4 Environmental Consequences

This chapter presents an analysis of the potential direct and indirect effects of each alternative on the affected environment. The following discussion elaborates on the nature of the characteristics that might relate to resources. “Significantly,” as used in the National Environmental Policy Act (NEPA), requires considerations of both context and intensity. Context means that the significance of an action must be analyzed in several contexts, such as society as a whole (e.g., human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of a proposed action. For instance, in the case of a site-specific action, significance would usually depend on the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant (40 Code of Federal Regulations [CFR] part 1508.27). Intensity refers to the severity or extent of the potential environmental impact, which can be thought of in terms of the potential amount of the likely change. In general, the more sensitive the context, the less intense a potential impact needs to be in order to be considered significant. Likewise, the less sensitive the context, the more intense a potential impact would be expected to be to be categorized as significant.

Construction of new and improved facilities could begin as early as 2017. Personnel and aircraft would arrive incrementally, as aircraft are delivered by the manufacturer, personnel are trained, and families relocate to the area, until the action is complete. The year 2021 is the end-state used in this analysis, which represents full implementation of the Proposed Action. In addition, 2021 is when events at Ault Field for aircraft loading, facility and infrastructure assets, personnel levels, and number of aircraft unrelated to the Proposed Action are expected to be fully implemented and complete. Therefore, with these other actions complete, the analysis isolates the impacts of this Proposed Action of adding additional Growler aircraft, personnel, and associated construction. The analysis of the environmental consequences includes the following: airspace and airfield operations; noise associated with aircraft operations; public health and safety; air quality; land use; cultural resources; American Indian traditional resources; biological resources; water resources; socioeconomics; environmental justice; transportation; infrastructure; geological resources; hazardous materials and waste; and climate change and greenhouse gases. Section 1.5, Scope of Environmental Analysis, provides more detail on which environmental resource areas were considered for analysis in this Environmental Impact Statement (EIS).

4.1 Airspace and Airfield Operations

The analysis of airspace management and use involves consideration of many factors, including the types, locations, and frequency of airspace operations, the presence or absence of already designated (controlled) airspace, and the amount of air traffic using or transiting through a given area. Specifically, this assessment examines how the Proposed Action would affect airspace management structure and airfield operations related to the Naval Air Station (NAS) Whidbey Island complex. The communities surrounding Ault Field and Outlying Landing Field (OLF) Coupeville are assessed for impacts from changes to the number of annual operations that would occur from the Proposed Action under each of the alternatives and scenarios. These increases represent levels of operations similar to historic levels of operations experienced over the life of the airfield (see Section 1.4).

The alternatives and sub-alternatives, comprised of operational scenarios, are more fully described in Section 2.3 and are summarized below:

- **Scenario A**
  20 percent of all field carrier landing practice (FCLP) operations conducted at Ault Field, and 80 percent of all FCLPs conducted at OLF Coupeville
- **Scenario B**
  50 percent of all FCLPs conducted at Ault Field, and 50 percent of all FCLPs conducted at OLF Coupeville
- **Scenario C**
  80 percent of all FCLPs conducted at Ault Field, and 20 percent of all FCLPs conducted at OLF Coupeville

Airspace and Airfield Operations

Net increase of 35 or 36 Growler aircraft; total annual airfield operations for the NAS Whidbey Island complex (Ault and OLF Coupeville) would increase up to approximately 130,000 operations, a 47-percent increase, which represents a return to previous levels of airfield operations at the NAS Whidbey Island complex.

Airspace

No changes are proposed to existing airspace under any of the alternatives.

Airfield

Ault Field and OLF Coupeville meet all the operational requirements and have sufficient capacity under routine operating conditions to support the airfield operations of the additional Growler aircraft. Airfield operations at Ault Field may be adversely impacted under Scenario C of all the action alternatives, with approximately 80 percent of the FCLP operations conducted at Ault Field. Airfield operations at Ault Field under all scenarios would not result in significant adverse impacts to airfields and airspace at the NAS Whidbey Island complex.

4.1.1 Airspace and Airfield Operations, No Action Alternative

Under the No Action Alternative, the Navy would not add additional EA-18G "Growler" aircraft or increase operations at Ault Field. Under the No Action Alternative, the FCLP patterns at OLF Coupeville would remain unchanged (Figure 4.1-1). The primary mission of OLF Coupeville is to support Growler FCLPs; however, MH-60 helicopter operations would continue to occur at OLF Coupeville. Helicopter operations total fewer than 400 operations annually and would be scheduled on a not-to-interfere basis with Growler operations.

4.1.2 Airspace and Airfield Operations, Alternative 1

Under Alternative 1, carrier capabilities would be expanded by adding three additional aircraft and associated aircrews to each existing carrier squadron and augmenting the Fleet Replacement Squadron (FRS) with eight additional aircraft (a net increase of 35 aircraft).

4.1.2.1 Airspace and Airfield Operations, Potential Impacts under Alternative 1

Airspace

No changes are proposed to existing airspace under Alternative 1. Proposed Growler operations within controlled airspace and Special Use Airspace (SUA) in the vicinity of the NAS Whidbey Island complex would be similar to current Growler operations. Growler operations would occur in Ault Field's Class C controlled airspace, Class A and E controlled airspace, Alert Area-680, Naval Weapons System Training Facility [NWSTF] Boardman Okanogan A/B/C Military Operations Area, Olympic A/B MOAs, Roosevelt A/B MOAs, W-237 A/B/C/D/E/F/G/H/J, and Military Training Routes (MTRs) IR-341, IR342, IR-343, IR-344, IR-346, IR-348, VR-1350, VR-1351, VR-1352, VR-1353, VR-1354, and VR-1355. Training operations are analyzed under other NEPA documents that focus on all training activities, including Growler operations, occurring within a range complex or MOA, and involve many different types of aircraft, ships, and range complex enhancements. Growler training occurring in Okanogan, Roosevelt, and W-237 airspace is analyzed in the 2010 Northwest Training and Testing FEIS/OEIS. Growler training within the Olympic MOAs was analyzed in the 2010 NWTRC EIS/OEIS. The 2015 NWTT EIS/OEIS analyzed a small increase in Growler training in the Olympic MOAs.

Existing Growler aircraft that are transiting from Ault Field's Class C controlled airspace to nearby military training areas (Olympic, Okanogan, Roosevelt, and NWSTF Boardman) fly at altitudes between 14,000 feet and 16,000 feet above mean sea level (MSL). The aircraft that train in the MOAs and NWSTF Boardman arrive in the SUA via established, standard flight routes under the direct control of the FAA.

Under all alternatives, the number of transits to all training areas would increase by approximately two or three flights per day. Proposed Growler operations would transit between Ault Field and military training areas (Olympic, Okanogan, Roosevelt, and NWSTF Boardman) in a similar manner as existing Growlers (at altitudes between 14,000 feet and 16,000 feet above MSL) and would generate similar sound levels. Because the area between Ault Field and the military training areas is mountainous, the associated altitude above ground level (AGL) would range from approximately 6,000 feet AGL to 16,000 feet AGL. Therefore, Growler aircraft operating at these transit altitudes would create a sound exposure level (SEL) at ground level between 69 and 84 decibels (dB) and an L_{max} of 54 to 72 dB, comparable to the sound level of a passing automobile. Noise metrics are outlined in Section 3.2. The public would hear noise from aircraft overflights if they are in the vicinity of an event. However, these effects would occur on a temporary and intermittent basis. All flight activity within 10 miles of the NAS Whidbey Island complex is analyzed in more detail in Section 4.2.

The cumulative effects of Growler training associated with this alternative and Growler training that occurs outside the study area of this EIS, which are addressed in other NEPA documents, are analyzed in the cumulative impacts chapter of this EIS (see Chapter 5).

Airspace usage and capacity were analyzed by evaluating flight track congestion in the NAS Whidbey Island complex by counting the number of aircraft using a specific flight track at the time the next arriving aircraft requests to use that flight track. Projected MTR operations would increase under Alternative 1 by approximately 32 percent across the 12 MTRs listed above, as shown in Table 4.1-1, and

the MTRs would have sufficient capacity for the increased operations. SUA in the vicinity of the NAS Whidbey Island complex (listed above) was evaluated to ensure adequate capacity for increased operations generated by the Proposed Action. Additionally, this alternative would not change existing procedures for airspace access for civil aviation transiting airspace under the control of the NAS Whidbey Island air traffic control (ATC) Facility, located at Ault Field. Therefore, implementation of Alternative 1 would not result in significant impacts to airspace.

Table 4.1-1 Annual Military Training Route Operations in the Affected Environment

Route Type	*No Action*	*Alternative 1*	*Alternative 2*	*Alternative 3*
IR-341	12	16	16	16
IR-342	7	10	10	10
IR-343	0	0	0	0
IR-344	192	254	260	258
IR-346	62	82	85	84
IR-348	34	44	46	45
Total IFR Routes	**308**	**413**	**417**	**413**
VR-1350	743	980	1,006	997
VR-1351	108	143	146	145
VR-1352	62	82	85	84
VR-1353	26	35	36	35
VR-1354	5	6	7	6
VR-1355	1,058	1,395	1,432	1,420
Total VFR Routes	**2,002**	**2,641**	**2,712**	**2,688**
Total for All VFR and IFR Routes	**2,310**	**3,046**	**3,128**	**3,101**

Key:
IFR = Instrument Flight Rules
VFR = Visual Flight Rules

Airfield Operations

Table 4.1-2 presents the projected number of aircraft operations at the NAS Whidbey Island complex under Alternative 1 as compared to the No Action Alternative. There is a net increase of 35 Growler aircraft; total annual airfield operations for the NAS Whidbey Island complex would increase to approximately 130,000, a 47-percent increase. This increase represents a level of operation similar to historic levels of operations experienced over the life of the airfield (see Section 1.4). Aircraft operations are presented for the Growler squadrons, all other aircraft, and total operations ("other aircraft" are defined as all stationed and transient aircraft that utilize Ault Field and OLF Coupeville). Although the MH-60 helicopters, C-40A aircraft, and transient aircraft would continue to operate at Ault Field, operations of these aircraft types are represented in the category entitled "all other aircraft operations" as part of the Proposed Action because the projected operations are not expected to change. Ault Field and OLF Coupeville meet all the operational requirements and have sufficient capacity under routine operating conditions to support the airfield operations of the additional Growler aircraft, given the increase in operations is consistent with previous levels of operations as described in Section 1.4.

