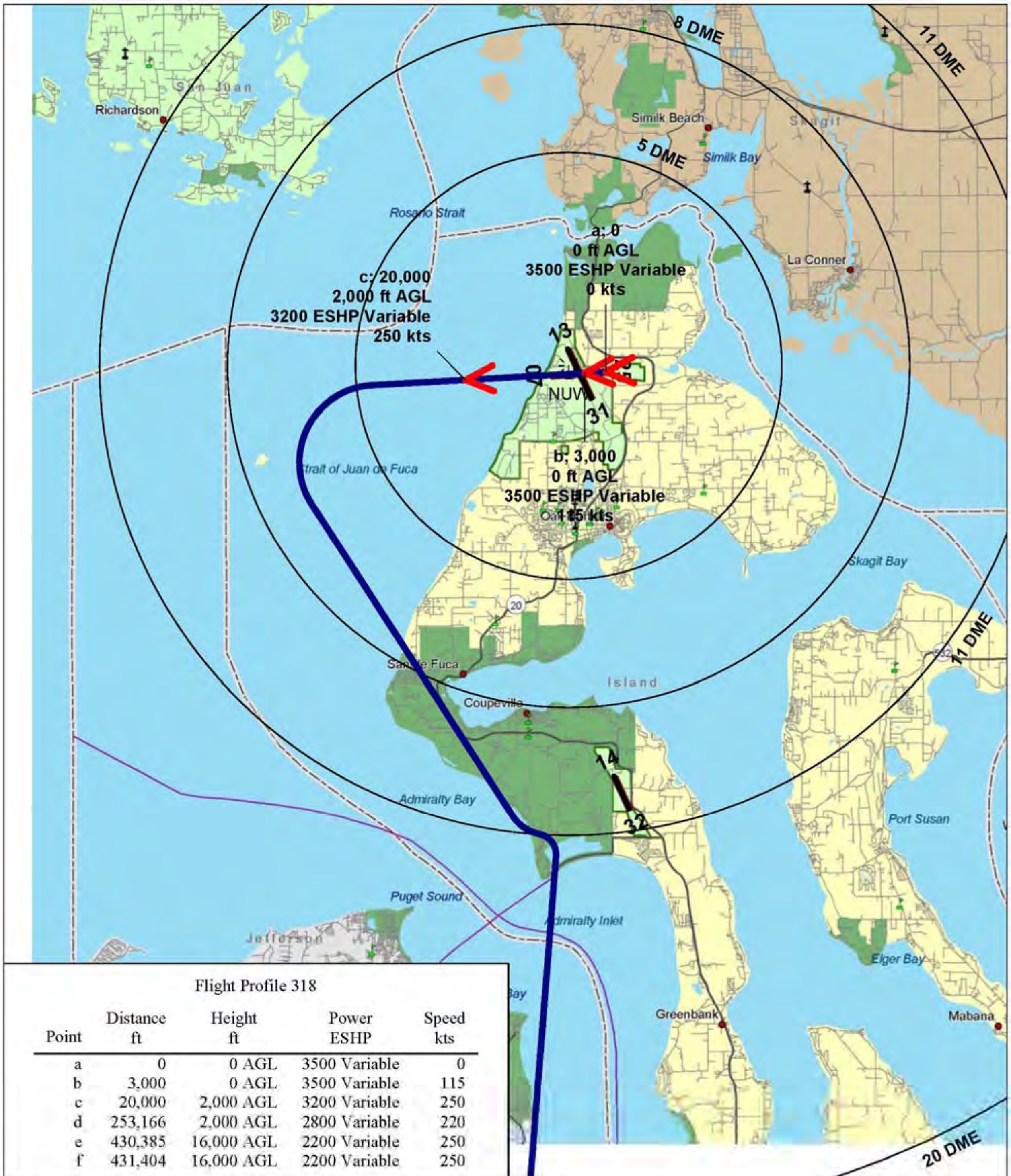
Point	Distance ft	Height ft	Power ESHP	Speed kts
a	0	0 AGL	3500 Variable	0
b	3,000	0 AGL	3500 Variable	115
c	27,005	2,000 AGL	3200 Variable	250
d	33,757	3,000 AGL	2800 Variable	220
e	209,292	16,000 AGL	2200 Variable	250
f	300,000	16,000 AGL	2200 Variable	250

Flight Profile 307
Based P-3
on Runway 25, Flight Track 25D5 - Departure to West

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

Scale in Feet 1:224,000 (1 inch = 18,600 feet)

N



Flight Profile 318

Point	Distance ft	Height ft	Power ESHP	Speed kts
a	0	0 AGL	3500 Variable	0
b	3,000	0 AGL	3500 Variable	115
c	20,000	2,000 AGL	3200 Variable	250
d	253,166	2,000 AGL	2800 Variable	220
e	430,385	16,000 AGL	2200 Variable	250
f	431,404	16,000 AGL	2200 Variable	250

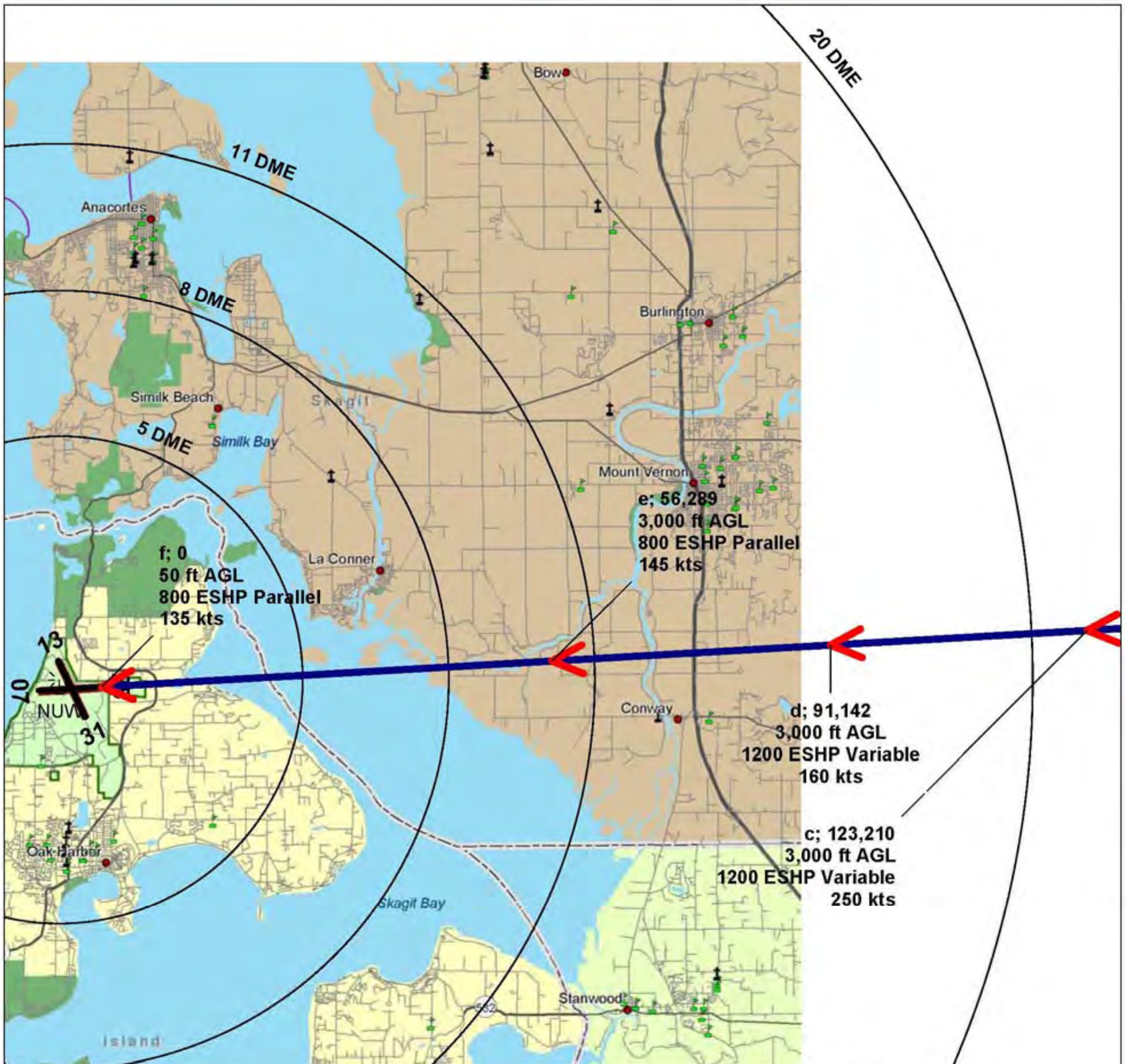
Flight Profile 318

Based P-3

on Runway 25, Flight Track 25DLT - LO-TACAN Departure

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

Scale in Feet 1:264,000 (1 inch = 22,000 feet)



Flight Profile 324

Point	Distance ft	Height ft	Power ESHP	Speed kts	Notes
a	212,664	10,000 AGL	2000 Variable	250	
b	182,284	10,000 AGL	500 Variable	250	
c	123,210	3,000 AGL	1200 Variable	250	
d	91,142	3,000 AGL	1200 Variable	160	
e	56,289	3,000 AGL	800 Parallel	145	gear down; start 3 deg glide slope
f	0	50 AGL	800 Parallel	135	

Flight Profile 324

Based P-3

on Runway 25, Flight Track 25A1 - P-3 VFR Arrival from East

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

Scale in Feet 1:257,000 (1 inch = 21,400 feet)

N

Flight Profile 337

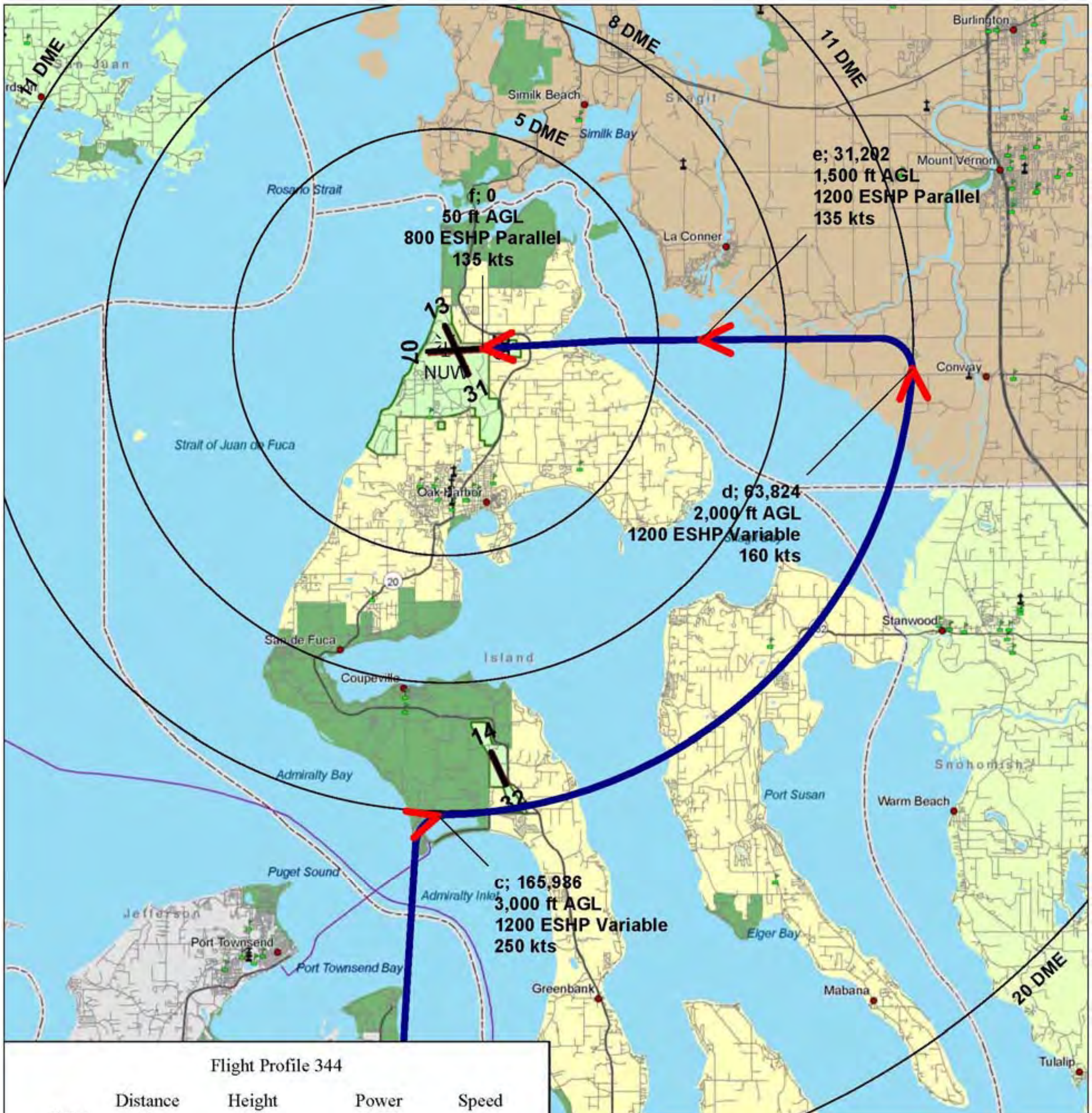
Point	Distance ft	Height ft	Power ESHP	Speed kts
a	212,664	10,000 AGL	2000 Variable	250
b	182,284	10,000 AGL	500 Variable	250
c	123,210	3,000 AGL	1200 Variable	250
d	91,142	3,000 AGL	1200 Variable	160
e	56,289	3,000 AGL	1200 Parallel	135
f	0	50 AGL	800 Parallel	135

Flight Profile 337
Based P-3
on Runway 25, Flight Track 25A4 - IFR Arrival Short Center Long East

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

Scale in Feet 1:257,000 (1 inch = 21,400 feet)

N



Flight Profile 344

Point	Distance ft	Height ft	Power ESHP	Speed kts
a	300,000	10,000 AGL	2000 Variable	250
b	253,170	10,000 AGL	500 Variable	250
c	165,986	3,000 AGL	1200 Variable	250
d	63,824	2,000 AGL	1200 Variable	160
e	31,202	1,500 AGL	1200 Parallel	135
f	0	50 AGL	800 Parallel	135

Flight Profile 344
Based P-3
on Runway 25, Flight Track 25ALT - LO-TACAN Arrival

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

Scale in Feet 1:286,000 (1 inch = 23,800 feet)

Flight Profile 348DB

Point	Distance ft	Height ft	Power ESHP	Speed kts	Notes
a	0	0 AGL	3500 Variable	135	
b	3,000	0 AGL	3500 Variable	115	
c	11,257	500 AGL	2500 Variable	160	
d	18,822	1,000 AGL	1200 Variable	160	reach pattern altitude
e	33,302	1,000 AGL	1200 Parallel	160	gear down; abeam of landing point
f	39,343	1,000 AGL	800 Parallel	160	
g	55,393	317 AGL	800 Parallel	145	
h	61,450	0 AGL	800 Parallel	135	

Flight Profile 348DB

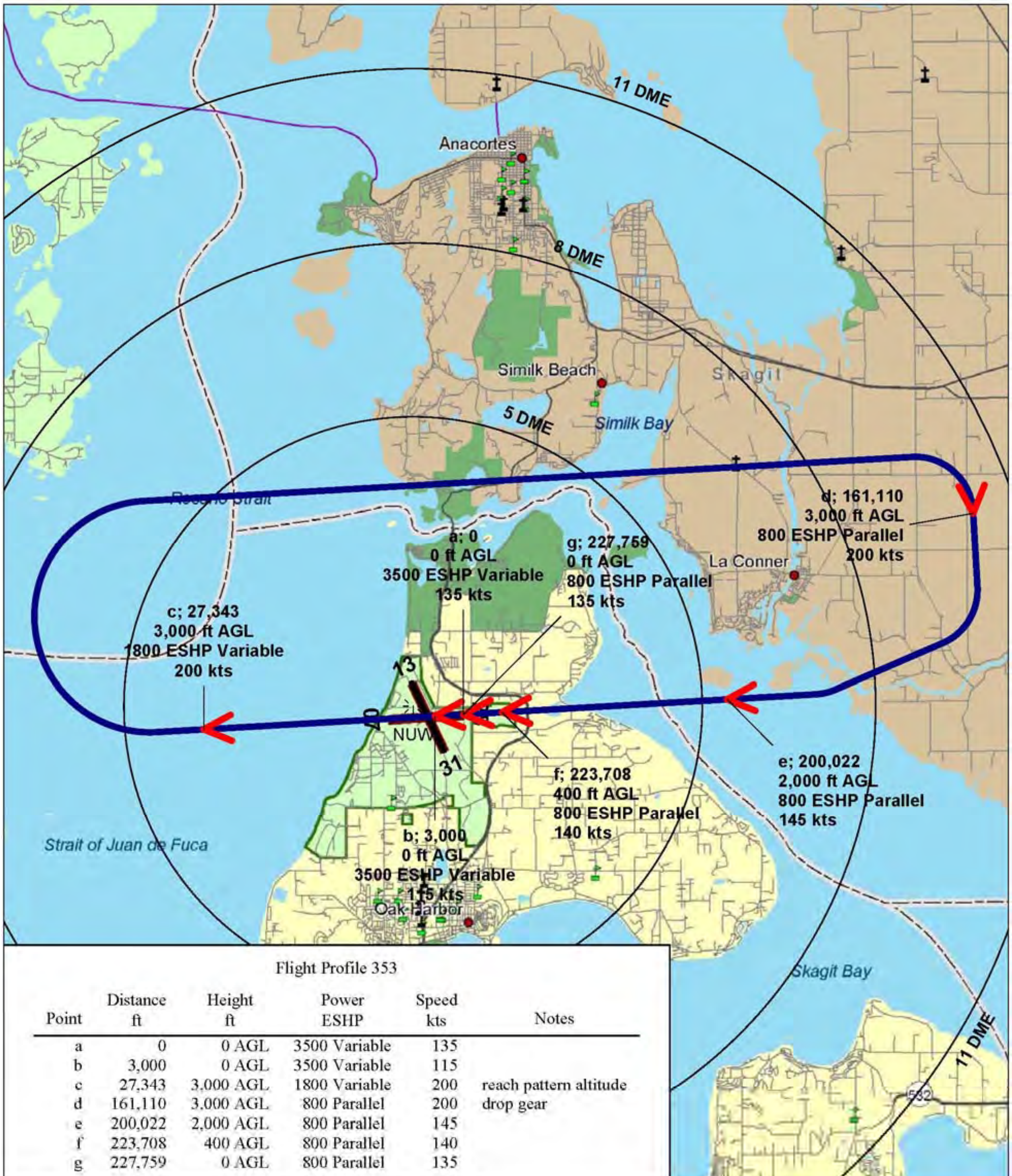
Based P-3

on Runway 25, Flight Track 25TN2 - Tower Pattern Night - Center

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

Scale in Feet 1:48,600 (1 inch = 4,050 feet)

N



Flight Profile 353

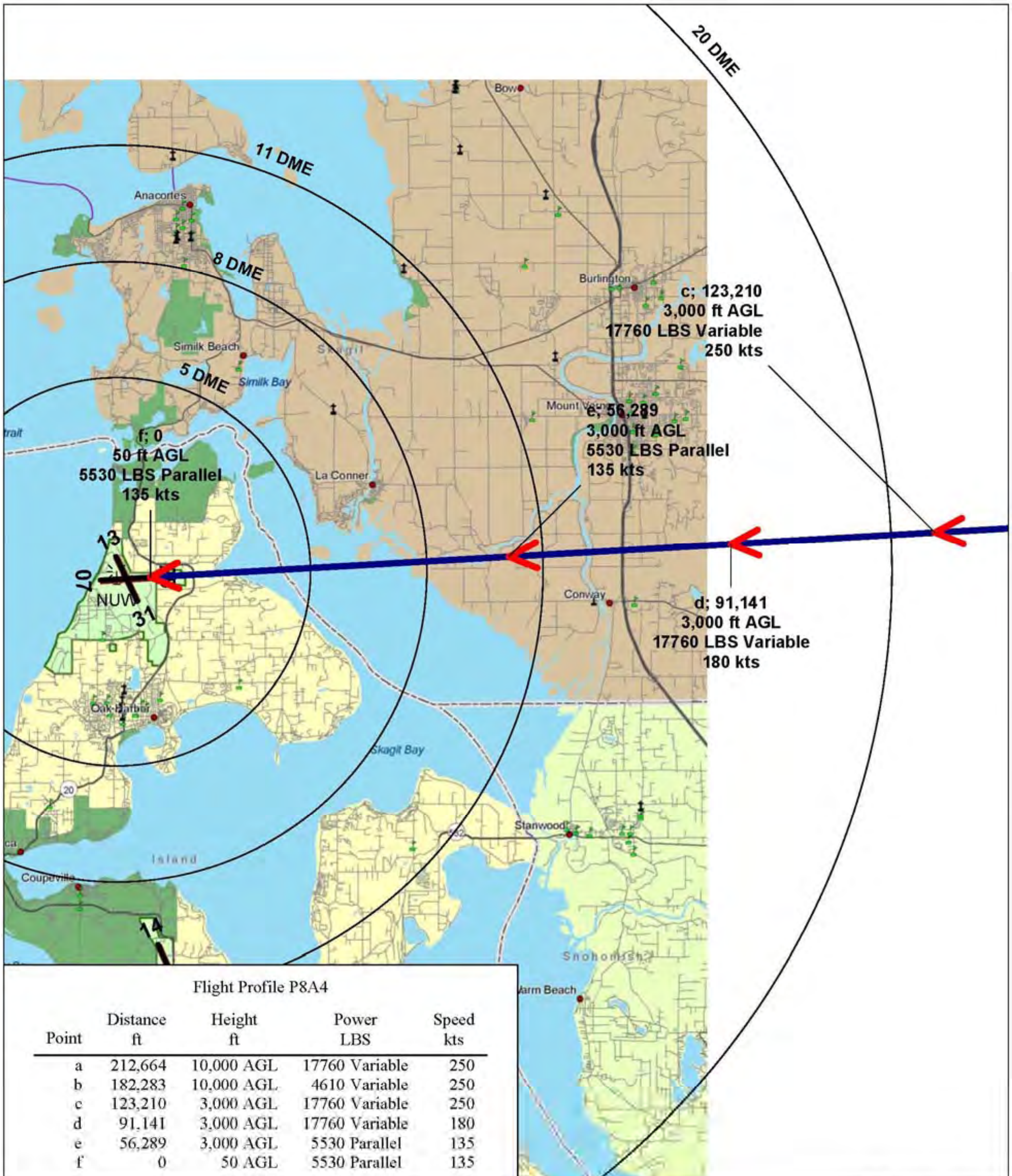
Point	Distance ft	Height ft	Power ESHP	Speed kts	Notes
a	0	0 AGL	3500 Variable	135	
b	3,000	0 AGL	3500 Variable	115	
c	27,343	3,000 AGL	1800 Variable	200	reach pattern altitude
d	161,110	3,000 AGL	800 Parallel	200	drop gear
e	200,022	2,000 AGL	800 Parallel	145	
f	223,708	400 AGL	800 Parallel	140	
g	227,759	0 AGL	800 Parallel	135	

Flight Profile 353
Based P-3
on Runway 25, Flight Track 25G2 - 4NM Wide GCA Box

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

Scale in Feet 1:195,000 (1 inch = 16,200 feet)

N



Flight Profile P8A4

Point	Distance ft	Height ft	Power LBS	Speed kts
a	212,664	10,000 AGL	17760 Variable	250
b	182,283	10,000 AGL	4610 Variable	250
c	123,210	3,000 AGL	17760 Variable	250
d	91,141	3,000 AGL	17760 Variable	180
e	56,289	3,000 AGL	5530 Parallel	135
f	0	50 AGL	5530 Parallel	135

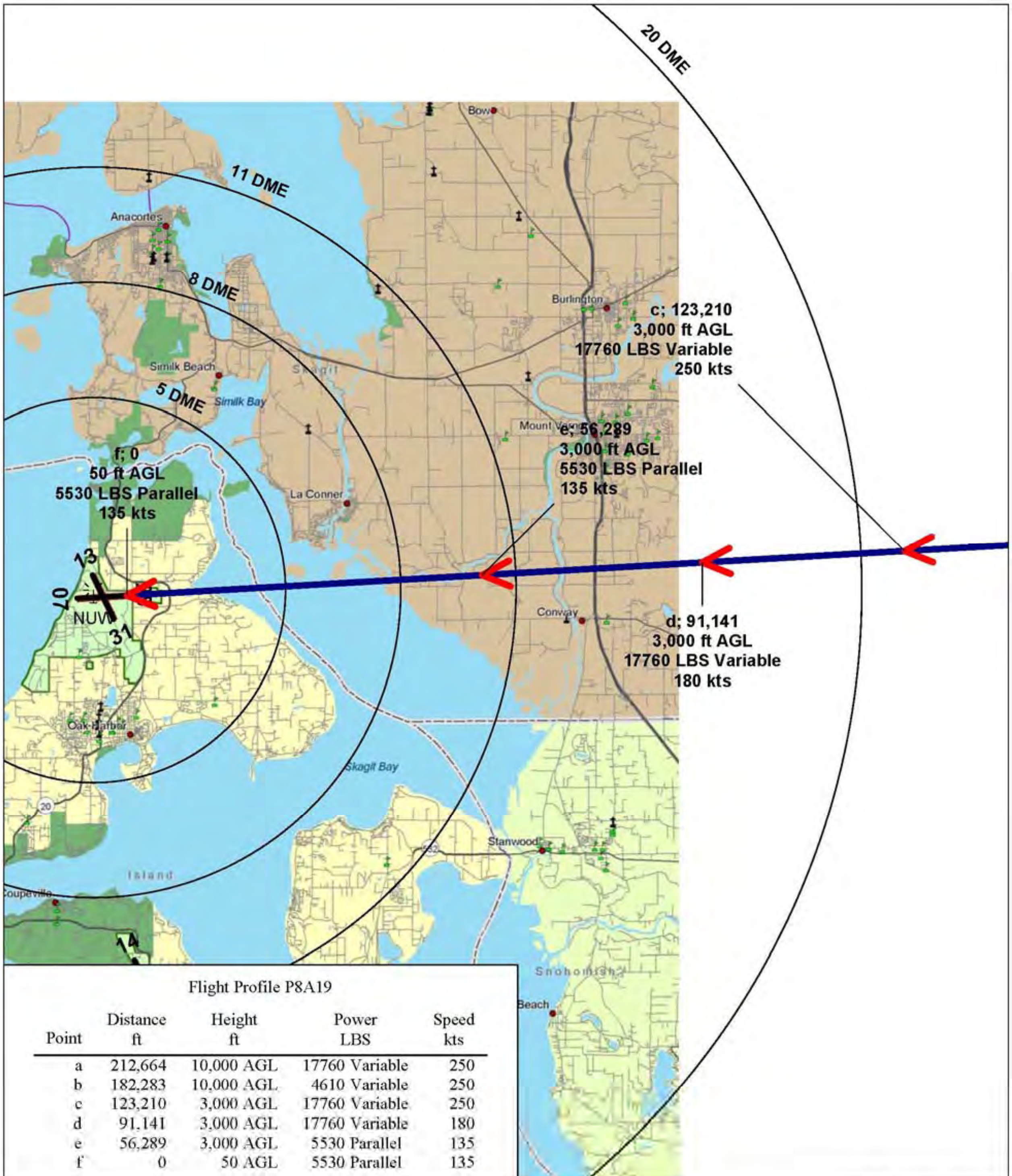
Flight Profile P8A4

Based P-8 (modeled as 737-700)

on Runway 25, Flight Track 25A1 - P-3 VFR Arrival from East

0 10,000 20,000 30,000 40,000 50,000 60,000 70,000 80,000 90,000 100,000

Scale in Feet 1:291,000 (1 inch = 24,200 feet)