Operation and maintenance of additional Growler aircraft would continue to adhere to established procedures in the affected environment. Further analysis related to impacts from personnel, maintenance operations, and environmental impacts are detailed later in Chapter 4 to include socioeconomics (see Section 4.10.2), hazardous materials (see Section 4.15.2), direct and indirect stationary air emissions (see Section 4.4), and land use (4.5.2).

Ault Field

Projected operations at Ault Field would include arrivals, departures, FCLPs, and other pattern operations, as depicted in Figures 3.1-3 to 3.1-5. FCLPs for Ault Field are depicted in Figure 4.1-1. The majority of airfield operations at Ault Field are conducted on runways 14 and 25, primarily due to prevailing wind conditions, but also due to noise-abatement procedures when allowed by weather conditions. See Section 3.2.4.1 for a noise-complaint and noise-abatement discussion. Noise-abatement procedures would continue to be followed under all alternatives analyzed as part of the Proposed Action. See Figure 1.2-2 for runway designations.

During an average year, total airfield operations at Ault Field would result in an increase of 12,300 projected operations under Scenario A, when 20 percent of all FCLPs would be conducted at Ault Field, to an increase of 38,700 projected operations under Scenario C, when 80 percent of all FCLPs would be conducted at Ault Field (Table 4.1-2). Compared to Scenarios A and B, impacts related to airspace congestion may be experienced with greater frequency under Scenario C at Ault Field. The numbers above represent the average year conditions. Overall, Alternative 1 would not result in significant adverse impacts to airspace at Ault Field from proposed Growler operations. There would be a minor impact to operations when 80 percent of operations are conducted at Ault Field (Scenario C) due to instances of pattern congestion.

In order to provide a more transparent analysis for the public, high-tempo year FCLP data are provided in Appendix A. The high-tempo data represent years when the number of events increases due to operational needs. During a high-tempo FCLP year, total airfield operations at Ault Field would increase approximately 1 to 2 percent across all operational scenarios as compared to the corresponding alternative (see Appendix A).

Table 4.1-2 Comparison of Modeled No Action and Alternative 1, Scenarios A, B, and C (Average Year), Aircraft Operations at the NAS Whidbey Island Complex[1, 5, 7, 8]

Aircraft Type	*FCLP[2]*	*Other Operations[3]*	*Total*	*Total Change from No Action[6]*
Average Year Scenarios for Ault Field				
No Action	14,700	67,400	82,100	
Alternative 1, Scenario A (20% of FCLPs at Ault Field)				
Growler	8,700	71,500	80,200	
All Other Aircraft[4, 6]	0	14,200	14,200	
Total Airfield Operations	8,700	85,700	94,400	+12,300
Alternative 1, Scenario B (50% of FCLPs at Ault Field)				
Growler	21,900	71,400	93,300	
All Other Aircraft[4, 6]	0	14,200	14,200	
Total Airfield Operations	21,900	85,600	107,500	+25,400
Alternative 1, Scenario C (80% of FCLPs at Ault Field)				
Growler	35,100	71,800	106,900	
All Other Aircraft[4, 6]	0	13,900	13,900	
Total Airfield Operations	35,100	85,700	120,800	+38,700
Average Year Scenarios for OLF Coupeville				
No Action	6,100	400	6,500	
Alternative 1, Scenario A (80% of FCLPs at OLF Coupeville)				
Growler	35,100	0	35,100	
All Other Aircraft[4, 6]	0	400	400	
Total Airfield Operations	35,100	400	35,500	+29,000
Alternative 1, Scenario B (50% of FCLPs at OLF Coupeville)				
Growler	21,900	0	21,900	
All Other Aircraft[4, 6]	0	400	400	
Total Airfield Operations	21,900	400	22,300	+15,800
Alternative 1, Scenario C (20% of FCLPs at OLF Coupeville)				
Growler	8,800	0	8,800	
All Other Aircraft[4, 6]	0	400	400	
Total Airfield Operations	8,800	400	9,200	+2,700
Average Year Scenarios for the NAS Whidbey Island Complex				
No Action Total	20,800	67,800	88,600	
Alternative 1, Scenario A				
Total Airfield Operations	43,800	86,100	129,900	+41,300
Alternative 1, Scenario B				
Total Airfield Operations	43,800	86,000	129,800	+41,200
Alternative 1, Scenario C				
Total Airfield Operations	43,900	86,100	130,000	+41,400

Table 4.1-2 Comparison of Modeled No Action and Alternative 1, Scenarios A, B, and C (Average Year), Aircraft Operations at the NAS Whidbey Island Complex[1, 5, 7, 8]

Aircraft Type	*FCLP*[2]	*Other Operations*[3]	*Total*	*Total Change from No Action*[6]

Source: Wyle, 2015

Notes:

1 Three-digit numbers are rounded to nearest 100 if ≥ to 100; two-digit numbers are rounded to the nearest 10 if ≥ 10 or if between 1 and 9.

2 Each FCLP pass = 2 operations (one arrival and one departure).

3 Other operations include Touch-and-Goes, Depart and Re-enter, and Ground Controlled Approaches.

4 All other aircraft include P-8A, H-60, C-40, and transient aircraft.

5 An operation is defined as one arrival or one departure.

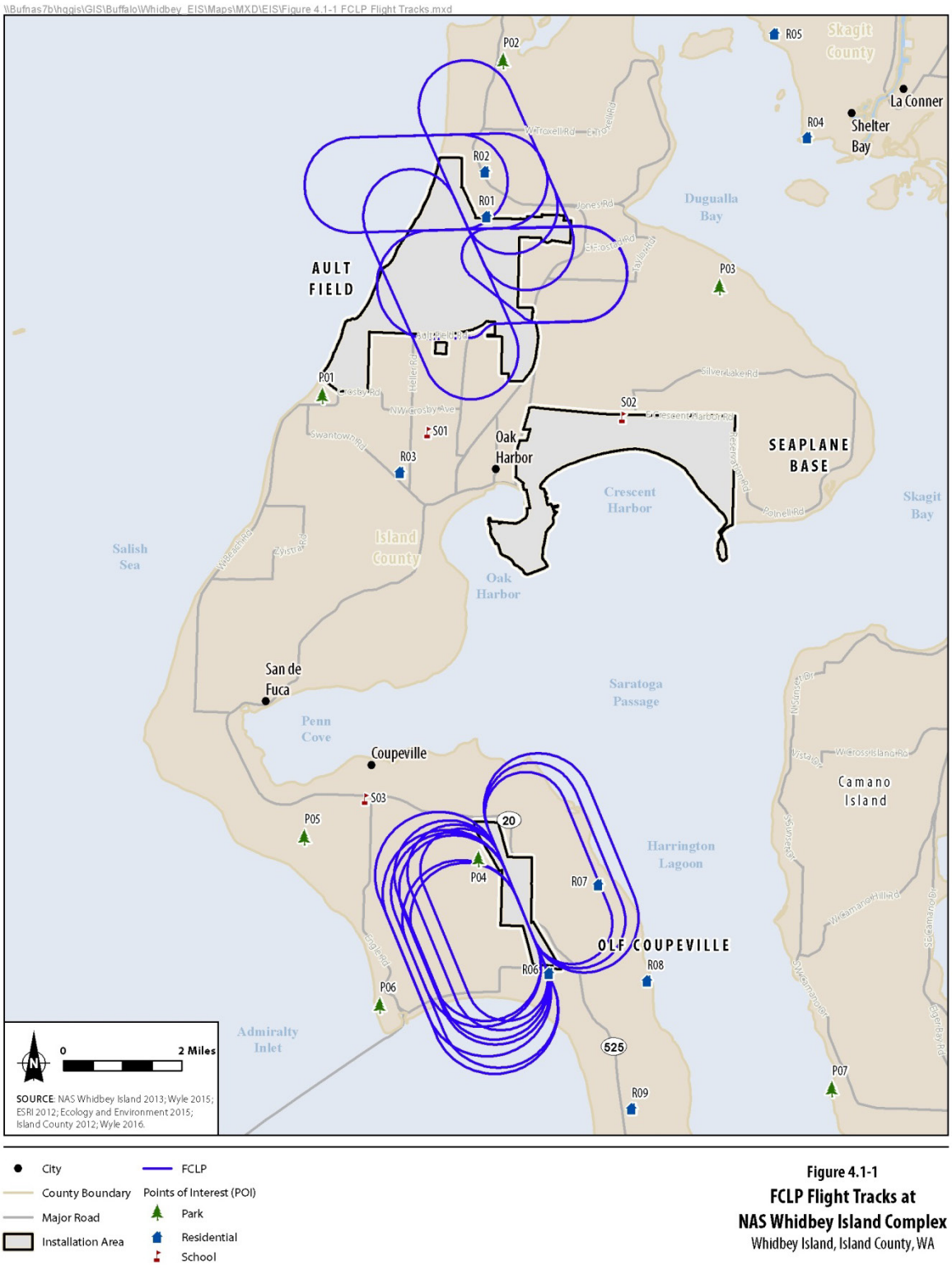
6 The numbers of operations fluctuate slightly from alternative to alternative due to randomness inherent in modeling.

7 The NAS Whidbey Island complex includes Ault Field and OLF Coupeville.

8 Scenario A: 20 percent of FCLPs conducted at Ault Field, and 80 percent conducted at OLF Coupeville; Scenario B: 50 percent of FCLPs conducted at Ault Field; Scenario C: 80 percent of FCLPs conducted at Ault Field.

Key:
FCLP = field carrier landing practice
OLF = outlying landing field

Figure 4.1-1 FCLP Flight Tracks at NAS Whidbey Island Complex



OLF Coupeville

Airfield operations at OLF Coupeville would primarily be conducted by the Growler squadrons and would include arrivals, departures, other pattern operations, and FCLPs, as depicted in Figures 3.1-3 through 3.1-5. FCLPs at OLF Coupeville are depicted in Figure 4.1-1. At OLF Coupeville, annual airfield operations would result in an increase of 29,000 operations during an average year under Scenario A, when 80 percent of the FCLPs would be conducted at OLF Coupeville, to an increase of 2,700 operations during an average year under Scenario C, when 20 percent of the FCLPs would be conducted at OLF Coupeville (Table 4.1-2). The numbers above represent the average year conditions. Overall, Alternative 2 would not result in significant adverse impacts to airspace at OLF Coupeville from proposed Growler operations. There would be a negligible impact to operations when 80 percent of operations are conducted at Ault Field (Scenario A) due to instances of pattern congestion.

Historically, the runway utilization goal at OLF Coupeville has been to split FCLPs equally between Runways 14 and 32. In recent years, however, due to a non-standard pattern on Runway 14, the utilization of Runway 14 has been significantly lower. This narrower pattern requires an unacceptably steep angle of bank for the Growler due to performance differences from the Prowler flying the pattern. The proposed OLF Coupeville FCLP patterns (day and night) are depicted in Figure 4.1-1; under Alternative 1 (and all action alternatives), these patterns will be used in order to improve the standardization of training and enable more use of Runway 14. The standard FCLP patterns will result in runway use percentages based on the prevailing winds rather than aircraft performance and quality of training. Based on meteorological conditions at the OLF, the projected runway utilization for Runway 14 is approximately 30 percent, and the remaining percentage is to be utilized on Runway 32.

Implementation of Alternative 1 would increase total airfield operations by up to 45 percent above the No Action Alternative. However, this action alternative would not require any modification to the current airspace or operational procedures or any changes to the departure and arrival route structures in order to accommodate the increased air traffic.

In order to provide a more transparent analysis for the public, high-tempo year FCLP data are provided in Appendix A. The high-tempo data represent years when the number of events may increase due to operational needs. During a high-tempo FCLP year, total airfield operations could increase approximately 10 to 11 percent at OLF Coupeville based on the operational scenarios selected as compared to the corresponding alternative (see Appendix A).

Alternative 1 Conclusion

Overall, Alternative 1 would not result in significant adverse impacts to airfields and airspace at the NAS Whidbey Island complex from proposed Growler operations. There would be a minor impact to operations when 80 percent of operations are conducted at Ault Field due to instances of pattern congestion. There would be an increase of 12,300 to 38,700 annual aircraft operations at Ault Field and an increase of 2,700 to 29,000 annual aircraft operations at OLF Coupeville, depending on the scenario selected. Growler operations would be conducted in a manner similar to the current Navy aircraft training missions conducted at the NAS Whidbey Island complex with the exception of standardizing the FCLP pattern for Runway 14 at OLF Coupeville utilizing the same pattern for day and night operations. There would be increases in the number of annual operations that would be consistent with previous levels, but additional Growler operations would not require changes to the structure of the affected SUA, and current safety procedures would continue to be emphasized.

4.1.3 Airspace and Airfield Operations, Alternative 2

Under Alternative 2, expeditionary and carrier capabilities would be expanded by adding two expeditionary squadrons and aircrew to existing expeditionary squadrons at Ault Field; adding two additional aircraft to each existing carrier squadron; and augmenting the FRS with eight additional aircraft (a net increase of 36 aircraft).

4.1.3.1 Airspace and Airfield Operations, Potential Impacts under Alternative 2

The potential impacts and analysis are identical to Alternative 1. The Proposed Action would have a minor impact to local area civil and commercial aviation airspace use because, although the additional Growler aircraft would be operating with an increased frequency, they would be doing so within the same flight parameters currently used by aircraft under existing conditions within the controlled airspace surrounding the NAS Whidbey Island complex. Airfield operations at OLF Coupeville would not be adversely affected under any scenario. Airfield operations at Ault Field may be adversely impacted under the Proposed Action, Alternative 2, with 80 percent or more of the FCLPs conducted at Ault Field, under Scenario C. An expected increase in scheduling challenges and the potential for mission delays could occur at Ault Field under Scenario C, which could cause intermittent deficiencies in pilot proficiency and unit readiness. When more FCLPs are flown at Ault Field, other flights and aircraft training occurring at Ault Filed are restricted or delayed. This causes more people off base to be affected because training is extended later into the night, and more aircraft are held in larger or extended flight patterns while FCLPs are conducted.

Airspace

No changes are proposed to existing airspace under Alternative 2. Proposed Growler operations within controlled airspace and SUA in the vicinity of the NAS Whidbey Island complex would be similar to current Growler operations. Proposed Growler operations would transit between Ault Field and military training areas in a similar manner to that used by existing Growlers and would generate similar sound levels. Projected MTR operations would increase under Alternative 2 by approximately 35 percent across the MTRs, as shown in Table 4.1-1, and the MTRs would have sufficient capacity for the increased operations. SUA in the vicinity of the NAS Whidbey Island complex was evaluated to ensure adequate capacity for increased operations generated by the Proposed Action. Additionally, this alternative would not change existing procedures for airspace access for civil aviation transiting airspace under control of the NAS Whidbey Island ATC Facility, located at Ault Field. Consequently, the opportunity for civil aviation to transit existing airspace would not be reduced. Therefore, implementation of Alternative 2 would not result in significant impacts to airspace.

Airfield Operations

The projected number of aircraft operations at the NAS Whidbey Island complex under Alternative 2 is compared to the No Action Alternative presented in Table 4.1-3. Aircraft operations are presented for the Growler squadrons, all other aircraft, and total operations. All other aircraft in addition to transient aircraft would continue to operate at Ault Field as part of the Proposed Action because the projected operations are not expected to change for these aircraft.

Ault Field

Projected operations at Ault Field would include arrivals, departures, FCLPs, and other pattern operations (i.e., touch-and-go [T&G] operations and Ground Control Approach [GCA]/CCA patterns) as

depicted in Figures 3.1-3 to 3.1-5. FCLPs for Ault Field are depicted in Figure 4.1-1. The majority of airfield operations at Ault Field are conducted on runways 14 and 25, primarily due to prevailing wind conditions but also due to noise-abatement procedures when allowed by weather conditions. See Section 3.2.4.1 for noise-complaint and noise-abatement discussion. Noise-abatement procedures would continue to be followed under the Proposed Action. See Figure 1.2-2 for runway designations.

During an average year, total airfield operations at Ault Field would result in an increase of 13,000 projected operations under Scenario A, when 20 percent of all FCLPs would be conducted at Ault Field, to an increase of 38,200 projected operations under Scenario C, when 80 percent of all FCLPs would be conducted at Ault Field (Table 4.1-3). As compared to Scenarios A and B, impacts related to airspace congestion may be experienced with greater frequency under Scenario Cat Ault Field. The numbers above represent the average year conditions. Overall, Alternative 2 would not result in significant adverse impacts to airspace at Ault Field from proposed Growler operations. There would be a minor impact to operations when 80 percent of operations are conducted at Ault Field (Scenario C) due to instances of pattern congestion.

In order to provide a more transparent analysis for the public, high-tempo year FCLP data are provided in Appendix A. The high-tempo data represent years when the number of events increase due to operational needs. During a high-tempo FCLP year, total airfield operations at Ault Field increase approximately 1 to 4 percent, based on the operational scenario selected (see Appendix A).

OLF Coupeville

Airfield operations at OLF Coupeville would primarily be conducted by the Growler squadrons and would include arrivals, departures, other pattern operations, and FCLPs, as depicted in Figures 3.1-3 through 3.1-5. FCLPs at OLF Coupeville are depicted in Figure 4.1-1. At OLF Coupeville, annual airfield operations would result in an increase of 27,500 operations during an average year under Scenario A, when 80 percent of the FCLPs would be conducted at OLF Coupeville, to an increase of 2,300 operations during an average year under Scenario C, when 20 percent of the FCLPs would be conducted at OLF Coupeville (Table 4.1-3). The numbers above represent the average year conditions. Overall, Alternative 2 would not result in significant adverse impacts to airspace at OLF Coupeville from proposed Growler operations. There would be a negligible impact to operations when 80 percent of operations are conducted at Ault Field (Scenario A) due to instances of pattern congestion.

The OLF Coupeville FCLP patterns (day and night) are depicted in Figure 4.1-1; under Alternative 2 (as stated for Alternative 1), these patterns would be used in order to improve the standardization of training and enable more use of Runway 14. The standard FCLP patterns would result in runway use percentages based on the prevailing winds. Based on meteorological conditions at the OLF, the projected runway utilization for Runway 14 is approximately 30 percent, and the remaining percentage is to be utilized on Runway 32. Additionally, for aircraft performance, safety, and improved training quality, the increased use of standard FCLP flight tracks for OLF Coupeville is expected to continue.

Table 4.1-3 Comparison of Modeled No Action and Alternative 2, Scenarios A, B, and C (Average Year), Aircraft Operations at the NAS Whidbey Island Complex[1, 5, 7, 8]

Aircraft Type	*FCLP*	*Other Operations*[2]	*Total*	*Total Change from No Action*
Average Year Scenarios for Ault Field				
No Action	14,700	67,400	82,100	
Alternative 2, Scenario A (20% of FCLPs at Ault Field)				
Growler	8,400	72,500	80,900	
All Other Aircraft[3, 5]	0	14,200	14,200	
Total Airfield Operations	8,400	86,700	95,100	+13,000
Alternative 2, Scenario B (50% of FCLPs at Ault Field)				
Growler	21,000	72,500	93,500	
All Other Aircraft[3, 5]	0	14,200	14,200	
Total Airfield Operations	21,000	86,700	107,700	+25,600
Alternative 2, Scenario C (80% of FCLPs at Ault Field)				
Growler	33,600	72,600	106,200	
All Other Aircraft[3, 5]	0	14,100	14,100	
Total Airfield Operations	33,600	86,700	120,300	+38,200
Average Year Scenarios for OLF Coupeville				
No Action	6,100	400	6,500	
Alternative 2, Scenario A (80% of FCLPs at OLF Coupeville)				
Growler	33,600	0	33,600	
All Other Aircraft[3]	0	400	400	
Total Airfield Operations	33,600	400	34,000	+27,500
Alternative 2, Scenario B (50% of FCLPs at OLF Coupeville)				
Growler	21,000	0	21,000	
All Other Aircraft[3]	0	400	400	
Total Airfield Operations	21,000	400	21,400	+14,900
Alternative 2, Scenario C (20% of FCLPs at OLF Coupeville)				
Growler	8,400	0	8,400	
All Other Aircraft[3]	0	400	400	
Total Airfield Operations	8,400	400	8,800	+2,300
Average Year Scenarios for the NAS Whidbey Island Complex				
No Action Total	20,800	67,800	88,600	
Alternative 2, Scenario A				
Total Airfield Operations	42,000	87,100	129,100	+40,500
Alternative 2, Scenario B				
Total Airfield Operations	42,000	87,100	129,100	+40,500
Alternative 2, Scenario C				
Total Airfield Operations	42,000	87,100	129,100	+40,500

Table 4.1-3 Comparison of Modeled No Action and Alternative 2, Scenarios A, B, and C (Average Year), Aircraft Operations at the NAS Whidbey Island Complex[1, 5, 7, 8]

Aircraft Type	*FCLP*	*Other Operations[2]*	*Total*	*Total Change from No Action*

Source: Wyle, 2015

Notes:
1. Three-digit numbers are rounded to nearest 100 if ≥ to 100; two-digit numbers are rounded to the nearest 10 if ≥ 10 or if between 1 and 9.
2. Each FCLP pass = 2 operations (one arrival and one departure).
3. Other operations include Touch-and-Goes, Depart and Re-enter, and Ground Controlled Approaches.
4. All other aircraft include P-8A, H-60, C-40, and transient aircraft.
5. An operation is defined as one arrival or one departure.
6. The numbers of operations fluctuate slightly from alternative to alternative due to randomness inherent in modeling.
7. The NAS Whidbey Island complex includes Ault Field and OLF Coupeville.
8. Scenario A: 20 percent of FCLPs conducted at Ault Field and 80 percent conducted at OLF Coupeville; Scenario B: 50 percent of FCLPs conducted at Ault Field; Scenario C: 80 percent of FCLPs conducted at Ault Field.