Flight Profile P8A19

Point	Distance ft	Height ft	Power LBS	Speed kts
a	212,664	10,000 AGL	17760 Variable	250
b	182,283	10,000 AGL	4610 Variable	250
c	123,210	3,000 AGL	17760 Variable	250
d	91,141	3,000 AGL	17760 Variable	180
e	56,289	3,000 AGL	5530 Parallel	135
f	0	50 AGL	5530 Parallel	135

Flight Profile P8A19

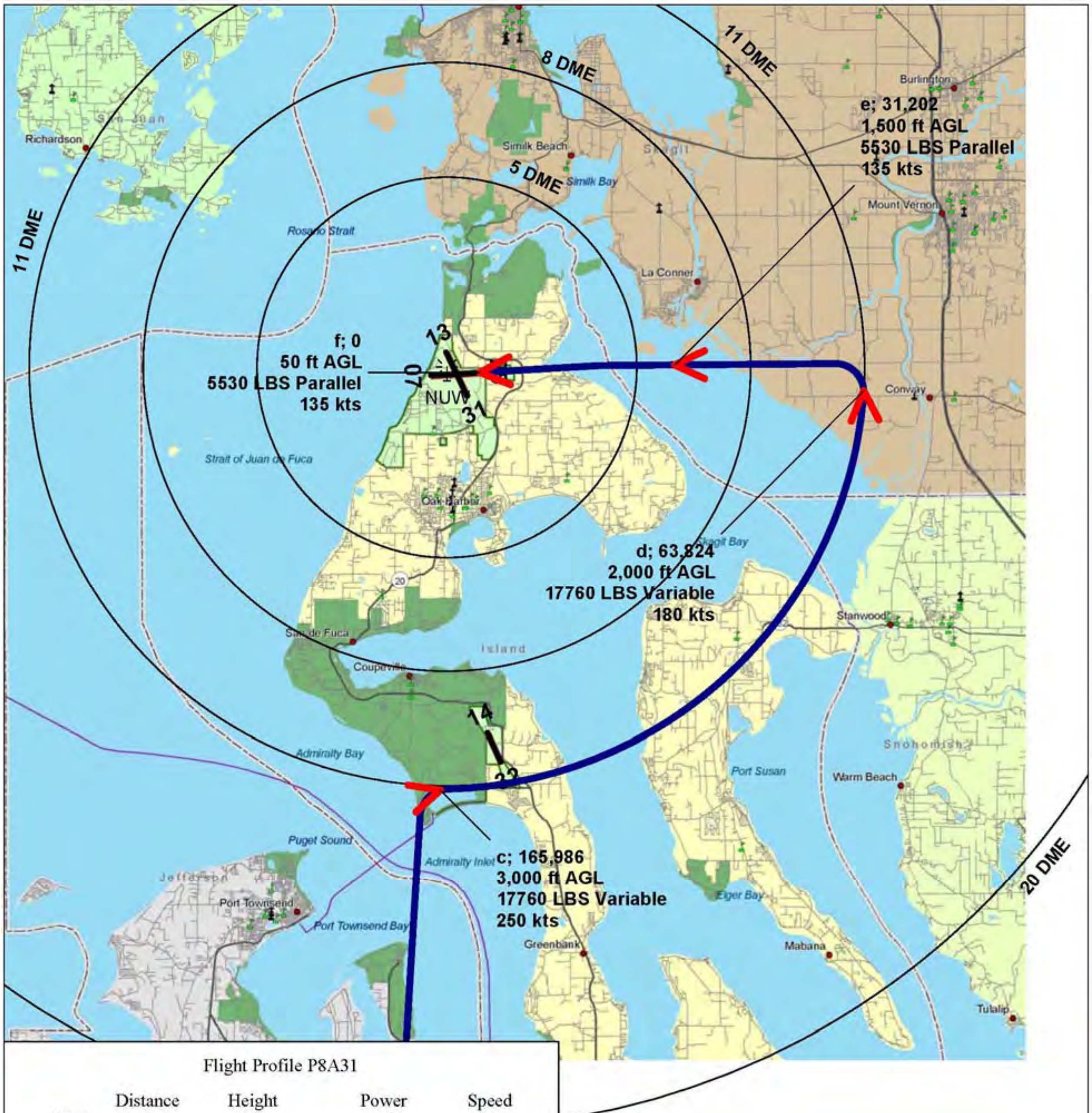
Based P-8 (modeled as 737-700)

on Runway 25, Flight Track 25A4 - IFR Arrival Short Center Long East

0 10,000 20,000 30,000 40,000 50,000 60,000 70,000 80,000 90,000 100,000

Scale in Feet 1:293,000 (1 inch = 24,400 feet)

N



Flight Profile P8A31

Point	Distance ft	Height ft	Power LBS	Speed kts
a	300,000	10,000 AGL	17760 Variable	250
b	253,170	10,000 AGL	4610 Variable	250
c	165,986	3,000 AGL	17760 Variable	250
d	63,824	2,000 AGL	17760 Variable	180
e	31,202	1,500 AGL	5530 Parallel	135
f	0	50 AGL	5530 Parallel	135

Flight Profile P8A31
Based P-8 (modeled as 737-700)
on Runway 25, Flight Track 25ALT - LO-TACAN Arrival

0 20,000 40,000 60,000 80,000 100,000

Scale in Feet 1:320,000 (1 inch = 26,700 feet)

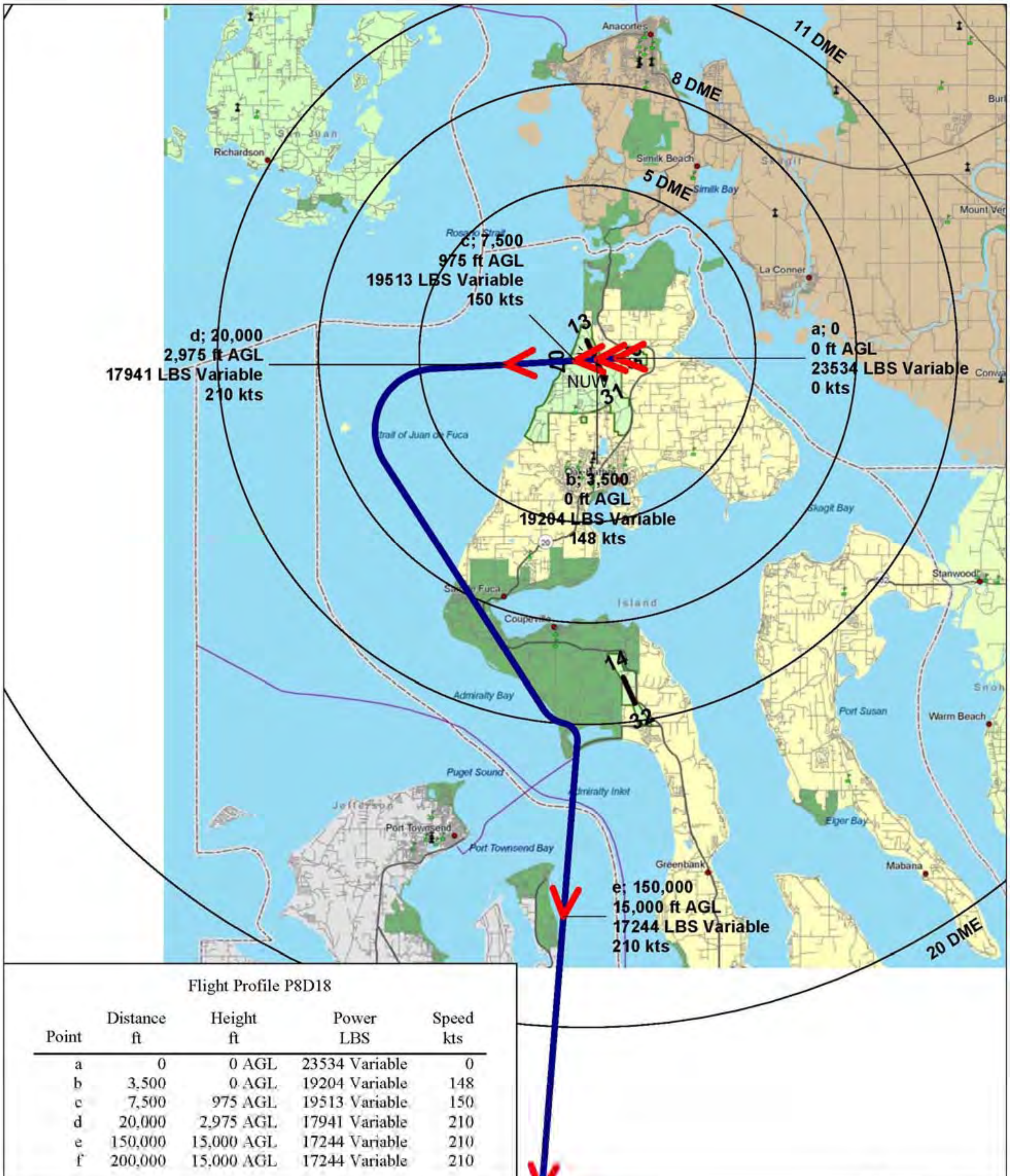
N

Flight Profile P8D7

Point	Distance ft	Height ft	Power LBS	Speed kts
a	0	0 AGL	23534 Variable	0
b	3,500	0 AGL	19204 Variable	148
c	7,500	975 AGL	19513 Variable	150
d	20,000	2,975 AGL	17941 Variable	210
e	150,000	15,000 AGL	17244 Variable	210
f	200,000	15,000 AGL	17244 Variable	210

Flight Profile P8D7
Based P-8 (modeled as 737-700)
on Runway 25, Flight Track 25D5 - Departure to West

Scale in Feet 1:180,000 (1 inch = 15,000 feet)



Flight Profile P8D18

Point	Distance ft	Height ft	Power LBS	Speed kts
a	0	0 AGL	23534 Variable	0
b	3,500	0 AGL	19204 Variable	148
c	7,500	975 AGL	19513 Variable	150
d	20,000	2,975 AGL	17941 Variable	210
e	150,000	15,000 AGL	17244 Variable	210
f	200,000	15,000 AGL	17244 Variable	210

Flight Profile P8D18

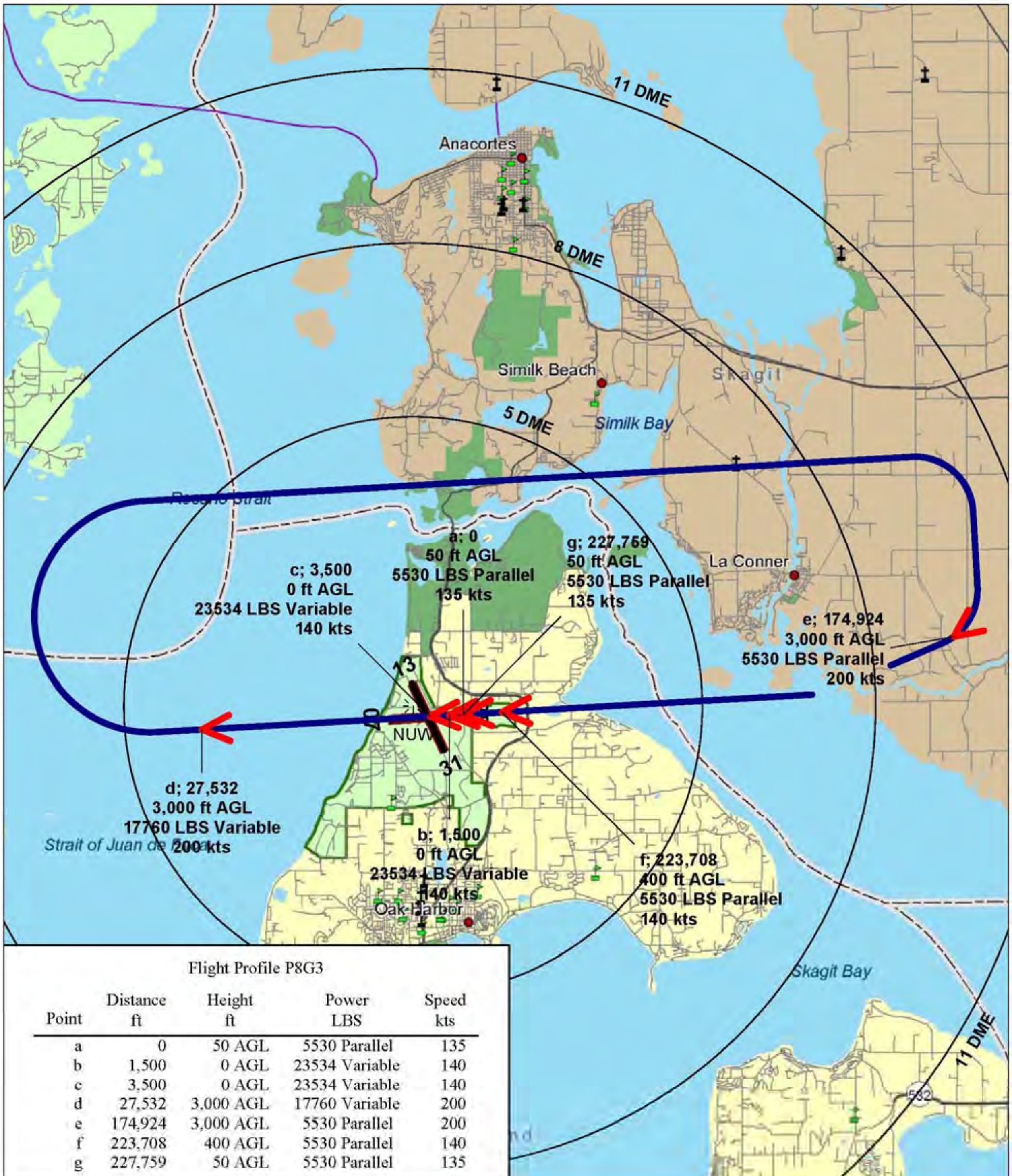
Based P-8 (modeled as 737-700)

on Runway 25, Flight Track 25DLT - LO-TACAN Departure

0 20,000 40,000 60,000 80,000 100,000

Scale in Feet 1:334,000 (1 inch = 27,900 feet)

N



Flight Profile P8G3

Point	Distance ft	Height ft	Power LBS	Speed kts
a	0	50 AGL	5530 Parallel	135
b	1,500	0 AGL	23534 Variable	140
c	3,500	0 AGL	23534 Variable	140
d	27,532	3,000 AGL	17760 Variable	200
e	174,924	3,000 AGL	5530 Parallel	200
f	223,708	400 AGL	5530 Parallel	140
g	227,759	50 AGL	5530 Parallel	135

Flight Profile P8G3
Based P-8 (modeled as 737-700)
on Runway 25, Flight Track 25G2 - 4NM Wide GCA Box

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

Scale in Feet 1:195,000 (1 inch = 16,200 feet)

Flight Profile P8T8

Point	Distance ft	Height ft	Power LBS	Speed kts
a	0	50 AGL	5530 Parallel	135
b	1,500	0 AGL	23534 Variable	140
c	3,500	0 AGL	23534 Variable	140
d	26,500	1,000 AGL	17760 Variable	150
e	39,000	1,000 AGL	5530 Parallel	150
f	61,450	50 AGL	5530 Parallel	135

Flight Profile P8T8
Based P-8 (modeled as 737-700)
on Runway 25, Flight Track 25TN2 - Tower Pattern Night - Center

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

Scale in Feet 1:48,600 (1 inch = 4,050 feet)

Flight Profile 407

Point	Distance ft	Height ft	Power EPR	Speed kts
a	0	0 AGL	2 Variable	0
b	3,500	0 AGL	2 Variable	115
c	17,000	1,500 AGL	2 Variable	200
d	24,000	2,500 AGL	1.8 Variable	250
e	40,000	4,000 AGL	1.8 Variable	250
f	200,000	15,000 AGL	1.8 Variable	250

Flight Profile 407

Based C-9

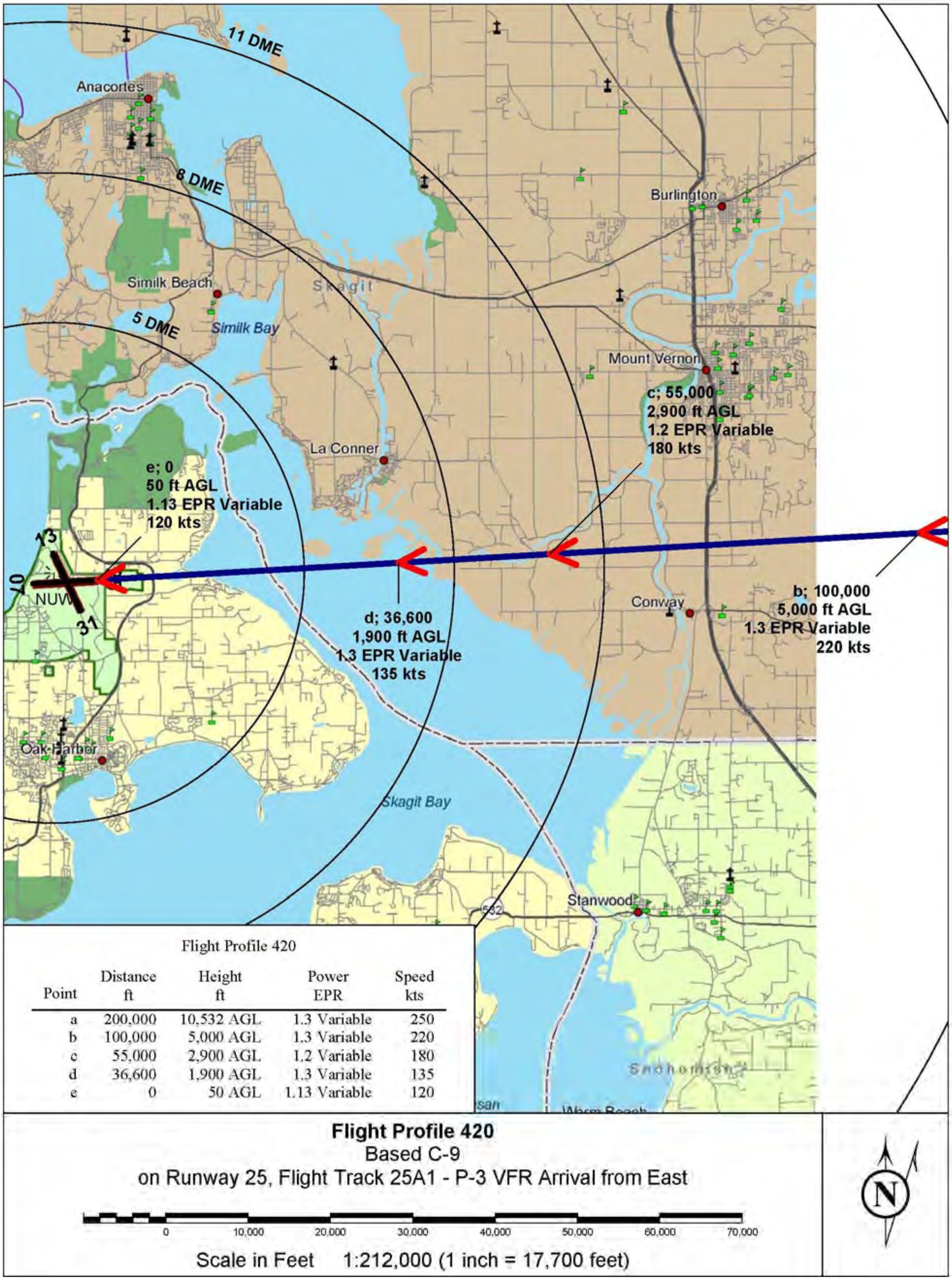
on Runway 25, Flight Track 25D5 - Departure to West

Prior to brake release, aircraft sits at 2 EPR Variable for 5 sec

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

Scale in Feet 1:90,100 (1 inch = 7,510 feet)

N



Flight Profile 420

Point	Distance ft	Height ft	Power EPR	Speed kts
a	200,000	10,532 AGL	1.3 Variable	250
b	100,000	5,000 AGL	1.3 Variable	220
c	55,000	2,900 AGL	1.2 Variable	180
d	36,600	1,900 AGL	1.3 Variable	135
e	0	50 AGL	1.13 Variable	120

Flight Profile 420
Based C-9
on Runway 25, Flight Track 25A1 - P-3 VFR Arrival from East

Scale in Feet 1:212,000 (1 inch = 17,700 feet)

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Appendix B

DISCUSSION OF NOISE AND ITS EFFECTS ON THE ENVIRONMENT

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B.1 Basics of Sound

Noise is unwanted sound. Sound is all around us; sound becomes noise when it interferes with normal activities, such as sleep or conversation.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Whether that sound is interpreted as pleasant (e.g., music) or unpleasant (e.g., jackhammers) depends largely on the listener's current activity, past experience, and attitude toward the source of that sound.

The measurement and human perception of sound involves three basic physical characteristics: intensity, frequency, and duration. First, intensity is a measure of the acoustic energy of the sound vibrations and is expressed in terms of sound pressure. The greater the sound pressure, the more energy carried by the sound and the louder the perception of that sound. The second important physical characteristic of sound is frequency, which is the number of times per second the air vibrates or oscillates. Low-frequency sounds are characterized as rumbles or roars, while high-frequency sounds are typified by sirens or screeches. The third important characteristic of sound is duration or the length of time the sound can be detected.

The loudest sounds that can be detected comfortably by the human ear have intensities that are a trillion times higher than those of sounds that can barely be detected. Because of this vast range, using a linear scale to represent the intensity of sound becomes very unwieldy. As a result, a logarithmic unit known as the decibel (abbreviated dB) is used to represent the intensity of a sound. Such a representation is called a sound level. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB; sound levels above 120 dB begin to be felt inside the human ear as discomfort. Sound levels between 130 to 140 dB are felt as pain (Berglund and Lindvall 1995).

Because of the logarithmic nature of the decibel unit, sound levels cannot be arithmetically added or subtracted and are somewhat cumbersome to handle mathematically. However, some simple rules are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. For example:

60 dB + 60 dB = 63 dB, and

80 dB + 80 dB = 83 dB.

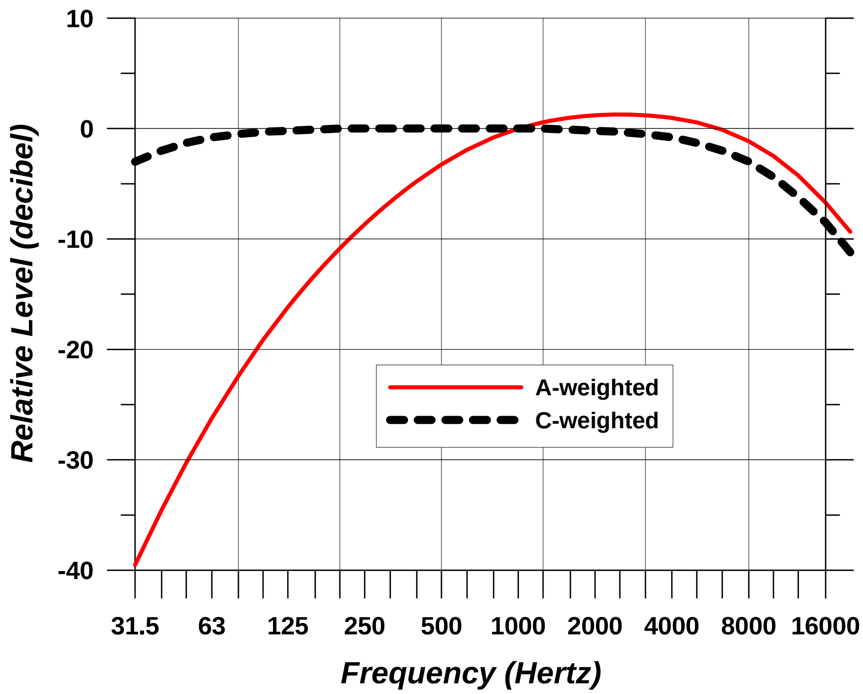
Second, the total sound level produced by two sounds of different levels is usually only slightly more than the higher of the two. For example:

60.0 dB + 70.0 dB = 70.4 dB.

Because the addition of sound levels is different than that of ordinary numbers, such addition is often referred to as "decibel addition" or "energy addition." The latter term arises from the fact that what we are really doing when we add decibel values is first converting each decibel value to its corresponding acoustic energy, then adding the energies using the normal rules of addition, and finally converting the total energy back to its decibel equivalent.

The minimum change in the sound level of individual events that an average human ear can detect is about 3 dB. On average, a person perceives a change in sound level of about 10 dB as a doubling (or halving) of the sound's loudness, and this relation holds true for loud and quiet sounds. A decrease in sound level of 10 dB actually represents a 90 percent decrease in sound intensity but only a 50 percent decrease in perceived loudness because of the nonlinear response of the human ear (similar to most human senses).