Key:
FCLP = field carrier landing practice
OLF = outlying landing field

Implementation of Alternative 2 would increase total airfield operations by up to 46-percent above the No Action Alternative. However, this action alternative would not require any modification to the current airspace or operational procedures or any changes to the departure and arrival route structures in order to accommodate the increased air traffic.

The numbers above represent the average number of operations. In order to provide a more transparent analysis for the public, high-tempo year FCLP data are provided in Appendix A. The high-tempo data represent years when the number of events increase due to operational needs.

During a high-tempo FCLP year, total airfield operations would increase approximately 10 percent at OLF Coupeville based on the operational scenario selected as compared to the corresponding alternative (see Appendix A).

The OLF Coupeville FCLP patterns (day and night) are depicted in Figure 4.1-1; under Alternative 2 (as stated for Alternative 1), these patterns would be used in order to improve the standardization of training and enable more use of Runway 14. The standard FCLP patterns would result in runway use percentages based on the prevailing winds. Based on meteorological conditions at the OLF, the projected runway utilization for Runway 14 is approximately 30 percent, and the remaining percentage is to be utilized on Runway 32. Additionally, for aircraft performance, safety, and improved training quality, the increased use of standard FCLP flight tracks for OLF Coupeville is expected to continue.

Alternative 2 Conclusion

Overall, Alternative 2 would not result in significant adverse impacts to airfields and airspace at the NAS Whidbey Island complex from proposed Growler operations. There would be an increase of 13,000 to 38,200 annual aircraft operations at Ault Field and an increase of 2,300 to 27,500 in annual aircraft operations at OLF Coupeville, depending on the scenario selected. Growler operations would be

conducted in a manner similar to the current Navy missions conducted by aircraft training at the NAS Whidbey Island complex with the exception of standardizing the FCLP pattern for Runway 14 at OLF Coupeville. There would be increases in the number of annual operations, additional Growler operations would not require changes to the structure of the affected SUA, and current safety procedures would continue to be emphasized.

4.1.4 Airspace and Airfield Operations, Alternative 3

Under Alternative 3, expeditionary and carrier capabilities would be expanded by adding three additional aircraft to each existing expeditionary squadron, adding two additional aircraft to each existing carrier squadron, and augmenting the FRS with nine additional aircraft (a net increase of 36 aircraft).

4.1.4.1 Airspace and Airfield Operations, Potential Impacts under Alternative 3

The potential impacts and analysis are identical to those of Alternatives 1 and 2. The Proposed Action would have a minor impact to local area civil and commercial aviation airspace use because although the additional Growler aircraft would be operating with an increased frequency they would be doing so within the same flight parameters currently used by aircraft under existing conditions within the controlled airspace surrounding the NAS Whidbey Island complex. Airfield operations at OLF Coupeville would not be adversely affected under any scenario. Airfield operations at Ault Field may be adversely impacted under the Proposed Action, Alternative 3, with 80 percent or more of the FCLPs conducted at Ault Field. An expected increase in scheduling challenges and the potential for mission delays could occur at Ault Field under Scenario C, which could cause intermittent deficiencies in pilot proficiency and unit readiness. When more FCLPs are flown at Ault Field, other flights and aircraft training occurring at Ault Filed are restricted or delayed. This causes flights and training occurring at Ault Field later into the night, and more aircraft are held in larger or extended flight patterns while FCLP is conducted.

Airspace

No changes are proposed to existing airspace under Alternative 3, and analysis is identical to that of Alternatives 1 and 2. Proposed Growler operations within controlled airspace and SUA in the vicinity of the NAS Whidbey Island complex would be similar to current Growler operations. Proposed Growler operations would transit between Ault Field and military training areas in a similar manner to those used by existing Growlers and would generate similar sound levels. Projected MTR operations would increase under Alternative 3 by approximately 34 percent across the MTRs, as shown in Table 4.1-1, and the MTRs would have sufficient capacity for the increased operations. SUA in the vicinity of the NAS Whidbey Island complex was evaluated to ensure adequate capacity for increased operations generated by the Proposed Action. Additionally, this alternative would not change existing procedures for airspace access for civil aviation transiting airspace under the control of the NAS Whidbey Island ATC Facility, located at Ault Field. Consequently, the opportunity for civil aviation to transit existing airspace would not be reduced. Therefore, implementation of Alternative 2 would not result in significant impacts to airspace.

Airfield Operations

In Table 4.1-4, the projected number of aircraft operations at the NAS Whidbey Island complex under Alternative 3 is compared to the No Action Alternative. Aircraft operations are presented for the Growler squadrons, all other aircraft, and total operations. All other aircraft in addition to transient

aircraft would continue to operate at Ault Field as part of the Proposed Action because the projected operations are not expected to change for these aircraft.

Table 4.1-4 Comparison of Modeled No Action and Alternative 3, Scenarios A, B, and C (Average Year), Aircraft Operations at the NAS Whidbey Island Complex[1, 5, 7, 8]

Aircraft Type	*FCLP*	*Other Operations[2]*	*Total*	*Total Change from No Action*
Average Year Scenarios for Ault Field				
No Action	14,700	67,400	82,100	
Alternative 3, Scenario A (20% of FCLPs at Ault Field)				
Growler	8,400	72,400	80,800	
All Other Aircraft[3, 5]	0	14,100	14,100	
Total Airfield Operations	8,400	86,500	94,900	+12,800
Alternative 3, Scenario B (50% of FCLPs at Ault Field)				
Growler	21,000	72,500	93,500	
All Other Aircraft[3, 5]	0	13,900	13,900	
Total Airfield Operations	21,000	86,400	107,400	+25,300
Alternative 3, Scenario C (80% of FCLPs at Ault Field)				
Growler	33,500	72,500	106,000	
All Other Aircraft[3, 5]	0	14,000	14,000	
Total Airfield Operations	33,500	86,500	120,000	+37,900
Average Year Scenarios for OLF Coupeville				
No Action	6,100	400	6,500	
Alternative 3, Scenario A (80% of FCLPs at OLF Coupeville)				
Growler	33,500	0	33,500	
All Other Aircraft[3]	0	400	400	
Total Airfield Operations	33,500	400	33,900	+27,400
Alternative 3, Scenario B (50% of FCLPs at OLF Coupeville)				
Growler	20,900	0	20,900	
All Other Aircraft[3]	0	400	400	
Total Airfield Operations	20,900	400	21,300	+14,800
Alternative 3, Scenario C (20% of FCLPs at OLF Coupeville)				
Growler	8,300	0	8,300	
All Other Aircraft[3]	0	400	400	
Total Airfield Operations	8,300	400	8,700	+2,200
Average Year Scenarios for the NAS Whidbey Island Complex				
No Action Total	20,800	67,800	88,600	
Alternative 3, Scenario A				
Total Airfield Operations	41,900	86,900	128,800	+40,200
Alternative 3, Scenario B				
Total Airfield Operations	41,900	86,800	128,700	+40,100
Alternative 3, Scenario C				
Total Airfield Operations	41,800	86,900	128,700	+40,100

Table 4.1-4 Comparison of Modeled No Action and Alternative 3, Scenarios A, B, and C (Average Year), Aircraft Operations at the NAS Whidbey Island Complex[1, 5, 7, 8]

Aircraft Type	*FCLP*	*Other Operations[2]*	*Total*	*Total Change from No Action*

Source: Wyle, 2015

Notes:
1. Three-digit numbers are rounded to nearest 100 if ≥ to 100; two-digit numbers are rounded to the nearest 10 if ≥ 10 or if between 1 and 9.
2. Each FCLP pass = two operations (one arrival and one departure).
   Other operations include Touch-and-Goes, Depart and Re-enter, and Ground Controlled Approaches.
4. All other aircraft include P-8A, H-60, C-40, and transient aircraft.
5. An operation is defined one arrival or one departure.
6. The numbers of operations fluctuate slightly from alternative to alternative due to randomness inherent in modeling.
7. The NAS Whidbey Island complex includes Ault Field and OLF Coupeville.
8. Scenario A: 20 percent of FCLPs conducted at Ault Field and 80 percent conducted at OLF Coupeville; Scenario B: 50 percent of FCLPs conducted at Ault Field; Scenario C: 80 percent of FCLPs conducted at Ault Field.

Key:
FCLP = field carrier landing practice
OLF = outlying landing field

Ault Field

Projected operations at Ault Field would include arrivals, departures, FCLPs, and other pattern operations (i.e., T&G and GCA/CCA patterns) as depicted in Figures 3.1-3 through 3.1-5. FCLPs for Ault Field are depicted in Figure 4.1-1. The majority of airfield operations at Ault Field are conducted on runways 14 and 25 due to prevailing wind conditions but also due to noise-abatement procedures when allowed by existing weather conditions. See Section 3.2.4.1 for noise-complaint and noise-abatement discussion. Noise-abatement procedures would continue to be followed under the Proposed Action. See Figure 1.2-2 for runway designations.

During an average year, total airfield operations at Ault Field would result in an increase of 12,800 projected operations under Scenario A, when 20 percent of all FCLPs would be conducted at Ault Field, to an increase of 37,900 projected operations under Scenario C, when 80 percent of all FCLPs would be conducted at Ault Field (see Table 4.1-4). As compared to Scenarios A and B, impacts related to airspace congestion may be experienced with greater frequency under Scenario C at Ault Field. The numbers above represent the average year conditions. Overall, Alternative 3 would not result in significant adverse impacts to airspace at Ault Field from proposed Growler operations. There would be a minor impact to operations when 80 percent of operations are conducted at Ault Field (Scenario C) due to instances of pattern congestion.

In order to provide a more transparent analysis for the public, high-tempo year FCLP data are provided in Appendix A. The high-tempo data represent years when the number of events increase due to operational needs. During a high-tempo FCLP year, total airfield operations at Ault Field would increase approximately 1 to 3 percent based on the operational scenario selected as compared to the corresponding alternative (see Appendix A).

OLF Coupeville

Airfield operations at OLF Coupeville would primarily be conducted by the Growler squadrons and would include arrivals, departures, other pattern operations, and FCLPs, as depicted in Figures 3.1-3 through 3.1-5. FCLPs at OLF Coupeville are depicted in Figure 4.1-1. At OLF Coupeville, annual airfield operations would result in an increase of 27,400 operations during an average year under Scenario A, when 80 percent of the FCLPs would be conducted at OLF Coupeville, to an increase of 2,200 operations during an average year under Scenario C, when 20 percent of the FCLPs would be conducted at OLF Coupeville (Table 4.1-4). The numbers above represent the average year conditions. Overall, Alternative 3 would not result in significant adverse impacts to airspace at OLF Coupeville from proposed Growler operations. There would be a negligible impact to operations when 80 percent of operations are conducted at Ault Field (Scenario A) due to instances of pattern congestion.

The OLF Coupeville FCLP patterns (day and night) are depicted in Figure 4.1-1; under Alternative 3 (as stated for Alternative 1), these patterns would be used in order to improve the standardization of training and enable more use of Runway 14. The standard FCLP patterns would result in runway use percentages based on the prevailing winds. Based on meteorological conditions at the OLF, the projected runway utilization for Runway 14 is approximately 30 percent, and the remaining percentage is to be utilized on Runway 32. Additionally, for aircraft performance, safety, and improved training quality, the increased use of standard FCLP flight tracks for OLF Coupeville is expected to continue.

Implementation of Alternative 3 would increase total airfield operations by up to 46 percent above the No Action Alternative. However, this action alternative would not require any modification to the current airspace or operational procedures or any changes to the departure and arrival route structures in order to accommodate the increased air traffic.

The numbers above represent the average number of operations. In order to provide a more transparent analysis for the public, high-tempo year FCLP data are provided in Appendix A. The high-tempo data represent years when the number of events increase due to operational needs. During a high-tempo FCLP year, total airfield operations would increase approximately 10 to 11 percent at OLF Coupeville based on the operational scenario selected as compared to the corresponding alternative (see Appendix A).

The OLF Coupeville FCLP patterns (day and night) are depicted in Figure 4.1-1; under Alternative 3 (as stated for Alternative 1), these patterns would be used in order to improve the standardization of training and enable more use of Runway 14. The standard FCLP patterns would result in runway use percentages based on the prevailing winds. Based on meteorological conditions at the OLF, the projected runway utilization for Runway 14 is approximately 30 percent, and the remaining percentage is to be utilized on Runway 32. The projected runway utilization for Runway 14 is approximately 30 percent, and the remaining percentage is to be utilized on Runway 32. Additionally, for aircraft performance, safety, and improved training quality, the increased use of standard FCLP flight tracks for OLF Coupeville is expected to continue.

Alternative 3 Conclusion

Overall, Alternative 3 would not result in significant adverse impacts to airfields and airspace at the NAS Whidbey Island complex from proposed Growler operations. There would be an increase of 12,800 to 37,900 annual aircraft operations at Ault Field and an increase of 2,200 to 27,400 in annual aircraft operations at OLF Coupeville depending on the scenario selected. Growler operations would be

conducted in a manner similar to the current Navy aircraft training missions conducted by aircraft at the NAS Whidbey Island complex with the exception of standardizing the FCLP pattern for Runway 14 at OLF Coupeville. There would be increases in the number of annual operations, additional Growler operations would not require changes to the structure of the affected SUA, and current safety procedures would continue to be emphasized.

4.1.5 Airspace and Airfield Operations Conclusion

Airspace Summary

Implementation of Alternatives 1 through 3 would increase total airfield operations by up to 47 percent at the NAS Whidbey Island complex. Table 4.1-5 lists airfield operations at NAS Whidbey Island. Additionally, under alternatives 1 through 3, operations at Ault Field would increase to a total of approximately 120,800 total annual airfield operations (Alternative 1, Scenario C). Likewise, operations at OLF Coupeville would increase in operations with a total of approximately 35,500 operations (Alternative 1, Scenario A). However, none of the action alternatives would require any modification to the current airspace or operational procedures or any changes to the departure and arrival route structures in order to accommodate the increased air traffic. The expected volume of air traffic on each flight track would increase slightly (approximately 1 to 2 flights per day).

Table 4.1-5 Comparison of Alternatives, Scenarios A, B, and C (Average Year), and No Action for Total Aircraft Operations at the NAS Whidbey Island Complex[1, 2, 4, 5]

Aircraft Type	*Ault Field*[3]	*OLF Coupeville*[3]	*Total Airfield Operations*[5]
Average Year Scenarios			
Alternative 1			
Scenario A	94,400	35,500	129,900
Scenario B	107,500	22,300	129,800
Scenario C	120,800	9,200	130,000
Alternative 2			
Scenario A	95,100	34,000	129,100
Scenario B	107,700	21,400	129,100
Scenario C	120,300	8,800	129,100
Alternative 3			
Scenario A	94,900	33,900	128,800
Scenario B	107,400	21,300	128,700
Scenario C	120,000	8,700	128,700
No Action Alternative			
No Action	81,700	6,500	88,600

Table 4.1-5 Comparison of Alternatives, Scenarios A, B, and C (Average Year), and No Action for Total Aircraft Operations at the NAS Whidbey Island Complex[1, 2, 4, 5]

Aircraft Type	*Ault Field[3]*	*OLF Coupeville[3]*	*Total Airfield Operations[5]*

Source: Wyle, 2015

Notes:
1 Three-digit numbers are rounded to nearest 100 if ≥ to 100; two-digit numbers are rounded to the nearest 10 if ≥ 10 or if between 1 and 9.
2 An operation is defined as one landing, one take-off, one approach, or one departure.
3 The numbers of operations fluctuate slightly from alternative to alternative due to randomness inherent in modeling.
4 Scenario A: 20 percent of operations conducted at Ault Field and 80 percent conducted at OLF Coupeville; Scenario B: 50 percent of operations conducted at Ault Field; Scenario C: 80 percent of operations conducted at Ault Field.
5 The NAS Whidbey Island complex includes Ault Field and OLF Coupeville.

Key:
OLF = outlying landing field

The Proposed Action for all alternatives would have no adverse effect on local area civil and commercial aviation airspace use because the additional Growler aircraft would be operating within the same flight parameters currently used by aircraft under existing conditions within the controlled airspace surrounding the NAS Whidbey Island complex. None of the action alternatives would change existing procedures for airspace access or have an adverse impact to civil aviation transiting airspace under the control of the NAS Whidbey Island ATC Facility, located at Ault Field. Consequently, the opportunity for civil aviation to transit existing airspace would not be reduced. Therefore, implementation of all three action alternative would not result in significant impacts to airspace.

Airfield Operations Summary

Projected operations at Ault Field would include arrivals, departures, FCLPs, and other pattern operations (i.e., T&G and GCA patterns), as depicted in Figures 3.1-3 through 3.1-5. FCLPs for Ault Field are depicted in Figure 4.1-1. Airfield operations at Ault Field are primarily conducted on Runways 14 and 25 due to noise-abatement procedures and prevailing wind conditions. The primary mission of OLF Coupeville is to support Growler FCLPs; however, MH-60 helicopter operations would continue to occur at OLF Coupeville.

No changes are proposed to existing mission types (e.g., FCLP, T&G, etc.); however, flight operations are expected to increase with the increase in Growler aircraft and aircrews. Ault Field and OLF Coupeville meet all the operational requirements and have sufficient capacity under routine operating conditions to support the airfield operations of the additional Growler aircraft. Airfield operations at OLF Coupeville would not be adversely affected under any alternative or scenario. Airfield operations at Ault Field may be adversely impacted under the action alternatives with 80 percent or more of the FCLPs conducted at Ault Field. An expected increase in scheduling challenges and the potential for mission delays could occur at Ault Field under Scenario C, which could cause deficiencies in pilot proficiency and unit readiness. These scheduling delays could result in flights and training occurring at Ault Field later into the night.

4.2 Noise Associated with Aircraft Operations

The information presented in this noise section is the result of noise modeling that analyzed the projected noise levels based upon a wide range of inputs (such as flight tracks, aircraft type, and number of aircraft operations). For a full discussion of noise modeling and background data used for this analysis, refer to Section 3.2.2, Noise Metrics and Modeling, as well as Appendix A, Draft Aircraft Noise Study. The noise levels analyzed and described within this study are from computer-modeled noise and not actual noise measurements at Ault Field or OLF Coupeville. As discussed in Section 3.2.2, computer modeling provides a tool to assess potential noise impacts. Day-Night Average Sound Level (DNL) noise contours are generated by a computer model that draws from a library of actual aircraft noise measurements. Noise contours produced by the model allow a comparison of existing conditions and proposed changes or alternative actions that do not currently exist or operate at the installation. For these reasons, on-site noise monitoring is seldom used at military air installations, especially when the aircraft mix and operational tempo are not uniform.

Noise Associated with Aircraft Operations

New areas that were not previously within the 65 dB DNL noise contour generated by Navy aircraft operations under the No Action Alternative would be under the 65 dB DNL noise contour associated with the action alternatives. Although some of these areas are over water, others are over land and would therefore result in some additional people living within the 65 dB DNL noise contour.

Other supplemental metrics utilized in the analysis show additional events of indoor and outdoor speech interference, an increase in the number of events causing classroom/learning interference, an increase in the probability of awakening, and an increase in the population that may be vulnerable to experiencing potential hearing loss of 5 dB or more.