Sound frequency is measured in terms of cycles per second (cps), or hertz (Hz), which is the standard unit for cps. The normal human ear can detect sounds that range in frequency from about 20 Hz to about 15,000 Hz. All sounds in this wide range of frequencies, however, are not heard equally by the human ear, which is most sensitive to frequencies in the 1,000 to 4,000 Hz range. Weighting curves have been developed to correspond to the sensitivity and perception of different types of sound. A-weighting and C-weighting are the two most common weightings. A-weighting accounts for frequency dependence by adjusting the very high and very low frequencies (below approximately 500 Hz and above approximately 10,000 Hz) to approximate the human ear's lower sensitivities to those frequencies. C-weighting is nearly flat throughout the range of audible frequencies, hardly de-emphasizing the low frequency sound while approximating the human ear's sensitivity to higher intensity sounds. The two curves shown in Figure B-1 are also the most adequate to quantify environmental noises.



Source: ANSI S1.4A -1985 "Specification of Sound Level Meters"

Figure B-1. Frequency Response Characteristics of A- and C-Weighting Networks

B.1.1 A-weighted Sound Level

Sound levels that are measured using A-weighting, called A-weighted sound levels, are often denoted by the unit dBA or dB(A) rather than dB. When the use of A-weighting is understood, the adjective "A-weighted" is often omitted and the measurements are expressed as dB. In this report (as in most environmental impact documents), dB units refer to A-weighted sound levels.

Noise potentially becomes an issue when its intensity exceeds the ambient or background sound pressures. Ambient background noise in metropolitan, urbanized areas typically varies from 60 to 70 dB and can be as high as 80 dB or greater; quiet suburban neighborhoods experience ambient noise levels of approximately 45-50 dB (U.S. Environmental Protection Agency (EPA) 1978).

Figure B-2 is a chart of A-weighted sound levels from typical sounds. Some noise sources (air conditioner, vacuum cleaner) are continuous sounds which levels are constant for some time. Some (automobile, heavy truck) are the maximum sound during a vehicle pass-by. Some (urban daytime, urban nighttime) are averages over extended periods. A variety of noise metrics have been developed to describe noise over different time periods, as discussed below.

Aircraft noise consists of two major types of sound events: aircraft takeoffs and landings, and engine maintenance operations. The former can be described as intermittent sounds and the latter as continuous. Noise levels from flight operations exceeding background noise typically occur beneath main approach and departure corridors, in local air traffic patterns around the airfield, and in areas immediately adjacent to parking ramps and aircraft staging areas. As aircraft in flight gain altitude, their noise contribution drops to lower levels, often becoming indistinguishable from the background.

B.1.2 C-weighted Sound Level

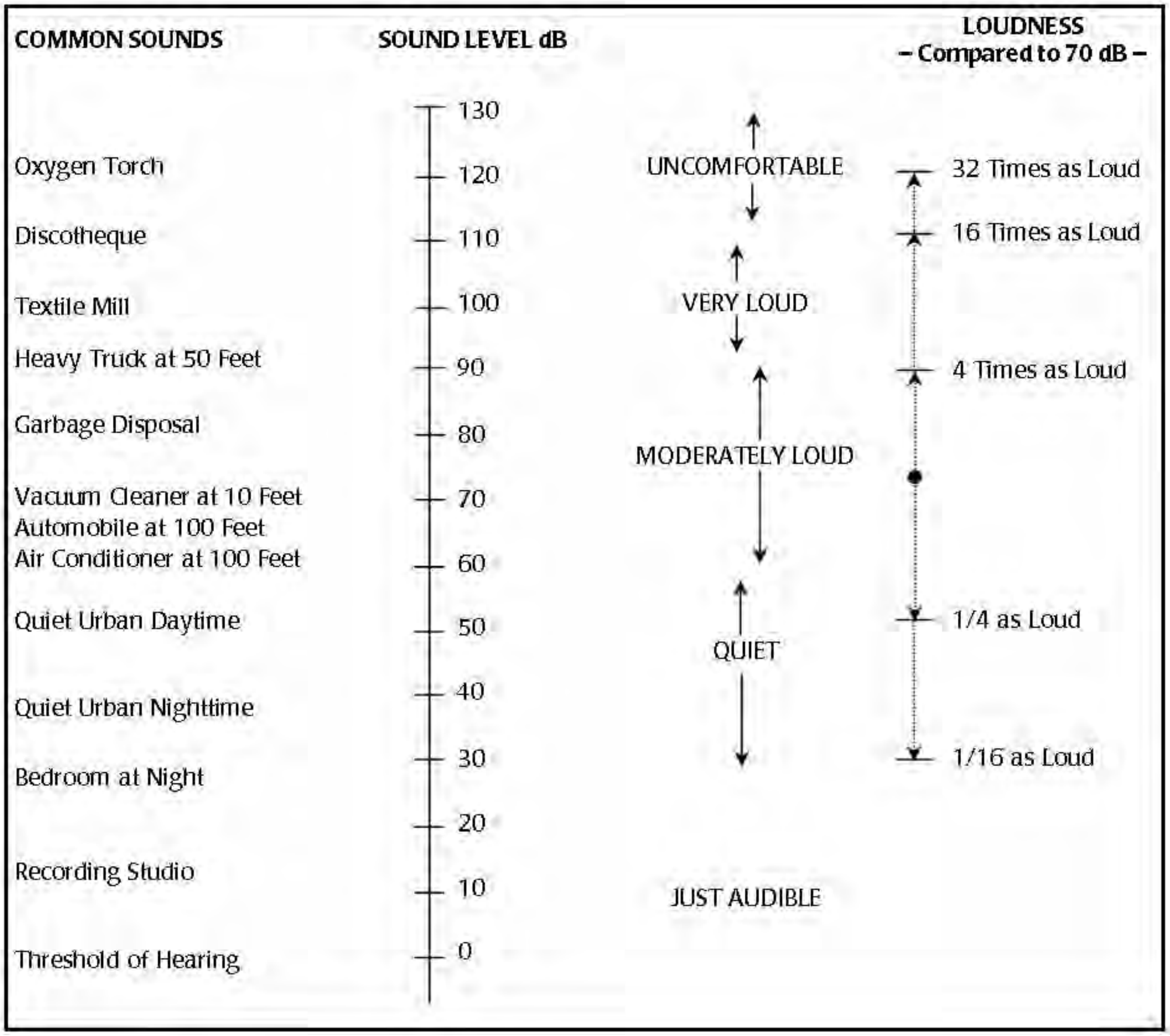
Sound levels measured using a C-weighting are most appropriately called C-weighted sound levels (and denoted dBC). C-weighting is nearly flat throughout the audible frequency range, hardly de-emphasizing the low frequency. This weighting scale is generally used to describe impulsive sounds. Sounds that are characterized as impulsive generally contain low frequencies. Impulsive sounds may induce secondary effects, such as shaking of a structure, rattling of windows, inducing vibrations. These secondary effects can cause additional annoyance and complaints.

The following definitions in the American National Standard Institute (ANSI) Report S12.9, Part 4 provide general concepts helpful in understanding impulsive sounds (ANSI 1996).

Impulsive Sound: Sound characterized by brief excursions of sound pressure (acoustic impulses) that significantly exceeds the ambient environmental sound pressure. The duration of a single impulsive sound is usually less than one second (ANSI 1996).

Highly Impulsive Sound: Sound from one of the following enumerated categories of sound sources: small-arms gunfire, metal hammering, wood hammering, drop hammering, pile driving, drop forging, pneumatic hammering, pavement breaking, metal impacts during rail-yard shunting operation, and riveting.

High-energy Impulsive Sound: Sound from one of the following enumerated categories of sound sources: quarry and mining explosions, sonic booms, demolition and industrial processes that use high explosives, military ordnance (e.g., armor, artillery and mortar fire, and bombs), explosive ignition of rockets and missiles, explosive industrial circuit breakers, and any other explosive source where the equivalent mass of dynamite exceeds 25 grams.



SOURCE: Handbook of Noise Control, *C.M. Harris, Editor McGraw-Hill Book Co., 1979, and FICAN 1997*

Figure B-2. Typical A-weighted Sound Levels of Common Sounds

B.2 Noise Metrics

In general, a metric is a statistic for measuring or quantifying. A noise metric quantifies the noise environment. There are three families of noise metrics described herein – one for single noise events such as an aircraft flyby, one for cumulative noise events such as a day's worth of aircraft activity and one which quantifies the events or time relative to single noise events.

Within the single noise event family, metrics described below include Peak Sound Pressure Level, Maximum Sound Level and Sound Exposure Level. Within the cumulative noise events family, metrics described below include Equivalent Sound Level, Day-Night Average Sound Level and several others. Within the events/time family, metrics described below include Number of Events Above a Threshold Level and Time Above a Specified Level.

B.2.1 Maximum Sound Level (L_{max})

The highest A-weighted integrated sound level measured during a single event in which the sound level changes value with time (e.g., an aircraft overflight) is called the maximum A-weighted sound level or Maximum Sound Level.

During an aircraft overflight, the noise level starts at the ambient or background noise level, rises to the maximum level as the aircraft flies closest to the observer, and returns to the background level as the aircraft recedes into the distance. The L_{max} indicates the maximum sound level occurring for a fraction of a second. For aircraft noise, the "fraction of a second" over which the maximum level is defined is generally one-eighth of a second, and is denoted as "fast" response (ANSI 1988). Slowly varying or steady sounds are generally measured over a period of one second, denoted "slow" response. The L_{max} is important in judging the interference caused by a noise event with conversation, TV or radio listening, sleep, or other common activities. Although it provides some measure of the intrusiveness of the event, it does not completely describe the total event, because it does not include the period of time that the sound is heard.

B.2.2 Peak Sound Pressure Level (L_{pk})

The Peak Sound Pressure Level, is the highest instantaneous level obtained by a sound level measurement device. The L_{pk} is typically measured using a 20 microseconds or faster sampling rate, and is typically based on unweighted or linear response of the meter.

B.2.3 Sound Exposure Level (SEL)

Sound Exposure Level is a composite metric that represents both the intensity of a sound and its duration. Individual time-varying noise events (e.g., aircraft overflights) have two main characteristics: a sound level that changes throughout the event and a period of time during which the event is heard. SEL provides a measure of the net impact of the entire acoustic event, but it does not directly represent the sound level heard at any given time. During an aircraft flyover, SEL would include both the L_{max} and the lower noise levels produced during onset and recess periods of the overflight.

SEL is a logarithmic measure of the total acoustic energy transmitted to the listener during the event. Mathematically, it represents the sound level of a constant sound that would, in one second, generate the same acoustic energy as the actual time-varying noise event. For sound from aircraft overflights, which typically lasts more than one second, the SEL is usually greater than the L_{max} because an individual overflight takes seconds and the L_{max} occurs instantaneously. SEL represents the best metric to compare noise levels from overflights.

B.2.4 Equivalent Sound Level (L_{eq})

A cumulative noise metric useful in describing noise is the Equivalent Sound Level. L_{eq} is the continuous sound level that would be present if all of the variations in sound level occurring over a specified time period were smoothed out as to contain the same total sound energy.

Just as SEL has proven to be a good measure of the noise impact of a single event, L_{eq} has been established to be a good measure of the impact of a series of events during a given time period. Also, while L_{eq} is defined as an average, it is effectively a sum over that time period and is, thus, a measure of the cumulative impact of noise. For example, the sum of all noise-generating events during the period of 7 a.m. to 4 p.m. could provide the relative impact of noise generating events for a school day.

B.2.5 Day-Night Average Sound Level (DNL or L_{dn}) and Community Noise Equivalent Level (CNEL)

Day-Night Average Sound Level and Community Noise Equivalent Level are composite metrics that account for all noise events in a 24-hour period. In order to account for increased human sensitivity to noise at night, a 10 dB penalty is applied to nighttime events (10:00 p.m. to 7:00 a.m. time period). A variant of the DNL, the CNEL includes a 5 dB penalty on noise during the 7:00 a.m. to 10:00 p.m. time period, and a 10 dB penalty on noise during the 10:00 p.m. to 7:00 a.m. time period. The notations DNL and L_{dn} are both used for Day-Night Average Sound Level and are equivalent.

Like L_{eq}, DNL and CNEL without their penalties are average quantities, mathematically representing the continuous A-weighted or C-weighted sound level that would be present if all of the variations in sound level that occur over a 24-hour period were smoothed out so as to contain the same total sound energy. These composite single-measure time-average metrics account for the SELs, L_{max}, the duration of the events (sorties or operations), and the number of events that occur over a 24-hour period but do not provide specific information on the number of noise events or the individual sound levels that occur during the 24-hour day. Like SEL, neither DNL nor CNEL represent the sound level heard at any particular time, but quantifies the total sound energy received. While it is normalized as an average, it represents all of the sound energy, and is therefore a cumulative measure.

The nighttime penalties in both DNL and CNEL account for the added intrusiveness of sounds that occur during normal sleeping hours, both because of the increased sensitivity to noise during those hours and because ambient sound levels during nighttime are typically about 10 dB lower than during daytime hours. The evening penalty in CNEL accounts for the added intrusiveness of sounds during that period.

The inclusion of daytime, evening and nighttime periods in the computation of the DNL and CNEL reflects their basic 24-hour definition. They can, however, be applied over periods of multiple days. For application to civil airports, where operations are consistent from day to day, DNL and CNEL are usually applied as an annual average.

The logarithmic nature of the decibel unit causes the noise levels of the loudest events to control the 24-hour average. A DNL of 65 dB could result from a very few noisy events or a large number of quieter events.

As a simple example of this characteristic, consider a case in which only one aircraft overflight occurs during the daytime over a 24-hour period, creating a sound level of 100 dB for 30 seconds. During the remaining 23 hours, 59 minutes, and 30 seconds of the day, the ambient sound level is 50 dB. The DNL for this 24-hour period is 65.9 dB. Assume, as a second example that 10 such 30-second overflights occur during daytime hours during the next 24-hour period, with the same ambient sound level of 50 dB during the remaining 23 hours and 55 minutes of the day. The DNL for this 24-hour period is 75.5 dB. Clearly, the averaging of noise over a 24-hour period does not ignore the louder single events and tends to emphasize both the sound levels and number of those events.

Daily average sound levels are typically used for the evaluation of community noise effects (i.e., long-term annoyance), and particularly aircraft noise effects. In general, scientific studies and social surveys have found a high correlation between the percentages of groups of people highly annoyed and the level of average noise exposure measured in DNL (EPA 1978 and Schultz 1978).

B.2.6 Onset-Rate Adjusted Monthly Day-Night Average Sound Level (L_{dnmr}) and Onset-Rate Adjusted Monthly Community Noise Equivalent Level ($CNEL_{mr}$)

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

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

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

B.2.7 Number-of-Events Above (NA) a Threshold Level (L)

The Number-of-events Above metric (NA) provides the total number of noise events that exceed the selected noise level threshold during a specified period of time. Combined with the selected threshold level (L), the NA metric is symbolized as NAL. The threshold L can be defined in terms of either the SEL or L_{max} metric, and it is important that this selection is reflected in the nomenclature. When labeling a contour line or point of interest (POI) on a map the NAL will be followed by the number of events in parentheses for that line or POI. For example, the noise environment at a location where 10 events exceed an SEL of 90 dB, over a given period of time, would be represented by the nomenclature NA90SEL(10). Similarly, for L_{max} it would be NA90L_{max}(10). The period of time can be an average 24-hour day, daytime, nighttime, school day, or any other time period appropriate to the nature and application of the analysis.

NA can be portrayed for single or multiple locations, or by means of noise contours on a map similar to the common DNL contours. A threshold level is selected that best meets the need for that situation. An L_{max} threshold is normally selected to analyze speech interference, whereas an SEL threshold is normally selected for analysis of sleep disturbance.

The NA metric is the only supplemental metric that has been developed that combines single-event noise levels with the number of aircraft operations. In essence, it answers the question of how many aircraft (or range of aircraft) fly over a given location or area at or above a selected threshold noise level.

B.2.8 Time Above (TA) a Specified Level (L)

The Time Above (TA) metric is a measure of the total time that the A-weighted aircraft noise level is at or above a defined sound level threshold. Combined with the selected threshold level (L), the TA metric is symbolized as TAL. TA is not a sound level, but rather a time expressed in minutes. TA values can be calculated over a full 24-hour annual average day, the 15-hour daytime and 9-hour nighttime periods, a school day, or any other time period of interest, provided there is operational data to define the time period of interest.

TA has application for describing the noise environment in schools, particularly when comparing the classroom or other noise sensitive environments for different operational scenarios. TA can be portrayed by means of noise contours on a map similar to the common DNL contours.

The TA metric is a useful descriptor of the noise impact of an individual event or for many events occurring over a certain time period. When computed for a full day, the TA can be compared alongside the DNL in order to determine the sound levels and total duration of events that contribute to the DNL. TA analysis is usually conducted along with NA analysis so the results show not only how many events occur above the selected threshold(s), but also the total duration of those events above those levels for the selected time period.

B.3 Noise Effects

This noise effects section includes discussions of annoyance, speech interference and sleep disturbance, and the effects of noise on hearing, health, performance, learning, animals, property values, terrain and archaeological sites.

B.3.1 Annoyance

The primary effect of aircraft noise on exposed communities is one of long-term annoyance, defined by the Environmental Protection Agency (EPA) as any negative subjective reaction on the part of an individual or group. The scientific community has adopted the use of long-term annoyance as a primary indicator of community response because it attempts to account for all negative aspects of effects from noise, e.g., increased annoyance due to being awakened the previous night by aircraft and interference with everyday conversation.

Numerous laboratory studies and field surveys have been conducted to measure annoyance and to account for a number of variables, many of which are dependent on a person's individual circumstances and preferences. Laboratory studies of individual response to noise have helped isolate a number of the factors contributing to annoyance, such as the intensity level and spectral characteristics of the noise, duration, the presence of impulses, pitch, information content, and the degree of interference with activity. Social surveys of community response to noise have allowed the development of general dose-response relationships that can be used to estimate the proportion of people who will be highly annoyed by a given noise level. The results of these studies have formed the basis for criteria established to define areas of compatible land use.

A wide variety of responses have been used to determine intrusiveness of noise and disturbances of speech, sleep, audio/video entertainment, and outdoor living; but the most useful metric for assessing peoples' responses to noise is the percentage of the population expected to be "highly annoyed." The concept of "percent highly annoyed" has provided the most consistent response of a community to a particular noise environment. In his synthesis of several different social surveys that employed different response scales, Schultz (1978) defined "highly annoyed" respondents as those respondents whose self-described annoyance fell within the upper 28 percent of the response scale where the scale was numerical or un-named. For surveys where the response scale was named, Schultz counted those who claimed to be highly annoyed, combining the responses of "very annoyed" and "extremely annoyed." Schultz's definition of "percent highly annoyed" (%HA) became the basis for the Federal policy on environmental noise. Daily average sound levels are typically used for the evaluation of community noise effects, such as long-term annoyance.

In general, scientific studies and social surveys have found a correlation between the percentages of groups of people highly annoyed and the level of average noise exposure. Thus, the results are expressed as the average %HA at various exposure levels measured in DNL. The classic analysis is Schultz's original 1978 study, whose results are shown in Figure B-3. This figure is commonly referred to as the Schultz curve. It represents the synthesis of a large number of social surveys (161 data points in all), that relates the long-term community response to various types of noise sources, measured using the DNL metric.

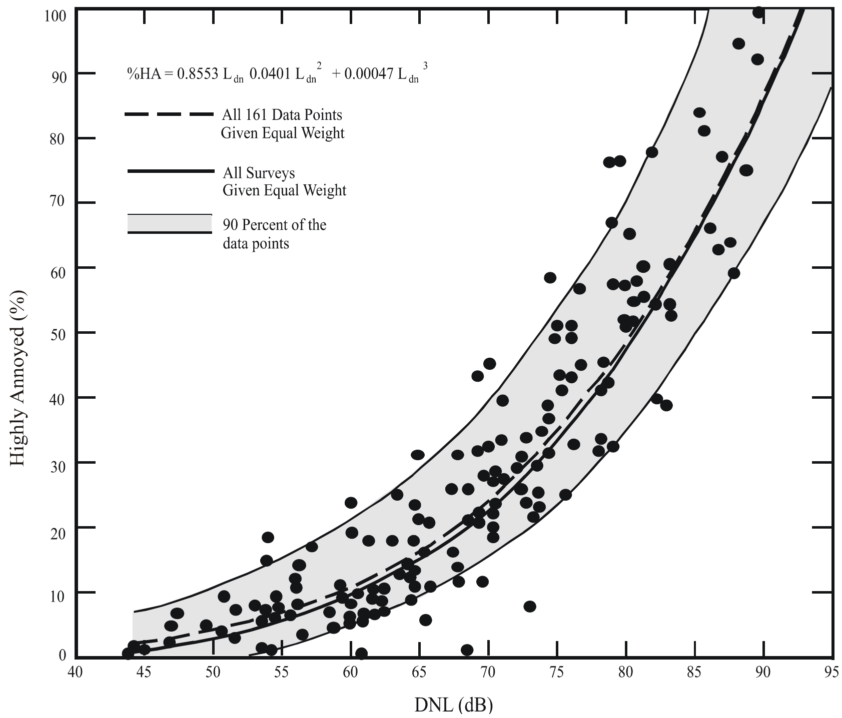
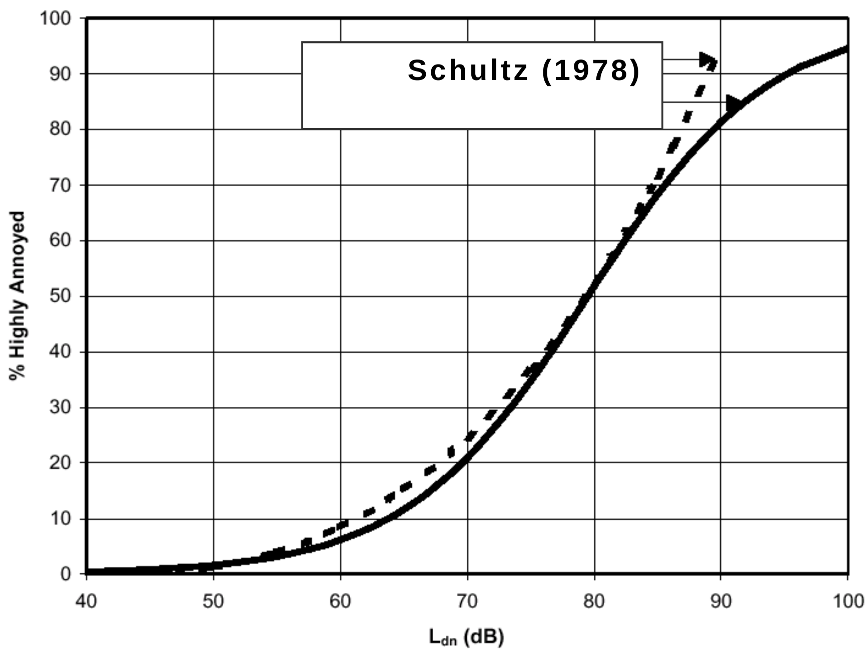


Figure B-3. Community Surveys of Noise Annoyance

An updated study of the original Schultz data based on the analysis of 400 data points collected through 1989 essentially reaffirmed this relationship. Figure B-4 shows an updated form of the curve fit in comparison with the original Schultz curve (Finegold 1994). The updated fit, which does not differ substantially from the original, is the preferred form in the U.S. The relationship between %HA and DNL is:

$$\%HA = 100/[1+ \exp(11.13 - 0.141L_{dn})]$$

In general, correlation coefficients of 0.85 to 0.95 are found between the percentages of groups of people highly annoyed and the level of average noise exposure. However, the correlation coefficients for the annoyance of individuals are relatively low, on the order of 0.5 or less. This is not surprising, considering the varying personal factors that influence the manner in which individuals react to noise.



SOURCE:(Schultz, 1978) and Current (Finegold, et al. 1994) Curve Fits

Figure B-4. Response of Communities to Noise; Comparison of Original

A number of non-acoustic factors have been identified that may influence the annoyance response of an individual. Newman and Beattie (1985) divided these factors into emotional and physical variables.

Emotional Variables:

- Feelings about the necessity or preventability of the noise;
- Judgment of the importance and value of the activity that is producing the noise;
- Activity at the time an individual hears the noise;
- Attitude about the environment;
- General sensitivity to noise;
- Belief about the effect of noise on health; and
- Feeling of fear associated with the noise.
- Physical Variables:
- Type of neighborhood;
- Time of day;
- Season;
- Predictability of noise;
- Control over the noise source; and
- Length of time an individual is exposed to a noise.

The low correlation coefficients for individuals' reactions reflect the large amount of scatter among the data drawn from the various surveys and point to the substantial uncertainty associated with the equation representing the relationship between %HA and DNL. Based on the results of surveys it has been observed that noise exposure can explain less than 50 percent of the observed variance in annoyance, indicating that non-acoustical factors play a major role. As a result, it is not possible to accurately predict individual annoyance in any specific community based on the aircraft noise exposure. Nevertheless, changes in %HA can be useful in giving the decision maker more information about the relative effects that different alternatives may have on the community.

The original Schultz curve and the subsequent updates do not separate out the annoyance from aircraft noise and other transportation noise sources. This was an important element, in that it allowed Schultz to obtain some consensus among the various social surveys from the 1960s and 1970s that were synthesized in the analysis. In essence, the Schultz curve assumes that the effects of long-term annoyance on the general population are the same, regardless of whether the noise source is road, rail, or aircraft. In the years after the classical Schultz analysis, additional social surveys have been conducted to better understand the annoyance effects of various transportation sources.

Miedema & Vos (1998) present synthesis curves for the relationship between DNL and percentage "Annoyed" and percentage "Highly Annoyed" for three transportation noise sources. Separate, non-identical curves were found for aircraft, road traffic, and railway noise. Table B-1 illustrates that, for a DNL of 65 dB, the percent of the people forecasted to be Highly Annoyed is 28 percent for air traffic, 18 percent for road traffic, and 11 percent for railroad traffic. For an outdoor DNL of 55 dB, the percent highly annoyed would be close to 12 percent if the noise is generated by aircraft operations, but only 7 percent and 4 percent, respectively, if the noise is generated by road or rail traffic. Comparing the levels on the Miedema & Vos curve to those on the updated Schultz curve indicates that the percentage of people highly annoyed by aircraft noise may be higher than previously thought when the noise is solely generated by aircraft activity.

Table B-1. Percent Highly Annoyed for Different Transportation Noise Sources

DNL (dB)	Percent Hightly Annoyed (% HA)			
	Miedema and Vos			Schultz Combined
	Air	Road	Rail	
55	12	7	4	3
60	19	12	7	6
65	28	18	11	12
70	37	29	16	22
75	48	40	22	36

Source: Miedema & Vos 1998

As noted by the World Health Organization (WHO), even though aircraft noise seems to produce a stronger annoyance response than road traffic, caution should be exercised when interpreting synthesized data from different studies (WHO 2000). The WHO noted that five major parameters should be randomly distributed for the analyses to be valid: personal, demographic, and lifestyle factors, as well as the duration of noise exposure and the population experience with noise

The FICON found that the updated Schultz curve remains the best available source of empirical dosage effect information to predict community response to transportation noise without any segregation by transportation source (FICON 1992); a position held by the FICAN in 1997 (FICAN 1997). However, FICON also recommended further research to investigate the differences in perceptions of aircraft noise, ground transportation noise (highways and railroads), and general background noise.

B.3.2 Speech Interference

Speech interference associated with aircraft noise is a primary cause of annoyance for communities. The disruption of routine activities such as radio or television listening, telephone use, or family conversation gives rise to frustration and irritation. The quality of speech communication is particularly important in classrooms and offices. In industrial settings it can cause fatigue and vocal strain in those who attempt to communicate over the noise.

The disruption of speech in the classroom is a primary concern, due to the potential for adverse effects on children's learning ability. There are two aspects to speech comprehension:

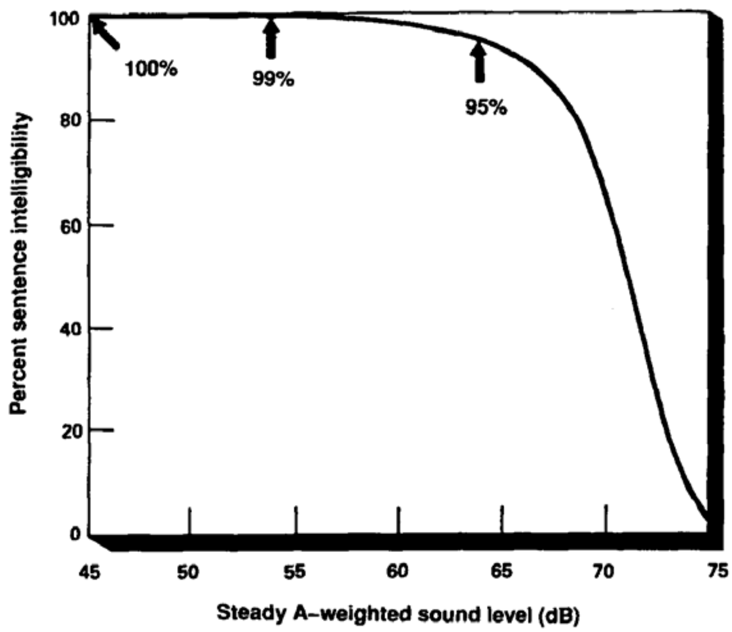
1. *Word Intelligibility* - the percent of words transmitted and received. This might be important for students in the lower grades who are learning the English language, and particularly for students who have English as a Second Language.
2. S*entence Intelligibility* – the percent of sentences transmitted and understood. This might be important for high-school students and adults who are familiar with the language, and who do not necessarily have to understand each word in order to understand sentences.

For teachers to be clearly understood by their students, it is important that regular voice communication is clear and uninterrupted. Not only does the background sound level have to be low enough for the teacher to be clearly heard, but intermittent outdoor noise events also need to be minimized. It is therefore important to evaluate the steady background level, the level of voice communication, and the single-event level due to aircraft overflights that might interfere with speech.

Several research studies have been conducted and guideline documents been developed resulting in a fairly consistent set of noise level criteria for speech interference. This section provides an overview of the results of these studies.

U.S. Federal Criteria for Interior Noise

In 1974, the EPA identified a goal of an indoor 24-hour average sound level $L_{eq(24)}$ of 45 dB to minimize speech interference based on the intelligibility of sentences in the presence of a steady background noise (EPA 1974). Intelligibility pertains to the percentage of speech units correctly understood out of those transmitted, and specifies the type of speech material used, i.e. sentences or words. The curve displayed in Figure B-5 shows the effect of steady indoor background sound levels on sentence intelligibility. For an average adult with normal hearing and fluency in the language, steady background sound levels indoors of less than 45 dB L_{eq} are expected to allow 100 percent intelligibility of sentences.



Source: EPA 1974

Figure B-5. Speech Intelligibility Curve

The curve shows 99 percent sentence intelligibility for background levels at a L_{eq} of 54 dB, and less than 10 percent intelligibility for background levels above a L_{eq} of 73 dB. Note that the curve is especially sensitive to changes in sound level between 65 dB and 75 dB - an increase of 1 dB in background sound level from 70 dB to 71 dB results in a 14 percent decrease in sentence intelligibility, whereas a 1 dB increase in background sound level from 60 dB to 61 dB results in less than 1 percent decrease in sentence intelligibility.

Classroom Criteria

For listeners with normal hearing and fluency in the language, complete sentence intelligibility can be achieved when the signal-to-noise ratio (i.e., the difference between the speech level and the level of the interfering noise) is in the range 15-18 dB (Lazarus 1990).

Both the ANSI and the American Speech-Language-Hearing Association (ASHLA) recommend at least a 15 dB signal-to-noise ratio in classrooms, to ensure that children with hearing impairments and language disabilities are able to enjoy high speech intelligibility (ANSI 2002; ASHLA 1995). As such, provided that the average adult male or female voice registers a minimum of 50 dB L_{max} in the rear of the classroom, the ANSI standard requires that the continuous background noise level indoors must not exceed a L_{eq} of 35 dB (assumed to apply for the duration of school hours).

The WHO reported for a speaker-to-listener distance of about 1 meter, empirical observations have shown that speech in relaxed conversations is 100 percent intelligible in background noise levels of about 35 dB, and speech can be fairly well understood in the presence of background levels of 45 dB. The WHO recommends a guideline value of 35 dB L_{eq} for continuous background levels in classrooms during school hours (WHO 2000).

Bradley suggests that in smaller rooms, where speech levels in the rear of the classroom are approximately 50 dB L_{max}, steady-state noise levels above 35 dB L_{eq} may interfere with the intelligibility of speech (Bradley 1993).

For the purposes of determining eligibility for noise insulation funding, the Federal Aviation Administration (FAA) guidelines state that the design objective for a classroom environment is 45 dB L_{eq} resulting from aircraft operations during normal school hours (FAA 1985).

However, most aircraft noise is not continuous and consists of individual events where the sound level exceeds the background level for a limited time period as the aircraft flies over. Since speech interference in the presence of aircraft noise is essentially determined by the magnitude and frequency of individual aircraft flyover events, a time-averaged metric alone, such as L_{eq}, is not necessarily appropriate when evaluating the overall effects. In addition to the background level criteria described above, single-event criteria, which account for those sporadic intermittent outdoor noisy events, are also essential to specifying speech interference criteria.

In 1984, a report to the Port Authority of New York and New Jersey recommended utilizing the Speech Interference Level (SIL) metric for classroom noise criteria (Sharp and Plotkin 1984). This metric is based on the maximum sound levels in the frequency range (approximately 500 Hz to 2,000 Hz) that directly affects speech communication. The study identified an SIL (the average of the sound levels in the 500, 1000, and 2000 Hz octave-bands) of 45 dB as the desirable goal, which was estimated to provide 90 percent word intelligibility for the short time periods during aircraft over-flights. Although early classroom level criteria were defined in terms of SIL, the use and measurement of L_{max} as the primary metric has since become more popular. Both metrics take into consideration the L_{max} associated with intermittent noise events and can be related to existing background levels when determining speech interference percentages. An SIL of 45 dB is approximately equivalent to an A-weighted L_{max} of 50 dB for aircraft noise (Wesler 1986).

In 1998, a report also concluded that if an aircraft noise event's indoor L_{max} reached the speech level of 50 dB, 90 percent of the words would be understood by students seated throughout the classroom (Lind, Pearsons, and Fidell 1998). Since intermittent aircraft noise does not appreciably disrupt classroom communication at lower levels and other times, the authors also adopted an indoor L_{max} of 50 dB as the maximum single-event level permissible in classrooms. Note that this limit was set based on students with normal hearing and no special needs; at-risk students may be adversely affected at lower sound levels.

Bradley recommends SEL as a better indicator of indoor estimated speech interference in the presence of aircraft overflights (Bradley 1985). For acceptable speech communication using normal vocal efforts, Bradley suggests that the indoor SEL be no greater than 64 dB. He assumes a 26 dB outdoor-to-indoor noise reduction that equates to 90 dB SEL outdoors. Aircraft events producing outdoor SEL values greater than 90 dB would result in disruption to indoor speech communication. Bradley's work indicates that, for speakers talking with a casual vocal effort, 95 percent intelligibility would be achieved when indoor SEL values did not exceed 60 dB, which translates approximately to an L_{max} of 50 dB.

In the presence of intermittent noise events, ANSI states that the criteria for allowable background noise level can be relaxed since speech is impaired only for the short time when the aircraft noise is close to its maximum value. Consequently, they recommend when the background noise level of the noisiest hour is dominated by aircraft noise, the indoor criteria (35 dB L_{eq} for continuous background noise) can be increased by 5 dB to an Leq of 40 dB, as long as the noise level does not exceed 40 dB for more than 10 percent of the noisiest hour. (ANSI 2002).

The WHO does not recommend a specific indoor L_{max} criterion for single-event noise, but does place a guideline value at L_{eq} of 35 dB for overall background noise in the classroom. However, WHO does report that "for communication distances beyond a few meters, speech interference starts at sound pressure levels below 50 dB for octave bands centered on the main speech frequencies at 500 Hz, 1kHz, and 2 kHz." (WHO 2000). One can infer this can be approximated by an L_{max} value of 50 dB.

The United Kingdom Department for Education and Skills (UKDFES) established in its classroom acoustics guide a 30-minute time-averaged metric [$L_{eq(30min)}$] for background levels and $L_{A1,30}$ min for intermittent noises, at thresholds of 30-35 dB and 55 dB, respectively. $L_{A1,30}$ min represents the A-weighted sound level that is exceeded one percent of the time (in this case, during a 30 minute teaching session) and is generally equivalent to the L_{max} metric (UKDFES 2003).

Summary

As the previous section demonstrates, research indicates that it is not only important to consider the continuous background levels using time-averaged metrics, but also the intermittent events, using single-event metrics such as L_{max}. Table B-2 provides a summary of the noise level criteria recommended in the scientific literature.

Table B-2. Indoor Noise Level Criteria Based on Speech Intelligibility

Source	Metric/Level (dB)	Effects and Notes
U.S. FAA (1985)	L_{eq}(during school hours) = 45 dB	Federal assistance criteria for school sound insulation; supplemental single-event criteria may be used
Lind et al. (1998), Sharp and Plotkin (1984), Wesler (1986)	L_{max} = 50 dB / SIL 45	Single event level permissible in the classroom
WHO (1999)	L_{eq} = 35 dB L_{max} = 50 dB	Assumes average speech level of 50 dB and recommends signal to noise ratio of 15 dB
U.S. ANSI (2002)	L_{eq} = 40 dB, Based on Room Volume	Acceptable background level for continuous noise/ relaxed criteria for intermittent noise in the classroom
U.K. DFES (2003)	$L_{eq(30min)}$ = 30-35 dB L_{max} = 55 dB	Minimum acceptable in classroom and most other learning environs

When considering intermittent noise caused by aircraft overflights, a review of the relevant scientific literature and international guidelines indicates that an appropriate criteria is a limit on indoor background noise levels of 35 to 40 dB L_{eq} and a limit on single events of 50 dB L_{max}.

B.3.3 Sleep Disturbance

The disturbance of sleep is a major concern for communities exposed to nighttime aircraft noise. There have been numerous research studies that have attempted to quantify the complex effects of noise on sleep. This section provides an overview of the major noise-induced sleep disturbance studies that have been conducted, with particular emphasis placed on those studies that have influenced U.S. federal noise policy. The studies have been separated into two groups:

1. Initial studies performed in the 1960s and 1970s, where the research was focused on laboratory sleep observations.
2. Later studies performed in the 1990s up to the present, where the research was focused on field observations, and correlations to laboratory research were sought.

Initial Studies

The relationship between noise levels and sleep disturbance is complex and not fully understood. The disturbance depends not only on the depth of sleep, but also on the previous exposure to aircraft noise, familiarity with the surroundings, the physiological and psychological condition of the recipient, and a host of other situational factors. The most readily measurable effect of noise on sleep is the number of arousals or awakenings, and so the body of scientific literature has focused on predicting the percentage of the population that will be awakened at various noise levels. Fundamentally, regardless of the tools used to measure the degree of sleep disturbance (awakenings, arousals, etc.), these studies have grouped the data points into bins to predict the percentage of the population likely to be disturbed at various sound level thresholds.

FICON produced a guidance document that provided an overview of the most pertinent sleep disturbance research that had been conducted throughout the 1970s (FICON 1992). Literature reviews and meta-analysis conducted between 1978 and 1989 made use of the existing datasets that indicated the effects of nighttime noise on various sleep-state changes and awakenings (Lukas 1978; Griefahn 1978; Peasons et. al. 1989). FICON noted that various indoor A-weighted sound levels – ranging from 25 to 50 dB were observed to be thresholds below which significant sleep effects were not expected. Due to the large variability in the data, FICON did not endorse the reliability of the results.

However, FICON did recommend the use of an interim dose-response curve—awaiting future research—which predicted the percent of the exposed population expected to be awakened as a function of the exposure to single event noise levels expressed in terms of SEL. This curve was based on the research conducted for the U.S. Air Force (Finegold 1994). The dataset included most of the research performed up to that point, and predicted that ten percent of the population would be awakened when exposed to an interior SEL of approximately 58 dB. The data utilized to derive this relationship were primarily the results of controlled laboratory studies.

Recent Sleep Disturbance Research – Field and Laboratory Studies

It was noted in the early sleep disturbance research that the controlled laboratory studies did not account for many factors that are important to sleep behavior, such as habituation to the environment and previous exposure to noise and awakenings from sources other than aircraft noise. In the early 1990s, field studies were conducted to validate the earlier laboratory work. The most significant finding from these studies was that an estimated 80 to 90 percent of sleep disturbances were not related to individual outdoor noise events, but were instead the result of indoor noise sources and other non-noise-related factors. The results showed that there was less of an effect of noise on sleep in real-life conditions than had been previously reported from laboratory studies.

FICAN

The interim FICON dose-response curve that was recommended for use in 1992 was based on the most pertinent sleep disturbance research that was conducted through the 1970s, primarily in laboratory settings. After that time, considerable field research was conducted to evaluate the sleep effects in peoples' normal, home environment. Laboratory sleep studies tend to show higher values of sleep disturbance than field studies because people who sleep in their own homes are habituated to their environment and, therefore, do not wake up as easily (FICAN 1997).

Based on the new information, FICAN updated its recommended dose-response curve in 1997, depicted as the lower curve in Figure B-6. This figure is based on the results of three field studies (Ollerhead 1992; Fidell et. al. 1994; Fidell et al. 1995a and 1995b), along with the datasets from six previous field studies.

The new relationship represents the higher end, or upper envelope, of the latest field data. It should be interpreted as predicting the "maximum percent of the exposed population expected to be behaviorally awakened" or the "maximum percent awakened" for a given residential population. According to this relationship, a maximum of 3 percent of people would be awakened at an indoor SEL of 58 dB, compared to 10 percent using the 1992 curve. An indoor SEL of 58 dB is equivalent to outdoor SEL's of 73 and 83 dB respectively assuming 15 and 25 dB noise level reduction from outdoor to indoor with windows open and closed, respectively.

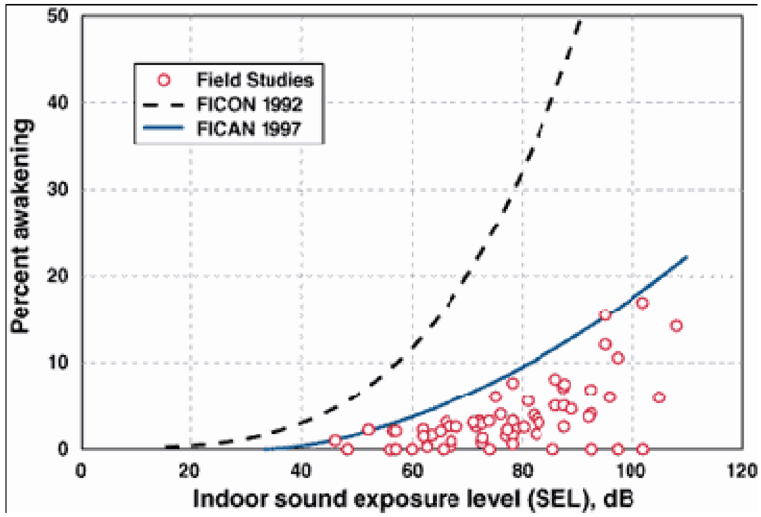


Figure B-6. FICAN's 1997 Recommended Sleep Disturbance Dose-Response Relationship

The FICAN 1997 curve is represented by the following equation:

$$\text{Percent Awakenings} = 0.0087 \times [\text{SEL} - 30]^{1.79}$$

Note the relatively low percentage of awakenings to fairly high noise levels. People think they are awakened by a noise event, but usually the reason for awakening is otherwise. For example, the 1992 UK CAA study found the average person was awakened about 18 times per night for reasons other than exposure to an aircraft noise – some of these awakenings are due to the biological rhythms of sleep and some to other reasons that were not correlated with specific aircraft events.

Number of Events and Awakenings

In recent years, there have been studies and one proposal that attempted to determine the effect of multiple aircraft events on the number of awakenings. The German Aerospace Center (DLR) conducted an extensive study focused on the effects of nighttime aircraft noise on sleep and other related human performance factors (Basner 2004). The DLR study was one of the largest studies to examine the link between aircraft noise and sleep disturbance and involved both laboratory and in-home field research phases. The DLR investigators developed a dose-effect curve that predicts the number of aircraft events at various values of L_{max} expected to produce one additional awakening over the course of a night. The dose-effect curve was based on the relationships found in the field studies.

In July 2008 ANSI and the Acoustical Society of America (ASA) published a method to estimate the percent of the exposed population that might be awakened by multiple aircraft noise events based on statistical assumptions about the probability of awakening (or not awakening) (ANSI 2008). This method relies on probability theory rather than direct field research/experimental data to account for multiple events.

Figure B-7 depicts the awakenings data that form the basis and equations of ANSI S12.9-2008. The curve labeled 'Eq. (B1)' is the relationship between noise and awakening endorsed by FICAN in 1997. The ANSI recommended curve labeled 'Eq. (1)' quantifies the probability of awakening for a population of sleepers who are exposed to an outdoor noise event as a function of the associated indoor SEL in the bedroom. This curve was derived from studies of behavioral awakenings associated with noise events in "steady state" situations where the population has been exposed to the noise long enough to be habituated. The data points in Figure B-7 come from these studies. Unlike the FICAN curve, the ANSI 2008 curve represents the average of the field research data points.

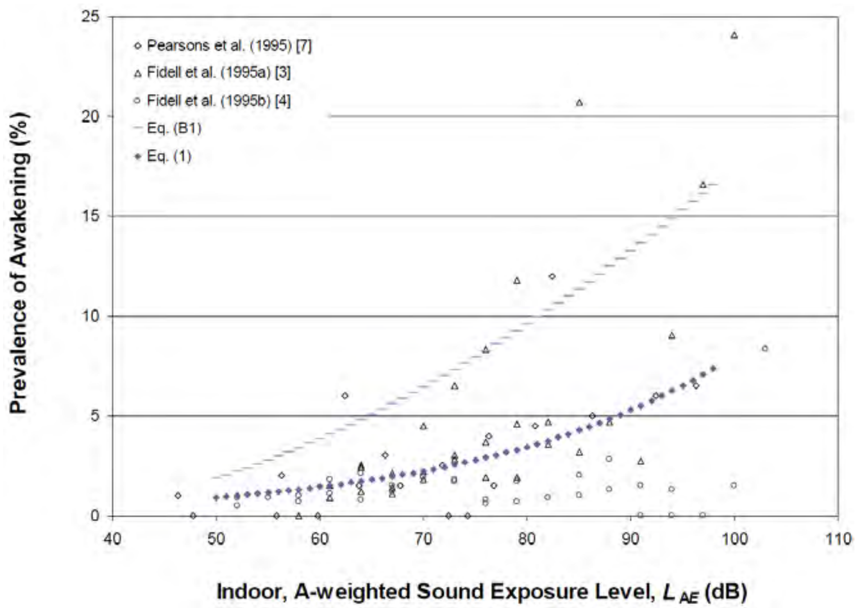


Figure B-7. Plot of Sleep Awakening Data versus Indoor SEL

In December 2008, FICAN recommended the use of this new estimation procedure for future analyses of behavioral awakenings from aircraft noise. In that statement, FICAN also recognized that additional sleep disturbance research is underway by various research organizations, and results of that work may result in additional changes to FICAN's position. Until that time, FICAN recommends the use of ANSI S12.9-2008.

B.3.4 Noise-Induced Hearing Impairment

Residents in surrounding communities express concerns regarding the effects of aircraft noise on hearing. This section provides a brief overview of hearing loss caused by noise exposure. The goal is to provide a sense of perspective as to how aircraft noise (as experienced on the ground) compares to other activities that are often linked with hearing loss.

Hearing Threshold Shifts

Hearing loss is generally interpreted as a decrease in the ear's sensitivity or acuity to perceive sound; i.e. a shift in the hearing threshold to a higher level. This change can either be a Temporary Threshold Shift (TTS), or a Permanent Threshold Shift (PTS) (Berger 1995).

TTS can result from exposure to loud noise over a given amount of time, yet the hearing loss is not necessarily permanent. An example of TTS might be a person attending a loud music concert. After the concert is over, the person may experience a threshold shift that may last several hours, depending upon the level and duration of exposure. While experiencing TTS, the person becomes less sensitive to low-level sounds, particularly at certain frequencies in the speech range (typically near 4,000 Hz). Normal hearing ability eventually returns, as long as the person has enough time to recover within a relatively quiet environment.

PTS usually results from repeated exposure to high noise levels, where the ears are not given adequate time to recover from the strain and fatigue of exposure. A common example of PTS is the result of working in a loud environment such as a factory. It is important to note that a temporary shift (TTS) can eventually become permanent (PTS) over time with continuous exposure to high noise levels. Thus, even if the ear is given time to recover from TTS, repeated occurrence of TTS may eventually lead to permanent hearing loss. The point at which a Temporary Threshold Shift results in a Permanent Threshold Shift is difficult to identify and varies with a person's sensitivity.

Criteria for Permanent Hearing Loss

Considerable data on hearing loss have been collected and analyzed by the scientific/medical community. It has been well established that continuous exposure to high noise levels will damage human hearing (EPA 1978). The Occupational Safety and Health Administration (OSHA) regulation of 1971 standardizes the limits on workplace noise exposure for protection from hearing loss as an average level of 90 dB over an 8-hour work period or 85 dB over a 16-hour period (the average level is based on a 5 dB decrease per doubling of exposure time) (US Department of Labor 1970). Even the most protective criterion (no measurable hearing loss for the most sensitive portion of the population at the ear's most sensitive frequency, 4,000 Hz, after a 40-year exposure) is an average sound level of 70 dB over a 24-hour period.

The US EPA established 75 dB for an 8-hour exposure and 70 dB for a 24-hour exposure as the average noise level standard requisite to protect 96 percent of the population from greater than a 5 dB PTS (EPA 1978). The National Academy of Sciences Committee on Hearing, Bioacoustics, and Biomechanics identified 75 dB as the minimum level at which hearing loss may occur (CHABA 1977). Finally, the WHO has concluded that environmental and leisure-time noise below an L_{eq24} value of 70 dB "will not cause hearing loss in the large majority of the population, even after a lifetime of exposure" (WHO 2000).

Hearing Loss and Aircraft Noise

The 1982 EPA Guidelines report specifically addresses the criteria and procedures for assessing the noise-induced hearing loss in terms of the Noise-Induced Permanent Threshold Shift (NIPTS), a quantity that defines the permanent change in hearing level, or threshold, caused by exposure to noise (EPA, 1982). Numerically, the NIPTS is the change in threshold averaged over the frequencies 0.5, 1, 2, and 4 kHz that can be expected from daily exposure to noise over a normal working lifetime of 40 years, with the exposure beginning at an age of 20 years. A grand average of the NIPTS over time (40 years) and hearing sensitivity (10 to 90 percentiles of the exposed population) is termed the Average NIPTS or Ave NIPTS for short. The Average Noise Induced Permanent Threshold Shift (Ave. NIPTS) that can be expected for noise exposure as measured by the DNL metric is given in Table B-3.

Table B-3. Ave. NIPTS and 10th Percentile NIPTS as a Function of DNL

DNL	Ave. NIPTS dB*	10th Percentile NIPTS dB*
75-76	1.0	4.0
76-77	1.0	4.5
77-78	1.6	5.0
78-79	2.0	5.5
79-80	2.5	6.0
80-81	3.0	7.0
81-82	3.5	8.0
82-83	4.0	9.0
83-84	4.5	10.0
84-85	5.5	11.0

* Rounded to the nearest 0.5 dB

For example, for a noise exposure of 80 dB DNL, the expected lifetime average value of NIPTS is 2.5 dB, or 6.0 dB for the 10th percentile. Characterizing the noise exposure in terms of DNL will usually overestimate the assessment of hearing loss risk as DNL includes a 10 dB weighting factor for aircraft operations occurring between 10 p.m. and 7 a.m. If, however, flight operations between the hours of 10 p.m. and 7 a.m. account for 5 percent or less of the total 24-hour operations, the overestimation is on the order of 1.5 dB.