This section presents potential noise impacts related to aircraft operations for the No Action Alternative and the three action alternatives.

The methodology and metrics used for evaluating potential noise impacts associated with the Proposed Action was developed based on guidance from the Department of Defense Noise Working Group as well as public scoping comments received on this project. The analysis contained within this section, by alternative, is presented in two parts, discussed below.

Day-Night Average Sound Level (DNL), which is the federal standard for analyzing the long-term community annoyance with noise exposure from aircraft operations. The data associated with the DNL analysis are presented utilizing the following outputs:

- DNL contour maps
- acreages and population within the projected noise contours

Supplemental Noise Metrics, which are used to provide more detailed information on potential impacts of noise exposure as it relates to specific noise effects. The data associated with the supplemental noise metrics are presented utilizing the following outputs:

- single event noise levels for 30 points of interest (POIs)
- indoor speech Interference for 19 POIs (residences and schools)
- classroom/learning interference for nine POIs (schools, residences [where schools may be located])

- sleep disturbance for 19 POIs (residences, schools [in residential locations])
- potential noise effects on recreation for 11 POIs (parks)
- Potential hearing loss for populations within the 80 decibel (dB) DNL contour

In addition, a review of existing literature addressing nonauditory health effects from aircraft noise exposure is summarized in Section 3.2.3, with a more in-depth review provided in Appendix A, Draft Aircraft Noise Study.

Although the noise analysis presented in this section is specific to the noise environment as it relates to aircraft operations, there would be other noise generated as part of the Proposed Action, such as construction noise and occupational noise. However, based upon scoping comments received, the location and duration of the potential noise, as well as other factors, these types of noise impacts were not considered potentially significant. They are discussed individually below, and they would generally be the same impact across the three action alternatives.

Construction Noise

Construction noise generated by multiple construction, modification, expansion, and demolition projects under each action alternative would result in short-term noise impacts at and near Ault Field. Construction activities are described in Section 2.4.2.3. Since the proposed construction is located on the flight line, aircraft-related noise would likely dominate construction noise. No residential areas or other POIs are located in the vicinity of the proposed construction activity; therefore, there would not be a significant construction-noise-related impact. There is no proposed construction at OLF Coupeville associated with the Proposed Action.

Occupational Noise

Navy occupational noise exposure prevention procedures, such as hearing protection and monitoring, would continue to be required at the NAS Whidbey Island complex in compliance with all applicable Occupational Safety and Health Administration and Navy occupational noise exposure regulations. As a result, these measures are designed to minimize occupational hearing hazards, and no increased risk of hearing impacts associated with occupational noise would be expected to occur under the Proposed Action compared to the affected environment conditions.

4.2.1 Noise, No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur, and the Navy would not operate additional Growler aircraft (see Section 2.4.2.4). Consequently, implementing the No Action Alternative, or taking “no action”, means annual Growler airfield operations would be consistent with levels identified in the 2005 and 2012 transition Environmental Assessments (EAs). The transition of the P-3 to the P-8A aircraft would still take place as it is a separate, ongoing action. Therefore, the DNL noise contours presented in Section 3.2.4, Noise Affected Environment, were modeled based upon the anticipated aircraft operating levels for Calendar Year 2021 (CY21). Implementation of the No Action Alternative would, by default, result in the same acreage and population coverage as noted under the affected environment (see Table 3.2-2).

Similarly, the supplemental analyses (indoor and outdoor speech interference, classroom/learning interference, sleep disturbance, and potential hearing loss conditions) presented throughout Section 3.2.4 would be the same under the No Action Alternative, and there would be no change from the affected environment. Therefore, no significant impacts to the noise environment would occur with implementation of the No Action Alternative.

4.2.2 Noise, Alternative 1

This section outlines the noise environment as modeled for Alternative 1 and describes the noise conditions associated with aircraft activity at Ault Field and OLF Coupeville using DNL and several supplemental noise metrics outlined in Section 3.2, including equivalent sound level (L_{eq}), sound exposure level (SEL), maximum A-weighted sound level (L_{max}), and the number of events above a threshold, which are used to evaluate such noise effects as community noise exposure, indoor and outdoor speech interference, sleep disturbance, classroom/learning interference, and potential hearing loss. Additional information on the noise metrics is also available in Appendix A, Draft Aircraft Noise Study.

4.2.2.1 Noise Potential Impacts, Alternative 1

The following sections detail potential impacts using projected DNL contours (the federally approved noise metric) and several supplemental metrics (to more fully describe the noise effects).

4.2.2.1.1 Projected DNL Contours, Alternative 1

As part of the noise analysis and as discussed in Section 3.2.1.1, the DNL noise contours for the action alternatives were modeled for an "average year" at Ault Field and OLF Coupeville. An average year represents conditions that are projected to occur on an annual basis, or a typical operating tempo at the NAS Whidbey Island complex. In addition, the three scenarios, which present the optional FCLP allocations, were modeled individually to provide a comparative presentation of the potential noise levels.

Figure 4.2-1 presents the projected DNL noise contours for Scenarios A, B, and C under Alternative 1. This overview figure of the NAS Whidbey Island complex (both Ault Field and OLF Coupeville) presents the 65 dB DNL contour for Scenarios A, B, and C for comparison.

Figures 4.2-2 through 4.2-4 present the three scenarios separately for Ault Field, and Figures 4.2-5 through 4.2-7 present the three scenarios separately for OLF Coupeville. In these sets of figures, the projected 60 dB, 65 dB, 70 dB, and greater than 75 dB DNL contours for Alternative 1 are compared to the No Action Alternative DNL contours. The 65 dB DNL contour at Ault Field extends approximately 10 miles from the four runway endpoints. Under Alternative 1, the length of these lobes is primarily due to the Growler on the approach portion of the GCA patterns (described in Section 3.1), where the aircraft generally descends on a 3-degree glide slope through 3,000 feet above ground level AGL 10 miles from the runway.

The DNL noise exposure at OLF Coupeville is due to the FCLPs. The 65 to less than 70 dB DNL contour range takes the shape of two ovals, on each side of OLF Coupeville's runway, which corresponds to the FCLP flight tracks. The 65 dB DNL contours extend approximately 2 miles to the north and south of the airfield under Scenarios A, B, and C. Generally speaking, around Ault Field, the 65 dB DNL contours associated with Scenario C extend the farthest from the airfield and cover the most area (14,355 acres, compared to 13,247 acres under Scenario A). Conversely, around OLF Coupeville, the 65 dB DNL contours associated with Scenario A extend the farthest from the airfield and cover the most area (10,563 acres, compared to 8,613 acres under Scenario C). The differences between the scenarios at the two airfields are sometimes small (nearly overlapping) and at other times can differ by approximately one mile. The differences are more prominent at Ault Field toward the ends of the four lobes of the noise contour, which is commonly located over water. The difference in noise contours at OLF Coupeville between the scenarios is more pronounced than at Ault Field due to the larger proportional difference of operations at OLF Coupeville than at Ault Field.

Table 4.2-1 presents an overall comparison of the number of acres and population in each of the DNL contour ranges, as well as the difference in conditions between the No Action Alternative and Alternative 1, Scenarios A, B, and C. As indicated in the table, the total change in population within the entire 65 dB DNL contour increases from the No Action Alternative by between 442 and 1,979 at Ault Field, depending on the scenario and, for OLF Coupeville, increases from the No Action Alternative by between 535 and 1,316, depending on the scenario.

For purposes of comparison and to be fully transparent regarding the possible range of impacts that could arise from the Proposed Action, DNL noise contours were also modeled for a high-tempo FCLP year, which represents conditions when pre-deployment training for multiple units overlaps and, therefore, FCLP activity would be expected to increase over average conditions. The high-tempo FCLP year data are depicted on the same figures noted previously, as well as included in Appendix A, Draft Aircraft Noise Study. Figures 4.2-2 through 4.2-7 present both the average year and high-tempo FCLP year DNL noise contours on the same figures for the airfields to illustrate the relatively small differences in the overall noise environment, with many of the areas where they diverge occurring over water.

Table 4.2-1 Estimated Acreage and Population within the DNL Contour Ranges[1] for the NAS Whidbey Island Complex, Alternative 1 (Average Year)[2,3]

	DNL Contour Ranges							
	65 to <70 dB DNL		*70 to <75 dB DNL*		*Greater than or equal to 75 dB DNL*		*Total*	
	Area (acres)	*Pop[4]*	*Area (acres)*	*Pop[4]*	*Area (acres)*	*Pop[4]*	*Area (acres)*	*Pop[4]*
Ault Field								
No Action Alternative								
Average Year	3,557	2,995	3,030	2,345	5,587	3,377	12,174	8,717
Alternative 1								
Scenario A (20/80 FCLP split)	4,164 (+607)	3,563 (+568)	3,239 (+209)	2,117 (-228)	5,844 (+257)	3,479 (+102)	13,247 (+1,073)	9,159 (+442)
Scenario B (50/50 FCLP split)	4,172 (+615)	3,776 (+781)	3,069 (+39)	2,382 (+37)	6,539 (+952)	3,886 (+509)	13,780 (+1,606)	10,044 (+1,327)
Scenario C (80/20 FCLP split)	4,257 (+700)	4,087 (+1,092)	2,970 (-60)	2,343 (-2)	7,128 (+1,541)	4,266 (+889)	14,355 (+2,181)	10,696 (+1,979)
OLF Coupeville								
No Action Alternative								
Average Year	3,742	880	3,181	820	836	616	7,759	2,316
Alternative 1								
Scenario A (20/80 FCLP split)	1,574 (-2,168)	687 (-193)	3,013 (-168)	850 (+30)	5,976 (+5,140)	2,095 (+1,479)	10,563 (+2,804)	3,632 (+1,316)
Scenario B (50/50 FCLP split)	1,698 (-2,044)	513 (-367)	3,820 (+639)	1,133 (+313)	4,325 (+3,489)	1,609 (+993)	9,843 (+2,084)	3,255 (+939)
Scenario C (80/20 FCLP split)	3,543 (-199)	1,008 (+128)	3,649 (+468)	1,081 (+261)	1,421 (+585)	762 (+146)	8,613 (+854)	2,851 (+535)
NAS Whidbey Island Complex								
No Action Alternative								
Average Year	7,299	3,875	6,211	3,165	6,423	3,993	19,933	11,033
Alternative 1								
Scenario A (20/80 FCLP split)	5,738 (-1,561)	4,250 (+375)	6,252 (+41)	2,967 (-198)	11,820 (+5,397)	5,574 (+1,581)	23,810 (+3,877)	12,791 (+1,758)
Scenario B (50/50 FCLP split)	5,870 (-1,429)	4,289 (+414)	6,889 (+678)	3,515 (+350)	10,864 (+4,441)	5,495 (+1,502)	23,623 (+3,690)	13,299 (+2,266)
Scenario C (80/20 FCLP split)	7,800 (+501)	5,095 (+1,220)	6,619 (+408)	3,424 (+259)	8,549 (+2,126)	5,028 (+1,035)	22,968 (+3,035)	13,547 (+2,514)

Table 4.2-1 Estimated Acreage and Population within the DNL Contour Ranges[1] for the NAS Whidbey Island Complex, Alternative 1 (Average Year)[2,3]

	DNL Contour Ranges							
	65 to <70 dB DNL		*70 to <75 dB DNL*		*Greater than or equal to 75 dB DNL*		*Total*	
	Area (acres)	*Pop[4]*	*Area (acres)*	*Pop[4]*	*Area (acres)*	*Pop[4]*	*Area (acres)*	*Pop[4]*

Notes:

1 Scenarios A, B and C are outlined in Section 2.3.3, where the split represents the percent of FCLPs conducted at Ault Field and OLF Coupeville, respectively (i.e., 20/80 FCLP split = 20 percent of FCLPs at Ault Field and 80 percent of FCLPs at OLF Coupeville).