From a civilian airport perspective, the scientific community has concluded that there is little likelihood that the resulting noise exposure from aircraft noise could result in either a temporary or permanent hearing loss. Studies on community hearing loss from exposure to aircraft flyovers near airports showed that there is no danger, under normal circumstances, of hearing loss due to aircraft noise (Newman and Beattie 1985). The EPA criterion (L_{eq24} = 70 dBA) can be exceeded in some areas located near airports, but that is only the case outdoors. Inside a building, where people are more likely to spend most of their time, the average noise level will be much less than 70 dBA (Eldred and von Gierke 1993). Eldred and von Gierke also report that "several studies in the U.S., Japan, and the U.K. have confirmed the predictions that the possibility for permanent hearing loss in communities, even under the most intense commercial take-off and landing patterns, is remote."

With regard to military airbases, as individual aircraft noise levels are increasing with the introduction of new aircraft, a 2009 DoD policy directive requires that hearing loss risk be estimated for the at risk population, defined as the population exposed to DNL greater than or equal to 80 dB and higher (DoD 2009). Specifically, DoD components are directed to "*use the 80 Day-Night A-Weighted (DNL) noise contour to identify populations at the most risk of potential hearing loss*". This does not preclude populations outside the 80 DNL contour, i.e. at lower exposure levels, from being at some degree of risk of hearing loss. However, the analysis should be restricted to populations within this contour area, including residents of on-base housing. The exposure of workers inside the base boundary area should be considered occupational and evaluated using the appropriate DoD component regulations for occupational noise exposure.

With regard to military airspace activity, studies have shown conflicting results. A 1995 laboratory study measured changes in human hearing from noise representative of low-flying aircraft on MTRs (Nixon, et al. 1993). The potential effects of aircraft flying along MTRs is of particular concern because of maximum overflight noise levels can exceed 115 dB, with rapid increases in noise levels exceeding 30 dB per second. In this study, participants were first subjected to four overflight noise exposures at A-weighted levels of 115 dB to 130 dB. Fifty percent of the subjects showed no change in hearing levels, 25 percent had a temporary 5 dB *increase* in sensitivity (the people could hear a 5 dB wider range of sound than before exposure), and 25 percent had a temporary 5 dB decrease in sensitivity (the people could hear a 5 dB narrower range of sound than before exposure). In the next phase, participants were subjected to a single overflight at a maximum level of 130 dB for eight successive exposures, separated by 90 seconds or until a temporary shift in hearing was observed. The temporary hearing threshold shifts showed an *increase* in sensitivity of up to 10 dB.

In another study of 115 test subjects between 18 and 50 years old in 1999, temporary threshold shifts were measured after laboratory exposure to military low-altitude flight noise (Ising, et al. 1999). According to the authors, the results indicate that repeated exposure to military low-altitude flight noise with L_{max} greater than 114 dB, especially if the noise level increases rapidly, may have the potential to cause noise induced hearing loss in humans.

Summary

Aviation and typical community noise levels near airports are not comparable to the occupational or recreational noise exposures associated with hearing loss. Studies of aircraft noise levels associated with civilian airport activity have not definitively correlated permanent hearing impairment with aircraft activity. It is unlikely that airport neighbors will remain outside their homes 24 hours per day, so there is little likelihood of hearing loss below an average sound level of 75 dB DNL. Near military airbases, average noise levels above 75 dB may occur, and while new DoD policy dictates that NIPTS be evaluated, no research results to date have definitively related permanent hearing impairment to aviation noise.

B.3.5 Nonauditory Health Effects

Studies have been conducted to determine whether correlations exist between noise exposure and cardiovascular problems, birth weight, and mortality rates. The nonauditory effect of noise on humans is not as easily substantiated as the effect on hearing. The results of studies conducted in the United States, primarily concentrating on cardiovascular response to noise, have been contradictory (Cantrell 1974). Cantrell concluded that the results of human and animal experiments show that average or intrusive noise can act as a stress-provoking stimulus. Prolonged stress is known to be a contributor to a number of health disorders. Kryter and Poza (1980) state, "It is more likely that noise-related general ill-health effects are due to the psychological annoyance from the noise interfering with normal everyday behavior, than it is from the noise eliciting, because of its intensity, reflexive response in the autonomic or other physiological systems of the body." Psychological stresses may cause a physiological stress reaction that could result in impaired health.

The National Institute for Occupational Safety and Health and EPA commissioned CHABA in 1981 to study whether established noise standards are adequate to protect against health disorders other than hearing defects. CHABA's conclusion was that:

Evidence from available research reports is suggestive, but it does not provide definitive answers to the question of health effects, other than to the auditory system, of long-term exposure to noise. It seems prudent, therefore, in the absence of adequate knowledge as to whether or not noise can produce effects upon health other than damage to auditory system, either directly or mediated through stress, that insofar as feasible, an attempt should be made to obtain more critical evidence.

Since the CHABA report, there have been more recent studies that suggest that noise exposure may cause hypertension and other stress-related effects in adults. Near an airport in Stockholm, Sweden, the prevalence of hypertension was reportedly greater among nearby residents who were exposed to energy averaged noise levels exceeding 55 dB and maximum noise levels exceeding 72 dB, particularly older subjects and those not reporting impaired hearing ability (Rosenlund, et al. 2001). A study of elderly volunteers who were exposed to simulated military low-altitude flight noise reported that blood pressure was raised by L_{max} of 112 dB and high speed level increase (Michalak, et al. 1990). Yet another study of subjects exposed to varying levels of military aircraft or road noise found no significant relationship between noise level and blood pressure (Pulles, et al. 1990).

The U.S. Department of the Navy prepared a programmatic Environmental Assessment (EA) for the continued use of non-explosive ordnance on the Vieques Inner Range. Following the preparation of the EA, it was learned that research conducted by the University of Puerto Rico, Ponce School of Medicine, suggested that Vieques fishermen and their families were experiencing symptoms associated with vibroacoustic disease (VAD) (U.S. Department of the Navy 2002). The study alleged that exposure to noise and sound waves of large pressure amplitudes within lower frequency bands, associated with Navy training activities—specifically, air-to-ground bombing or naval fire support—was related to a larger prevalence of heart anomalies within the Vieques fishermen and their families. The Ponce School of Medicine study compared the Vieques group with a group from Ponce Playa. A 1999 study conducted on Portuguese aircraft-manufacturing workers from a single factory reported effects of jet aircraft noise exposure that involved a wide range of symptoms and disorders, including the cardiac issues on which the Ponce School of Medicine study focused. The 1999 study identified these effects as VAD.

Johns Hopkins University (JHU) conducted an independent review of the Ponce School of Medicine study, as well as the Portuguese aircraft workers study and other relevant scientific literature. Their findings concluded that VAD should not be accepted as a syndrome, given that exhaustive research across a number of populations has not yet been conducted. JHU also pointed out that the evidence supporting the existence of VAD comes largely from one group of investigators and that similar results would have to be replicated by other investigators. In short, JHU concluded that it had not been established that noise was the causal agent for the symptoms reported and no inference can be made as to the role of noise from naval gunfire in producing echocardiographic abnormalities (U.S. Department of the Navy 2002).

Most studies of nonauditory health effects of long-term noise exposure have found that noise exposure levels established for hearing protection will also protect against any potential nonauditory health effects, at least in workplace conditions. One of the best scientific summaries of these findings is contained in the lead paper at the National Institutes of Health Conference on Noise and Hearing Loss, held on 22 to 24 January 1990 in Washington, D.C.:

> "The nonauditory effects of chronic noise exposure, when noise is suspected to act as one of the risk factors in the development of hypertension, cardiovascular disease, and other nervous disorders, have never been proven to occur as chronic manifestations at levels below these criteria (an average of 75 dBA for complete protection against hearing loss for an 8-hour day). At the recent (1988) International Congress on Noise as a Public Health Problem, most studies attempting to clarify such health effects did not find them at levels below the criteria protective of noise-induced hearing loss, and even above these criteria, results regarding such health effects were ambiguous. Consequently, one comes to the conclusion that establishing and enforcing exposure levels protecting against noise-induced hearing loss would not only solve the noise-induced hearing loss problem, but also any potential nonauditory health effects in the work place" (von Gierke 1990).

Although these findings were specifically directed at noise effects in the workplace, they are equally applicable to aircraft noise effects in the community environment. Research studies regarding the nonauditory health effects of aircraft noise are ambiguous, at best, and often contradictory. Yet, even those studies that purport to find such health effects use time-average noise levels of 75 dB and higher for their research.

For example, two UCLA researchers apparently found a relationship between aircraft noise levels under the approach path to Los Angeles International Airport (LAX) and increased mortality rates among the exposed residents by using an average noise exposure level greater than 75 dB for the "noise-exposed" population (Meacham and Shaw 1979). Nevertheless, three other UCLA professors analyzed those same data and found no relationship between noise exposure and mortality rates (Frerichs, et al. 1980).

As a second example, two other UCLA researchers used this same population near LAX to show a higher rate of birth defects for 1970 to 1972 when compared with a control group residing away from the airport (Jones and Tauscher 1978). Based on this report, a separate group at the Center for Disease Control performed a more thorough study of populations near Atlanta's Hartsfield International Airport (ATL) for 1970 to 1972 and found no relationship in their study of 17 identified categories of birth defects to aircraft noise levels above 65 dB (Edmonds, et al. 1979).

In summary, there is no scientific basis for a claim that potential health effects exist for aircraft time-average sound levels below 75 dB.

The potential for noise to affect physiological health, such as the cardiovascular system, has been speculated; however, no unequivocal evidence exists to support such claims (Harris 1997). Conclusions drawn from a review of health effect studies involving military low-altitude flight noise with its unusually high maximum levels and rapid rise in sound level have shown no increase in cardiovascular disease (Schwartze and Thompson 1993). Additional claims that are unsupported include flyover noise producing increased mortality rates and increases in cardiovascular death, aggravation of post-traumatic stress syndrome, increased stress, increase in admissions to mental hospitals, and adverse effects on pregnant women and the unborn fetus (Harris 1997).

B.3.6 Performance Effects

The effect of noise on the performance of activities or tasks has been the subject of many studies. Some of these studies have established links between continuous high noise levels and performance loss. Noise-induced performance losses are most frequently reported in studies employing noise levels in excess of 85 dB. Little change has been found in low-noise cases. It has been cited that moderate noise levels appear to act as a stressor for more sensitive individuals performing a difficult psychomotor task.

While the results of research on the general effect of periodic aircraft noise on performance have yet to yield definitive criteria, several general trends have been noted including:

- A periodic intermittent noise is more likely to disrupt performance than a steady-state continuous noise of the same level. Flyover noise, due to its intermittent nature, might be more likely to disrupt performance than a steady-state noise of equal level.
- Noise is more inclined to affect the quality than the quantity of work.
- Noise is more likely to impair the performance of tasks that place extreme demands on the worker.

B.3.7 Noise Effects on Children

In response to noise-specific and other environmental studies, Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks (1997), requires federal agencies to ensure that policies, programs, and activities address environmental health and safety risks to identify any disproportionate risks to children.

A review of the scientific literature indicates that there has not been a tremendous amount of research in the area of aircraft noise effects on children. The research reviewed does suggest that environments with sustained high background noise can have variable effects, including noise effects on learning and cognitive abilities, and reports of various noise-related physiological changes.

B.3.7.1 Effects on Learning and Cognitive Abilities

In 2002 ANSI refers to studies that suggest that loud and frequent background noise can affect the learning patterns of young children (ANSI 2002). ANSI provides discussion on the relationships between noise and learning, and stipulates design requirements and acoustical performance criteria for outdoor-to-indoor noise isolation. School design is directed to be cognizant of, and responsive to surrounding land uses and the shielding of outdoor noise from the indoor environment. The ANSI acoustical performance criteria for schools include the requirement that the one-hour-average background noise level shall not exceed 35 dBA in core learning spaces smaller than 20,000 cubic-feet and 40 dBA in core learning spaces with enclosed volumes exceeding 20,000 cubic-feet. This would require schools be constructed such that, in quiet neighborhoods indoor noise levels are lowered by 15 to 20 dBA relative to outdoor levels. In schools near airports, indoor noise levels would have to be lowered by 35 to 45 dBA relative to outdoor levels (ANSI 2002).

The studies referenced by ANSI to support the new standard are not specific to jet aircraft noise and the potential effects on children. However, there are references to studies that have shown that children in noisier classrooms scored lower on a variety of tests. Excessive background noise or reverberation within schools causes interferences of communication and can therefore create an acoustical barrier to learning (ANSI 2002). Studies have been performed that contribute to the body of evidence emphasizing the importance of communication by way of the spoken language to the development of cognitive skills. The ability to read, write, comprehend, and maintain attentiveness, are, in part, based upon whether teacher communication is consistently intelligible (ANSI 2002).

Numerous studies have shown varying degrees of effects of noise on the reading comprehension, attentiveness, puzzle-solving, and memory/recall ability of children. It is generally accepted that young children are more susceptible than adults to the effects of background noise. Because of the developmental status of young children (linguistic, cognitive, and proficiency), barriers to hearing can cause interferences or disruptions in developmental evolution.

Research on the impacts of aircraft noise, and noise in general, on the cognitive abilities of school-aged children has received more attention in recent years. Several studies suggest that aircraft noise can affect the academic performance of schoolchildren. Although many factors could contribute to learning deficits in school-aged children (e.g., socioeconomic level, home environment, diet, sleep patterns), evidence exists that suggests that chronic exposure to high aircraft noise levels can impair learning.

Specifically, elementary school children attending schools near New York City's two airports demonstrated lower reading scores than children living farther away from the flight paths (Green, et al. 1982). Researchers have found that tasks involving central processing and language comprehension (such as reading, attention, problem solving, and memory) appear to be the most affected by noise (Evans and Lepore 1993; Hygge 1994; and Evans, et al. 1998). It has been demonstrated that chronic exposure of first- and second-grade children to aircraft noise can result in reading deficits and impaired speech perception (i.e., the ability to hear common, low-frequency [vowel] sounds but not high frequencies [consonants] in speech) (Evans and Maxwell 1997).

The Evans and Maxwell (1997) study found that chronic exposure to aircraft noise resulted in reading deficits and impaired speech perception for first- and second-grade children. Other studies found that children residing near the Los Angeles International Airport had more difficulty solving cognitive problems and did not perform as well as children from quieter schools in puzzle-solving and attentiveness (Bronzaft 1997; Cohen, et al. 1980). Children attending elementary schools in high aircraft noise areas near London's Heathrow Airport demonstrated poorer reading comprehension and selective cognitive impairments (Haines, et al. 2001a, and 2001b). Similarly, a 1994 study found that students exposed to aircraft noise of approximately 76 dBA scored 20% lower on recall ability tests than students exposed to ambient noise of 42-44 dBA (Hygge 1994). Similar studies involving the testing of attention, memory, and reading comprehension of school children located near airports showed that their tests exhibited reduced performance results compared to those of similar groups of children who were located in quieter environments (Evans, et al. 1998; Haines, et al. 1998). The Haines and Stansfeld study indicated that there may be some long-term effects associated with exposure, as one-year follow-up testing still demonstrated lowered scores for children in higher noise schools (Haines, et al. 2001a, and 2001b). In contrast, a 2002 study found that although children living near the old Munich airport scored lower in standardized reading and long-term memory tests than a control group, their performance on the same tests was equal to that of the control group once the airport was closed. (Hygge, et al. 2002).

Finally, although it is recognized that there are many factors that could contribute to learning deficits in school-aged children, there is increasing awareness that chronic exposure to high aircraft noise levels may impair learning. This awareness has led the World Health Organization and a North Atlantic Treaty Organization working group to conclude that daycare centers and schools should not be located near major sources of noise, such as highways, airports, and industrial sites (World Health Organization 2000; North Atlantic Treaty Organization 2000).

B.3.7.2 Health Effects

Physiological effects in children exposed to aircraft noise and the potential for health effects have also been the focus of limited investigation. Studies in the literature include examination of blood pressure levels, hormonal secretions, and hearing loss.

As a measure of stress response to aircraft noise, authors have looked at blood pressure readings to monitor children's health. Children who were chronically exposed to aircraft noise from a new airport near Munich, Germany, had modest (although significant) increases in blood pressure, significant increases in stress hormones, and a decline in quality of life (Evans, et al. 1998). Children attending noisy schools had statistically significant average systolic and diastolic blood pressure ($p<0.03$). Systolic blood pressure means were 89.68 mm for children attending schools located in noisier environments compared to 86.77 mm for a control group. Similarly, diastolic blood pressure means for the noisier environment group were 47.84 mm and 45.16 for the control group (Cohen, et al. 1980).

Although the literature appears limited, studies focused on the wide range of potential effects of aircraft noise on school children have also investigated hormonal levels between groups of children exposed to aircraft noise compared to those in a control group. Specifically, two studies analyzed cortisol and urinary catecholamine levels in school children as measurements of stress response to aircraft noise (Haines, et al. 2001b and 2001c). In both instances, there were no differences between the aircraft-noise-exposed children and the control groups.

Other studies have reported hearing losses from exposure to aircraft noise. Noise-induced hearing loss was reportedly higher in children who attended a school located under a flight path near a Taiwan airport, as compared to children at another school far away (Chen, et al. 1997). Another study reported that hearing ability was reduced significantly in individuals who lived near an airport and were frequently exposed to aircraft noise (Chen and Chen 1993). In that study, noise exposure near the airport was reportedly uniform, with DNL greater than 75 dB and maximum noise levels of about 87 dB during overflights. Conversely, several other studies that were reviewed reported no difference in hearing ability between children exposed to high levels of airport noise and children located in quieter areas (Fisch 1977; Andrus, et al. 1975; Wu, et al. 1995).

B.3.8 Effects on Domestic Animals and Wildlife

Hearing is critical to an animal's ability to react, compete, reproduce, hunt, forage, and survive in its environment. While the existing literature does include studies on possible effects of jet aircraft noise and sonic booms on wildlife, there appears to have been little concerted effort in developing quantitative comparisons of aircraft noise effects on normal auditory characteristics. Behavioral effects have been relatively well described, but the larger ecological context issues, and the potential for drawing conclusions regarding effects on populations, has not been well developed.

The relationships between potential auditory/physiological effects and species interactions with their environments are not well understood. Manci, et al. (1988), assert that the consequences that physiological effects may have on behavioral patterns is vital to understanding the long-term effects of noise on wildlife. Questions regarding the effects (if any) on predator-prey interactions, reproductive success, and intra-inter specific behavior patterns remain.

The following discussion provides an overview of the existing literature on noise effects (particularly jet aircraft noise) on animal species. The literature reviewed here involves those studies that have focused on the observations of the behavioral effects that jet aircraft and sonic booms have on animals.

A great deal of research was conducted in the 1960's and 1970's on the effects of aircraft noise on the public and the potential for adverse ecological impacts. These studies were largely completed in response to the increase in air travel and as a result of the introduction of supersonic jet aircraft. According to Manci, et al. (1988), the foundation of information created from that focus does not necessarily correlate or provide information specific to the impacts to wildlife in areas overflown by aircraft at supersonic speed or at low altitudes.

The abilities to hear sounds and noise and to communicate assist wildlife in maintaining group cohesiveness and survivorship. Social species communicate by transmitting calls of warning, introduction, and other types that are subsequently related to an individual's or group's responsiveness.

Animal species differ greatly in their responses to noise. Noise effects on domestic animals and wildlife are classified as primary, secondary, and tertiary. Primary effects are direct, physiological changes to the auditory system, and most likely include the masking of auditory signals. Masking is defined as the inability of an individual to hear important environmental signals that may arise from mates, predators, or prey. There is some potential that noise could disrupt a species' ability to communicate or could interfere with behavioral patterns (Manci, et al. 1988). Although the effects are likely temporal, aircraft noise may cause masking of auditory signals within exposed faunal communities. Animals rely on hearing to avoid predators, obtain food, and communicate with, and attract, other members of their species. Aircraft noise may mask or interfere with these functions. Other primary effects, such as ear drum rupture or temporary and permanent hearing threshold shifts, are not as likely given the subsonic noise levels produced by aircraft overflights. Secondary effects may include non-auditory effects such as stress and hypertension; behavioral modifications; interference with mating or reproduction; and impaired ability to obtain adequate food, cover, or water. Tertiary effects are the direct result of primary and secondary effects, and include population decline and habitat loss. Most of the effects of noise are mild enough that they may never be detectable as variables of change in population size or population growth against the background of normal variation (Bowles 1995). Other environmental variables (e.g., predators, weather, changing prey base, ground-based disturbance) also influence secondary and tertiary effects, and confound the ability to identify the ultimate factor in limiting productivity of a certain nest, area, or region (Smith, et al. 1988). Overall, the literature suggests that species differ in their response to various types, durations, and sources of noise (Manci, et al. 1988).

Many scientific studies have investigated the effects of aircraft noise on wildlife, and some have focused on wildlife "flight" due to noise. Apparently, animal responses to aircraft are influenced by many variables, including size, speed, proximity (both height above the ground and lateral distance), engine noise, color, flight profile, and radiated noise. The type of aircraft (e.g., fixed wing versus rotor-wing [helicopter]) and type of flight mission may also produce different levels of disturbance, with varying animal responses (Smith, et al. 1988). Consequently, it is difficult to generalize animal responses to noise disturbances across species.

One result of the 1988 Manci, et al., literature review was the conclusion that, while behavioral observation studies were relatively limited, a general behavioral reaction in animals from exposure to aircraft noise is the startle response. The intensity and duration of the startle response appears to be dependent on which species is exposed, whether there is a group or an individual, and whether there have been some previous exposures. Responses range from flight, trampling, stampeding, jumping, or running, to movement of the head in the apparent direction of the noise source. Manci, et al. (1988), reported that the literature indicated that avian species may be more sensitive to aircraft noise than mammals.

B.3.8.1 Domestic Animals

Although some studies report that the effects of aircraft noise on domestic animals is inconclusive, a majority of the literature reviewed indicates that domestic animals exhibit some behavioral responses to military overflights but generally seem to habituate to the disturbances over a period of time. Mammals in particular appear to react to noise at sound levels higher than 90 dB, with responses including the startle response, freezing (i.e., becoming temporarily stationary), and fleeing from the sound source. Many studies on domestic animals suggest that some species appear to acclimate to some forms of sound disturbance (Manci, et al. 1988). Some studies have reported such primary and secondary effects as reduced milk production and rate of milk release, increased glucose concentrations, decreased levels of hemoglobin, increased heart rate, and a reduction in thyroid activity. These latter effects appear to represent a small percentage of the findings occurring in the existing literature.

Some reviewers have indicated that earlier studies, and claims by farmers linking adverse effects of aircraft noise on livestock, did not necessarily provide clear-cut evidence of cause and effect (Cottereau 1978). In contrast, many studies conclude that there is no evidence that aircraft overflights affect feed intake, growth, or production rates in domestic animals.

Cattle

In response to concerns about overflight effects on pregnant cattle, milk production, and cattle safety, the U.S. Air Force prepared a handbook for environmental protection that summarizes the literature on the impacts of low-altitude flights on livestock (and poultry) and includes specific case studies conducted in numerous airspaces across the country. Adverse effects have been found in a few studies but have not been reproduced in other similar studies. One such study, conducted in 1983, suggested that 2 of 10 cows in late pregnancy aborted after showing rising estrogen and falling progesterone levels. These increased hormonal levels were reported as being linked to 59 aircraft overflights. The remaining eight cows showed no changes in their blood concentrations and calved normally (U.S. Air Force 1994b). A similar study reported abortions occurred in three out of five pregnant cattle after exposing them to flyovers by six different aircraft (U.S. Air Force 1994b). Another study suggested that feedlot cattle could stampede and injure themselves when exposed to low-level overflights (U.S. Air Force 1994b).

A majority of the studies reviewed suggests that there is little or no effect of aircraft noise on cattle. Studies presenting adverse effects to domestic animals have been limited. A number of studies (Parker and Bayley 1960; Casady and Lehmann 1967; Kovalcik and Sottnik 1971) investigated the effects of jet aircraft noise and sonic booms on the milk production of dairy cows. Through the compilation and examination of milk production data from areas exposed to jet aircraft noise and sonic boom events, it was determined that milk yields were not affected. This was particularly evident in those cows that had been previously exposed to jet aircraft noise.

A study examined the causes of 1,763 abortions in Wisconsin dairy cattle over a one-year time period and none were associated with aircraft disturbances (U.S. Air Force 1993). In 1987, Anderson contacted seven livestock operators for production data, and no effects of low-altitude and supersonic flights were noted. Three out of 43 cattle previously exposed to low-altitude flights showed a startle response to an F/A-18 aircraft flying overhead at 500 feet above ground level and 400 knots by running less than 10 meters. They resumed normal activity within one minute (U.S. Air Force 1994b). Beyer (1983) found that helicopters caused more reaction than other low-aircraft overflights, and that the helicopters at 30 to 60 feet overhead did not affect milk production and pregnancies of 44 cows and heifers in a 1964 study (U.S. Air Force 1994b).

Additionally, Beyer reported that five pregnant dairy cows in a pasture did not exhibit fright-flight tendencies or disturb their pregnancies after being overflown by 79 low-altitude helicopter flights and 4 low-altitude, subsonic jet aircraft flights (U.S. Air Force 1994b). A 1956 study found that the reactions of dairy and beef cattle to noise from low-altitude, subsonic aircraft were similar to those caused by paper blowing about, strange persons, or other moving objects (U.S. Air Force 1994b).

In a report to Congress, the U. S. Forest Service concluded that "evidence both from field studies of wild ungulates and laboratory studies of domestic stock indicate that the risks of damage are small (from aircraft approaches of 50 to 100 meters), as animals take care not to damage themselves (U.S. Forest Service 1992). If animals are overflown by aircraft at altitudes of 50 to 100 meters, there is no evidence that mothers and young are separated, that animals collide with obstructions (unless confined) or that they traverse dangerous ground at too high a rate." These varied study results suggest that, although the confining of cattle could magnify animal response to aircraft overflight, there is no proven cause-and-effect link between startling cattle from aircraft overflights and abortion rates or lower milk production.

Horses

Horses have also been observed to react to overflights of jet aircraft. Several of the studies reviewed reported a varied response of horses to low-altitude aircraft overflights. Observations made in 1966 and 1968 noted that horses galloped in response to jet flyovers (U.S. Air Force 1993). Bowles (1995) cites Kruger and Erath as observing horses exhibiting intensive flight reactions, random movements, and biting/kicking behavior. However, no injuries or abortions occurred, and there was evidence that the mares adapted somewhat to the flyovers over the course of a month (U.S. Air Force 1994b). Although horses were observed noticing the overflights, it did not appear to affect either survivability or reproductive success. There was also some indication that habituation to these types of disturbances was occurring.

LeBlanc, et al. (1991), studied the effects of F-14 jet aircraft noise on pregnant mares. They specifically focused on any changes in pregnancy success, behavior, cardiac function, hormonal production, and rate of habituation. Their findings reported observations of "flight-fright" reactions, which caused increases in heart rates and serum cortisol concentrations. The mares, however, did habituate to the noise. Levels of anxiety and mass body movements were the highest after initial exposure, with intensities of responses decreasing thereafter. There were no differences in pregnancy success when compared to a control group.

Swine

Generally, the literature findings for swine appear to be similar to those reported for cows and horses. While there are some effects from aircraft noise reported in the literature, these effects are minor. Studies of continuous noise exposure (i.e., 6 hours, 72 hours of constant exposure) reported influences on short-term hormonal production and release. Additional constant exposure studies indicated the observation of stress reactions, hypertension, and electrolyte imbalances (Dufour 1980). A study by Bond, et al. (1963), demonstrated no adverse effects on the feeding efficiency, weight gain, ear physiology, or thyroid and adrenal gland condition of pigs subjected to observed aircraft noise. Observations of heart rate increase were recorded, noting that cessation of the noise resulted in the return to normal heart rates. Conception rates and offspring survivorship did not appear to be influenced by exposure to aircraft noise.

Similarly, simulated aircraft noise at levels of 100 dB to 135 dB had only minor effects on the rate of feed utilization, weight gain, food intake, or reproduction rates of boars and sows exposed, and there were no injuries or inner ear changes observed (Manci, et al. 1988; Gladwin, et al. 1988).

Domestic Fowl

According to a 1994 position paper by the U.S. Air Force on effects of low-altitude overflights (below 1,000 ft) on domestic fowl, overflight activity has negligible effects (U.S. Air Force 1994a). The paper did recognize that given certain circumstances, adverse effects can be serious. Some of the effects can be panic reactions, reduced productivity, and effects on marketability (e.g., bruising of the meat caused during "pile-up" situations).

The typical reaction of domestic fowl after exposure to sudden, intense noise is a short-term startle response. The reaction ceases as soon as the stimulus is ended, and within a few minutes all activity returns to normal. More severe responses are possible depending on the number of birds, the frequency of exposure, and environmental conditions. Large crowds of birds, and birds not previously exposed, are more likely to pile up in response to a noise stimulus (U.S. Air Force 1994a). According to studies and interviews with growers, it is typically the previously unexposed birds that incite panic crowding, and the tendency to do so is markedly reduced within five exposures to the stimulus (U.S. Air Force 1994a). This suggests that the birds habituate relatively quickly. Egg productivity was not adversely affected by infrequent noise bursts, even at exposure levels as high as 120 to 130 dBA.

Between 1956 and 1988, there were 100 recorded claims against the Navy for alleged damage to domestic fowl. The number of claims averaged three per year, with peak numbers of claims following publications of studies on the topic in the early 1960s (U.S. Air Force 1994a). Many of the claims were disproved or did not have sufficient supporting evidence. The claims were filed for the following alleged damages: 55% for panic reactions, 31% for decreased production, 6% for reduced hatchability, 6% for weight loss, and less than 1% for reduced fertility (U.S. Air Force 1994a).

Turkeys

The review of the existing literature suggests that there has not been a concerted or widespread effort to study the effects of aircraft noise on commercial turkeys. One study involving turkeys examined the differences between simulated versus actual overflight aircraft noise, turkey responses to the noise, weight gain, and evidence of habituation (Bowles, et al. 1990a). Findings from the study suggested that turkeys habituated to jet aircraft noise quickly, that there were no growth rate differences between the experimental and control groups, and that there were some behavioral differences that increased the difficulty in handling individuals within the experimental group.

Low-altitude overflights were shown to cause turkey flocks that were kept inside turkey houses to occasionally pile up and experience high mortality rates due to the aircraft noise and a variety of disturbances unrelated to aircraft (U.S. Air Force 1994a).

B.3.8.2 Wildlife

Studies on the effects of overflights and sonic booms on wildlife have been focused mostly on avian species and ungulates such as caribou and bighorn sheep. Few studies have been conducted on marine mammals, small terrestrial mammals, reptiles, amphibians, and carnivorous mammals. Generally, species that live entirely below the surface of the water have also been ignored due to the fact they do not experience the same level of sound as terrestrial species (National Park Service 1994). Wild ungulates appear to be much more sensitive to noise disturbance than domestic livestock (Manci, et al. 1988). This may be due to previous exposure to disturbances. One common factor appears to be that low-altitude flyovers seem to be more disruptive in terrain where there is little cover (Manci, et al. 1988).

B.3.8.2.1 MAMMALS

Terrestrial Mammals

Studies of terrestrial mammals have shown that noise levels of 120 dBA can damage mammals' ears, and levels at 95 dBA can cause temporary loss of hearing acuity. Noise from aircraft has affected other large carnivores by causing changes in home ranges, foraging patterns, and breeding behavior. One study recommended that aircraft not be allowed to fly at altitudes below 2,000 feet above ground level over important grizzly and polar bear habitat (Dufour 1980). Wolves have been frightened by low-altitude flights that were 25 to 1,000 feet off the ground. However, wolves have been found to adapt to aircraft overflights and noise as long as they were not being hunted from aircraft (Dufour 1980).

Wild ungulates (American bison, caribou, bighorn sheep) appear to be much more sensitive to noise disturbance than domestic livestock (Weisenberger, et al. 1996). Behavioral reactions may be related to the past history of disturbances by such things as humans and aircraft. Common reactions of reindeer kept in an enclosure exposed to aircraft noise disturbance were a slight startle response, raising of the head, pricking ears, and scenting of the air. Panic reactions and extensive changes in behavior of individual animals were not observed. Observations of caribou in Alaska exposed to fixed-wing aircraft and helicopters showed running and panic reactions occurred when overflights were at an altitude of 200 feet or less. The reactions decreased with increased altitude of overflights, and, with more than 500 feet in altitude, the panic reactions stopped. Also, smaller groups reacted less strongly than larger groups. One negative effect of the running and avoidance behavior is increased expenditure of energy. For a 90-kg animal, the calculated expenditure due to aircraft harassment is 64 kilocalories per minute when running and 20 kilocalories per minute when walking. When conditions are favorable, this expenditure can be counteracted with increased feeding; however, during harsh winter conditions, this may not be possible. Incidental observations of wolves and bears exposed to fixed-wing aircraft and helicopters in the northern regions suggested that wolves are less disturbed than wild ungulates, while grizzly bears showed the greatest response of any animal species observed.

It has been proven that low-altitude overflights do induce stress in animals. Increased heart rates, an indicator of excitement or stress, have been found in pronghorn antelope, elk, and bighorn sheep. As such reactions occur naturally as a response to predation, infrequent overflights may not, in and of themselves, be detrimental. However, flights at high frequencies over a long period of time may cause harmful effects. The consequences of this disturbance, while cumulative, is not additive. It may be that aircraft disturbance may not cause obvious and serious health effects, but coupled with a harsh winter, it may have an adverse impact. Research has shown that stress induced by other types of disturbances produces long-term decreases in metabolism and hormone balances in wild ungulates.

Behavioral responses can range from mild to severe. Mild responses include head raising, body shifting, or turning to orient toward the aircraft. Moderate disturbance may be nervous behaviors, such as trotting a short distance. Escape is the typical severe response.

Marine Mammals

The physiological composition of the ear in aquatic and marine mammals exhibits adaptation to the aqueous environment. These differences (relative to terrestrial species) manifest themselves in the auricle and middle ear (Manci, et al. 1988). Some mammals use echolocation to perceive objects in their surroundings and to determine the directions and locations of sound sources (Simmons 1983 in Manci, et al. 1988).

In 1980, the Acoustical Society of America held a workshop to assess the potential hazard of manmade noise associated with proposed Alaska Arctic (North Slope-Outer Continental Shelf) petroleum operations on marine wildlife and to prepare a research plan to secure the knowledge necessary for proper assessment of noise impacts (Acoustical Society of America, 1980). Since 1980 it appears that research on responses of aquatic mammals to aircraft noise and sonic booms has been limited. Research conducted on northern fur seals, sea lions, and ringed seals indicated that there are some differences in how various animal groups receive frequencies of sound. It was observed that these species exhibited varying intensities of a startle response to airborne noise, which was habituated over time. The rates of habituation appeared to vary with species, populations, and demographics (age, sex). Time of day of exposure was also a factor (Muyberg 1978 in Manci, et al. 1988).

Studies accomplished near the Channel Islands were conducted near the area where the space shuttle launches occur. It was found that there were some response differences between species relative to the loudness of sonic booms. Those booms that were between 80 and 89 dBA caused a greater intensity of startle reactions than lower-intensity booms at 72 to 79 dBA. However, the duration of the startle responses to louder sonic booms was shorter (Jehl and Cooper 1980 in Manci, et al. 1988).

Jehl and Cooper (1980) indicated that low-flying helicopters, loud boat noises, and humans were the most disturbing to pinnipeds. According to the research, while the space launch and associated operational activity noises have not had a measurable effect on the pinniped population, it also suggests that there was a greater “disturbance level” exhibited during launch activities. There was a recommendation to continue observations for behavioral effects and to perform long-term population monitoring (Jehl and Cooper 1980).

The continued presence of single or multiple noise sources could cause marine mammals to leave a preferred habitat. However, it does not appear likely that overflights could cause migration from suitable habitats as aircraft noise over water is mobile and would not persist over any particular area. Aircraft noise, including supersonic noise, currently occurs in the overwater airspace of Eglin, Tyndall, and Langley AFBs from sorties predominantly involving jet aircraft. Survey results reported in Davis, et al. (2000), indicate that cetaceans (i.e., dolphins) occur under all of the Eglin and Tyndall marine airspace. The continuing presence of dolphins indicates that aircraft noise does not discourage use of the area and apparently does not harm the locally occurring population.

In a summary by the National Parks Service (1994) on the effects of noise on marine mammals, it was determined that gray whales and harbor porpoises showed no outward behavioral response to aircraft noise or overflights. Bottlenose dolphins showed no obvious reaction in a study involving helicopter overflights at 1,200 to 1,800 feet above the water. Neither did they show any reaction to survey aircraft unless the shadow of the aircraft passed over them, at which point there was some observed tendency to dive (Richardson, et al. 1995). Other anthropogenic noises in the marine environment from ships and pleasure craft may have more of an effect on marine mammals than aircraft noise (U.S. Air Force 2000). The noise effects on cetaceans appear to be somewhat attenuated by the air/water interface. The cetacean fauna along the coast of California have been subjected to sonic booms from military aircraft for many years without apparent adverse effects (Tetra Tech, Inc. 1997).

Manatees appear relatively unresponsive to human-generated noise to the point that they are often suspected of being deaf to oncoming boats [although their hearing is actually similar to that of pinnipeds (Bullock, et al. 1980)]. Little is known about the importance of acoustic communication to manatees, although they are known to produce at least ten different types of sounds and are thought to have sensitive hearing (Richardson, et al. 1995). Manatees continue to occupy canals near Miami International Airport, which suggests that they have become habituated to human disturbance and noise (Metro-Dade County 1995). Since manatees spend most of their time below the surface and do not startle readily, no effect of aircraft overflights on manatees would be expected (Bowles, et al. 1991b).

B.3.8.2.2 BIRDS

Auditory research conducted on birds indicates that they fall between the reptiles and the mammals relative to hearing sensitivity. According to Dooling (1978), within the range of one to five kHz, birds show a level of hearing sensitivity similar to that of the more sensitive mammals. In contrast to mammals, bird sensitivity falls off at a greater rate to increasing and decreasing frequencies. Passive observations and studies examining aircraft bird strikes indicate that birds nest and forage near airports. Aircraft noise in the vicinity of commercial airports apparently does not inhibit bird presence and use.

High-noise events (like a low-altitude aircraft overflight) may cause birds to engage in escape or avoidance behaviors, such as flushing from perches or nests (Ellis, et al. 1991). These activities impose an energy cost on the birds that, over the long term, may affect survival or growth. In addition, the birds may spend less time engaged in necessary activities like feeding, preening, or caring for their young because they spend time in noise-avoidance activity. However, the long-term significance of noise-related impacts is less clear. Several studies on nesting raptors have indicated that birds become habituated to aircraft overflights and that long-term reproductive success is not affected (Grubb and King 1991; Ellis, et al. 1991). Threshold noise levels for significant responses range from 62 dB for Pacific black brant (Branta bernicla nigricans) (Ward and Stehn 1990) to 85 dB for crested tern (Sterna bergii) (Brown 1990).

Songbirds were observed to become silent prior to the onset of a sonic boom event (F-111 jets), followed by “raucous discordant cries.” There was a return to normal singing within 10 seconds after the boom (Higgins 1974 in Manci, et al. 1988). Ravens responded by emitting protestation calls, flapping their wings, and soaring.

Manci, et al. (1988), reported a reduction in reproductive success in some small territorial passerines (i.e., perching birds or songbirds) after exposure to low-altitude overflights. However, it has been observed that passerines are not driven any great distance from a favored food source by a nonspecific disturbance, such as aircraft overflights (U.S. Forest Service 1992). Further study may be warranted.

A recent study, conducted cooperatively between the DoD and the USFWS, assessed the response of the red-cockaded woodpecker to a range of military training noise events, including artillery, small arms, helicopter, and maneuver noise (Pater, et al. 1999). The project findings show that the red-cockaded woodpecker successfully acclimates to military noise events. Depending on the noise level that ranged from innocuous to very loud, the birds responded by flushing from their nest cavities. When the noise source was closer and the noise level was higher, the number of flushes increased proportionately. In all cases, however, the birds returned to their nests within a relatively short period of time (usually within 12 minutes). Additionally, the noise exposure did not result in any mortality or statistically detectable changes in reproductive success (Pater, et al. 1999). Red-cockaded woodpeckers did not flush when artillery simulators were more than 122 meters away and SEL noise levels were 70 dBA.

Lynch and Speake (1978) studied the effects of both real and simulated sonic booms on the nesting and brooding eastern wild turkey (Meleagris gallopavo silvestris) in Alabama. Hens at four nest sites were subjected to between 8 and 11 combined real and simulated sonic booms. All tests elicited similar responses, including quick lifting of the head and apparent alertness for between 10 and 20 seconds. No apparent nest failure occurred as a result of the sonic booms.

Twenty-one brood groups were also subjected to simulated sonic booms. Reactions varied slightly between groups, but the largest percentage of groups reacted by standing motionless after the initial blast. Upon the sound of the boom, the hens and poults fled until reaching the edge of the woods (approximately 4 to 8 meters). Afterward, the poults resumed feeding activities while the hens remained alert for a short period of time (approximately 15 to 20 seconds). In no instances were poults abandoned, nor did they scatter and become lost. Every observation group returned to normal activities within a maximum of 30 seconds after a blast.

B.3.8.2.2.1 RAPTORS

In a literature review of raptor responses to aircraft noise, Manci, et al. (1988), found that most raptors did not show a negative response to overflights. When negative responses were observed they were predominantly associated with rotor-winged aircraft or jet aircraft that were repeatedly passing within 0.5 mile of a nest.

Ellis, et al. (1991), performed a study to estimate the effects of low-level military jet aircraft and mid- to high-altitude sonic booms (both actual and simulated) on nesting peregrine falcons and seven other raptors (common black-hawk, Harris’ hawk, zone-tailed hawk, red-tailed hawk, golden eagle, prairie falcon, bald eagle). They observed responses to test stimuli, determined nest success for the year of the testing, and evaluated site occupancy the following year. Both long- and short-term effects were noted in the study. The results reported the successful fledging of young in 34 of 38 nest sites (all eight species) subjected to low-level flight and/or simulated sonic booms. Twenty-two of the test sites were revisited in the following year, and observations of pairs or lone birds were made at all but one nest. Nesting attempts were underway at 19 of 20 sites that were observed long enough to be certain of breeding activity. Reoccupancy and productivity rates were within or above expected values for self-sustaining populations.

Short-term behavior responses were also noted. Overflights at a distance of 150 m or less produced few significant responses and no severe responses. Typical responses consisted of crouching or, very rarely, flushing from the perch site. Significant responses were most evident before egg laying and after young were "well grown." Incubating or brooding adults never burst from the nest, thus preventing egg breaking or knocking chicks out of the nest. Jet passes and sonic booms often caused noticeable alarm; however, significant negative responses were rare and did not appear to limit productivity or reoccupancy. Due to the locations of some of the nests, some birds may have been habituated to aircraft noise. There were some test sites located at distances far from zones of frequent military aircraft usage, and the test stimuli were often closer, louder, and more frequent than would be likely for a normal training situation.

Manci, et al. (1988), noted that a female northern harrier was observed hunting on a bombing range in Mississippi during bombing exercises. The harrier was apparently unfazed by the exercises, even when a bomb exploded within 200 feet. In a similar case of habituation/non-disturbance, a study on the Florida snail-kite stated the greatest reaction to overflights (approximately 98 dBA) was "watching the aircraft fly by." No detrimental impacts to distribution, breeding success, or behavior were noted.

Bald Eagle

A study by Grubb and King (1991) on the reactions of the bald eagle to human disturbances showed that terrestrial disturbances elicited the greatest response, followed by aquatic (i.e., boats) and aerial disturbances. The disturbance regime of the area where the study occurred was predominantly characterized by aircraft noise. The study found that pedestrians consistently caused responses that were greater in both frequency and duration. Helicopters elicited the highest level of aircraft-related responses. Aircraft disturbances, although the most common form of disturbance, resulted in the lowest levels of response. This low response level may have been due to habituation; however, flights less than 170 meters away caused reactions similar to other disturbance types. Ellis, et al. (1991), showed that eagles typically respond to the proximity of a disturbance, such as a pedestrian or aircraft within 100 meters, rather than the noise level. Fleischner and Weisberg (1986) stated that reactions of bald eagles to commercial jet flights, although minor (e.g., looking), were twice as likely to occur when the jets passed at a distance of 0.5 mile or less. They also noted that helicopters were four times more likely to cause a reaction than a commercial jet and 20 times more likely to cause a reaction than a propeller plane.

The USFWS advised Cannon AFB that flights at or below 2,000 feet AGL from October 1 through March 1 could result in adverse impacts to wintering bald eagles (U.S. Fish and Wildlife Serice 1998). However, Fraser, et al. (1985), suggested that raptors habituate to overflights rapidly, sometimes tolerating aircraft approaches of 65 feet or less.

Osprey

A study by Trimper, et al. (1998), in Goose Bay, Labrador, Canada, focused on the reactions of nesting osprey to military overflights by CF-18 Hornets. Reactions varied from increased alertness and focused observation of planes to adjustments in incubation posture. No overt reactions (e.g., startle response, rapid nest departure) were observed as a result of an overflight. Young nestlings crouched as a result of any disturbance until they grew to 1 to 2 weeks prior to fledging. Helicopters, human presence, float planes, and other ospreys elicited the strongest reactions from nesting ospreys. These responses included flushing, agitation, and aggressive displays. Adult osprey showed high nest occupancy rates during incubation regardless of external influences.

The osprey observed occasionally stared in the direction of the flight before it was audible to the observers. The birds may have been habituated to the noise of the flights; however, overflights were strictly controlled during the experimental period. Strong reactions to float planes and helicopter may have been due to the slower flight and therefore longer duration of visual stimuli rather than noise-related stimuli.

Red-tailed Hawk

Anderson, et al. (1989), conducted a study that investigated the effects of low-level helicopter overflights on 35 red-tailed hawk nests. Some of the nests had not been flown over prior to the study. The hawks that were naïve (i.e., not previously exposed) to helicopter flights exhibited stronger avoidance behavior (nine of 17 birds flushed from their nests) than those that had experienced prior overflights. The overflights did not appear to affect nesting success in either study group. These findings were consistent with the belief that red-tailed hawks habituate to low-level air traffic, even during the nesting period.

B.3.8.2.2.2 MIGRATORY WATERFOWL

A study of caged American black ducks was conducted by Fleming, et al. in 1996. It was determined that noise had negligible energetic and physiologic effects on adult waterfowl. Measurements included body weight, behavior, heart rate, and enzymatic activity. Experiments also showed that adult ducks exposed to high noise events acclimated rapidly and showed no effects.

The study also investigated the reproductive success of captive ducks, which indicated that duckling growth and survival rates at Piney Island, North Carolina, were lower than those at a background location. In contrast, observations of several other reproductive indices (i.e., pair formation, nesting, egg production, and hatching success) showed no difference between Piney Island and the background location. Potential effects on wild duck populations may vary, as wild ducks at Piney Island have presumably acclimated to aircraft overflights. It was not demonstrated that noise was the cause of adverse impacts. A variety of other factors, such as weather conditions, drinking water and food availability and variability, disease, and natural variability in reproduction, could explain the observed effects. Fleming noted that drinking water conditions (particularly at Piney Island) deteriorated during the study, which could have affected the growth of young ducks. Further research would be necessary to determine the cause of any reproductive effects.

Another study by Conomy, et al. (1998) exposed previously unexposed ducks to 71 noise events per day that equaled or exceeded 80 dBA. It was determined that the proportion of time black ducks reacted to aircraft activity and noise decreased from 38 percent to 6 percent in 17 days and remained stable at 5.8 percent thereafter. In the same study, the wood duck did not appear to habituate to aircraft disturbance. This supports the notion that animal response to aircraft noise is species-specific. Because a startle response to aircraft noise can result in flushing from nests, migrants and animals living in areas with high concentrations of predators would be the most vulnerable to experiencing effects of lowered birth rates and recruitment over time. Species that are subjected to infrequent overflights do not appear to habituate to overflight disturbance as readily.

Black brant studied in the Alaska Peninsula were exposed to jets and propeller aircraft, helicopters, gunshots, people, boats, and various raptors. Jets accounted for 65% of all the disturbances. Humans, eagles, and boats caused a greater percentage of brant to take flight. There was markedly greater reaction to Bell-206-B helicopter flights than fixed wing, single-engine aircraft (Ward, et al. 1986).

The presence of humans and low-flying helicopters in the Mackenzie Valley North Slope area did not appear to affect the population density of Lapland longspurs, but the experimental group was shown to have reduced hatching and fledging success and higher nest abandonment. Human presence appeared to have a greater impact on the incubating behavior of the black brant, common eider, and Arctic tern than fixed-wing aircraft (Gunn and Livingston 1974).

Gunn and Livingston (1974) found that waterfowl and seabirds in the Mackenzie Valley and North Slope of Alaska and Canada became acclimated to float plane disturbance over the course of three days. Additionally, it was observed that potential predators (bald eagle) caused a number of birds to leave their nests. Non-breeding birds were observed to be more reactive than breeding birds. Waterfowl were affected by helicopter flights, while snow geese were disturbed by Cessna 185 flights. The geese flushed when the planes were under 1,000 feet, compared to higher flight elevations. An overall reduction in flock sizes was observed. It was recommended that aircraft flights be reduced in the vicinity of premigratory staging areas.

Manci, et al. 1988 reported that waterfowl were particularly disturbed by aircraft noise. The most sensitive appeared to be snow geese. Canada geese and snow geese were thought to be more sensitive than other animals such as turkey vultures, coyotes, and raptors (Edwards, et al. 1979).

B.3.8.2.2.3 WADING AND SHORE BIRDS

Black, et al. (1984), studied the effects of low-altitude (less than 500 feet AGL) military training flights with sound levels from 55 to 100 dBA on wading bird colonies (i.e., great egret, snowy egret, tricolored heron, and little blue heron). The training flights involved three or four aircraft, which occurred once or twice per day. This study concluded that the reproductive activity--including nest success, nestling survival, and nestling chronology--was independent of F-16 overflights. Dependent variables were more strongly related to ecological factors, including location and physical characteristics of the colony and climatology. Another study on the effects of circling fixed-wing aircraft and helicopter overflights on wading bird colonies found that at altitudes of 195 to 390 feet, there was no reaction in nearly 75 percent of the 220 observations. Ninety percent displayed no reaction or merely looked toward the direction of the noise source. Another 6 percent stood up, 3 percent walked from the nest, and 2 percent flushed (but were without active nests) and returned within 5 minutes (Kushlan 1978). Apparently, non-nesting wading birds had a slightly higher incidence of reacting to overflights than nesting birds. Seagulls observed roosting near a colony of wading birds in another study remained at their roosts when subsonic aircraft flew overhead (Burger 1981). Colony distribution appeared to be most directly correlated to available wetland community types and was found to be distributed randomly with respect to military training routes. These results suggest that wading bird species presence was most closely linked to habitat availability and that they were not affected by low-level military overflights (U.S. Air Force 2000).

Burger (1986) studied the response of migrating shorebirds to human disturbance and found that shorebirds did not fly in response to aircraft overflights, but did flush in response to more localized intrusions (i.e., humans and dogs on the beach). Burger (1981) studied the effects of noise from JFK Airport in New York on herring gulls that nested less than 1 kilometer from the airport. Noise levels over the nesting colony were 85 to 100 dBA on approach and 94 to 105 dBA on takeoff. Generally, there did not appear to be any prominent adverse effects of subsonic aircraft on nesting, although some birds flushed when the concorde flew overhead and, when they returned, engaged in aggressive behavior. Groups of gulls tended to loaf in the area of the nesting colony, and these birds remained at the roost when the Concorde flew overhead. Up to 208 of the loafing gulls flew when supersonic aircraft flew overhead. These birds would circle around and immediately land in the loafing flock (U.S. Air Force 2000).

In 1970, sonic booms were potentially linked to a mass hatch failure of Sooty Terns on the Dry Tortugas (Austin, et al. 1970). The cause of the failure was not certain, but it was conjectured that sonic booms from military aircraft or an overgrowth of vegetation were factors. In the previous season, Sooties were observed to react to sonic booms by rising in a “panic flight,” circling over the island, then usually settling down on their eggs again. Hatching that year was normal. Following the 1969 hatch failure, excess vegetation was cleared and measures were taken to reduce supersonic activity. The 1970 hatch appeared to proceed normally. A colony of Noddies on the same island hatched successfully in 1969, the year of the Sooty hatch failure.

Subsequent laboratory tests of exposure of eggs to sonic booms and other impulsive noises (Bowles, et al. 1991a; Bowles, et al. 1994; Cottereau 1972; Cogger and Zegarra 1980) failed to show adverse effects on hatching of eggs. A structural analysis (Ting, et al. 2002) showed that, even under extraordinary circumstances, sonic booms would not damage an avian egg.