2 Acreage presented does not include areas over water or areas over the NAS Whidbey Island complex.

3 The difference between the No Action Alternative and Alternative 1 is noted in parentheses.

4 Population counts of people within the DNL contour ranges were computed using 2010 Census block-level data. The percent area of the census block covered by the DNL contour range was applied to the population of that census block to estimate the population within the DNL contour range (e.g., if 25 percent of the census block is within a DNL contour range, then 25 percent of the population is included in the population count). This calculation assumes an even distribution of the population across the census block, and it excludes population on military properties within the DNL contour ranges (NAS Whidbey Island [Ault Field], the Seaplane Base, and OLF Coupeville). In addition, a 5.4-percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period (Washington State Office of Financial Management, 2012). These data should be used for comparative purposes only and are not considered actual numbers within the DNL contour range.

5 Numbers have been rounded to ensure totals sum.

Key:
dB = decibel
DNL = day-night average sound level
FCLP = Field Carrier Landing Practice

In addition, Table 4.2-2 shows the percentage change in acreage and population between the average year DNL contour ranges and the high-tempo FCLP year DNL contour ranges. The higher percent change means the deviation between the average year DNL noise contours and the high-tempo FCLP year DNL noise contours is larger; however, most changes are within +/- 5 percent of zero.

Table 4.2-2 Percent Difference in the Estimated Acreage and Population within the Average and High-Tempo FCLP Year DNL Contour Ranges for the NAS Whidbey Island Complex, Alternative 1

	DNL Contour Ranges[1]							
	65 to <70 dB DNL		*70 to <75 dB DNL*		*Greater than or equal to 75 dB DNL*		*Total*	
DNL Contours	*Area (acres)*	*Pop*	*Area (acres)*	*Pop*	*Area (acres)*	*Pop*	*Area (acres)*	*Pop*
Ault Field								
Scenario A	0.7%	1.3%	0.5%	2.9%	1.8%	1.5%	1.1%	1.7%
Scenario B	0.8%	1.8%	-0.1%	1.0%	1.9%	1.9%	1.1%	1.6%
Scenario C	0.6%	2.4%	-1.0%	-1.1%	2.7%	4.2%	1.3%	2.3%
OLF Coupeville								
Scenario A	3.9%	8.3%	-8.0%	-8.2%	6.6%	5.3%	2.0%	2.7%
Scenario B	-6.0%	0.4%	-1.0%	-3.0%	5.3%	5.0%	0.9%	1.5%
Scenario C	-0.6%	-1.1%	-0.2%	0.1%	5.0%	2.2%	0.5%	0.2%
NAS Whidbey Island Complex								
Scenario A	1.6%	2.5%	-3.6%	-0.3%	4.2%	2.9%	1.5%	2.0%
Scenario B	-1.2%	1.6%	-0.6%	-0.3%	3.2%	2.7%	1.0%	1.6%
Scenario C	0.1%	1.7%	-0.6%	-0.7%	3.0%	3.9%	1.0%	1.9%

Key:
dB = decibel
DNL = day-night average sound level
NAS = Naval Air Station
OLF = outlying landing field

Figure 4.2-1 Alternative 1 Overview of 65 dB DNL Noise Contours for the NAS Whidbey Island Complex

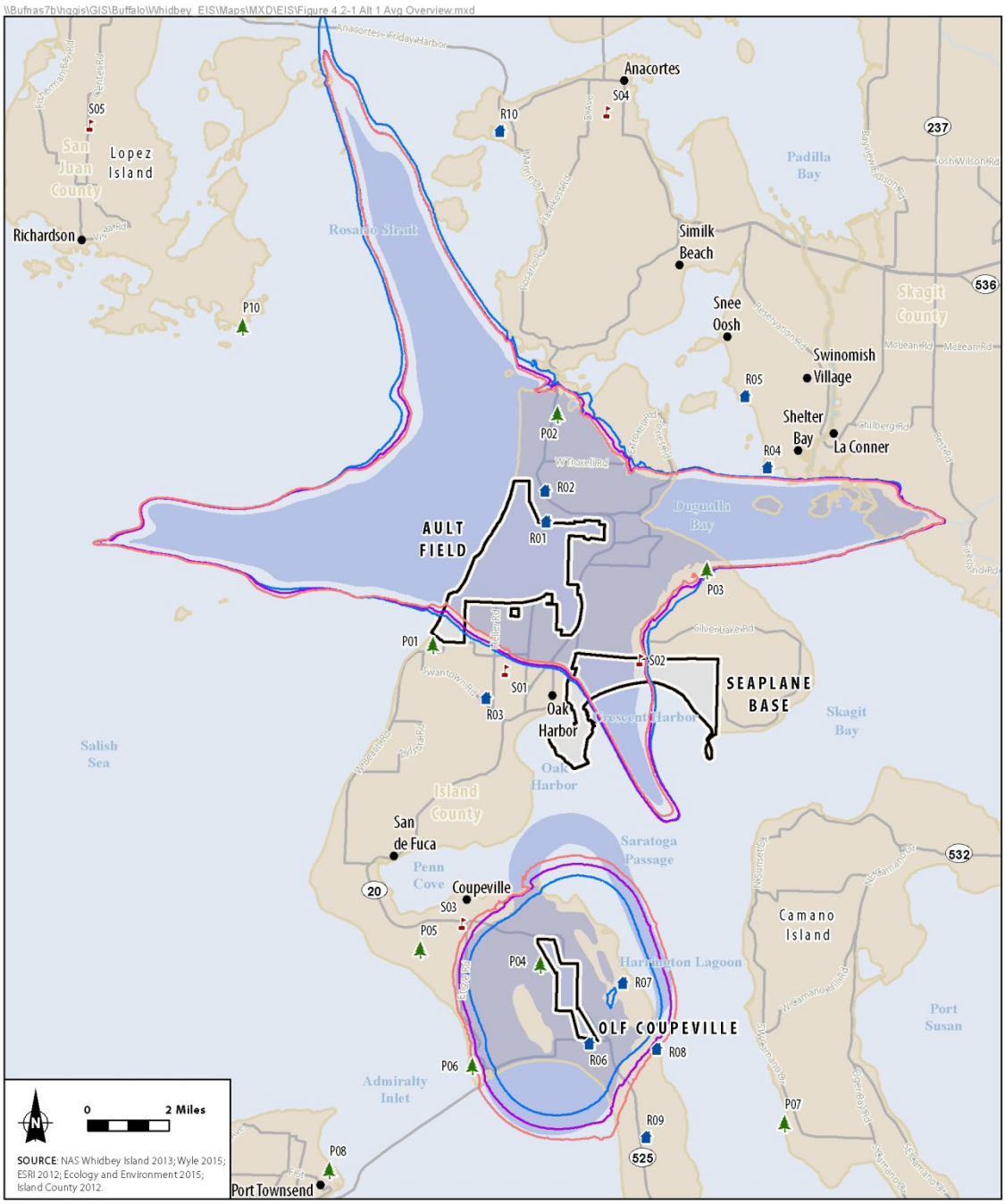


Figure 4.2-1
Alternative 1 Overview of the 65 dB DNL Noise Contours for the NAS Whidbey Island Complex
Whidbey Island, Island County, WA