Burger (1981) observed no effects of subsonic aircraft on herring gulls in the vicinity of JFK International Airport. The Concorde aircraft did cause more nesting gulls to leave their nests (especially in areas of higher density of nests), causing the breakage of eggs and the scavenging of eggs by intruder prey. Clutch sizes were observed to be smaller in areas of higher-density nesting (presumably due to the greater tendency for panic flight) than in areas where there were fewer nests.

B.3.8.3 Fish, Reptiles, and Amphibians

The effects of overflight noise on fish, reptiles, and amphibians have been poorly studied, but conclusions regarding their expected responses have involved speculation based upon known physiologies and behavioral traits of these taxa (Gladwin, et al. 1988). Although fish do startle in response to low-flying aircraft noise, and probably to the shadows of aircraft, they have been found to habituate to the sound and overflights. Reptiles and amphibians that respond to low frequencies and those that respond to ground vibration, such as spadefoots (genus Scaphiopus), may be affected by noise. Limited information is available on the effects of short-duration noise events on reptiles. Dufour (1980) and Manci, et al. (1988), summarized a few studies of reptile responses to noise. Some reptile species tested under laboratory conditions experienced at least temporary threshold shifts or hearing loss after exposure to 95 dB for several minutes. Crocodilians in general have the most highly developed hearing of all reptiles. Crocodile ears have lids that can be closed when the animal goes under water. These lids can reduce the noise intensity by 10 to 12 dB (Wever and Vernon 1957). On Homestead Air Reserve Station, Florida, two crocodilians (the American Alligator and the Spectacled Caiman) reside in wetlands and canals along the base runway suggesting that they can coexist with existing noise levels of an active runway including DNLs of 85 dB.

B.3.8.4 Summary

Some physiological/behavioral responses such as increased hormonal production, increased heart rate, and reduction in milk production have been described in a small percentage of studies. A majority of the studies focusing on these types of effects have reported short-term or no effects.

The relationships between physiological effects and how species interact with their environments have not been thoroughly studied. Therefore, the larger ecological context issues regarding physiological effects of jet aircraft noise (if any) and resulting behavioral pattern changes are not well understood.

Animal species exhibit a wide variety of responses to noise. It is therefore difficult to generalize animal responses to noise disturbances or to draw inferences across species, as reactions to jet aircraft noise appear to be species-specific. Consequently, some animal species may be more sensitive than other species and/or may exhibit different forms or intensities of behavioral responses. For instance, wood ducks appear to be more sensitive and more resistant to acclimation to jet aircraft noise than Canada geese in one study. Similarly, wild ungulates seem to be more easily disturbed than domestic animals.

The literature does suggest that common responses include the “startle” or “fright” response and, ultimately, habituation. It has been reported that the intensities and durations of the startle response decrease with the numbers and frequencies of exposures, suggesting no long-term adverse effects. The majority of the literature suggests that domestic animal species (cows, horses, chickens) and wildlife species exhibit adaptation, acclimation, and habituation after repeated exposure to jet aircraft noise and sonic booms.

Animal responses to aircraft noise appear to be somewhat dependent on, or influenced by, the size, shape, speed, proximity (vertical and horizontal), engine noise, color, and flight profile of planes. Helicopters also appear to induce greater intensities and durations of disturbance behavior as compared to fixed-wing aircraft. Some studies showed that animals that had been previously exposed to jet aircraft noise exhibited greater degrees of alarm and disturbance to other objects creating noise, such as boats, people, and objects blowing across the landscape. Other factors influencing response to jet aircraft noise may include wind direction, speed, and local air turbulence; landscape structures (i.e., amount and type of vegetative cover); and, in the case of bird species, whether the animals are in the incubation/nesting phase.

B.3.9 Property Values

Property within a noise zone (or Accident Potential Zone) may be affected by the availability of federally guaranteed loans. According to U.S. Department of Housing and Urban Development (HUD), Federal Housing Administration (FHA), and Veterans Administration (VA) guidance, sites are acceptable for program assistance, subsidy, or insurance for housing in noise zones of less than 65 dB DNL, and sites are conditionally acceptable with special approvals and noise attenuation in the 65 to 75 dB DNL noise zone and the greater than 75 dB DNL noise zone. HUD's position is that noise is not the only determining factor for site acceptability, and properties should not be rejected only because of airport influences if there is evidence of acceptability within the market and if use of the dwelling is expected to continue. Similar to the Navy's and Air Force's Air Installation Compatible Use Zone Program, HUD, FHA, and VA recommend sound attenuation for housing in the higher noise zones and written disclosures to all prospective buyers or lessees of property within a noise zone (or Accident Potential Zone).

Newman and Beattie (1985) reviewed the literature to assess the effect of aircraft noise on property values. One paper by Nelson (1978), reviewed by Newman and Beattie, suggested a 1.8 to 2.3 percent decrease in property value per decibel at three separate airports, while at another period of time, they found only a 0.8 percent devaluation per decibel change in DNL. However, Nelson also noted a decline in noise depreciation over time which he theorized could be due to either noise sensitive people being replaced by less sensitive people or the increase in commercial value of the property near airports; both ideas were supported by Crowley (1978). Ultimately, Newman and Beattie summarized that while an effect of noise was observed, noise is only one of the many factors that is part of a decision to move close to, or away from, an airport, but which is sometimes considered an advantage due to increased opportunities for employment or ready access to the airport itself. With all the issues associated with determining property values, their reviews found that decreases in property values usually range from 0.5 to 2 percent per decibel increase of cumulative noise exposure.

More recently Fidell, et al. (1996) studied the influences of aircraft noise on actual sale prices of residential properties in the vicinity of two military facilities and found that equations developed for one area to predict residential sale prices in areas unaffected by aircraft noise worked equally well when applied to predicting sale prices of homes in areas with aircraft noise in excess of 65 dB DNL. Thus, the model worked equally well in predicting sale prices in areas with and without aircraft noise exposure. This indicates that aircraft noise had no meaningful effect on residential property values. In some cases, the average sale prices of noise exposed properties were somewhat higher than those elsewhere in the same area. In the vicinity of Davis-Monthan AFB in Tucson, AZ, Fidell found the homes near the AFB were much older, smaller and in poorer condition than homes elsewhere. These factors caused the equations developed for predicting sale prices in areas further away from the base to be inapplicable with those nearer the AFB. However, again Fidell found that, similar to other researchers, differences in sale prices between homes with and without aircraft noise were frequently due to factors other than noise itself.

B.3.10 Noise Effects on Structures

Normally, the most sensitive components of a structure to airborne noise are the windows and, infrequently, the plastered walls and ceilings. An evaluation of the peak sound pressures impinging on the structure is normally used to determine the possibility of damage. In general, with peak sound levels above 130 dB, there is the possibility of the excitation of structural component resonances. While certain frequencies (such as 30 Hz for window breakage) may be of more concern than other frequencies, conservatively, only sounds lasting more than one second above a sound level of 130 dB are potentially damaging to structural components (Committee on Hearing, Bioacoustics, and Biomechanics 1977).

Noise-induced structural vibration may also cause annoyance to dwelling occupants because of induced secondary vibrations, or rattling of objects within the dwelling such as hanging pictures, dishes, plaques, and bric-a-brac. Window panes may also vibrate noticeably when exposed to high levels of airborne noise. In general, such noise-induced vibrations occur at peak sound levels of 110 dB or greater. Thus, assessments of noise exposure levels for compatible land use should also be protective of noise-induced secondary vibrations.

B.3.11 Noise Effects on Terrain

It has been suggested that noise levels associated with low-flying aircraft may affect the terrain under the flight path by disturbing fragile soil or snow, especially in mountainous areas, causing landslides or avalanches. There are no known instances of such effects, and it is considered improbable that such effects would result from routine, subsonic aircraft operations.

B.3.12 Noise Effects on Historical and Archaeological Sites

Because of the potential for increased fragility of structural components of historical buildings and other historical sites, aircraft noise may affect such sites more severely than newer, modern structures. Particularly in older structures, seemingly insignificant surface cracks initiated by vibrations from aircraft noise may lead to greater damage from natural forces (Hanson, et al. 1991). There are few scientific studies of such effects to provide guidance for their assessment.

One study involved the measurements of sound levels and structural vibration levels in a superbly restored plantation house, originally built in 1795, and now situated approximately 1,500 feet from the centerline at the departure end of Runway 19L at Washington Dulles International Airport. These measurements were made in connection with the proposed scheduled operation of the Concorde airplane at Dulles (Wesler 1977). There was special concern for the building's windows, since roughly half of the 324 panes were original. No instances of structural damage were found. Interestingly, despite the high levels of noise during Concorde takeoffs, the induced structural vibration levels were actually less than those induced by touring groups and vacuum cleaning.

As noted above for the noise effects of noise-induced vibrations of conventional structures, assessments of noise exposure levels for normally compatible land uses should also be protective of historic and archaeological sites.

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Appendix D Air Emissions Calculations

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Table 1 EA-18 G (F414-GE-400 Engines) Emission Factors

Flight Operation	Fuel used (lbs)	Emissions from Single Flight Operation[1,2] (lb/op)					
		CO	NO_x	HC	SO_2[3]	PM_{10}	CO_2
Straight-In Arrival LTO	2612	265.30	31.08	69.70	5.30	18.21	7823.99
Break Arrival LTO	2528	266.46	31.15	70.27	5.15	17.54	7553.13
Touch-and-Go/FCLP	706	0.50	14.47	0.08	1.43	3.95	2249.53
Depart&Reenter/ GCA Box (GCA Pattern)	1411	1.01	28.95	0.17	2.86	7.89	4499.05

Notes:

[1] Fuel used and emission factors for "Departure" and "Straight-In Arrival" from AESO Memorandum Report No. 9815, Rev G, March 2011.

[2] Emission factors for "Touch-and-Go" and "GCA Box" from AESO Memorandum Report No. 9933, Revision D March 2011.

[3] SO2 Emission Factor adjusted as recommended for operations after 2010 in AESO Memorandum report No 2012-01, May 2012

Table 2.1 Emission Factors for EA-18G(F414-GE-400 Engines) In-Frame Aircraft Maintenance, per test, one engine

Test Type	Annual # tests	Fuel used (lbs)	Emissions from Maintenance Tests (lb/test)					
			CO	NOx	HC	SO_2[3]	PM10	CO2
Water Wash	1.0	120.0	14.32	0.22	6.05	0.26	1.44	369.57
Low Power	1.0	364.07	34.16	1.21	22.71	0.74	4.40	1085.62
High Power	1.0	3187.56	521.51	45.34	27.78	6.50	9.80	9252.70

[1] Fuel used and emission factors for estimated annual maintenance operations per test, per engine based on ratio from AESO Memorandum Report No. 9815, Rev G, March 2011.

[3] SO2 Emission factor adjusted as recommended for operations after 2010 in AESO Memorandum report No 2012-01, May 2012

Table 2.2 Emission Factors for EA-18G In-Frame Aircraft Maintenance[1]

Test Type	Annual # tests	# engines in use	Fuel used (lbs)	Emissions from Maintenance Test (lb/aircraft-yr)					
				CO	NOx	HC	SO_2[3]	PM10	CO2
Water Wash	1.0	1.0	132.0	11.41	0.47	7.57	0.26	1.47	369.57
Low Power, 1 engine	15.0	1.0	5461.0	512.45	18.11	340.70	11.12	65.95	16284.26
High Power	8.0	2.0	51001.0	8344.08	725.39	444.43	104.04	156.87	148043.20

Notes:

[1] Estimated annual maintenance operations from AESO Memorandum Report No. 9815, Rev G, March 2011.

[3] SO2 Emission Factor adjusted as recommended for operations after 2010 in AESO Memorandum report No 2012-01, May 2012

Table 2.3 Emission Factors for EA-18G Out-of-Frame (Test Cell)Aircraft Maintenance, per test[1]

Test Type	Annual # tests	# engines in use	Fuel used (lbs)	Emissions from Maintenance Test (lb/test)					
				CO	NOx	HC	SO_2[3]	PM10	CO2
Performance Test	1.0	1.0	10458.6	587.18	270.16	78.22	21.32	36.72	32204.17

Notes:

[1] AESO Memorandum Report "F414-GE-400 Engine Test Cell Emissions Estimates" No. 2000-22, Rev A, March 2011.

[3] SO2 Emission Factor adjusted as recommended for operations after 2010 in AESO Memorandum report No 2012-01, May 2012

Table 3 EA-6B (J52-P-408A) Emission Factors

Flight Operation	Fuel used (lbs)	Emissions from Single Flight Operation[1,2] (lb/op)					
		CO	NO_x	HC	SO_2[3]	PM_{10}	CO_2
Straight-In Arrival LTO	2181	61.40	11.50	29.28	4.44	31.28	6787.80
Break Arrival LTO	2114	61.24	11.41	29.35	4.34	30.28	6554.80
Touch-and-Go/FCLP	600.6	2.95	4.65	0.50	1.22	5.83	1906.33
Depart&Reenter/ GCA Box (GCA Pattern)	1061	6.24	7.43	0.97	2.14	11.18	3365.98

Notes:

[1] Fuel used and Emission factors for "Departure" and "Straight-In Arrival" from AESO Memorandum Report No. 9917, Rev C, December 2009.

[2] Emission factors for "Touch-and-Go" and "GCA Box" from AESO Memorandum Report No. 9941, Revision A, August 2002.

[3] SO2 Emission Factor adjusted as recommended for operations after 2010 in AESO Memorandum report No 2012-01, May 2012

Table 4.1 Emission Factors for EA-6B (J52-P-408A Engines) Aircraft Maintenance, per test, one engine

Test type	# tests	Fuel used (lbs)	Emissions from Maintenance Tests (lbs)[1]					
			CO	NOx	HC	SO_2	PM10	CO2
Water Wash	1.0	396.0	13.34	1.45	5.83	0.81	6.65	1223.78
Low Power	1.0	646.58	22.06	2.35	9.69	1.32	10.91	1997.23
High Power	1.0	2123.15	22.18	19.15	7.80	4.33	20.22	6708.03

[1] Refer to Table EA-6B Maintenance Run Up Operation Emission Factors in this Appendix.

Table 4.2 Emission from EA-6B (J52-P-408A Engines) Aircraft Test Cell Maintenance

	Fuel used (lbs)[2,3]	Single Engine Test Emissions					
		CO	NOx	HC	SO_2	PM10	CO2[4]
Average pounds of Emissions per 1000 lbs fuel[1]	1000.0	7.68	9.19	3.03	2.04	8.82	3160.37
TPY Emissions from 2011 JP5 Fuel use	818,720	3.14	3.76	1.24	0.84	3.61	1293.73

[1]As provided in Whidbey Island Air operating Permit Number 008, issued July 27 2004

[2]Total 2011 fuel used for J52-P-408B Engine testing in test cells T6 and T10 of 120,400 gallons, reported by NAS WI Air Quality specialist Dina Torgersen, June 6, 2012

[3]JP-5 density: 6.8 lbs/gallon

[4]CO2 EF not included in AQ data. Assumed based on emission index for J52-P-408A for 75% powersetting(see Maint EF EA6B)

Table 5 EA-6B Maintenance Run Up Operation Emission Factors

Operation	# Ops	Engine Power Setting[1]	No. of Engines in Use[1]	Time-In Mode per Engine (min)[1]	Flow Rate per Engine (lb/hr)[2]	Fuel Used (lbs)[3]	Emission Indexes 1 (pounds per 1,000 pounds fuel)[2] EI CO	EI CO_2	EI NO_x	EI HC	EI SO_2	EI PM_{10}	Emissions from Maintenance Run Ups[4] (lbs) CO	CO_2	NO_x	HC	SO_2	PM_{10}
Water Wash, see Low Power																		
Water Wash, 1 Engine																		
Main eng run	1	Idle	1	15	779	195	55.96	3018	2.38	28.33	2.04	19.940	10.898	587.756	0.464	5.517	0.397	3.883
Main eng run	1	75% N2	1	5	2415	201	12.11	3160.37	4.91	1.53	2.04	13.770	2.437	636.024	0.988	0.308	0.411	2.771
						396		**Total Emissions per Operation (lbs):**					13.34	1,223.78	1.45	5.83	0.81	6.65
Low Power, 1 Engine																		
Main eng run	1	Idle	1	25	779	325	55.96	3018	2.38	28.33	2.04	19.940	18.164	979.593	0.773	9.195	0.662	6.472
Main eng run	1	75% N2	1	8	2415	322	12.11	3160.37	4.91	1.53	2.04	13.770	3.899	1017.639	1.581	0.493	0.657	4.434
						647		**Total Emissions per Operation (lbs):**					22.06	1,997.23	2.35	9.69	1.32	10.91
High Power, 1 Engine																		
Engine start	1	Idle	1	16	779	208	55.96	3018	2.38	28.33	2.04	19.940	11.625	626.939	0.494	5.885	0.424	4.142
Intermed power	1	70% N2	1	15	1825	456	18.09	3160.37	4.3	2.4	2.04	15.410	8.254	1441.919	1.962	1.095	0.931	7.031
High Power	1	98% N2	1	10	8755	1,459	1.58	3179.33	11.44	0.56	2.04	6.200	2.305	4639.172	16.693	0.817	2.977	9.047
						2,123		**Total Emissions per Operation (lbs):**					22.18	6,708.03	19.15	7.80	4.33	20.22

Notes:

1 Power Setting, # Engines in Use, and Time in mode values from Noise Report Data April 22, 2012.

2 Fuel flow and emission indexes from "J52-P-408 Engine Fuel Flow and Emission Indexes by Percentage of Core RPM (%N2)", AESO January 1999, as reported in AESO Memorandum Report No. 9917, Rev C, December 20(

3 Fuel used = fuel flow x time-in-mode / 60 x no. of engines in use.

4 Emissions = fuel used / 1,000 x emission index

Table 6 All EA 6B and EA18G Air Operations at Ault Field (Noise Analysis, 4/21/2012)

	Existing Operations (Baseline)		Proposed		
	EA-6B VAQ Squadrons	EA-18G VAQ Squadrons	EA-18G 1 Res Sqn	EA-18G VAQ Squadrons	EA-18G VAQ Total (40+39+14)
# Aircraft	40	39			93
Departures	1,962	1,913	459	3,875	4,334
Interfacility Departures	195	190	0	385	385
Straight in Arrivals	906	883	247	1,789	2,036
Overhead Break Arrivals	1,056	1,030	213	2,086	2,299
Interfacility Arrivals	195	190	0	385	385
Touch & Go Ops[2]	4,297	4,189	914	8,486	9,400
FCLP Ops[2]	8,595	8,380	0	16,975	16,975
Depart-Re-enter Ops[2]	114	112	25	226	251
GCA pattern Ops[2]	1,730	1,688	320	3,418	3,738
Total	**19,050**	**18,575**	**2,178**	**37,625**	**39,803**
Maintenance Run Ups					
Water Wash	445	86			195
Low Power	1,067	2,592			3,440
High Power	4	10			18
Test Cell Maintenance Run Ups[3]					
Test Cell Bldg 225 or 2756		71			

[1] Operations information from Aircraft Noise Study for NAS Whidbey Island and OLF Coupville (Wyle report WR 10-22), Wyle Laboratories, March, 2012. Noise analysis does not include test cell operations.

[3] One circuit counted at two operations (one take of and one landing), while emission factors are applied to the entire circuit--therefore reported operations on air tables will be half operations reported by noice anlysis as listed in these tables

[4] Baseline 2011 test cell operations as estimated in Aircraft Noise Study for the Introduction of the P-8A Multi-Mission Maritime Aircraft in to the Fleet, July 2008

Table 7 Expeditionary VAQ EA Action Only:Air Operations at Ault Field

	Existing Operations (Baseline)		Proposed Alt 1	Proposed Alt 2/3
	EA-6B VAQ Squadrons	EA-18G VAQ Squadrons	EA-18G	EA-18G
# Aircraft	12	0	21	26
Departures	589	0	979	1,212
Interfacility Departures	0	0	0	0
Straight in Arrivals	272	0	460	569
Overhead Break Arrivals	317	0	519	643
Interfacility Arrivals	0	0	0	0
Touch & Go Ops[2]	1,289	0	2,123	2,628
FCLP Ops[2]	0	0	0	0
Depart-Re-enter Ops[2]	34	0	57	70
GCA pattern Ops[2]	519	0	844	1,045
Total	**3,020**	**0**	**4,981**	**6,167**
Maintenance Run Ups				
Water Wash	134	0	44	55
Low Power	320	0	777	962
High Power	1	0	4	5
Test Cell Maintenance Run Ups[3]				
Test Cell Bldg 225 or 2756			38	47

[1] Operations estimated based on ratio of # of aircraft subject to the action to information from Aircraft Noise Study for NAS Whidbey Island and OLF Coupville (Wyle report WR 10-22), Wyle Laboratories, April, 2012

[3] One circuit counted at two operations (one take of and one landing), while emission factors are applied to the entire circuit--therefore reported operations on air tables will be half operations reported by noice anlysis as listed in these tables

[3] Test cell operations estimated based on ratio of # of aircraft subject to this action and information in Aircraft Noise Study for the Introduction of the P-8A Multi-Mission Maritime Aircraft in to the Fleet, July 2008

Table 8 Existing Operations Related to Action
Existing Expeditionary VAQ EA-6B Aircraft Operations at NAS Whidbey Island

Operation	No. of Operations[1]	Fuel use (lbs)	Emissions (tpy)[3]					
			CO	NO_x	HC	SO_2	PM_{10}	CO_2
Flight Operations								
Straight-In Arrival LTO[2]	272	592,796	8.34	1.56	3.98	0.60	4.25	922.46
Break Arrival LTO[2]	317	669,715	9.70	1.81	4.65	0.69	4.80	1,038.28
Touch-and-Go[4]	645	387,117	0.95	1.50	0.16	0.39	1.88	614.36
FCLP[4]	0	0	0.00	0.00	0.00	0.00	0.00	0.00
Depart and Re-enter[4]	17	24,128	0.01	0.25	0.00	0.02	0.07	38.47
GCA Pattern[4]	260	366,155	0.13	3.76	0.02	0.37	1.02	583.75
Total Emissions for Flight Operations		**2,039,910.3**	**19.1**	**8.9**	**8.8**	**2.1**	**12.0**	**3,197.3**
Maintenance Operations								
Water Wash	134	52,866	0.89	0.10	0.39	0.05	0.44	81.69
Low Power	320	206,971	3.53	0.38	1.55	0.21	1.75	319.66
High Power	1	2,548	0.01	0.01	0.00	0.00	0.01	4.02
Test Cell[5]	NA	818,720	3.14	3.76	1.24	0.84	3.61	1,293.73
Total Emissions for Maintenance Operations		**1,081,105.1**	**7.6**	**4.2**	**3.2**	**1.1**	**5.8**	**1,699.1**
Total		**3,121,015.4**	**26.7**	**13.1**	**12.0**	**3.2**	**17.8**	**4,896.4**

Notes:

1 See Table 7 fo thie Appendix for Calculation of Estimated Operations

2 All LTOs represent 2 operations, a Departure and Break or Straight-In Arrival

3 Emissions calculated using AESO Report emission factors: #Ops x EF(lbs emission/op)/2000

4 Touch and Go/FCLP, and Depart&Reenter/GCA Pattern operations are counted as two operations in Wyle calculations, but only once for air emission calculation purposes

5 See Table 4.2 for information on existing test cell emission assumption methods

Table 9 Alternative 1: Proposed Additional Operations and Related Increase in Emissions from Expeditionary VAQ EA-18G Aircraft Operations at NAS Whidbey Island

Operation	No. of New Operations[1]	Fuel use (lbs)	Emissions (tpy)[3] CO	NO_x	HC	SO_2	PM_{10}	CO_2
Flight Operations								
Straight-In Arrival LTO[2]	460	1,200,846	60.98	7.14	16.02	1.22	4.19	1,798.51
Break Arrival LTO[2]	519	1,312,358	69.16	8.09	18.24	1.34	4.55	1,960.52
Touch-and-Go[4]	1,061	749,271	0.27	7.68	0.04	0.76	2.10	1,193.70
FCLP[4]	0	0	0.00	0.00	0.00	0.00	0.00	0.00
Depart and Re-enter[4]	28	39,986	0.01	0.41	0.00	0.04	0.11	63.75
GCA Pattern[4]	422	595,488	0.21	6.11	0.04	0.60	1.66	949.37
Total Emissions for Flight Operations		**3,897,948.5**	**130.6**	**29.4**	**34.3**	**4.0**	**12.6**	**5,965.9**
Maintenance Operations								
Water Wash	44	5,284	0.32	0.005	0.13	0.006	0.03	8.14
Low Power	777	282,798	13.27	0.47	8.82	0.29	1.71	421.64
High Power	4	12,956	1.06	0.09	0.06	0.01	0.02	18.80
Test Cell	38	399,840	11.22	5.16	1.50	0.41	0.70	615.60
Total Emissions for Maintenance Operations		**700,877.7**	**25.9**	**5.7**	**10.5**	**0.7**	**2.5**	**1,064.2**
Total		**4,598,826.2**	**156.5**	**35.2**	**44.8**	**4.7**	**15.1**	**7,030.0**

Notes:

1 See Table 7 of this Appendix for Calculation of Estimated Operations

2 All LTOs represent 2 operations, a Departure and Break or Straight-In Arrival

3 Emissions calculated using AESO Report emission factors: #Ops x EF(lbs emission/op)/2000

4 Touch and Go/FCLP, and Depart&Reenter/GCA Pattern operations are counted as two operations in Wyle calculations, but only once for air emission calculation purposes

Table 10 Alternative 2 and 3: Proposed Additional Operations and Related Increase in Emissions from Expeditionary VAQ EA-18G Aircraft Operations at NAS Whidbey Island

Operation	No. of Operations[1]	Fuel use (lbs)	Emissions (tpy)[3]					
			CO	NO_x	HC	SO_2	PM_{10}	CO_2
Flight Operations								
Straight-In Arrival LTO[2]	569	1,486,762	75.50	8.85	19.84	1.51	5.18	2,226.72
Break Arrival LTO[2]	643	1,624,824	85.63	10.01	22.58	1.66	5.64	2,427.32
Touch-and-Go[4]	1,314	927,669	0.33	9.51	0.05	0.94	2.60	1,477.92
FCLP[4]	0	0	0.00	0.00	0.00	0.00	0.00	0.00
Depart and Re-enter[4]	35	49,506	0.02	0.51	0.00	0.05	0.14	78.93
GCA Pattern[4]	523	737,270	0.26	7.56	0.04	0.75	2.06	1,175.41
Total Emissions for Flight Operations		**4,826,031.5**	**161.7**	**36.4**	**42.5**	**4.9**	**15.6**	**7,386.3**
Maintenance Operations								
Water Wash	55	6,542	0.39	0.01	0.16	0.01	0.04	10.07
Low Power	962	350,130	16.43	0.58	10.92	0.36	2.11	522.03
High Power	5	16,041	1.31	0.11	0.07	0.02	0.02	23.28
Test Cell	47	495,040	13.90	6.39	1.85	0.50	0.87	762.17
Total Emissions for Maintenance Operations		**867,753.3**	**32.0**	**7.1**	**13.0**	**0.9**	**3.0**	**1,317.6**
Total		**5,693,784.8**	**193.8**	**43.5**	**55.5**	**5.8**	**18.7**	**8,703.8**

Notes:

1 See Table 7 of this Appendix for Calculation of Estimated Operations

2 All LTOs represent 2 operations, a Departure and Break or Straight-In Arrival

3 Emissions calculated using AESO Report emission factors: #Ops x EF(lbs emission/op)/2000

4 Touch and Go/FCLP, and Depart&Reenter/GCA Pattern operations are counted as two operations in Wyle calculations, but only once for air emission calculation purposes.

Table 11 Existing and Projected Emissions from Expeditionary VAQ Aircraft Operations at NAS Whidbey

Operation	No. of Operations[1]	Emissions (tpy)[2]				
		CO	NO_x	HC	SO_2	PM_{10}
Existing EA-6B Operations (12 Aircraft)						
LTOs	589	18.0	3.4	8.6	1.3	9.0
Pattern Operations	1,842	1.1	5.5	0.2	0.8	3.0
Total Emissions from Flight Operations		**19.1**	**8.9**	**8.8**	**2.1**	**12.0**
Water Wash	134	0.9	0.1	0.4	0.05	0.4
Low Power	320	3.5	0.4	1.6	0.2	1.7
High Power	1	0.01	0.0	0.00	0.003	0.01
Test Cell	NA	3.14	3.8	1.24	0.835	3.61
Total Emissions from Maintenance Operations		**7.6**	**4.2**	**3.2**	**1.1**	**5.8**
Total Emissions from Existing Exp VAQ EA-6B Operations		**26.7**	**13.1**	**12.0**	**3.2**	**17.8**
Alternative 1: Projected EA-18 G Operations (21 Aircraft)						
EA-18G						
LTOs	979	130.1	15.2	34.3	2.6	8.7
Pattern Operations	3,023	0.5	14.2	0.1	1.4	3.9
Total Emissions from Flight Operations		**130.6**	**29.4**	**34.3**	**4.0**	**12.6**
Water Wash	44	0.3	0.005	0.1	0.006	0.03
Low Power	777	13.3	0.5	8.8	0.3	1.7
High Power	4	1.1	0.1	0.1	0.0	0.0
Test Cell	38	11.2	5.2	1.5	0.4	0.7
Total Emissions from Maintenance Operations		**25.9**	**5.7**	**10.5**	**0.7**	**2.5**
Total Emissions from Proposed Exp VAQ EA-18G Operations		**156.5**	**35.2**	**44.8**	**4.7**	**15.1**
Total Change in Aircraft Operation Emissions		**129.8**	**22.0**	**32.9**	**1.5**	**-2.8**
Alternative 2 and 3: Projected EA-18 G Operations (26 Aircraft)						
EA-18G						
LTOs	1,212	161.1	18.9	42.4	3.2	10.8
Pattern Operations	3,743	0.6	17.6	0.1	1.7	4.8
Total Emissions from Flight Operations		**161.7**	**36.4**	**42.5**	**4.9**	**15.6**
Water Wash	55	0.4	0.0	0.2	0.0	0.0
Low Power	962	16.4	0.6	10.9	0.4	2.1
High Power	5	1.3	0.1	0.1	0.0	0.0
Test Cell	47	13.9	6.4	1.9	0.5	0.9
Total Emissions from Maintenance Operations		**32.0**	**7.1**	**13.0**	**0.9**	**3.0**
Total Emissions from Proposed Exp VAQ EA-18G Operations		**193.8**	**43.5**	**55.5**	**5.8**	**18.7**
Total Change in Aircraft Operation Emissions		**167.1**	**30.4**	**43.5**	**2.6**	**0.8**

Notes:

[1] Operations information from Aircraft Noise Study for NAS Whidbey Island and OLF Coupville (Wyle report WR 10-22), Wyle Laboratories, September 2010

[2] Emissions calculated using emission factors provided in Table 1: #Ops x EF(lbs emission/op)/2000

Table 12 Facility Construction - NAS Whidbey Island

Alternative	total sq ft	Acres
Alternative 1		
New Construction	41,700.00	0.96
Impervious Surface (Paving)	9,200.00	0.21
Total affected area	50,900.00	1.17
Demolition	38,636.00	0.89
Alternative 2		
New Construction Area	66,900.00	1.54
Impervious Surface (Paving)	9,200.00	0.21
Total graded space	76,100.00	1.75
Demolition	38,636.00	0.89
Alternative 3		
New Construction Area	46,000.00	1.06
Impervious Surface (Paving)	9,200.00	0.21
Total graded space	55,200.00	1.27
Demolition	38,636.00	0.89

Emission calculations assume all activities will be performed within one year

Work will occur 8 hours per day, 250 days in the year
An average of 35 construction workers per day
An Average of 2 Construction deliveries per day

Table 13 Nonroad Construction Equipment Exhaust Emission Factors

Equipment Type	Fuel Type	SCC	Avg Size[1] (hp)	Load[2]	Engine Size Range	Emission Factor[3] (g/hp-hr) VOC	CO	NO_x	SO_2	PM_{10}	CO_2	Equipment Emission Rate[4] (lbs-hr) VOC	CO	NO_x	SO_2	PM_{10}	CO_2
Asphalt Paving Machine	Diesel	2270002003	91	0.59	75<hp≤100	0.337	3.098	3.599	0.007	0.434	595.102	0.040	0.367	0.426	0.001	0.051	70.439
Vibratory Compactor	Diesel	2270002009	8	0.43	6<hp≤11	0.681	4.490	4.952	0.007	0.501	588.218	0.005	0.034	0.038	0.000	0.004	4.461
Generators	Diesel	2270006005	22	0.43	16<hp≤25	0.823	3.026	5.360	0.007	0.488	588.051	0.017	0.063	0.112	0.000	0.010	12.264
Air Compressors	Diesel	2270006015	37	0.43	25<hp≤40	0.250	1.278	4.283	0.007	0.228	588.575	0.009	0.045	0.150	0.000	0.008	20.644
Tractors/Loaders/Backhoes	Diesel	2270002066	77	0.21	75<hp≤100	1.033	6.128	5.138	0.008	0.912	692.767	0.037	0.218	0.183	0.000	0.033	24.696
Aerial Lifts (Cherry Pickers	Diesel	2270003010	43	0.21	40<hp≤50	1.810	6.781	5.879	0.008	0.978	690.333	0.036	0.135	0.117	0.000	0.019	13.743
Crawler Tractor/Dozers	Diesel	2270002069	157	0.59	100<hp≤175	0.206	1.000	2.435	0.006	0.241	536.182	0.042	0.204	0.497	0.001	0.049	109.494
Off-Highway Trucks	Diesel	2270002051	489	0.59	300<hp≤600	0.154	0.783	1.971	0.006	0.130	536.345	0.098	0.498	1.254	0.004	0.083	341.140

Notes:

1. Avg hp from "Nonroad Engine and Vehicle Emissions Study Report" EPA 460/3-91-02. Nov 1991.
2. Load from "Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling" EPA420-P-04-005. April 20(
3. Emission factors from EPA's NONROAD model (Year 2014) for Island County, Washington. VOC emissions include both Exhaust and Crankcase Emissions
4. Equipment Emission Rate = Average HP x Load x Emission Factor x 453.6 g/lb

Table 14 Mobile Equipment Exhaust Emissions, Construction and Demolition Equipment Use On Site

Activity -- Alt 1	Equipment List	Eqpt qty	Days Used	Emission Factors (lb/day/unit)[1] VOC	CO	NO_X	SO_2	PM_{10}	CO_2	Emissions (TPY) VOC	CO	NO_X	SO_2	PM_{10}	CO_2
Demolition	Loader	1	60	0.29	1.75	1.47	0.002	0.26	197.57	0.01	0.05	0.04	0.000	0.01	5.93
	Haul Truck	1	60	0.78	3.98	10.03	0.031	0.66	2729.12	0.02	0.12	0.30	0.001	0.02	81.87
Excavation	Backhoe Loader	1	60	0.29	1.75	1.47	0.002	0.26	197.57	0.01	0.05	0.04	0.000	0.01	5.93
	Haul Truck	1	60	0.78	3.98	10.03	0.031	0.66	2729.12	0.02	0.12	0.30	0.001	0.02	81.87
Cut and fill	Scraper	1	60	0.34	1.63	3.98	0.010	0.39	875.95	0.01	0.05	0.12	0.000	0.01	26.28
	Bulldozer	1	60	0.34	1.63	3.98	0.010	0.39	875.95	0.01	0.05	0.12	0.000	0.01	26.28
	Water Truck	1	60	0.78	3.98	10.03	0.031	0.66	2729.12	0.02	0.12	0.30	0.001	0.02	81.87
Trenching	Trencher	1	60	0.29	1.75	1.47	0.002	0.26	197.57	0.01	0.05	0.04	0.000	0.01	5.93
	Track loader	1	60	0.29	1.75	1.47	0.002	0.26	197.57	0.01	0.05	0.04	0.000	0.01	5.93
Grading	Grader	1	60	0.34	1.63	3.98	0.010	0.39	875.95	0.01	0.05	0.12	0.000	0.01	26.28
	Bulldozer	1	60	0.34	1.63	3.98	0.010	0.39	875.95	0.01	0.05	0.12	0.000	0.01	26.28
	Water Truck	1	60	0.78	3.98	10.03	0.031	0.66	2729.12	0.02	0.12	0.30	0.001	0.02	81.87
Concrete Slab pouring	Cement Truck	1	30	0.78	3.98	10.03	0.031	0.66	2729.12	0.01	0.06	0.15	0.000	0.01	40.94
	Compactor	1	30	0.04	0.27	0.30	0.000	0.03	35.69	0.00	0.00	0.00	0.000	0.00	0.54
Portable Equipment	Generator	1	125	0.14	0.50	0.89	0.001	0.08	98.11	0.01	0.03	0.06	0.000	0.01	6.13
	Air Compressor	1	125	0.07	0.36	1.20	0.002	0.06	165.15	0.00	0.02	0.08	0.000	0.00	10.32
Paving	Paving Machine Roller	1	30	0.32	2.93	3.41	0.007	0.41	563.51	0.00	0.04	0.05	0.000	0.01	8.45
	Haul Truck	1	30	0.78	3.98	10.03	0.031	0.66	2729.12	0.01	0.06	0.15	0.000	0.01	40.94
Architectural Coatings	Air Compressor	1	60	0.07	0.36	1.20	0.002	0.06	165.15	0.00	0.01	0.04	0.000	0.00	4.95
									Annual Emissions (TPY)	**0.2**	**1.1**	**2.4**	**0.006**	**0.195**	**568.6**

[1] Calculated using EPA NONROAD equipment emission rates (see Table 6), assuming operation for 8 hours per day.

Table 15 Particulate Emissions from Construction

Activity	ACRES	ACTIVITY DAYS	BULLDOZING (LBS)(1)	PAN SCRAPING SOIL REMOV(LBS)(2)	PAN SCRAPING ETHMOVING (LBS)(3)	EMISSIONS	
						lbs	Tons
Total Disturbed Acreage Alt 1	1.17	60	360	19	12	390	0.20
Total Disturbed Acreage Alt 2	1.75	60	360	28	18	406	0.20
Total Disturbed Acreage Alt 3	1.27	60	360	20	13	393	0.20

(1) Bulldozing dust emissions based on 8hr/activity day

(2) Soil removal dust emissions based on VMT/acre

(3) Earthmoving dust emissions based on soil removal miles

EPA 1992 Fugitive Dust Background document (EPA-450/2-92-004) used as data reference.

(4) Volumes provided by M. Byrne, E CIV NAVFAC Lant from M. Cowley

(5) Emissions calcuated using NCDENR Concrete Batch Plant Emission Calculator, rev A, issued 1/23/2006

retreived from http://daq.state.nc.us/cgi-bin/permit_forms.cgi?id=conbat&type=sheets

Table 16 VOC EMISSIONS FROM PAVING

Activity	Acres Paved	Emission Factor(1) (lbs/acre)	EMISSIONS	
			LBS/YR	TPY
Paving (total)	0.21	2.62	16.6	0.008

(1) URBEMIS 9.2.4, 2007

Table 17 VOC Emissions form Architectural Coatings

Activity	Sq ft surfaces[1]	Est. Paint Qty (gal)[2]	Avg VOC Content (lb/gal)	EMISSIONS	
				LBS/YR	TPY
New Built Space					
Alternative 1	133440	445	5	2224	1.11
Alternative 2	214080	714	5	3568	1.78
Alternative 3	147200	491	5	2453	1.23

[1]assumes total sq ft is divided to 10x10 spaces, with 8 ft ceilings

[2]assumes one gallon covers 300 sq ft

Table 18 Onroad Vehicle Exhaust Emission Factors

Equipment Type	Fuel Type	Exhaust Emission Factor[a,b,c] (g/VMT)							Road Dust Emission Factor[d] (g/VMT)		Total PM Emission Factor[e] (g/VMT)	
		VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
Cars and Light Trucks	Gasoline	1.49	14.05	1.09	0.0127	0.0059	0.0055	440	3.13	0.341	3.13	0.347
Delivery Vehicles	Diesel	0.28	1.10	8.06	0.158	0.17	0.17	1,400	3.13	0.341	3.30	0.511

Notes:

a. Emission factors for gasoline worker vehicles from "Emission Facts: Average Annual Emissions and Fuel Consumption for Gasoline-Fueled Passenger Cars and Light Trucks (EPA420-F-05-22, EPA 2005). It was assumed that the vehicle make-up included 50% car

b. Emission factors for diesel worker and delivery vehicles (except SO2 and CO2) from "Assessing the Effects of Freight Movement on Air Quality at the National and Regional Level- Final Report" (U.S. Federal Highway Administration 2005).

c. CO_2 and SO_2 emission factors for diesel worker and delivery vehicles from "Greenhouse Gas Protocol - Corporate Accounting and Reporting Standard / Mobile Guide" (World Resources Institute/World Business Council for Sustainable Development 2005). SO2

d. See emission factor derivation table below.

e. Sum of exhaust and road dust emission factors.

Paved Roads - Emission Factor Derivation

$E = (k(sL/2)^{0.65}(W/3)^{1.5}-C)$ AP-42 Section 13.2.1 (11/06 version)

where:

E = particulate emission factor (lb/VMT)

k = particle size multiplier

sL = road surface silt loading (g/m^2)

W = average vehicle weight (tons)

C = emission factor for 1980's vehicle fleet exhaust, break wear and tire wear

Parameter	Units	PM_{10}	$PM_{2.5}$	Reference
Mean Vehicle Weight	tons	3	3	Assumption
k factor	g/VMT	7.3	1.1	Table 13.2-1.1
Silt Loading, sL	g/m^2	0.6	0.6	Table 13.2.1-3
Emission factor, C	g/VMT	0.2119	0.1617	Table 13.2.1-2
Emission factor, E	g/VMT	3.13	0.341	Table 13.2.1-3

Table 19 Ground Transportation Vehicle Emissions for Construction Vehicles

Source	# of vehicles[2]	Avg Daily mileage[3]	Total Annual Miles	Emission Factors (lbs/mi)[1]							Emissions (tpy)						
				VOC	CO	NO_x	SO_2	CO_2	PM_{10}	$PM_{2.5}$	VOC	CO	NO_x	SO_2	CO_2	PM_{10}	$PM_{2.5}$
Deliveries	2	50	25,000	0.0006	0.0024	0.0178	0.0003	3.0864	0.0073	0.0011	0.01	0.03	0.22	0.004	39	0.09	0.01
Worker commute	35	30	262,500	0.0033	0.0310	0.0024	0.0000	0.9700	0.0069	0.0008	0.43	4.07	0.31	0.004	127	0.91	0.10
Total Ground Vehicle Emissions											**0.44**	**4.10**	**0.54**	**0.01**	**166**	**1.00**	**0.11**

[1] See Emission factors in Table 11 of this Appendi

[2] See Construction Assumptions, Table 5 of this Appendi

[3] Based on use of local landfills for wastes and local sources for construction material

Table 20 Ground Transportation Vehicle Emissions for New POV

Source	# of vehicles[2]	Avg Daily mileage	Annual days of Commute	Total Annual Miles[3]	Emission Factors (lbs/mi)[1] VOC	CO	NO_x	SO_2	CO_2	PM_{10}	$PM_{2.5}$	Emissions (tpy) VOC	CO	NO_x	SO_2	CO_2	PM_{10}	$PM_{2.5}$
Changes to POV Operations resulting from addition of VAQ-209 Staff																		
Alternative 1																		
Full-time	51	25	250	317,983	0.0033	0.0310	0.0024	0.0000	0.9700	0.0069	0.0008	0.52	4.92	0.38	0.004	154	1.10	0.12
Part-time	40	25	62.5	250,767	0.0033	0.0310	0.0024	0.0000	0.9700	0.0069	0.0008	0.41	3.88	0.30	0.003	122	0.87	0.10
Total	**91**			**568,750**								**0.93**	**8.81**	**0.68**	**0.01**	**275.85**	**1.96**	**0.22**
Alternative 2 and 3																		
Full-time	174	25	250	1,086,733	0.0033	0.0310	0.0024	0.0000	0.9700	0.0069	0.0008	1.78	16.83	1.30	0.015	527	3.75	0.42
Part-time	137	25	62.5	857,017	0.0033	0.0310	0.0024	0.0000	0.9700	0.0069	0.0008	1.40	13.27	1.02	0.012	416	2.96	0.33
Total	**311**			**1,943,750**								**3.18**	**30.10**	**2.32**	**0.03**	**942.74**	**6.71**	**0.74**

[1] See Emission factors in Table 18 of this Appendix

[2] Based on increase in personnel associated with alternative action as revised 7/3/2012, per ratio of Full time/Part time (123/97) personnel provided by LCDR Ross, 6/1/2012

[3] Based on 250 days for commute

Table 21 Construction Emissions NAS Whidbey Island, All Alternatives

Activity	Emissions (TPY)				
	VOC	CO	NO_X	SO_2	PM_{10}
Alternative 1					
Construction equipment	0.21	1.12	2.38	0.01	0.20
VOCs from paving and painting	1.12				
PM_{10} from grading and demolition					0.20
Worker Commute and Deliveries	4.10	0.54	0.44	0.01	1.00
Total	**5.43**	**1.65**	**2.82**	**0.01**	**1.39**
Alternative 2					
Construction equipment	0.21	1.12	2.38	0.01	0.20
VOCs from paving and painting	1.79	5.20			
PM_{10} from grading and demolition					0.20
Worker Commute and Deliveries	4.10	0.54	0.44	0.01	1.00
Total	**6.10**	**6.85**	**2.82**	**0.01**	**1.40**
Alternative 3					
Construction equipment	0.21	1.12	2.38	0.01	0.20
VOCs from paving and painting	1.23	2.95			
PM_{10} from grading and demolition					0.20
Worker Commute and Deliveries	4.10	0.54	0.44	0.01	1.00
Total	**5.54**	**4.60**	**2.82**	**0.01**	**1.39**

Key:

CO = Carbon monoxide.
NOx = Nitrogen oxides.
PM_{10} = Particulate matter less than 10 microns in diameter.
Tpy = Tons per year.
VOC = Volatile organic compound.

Table 22 Existing and Projected Emissions from Aircraft and POV Operations at NAS Whidbey

Operation	Emissions (tpy)				
	CO	NO_x	HC	SO_2	PM_{10}
Existing EA-6B Operations (12 Aircraft)					
LTOs[1]	18.0	3.4	8.6	1.3	9.0
Pattern Operations[2]	1.1	5.5	0.2	0.8	3.0
Total Emissions from Flight Operations	**19.1**	**8.9**	**8.8**	**2.1**	**12.0**
Water Wash	0.9	0.1	0.4	0.05	0.4
Low Power	3.5	0.4	1.6	0.2	1.7
High Power	0.01	0.0	0.00	0.003	0.01
Test Cell	3.14	3.8	1.24	0.835	3.61
Total Emissions from Maintenance Operations	**7.6**	**4.2**	**3.2**	**1.1**	**5.8**
Total Emissions from Existing Exp VAQ EA-6B Operations	**26.7**	**13.1**	**12.0**	**3.2**	**17.8**
Alternative 1: Projected EA-18 G Operations (21 Aircraft)					
EA-18G					
LTOs	130.1	15.2	34.3	2.6	8.7
Pattern Operations	0.5	14.2	0.1	1.4	3.9
Total Emissions from Flight Operations	**130.6**	**29.4**	**34.3**	**4.0**	**12.6**
Water Wash	0.3	0.005	0.1	0.006	0.03
Low Power	13.3	0.5	8.8	0.3	1.7
High Power	1.1	0.1	0.1	0.0	0.0
Test Cell	11.2	5.2	1.5	0.4	0.7
Total Emissions from Maintenance Operations	**25.9**	**5.7**	**10.5**	**0.7**	**2.5**
Total Emissions from Proposed Exp VAQ EA-18G Operations	**156.5**	**35.2**	**44.8**	**4.7**	**15.1**
Total Change in Aircraft Operation Emissions	**129.8**	**22.0**	**32.9**	**1.5**	**-2.8**
Total Change in POV Emissions	**8.8**	**0.7**	**0.9**	**0.0**	**2.0**
Total Change in Operation Emissions	**138.6**	**22.7**	**33.8**	**1.5**	**-0.8**
Alternative 2 and 3: Projected EA-18 G Operations (26 Aircraft)					
EA-18G					
LTOs	161.1	18.9	42.4	3.2	10.8
Pattern Operations	0.6	17.6	0.1	1.7	4.8
Total Emissions from Flight Operations	**161.7**	**36.4**	**42.5**	**4.9**	**15.6**
Water Wash	0.4	0.0	0.2	0.0	0.0
Low Power	16.4	0.6	10.9	0.4	2.1
High Power	1.3	0.1	0.1	0.0	0.0
Test Cell Operations	13.9	6.4	1.9	0.5	0.9
Total Emissions from Maintenance Operations	**32.0**	**7.1**	**13.0**	**0.9**	**3.0**
Total Emissions from Proposed Exp VAQ EA-18G Operations	**193.8**	**43.5**	**55.5**	**5.8**	**18.7**
Total Change in Aircraft Operation Emissions	**167.1**	**30.4**	**43.5**	**2.6**	**0.8**
Total Change in POV Emissions	**30.1**	**2.3**	**3.2**	**0.0**	**6.7**
Total Change in Operation Emissions	**197.2**	**32.7**	**46.7**	**2.6**	**7.5**

Notes:

Notes:

1 LTOs include departure and arrival, auxiliary power unit (APU), idling, taxi, and run-up operations.

2 Pattern operations include Touch and Go, Depart/re-enter, and GCA Box operations.

Key:

CO = carbon monoxide

HC = hydrocarbon

NAS = Naval Air Station

NO_x = nitrogen oxides

PM_{10} = particles10 micrometers or less in diameter

POV = personally operated vehicle

SO_2 = sulfur dioxide

TPY = tons per year

VAQ = electronic attack

Table 23 GHG Emissions, All Alternatives

Emission Source	CO2 Emissions (Metric TPY) Existing	Alt 1	Alt 2	Alt 3
Mobile Source Emissions				
Aircraft Emissions	4,896	7,030	8,704	7,030
Ground Vehicle Emissions	NA	276	943	943
Total CO2 Emissions (MTPY)	**4,896**	**7,306**	**9,647**	**7,973**
Total CO2 from all sources in Washington State, 2008		79,400,000		
Emissions as % of Total 2008 CO2 Emissions in Washington	0.006%	0.009%	0.012%	0.010%
Total CO2 from Transportation in Washington State, 2008		43,100,000		
Emissions as % of Total 2008 Transportation CO2 Emissions in Washington	0.011%	0.017%	0.022%	0.018%
Total CO2 from Transportation in the United States, 2008		1,930,100,000		
Emissions as % of Total 2008 CO2 Emissions in United States, 2008	0.0003%	0.0004%	0.000%	0.0004%

	CO2	unit	Source
Total CO2 from Energy and Industry 2008	5,839,300,000	metric tons	http://www.eia.doe.gov/oiaf/1605/ggrpt/carbon.html#emissions
Total CO2 from Transportation, 2008	1,930,100,000	metric tons	http://www.eia.doe.gov/oiaf/1605/ggrpt/carbon.html#emissions
Total CO2 from Energy and Industry, Washington State, 2008	79,400,000	metric tons	http://www.eia.doe.gov/oiaf/1605/state/state_emissions.html
Total CO2 from Transportation, Washington State, 2008	43,100,000	metric tons	http://www.eia.doe.gov/oiaf/1605/state/state_emissions.html

Table 24 Comparison of Percent Change in Mobile Source Emissions with NWCAA Region

	Emissions (tpy)[2]				
	CO	NO_x	VOCs	SO_2	PM_{10}
Change in Emissions Associated with Alternative 1	138.6	22.7	33.8	1.5	(0.8)
Total Mobile Source Emissions in Skagit, Island, and Whatcom Counties (NWCAA Region)[1]	140,341.2	23,747.8	12,735.6	2,983.4	1,159.4
% Change in Mobile Source Emissions in NWCAA Region, Alternative 1	0.10%	0.10%	0.27%	0.05%	-0.07%
Change in Emissions Associated with Alternative 2 and 3	197.2	32.7	46.7	2.6	7.5
% Change in Mobile Source Emissions in NWCAA Region, Alternative 2 and 3	0.14%	0.14%	0.37%	0.09%	0.65%

[1]Emission totals provided by NWAPA 2004. Total mobile emissions do not include aircraft emissions; therefore, existing aircraft emissions at NAS Whidbey Island as calculated in 2005 EA for Replacement of EA-6B with EA-18G analysis are added to the totals provided by NWAPA.