Figure 4.2-2 Alternative 1A DNL Noise Contours for Ault Field

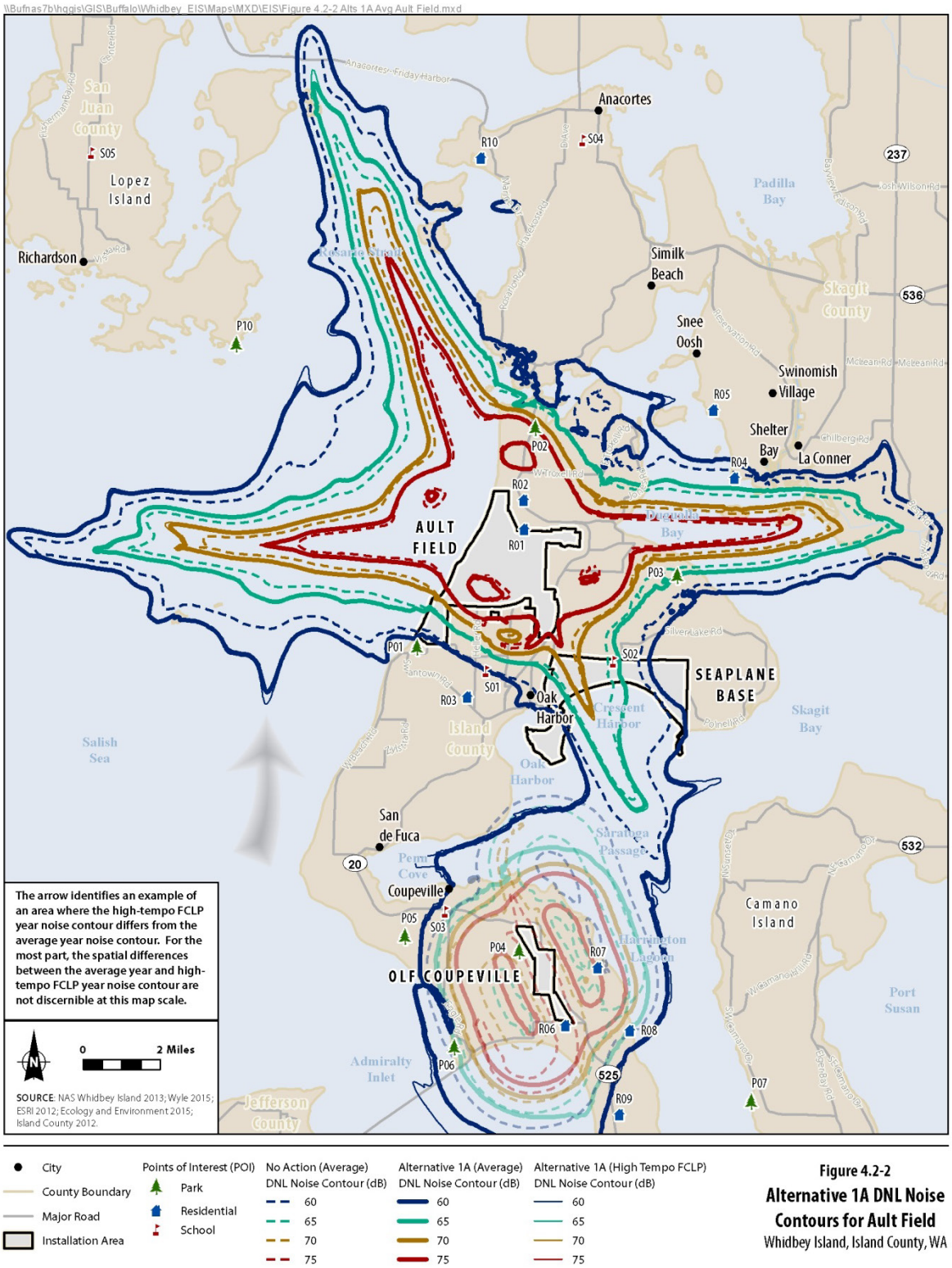


Figure 4.2-2
Alternative 1A DNL Noise Contours for Ault Field
Whidbey Island, Island County, WA

Figure 4.2-3 Alternative 1B DNL Noise Contours for Ault Field

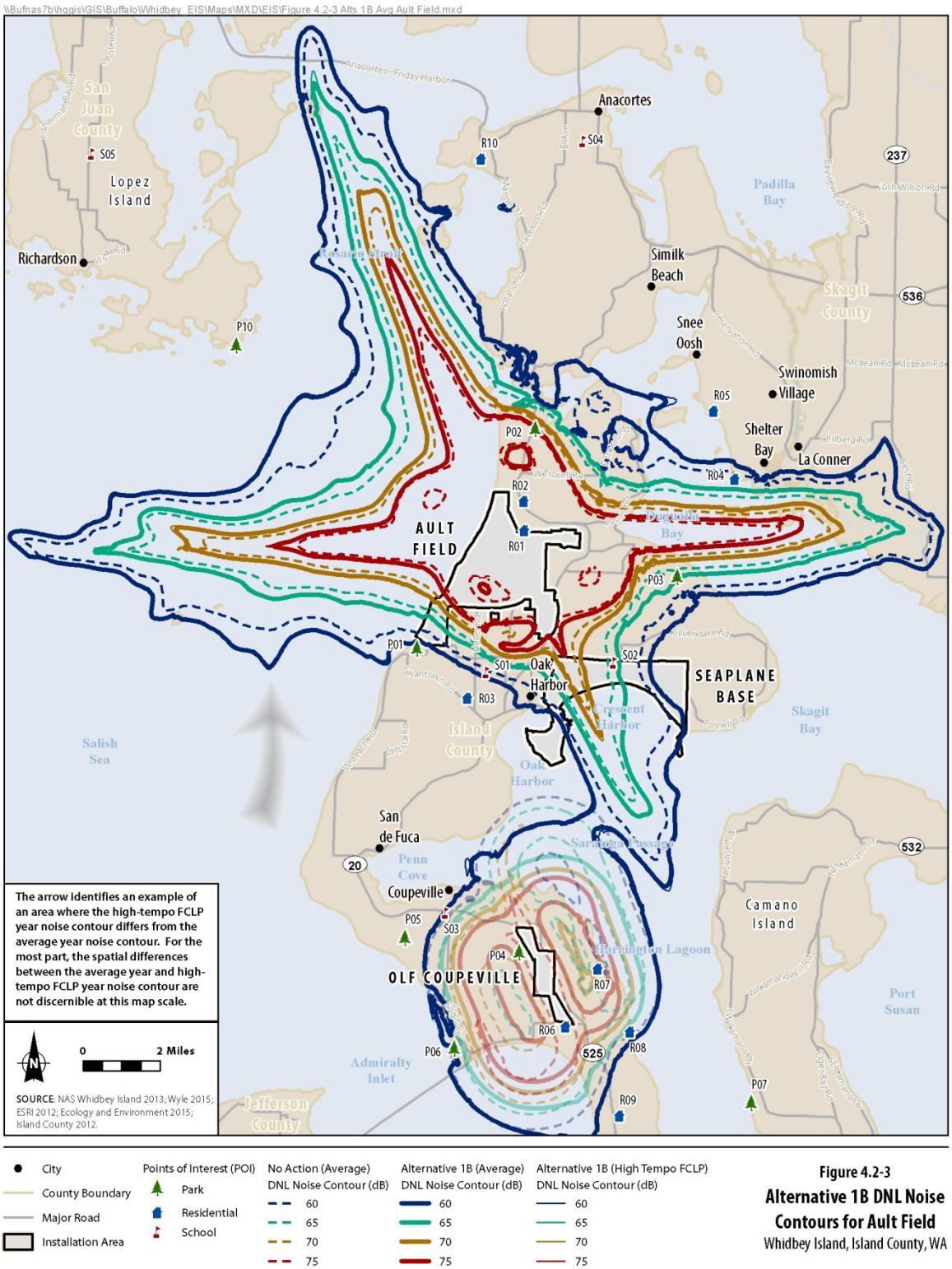


Figure 4.2-4 Alternative 1C DNL Noise Contours for Ault Field

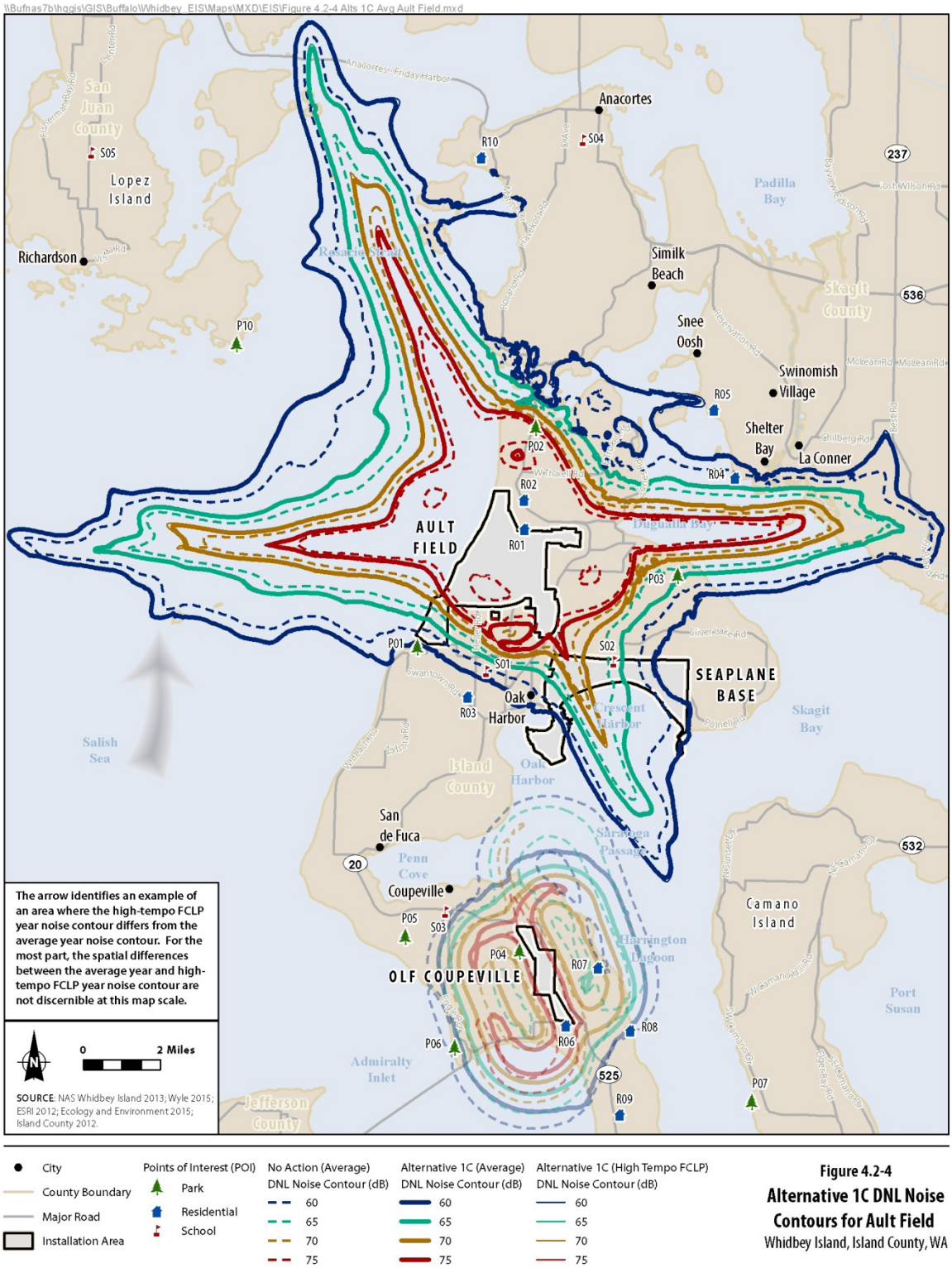


Figure 4.2-4
Alternative 1C DNL Noise Contours for Ault Field
Whidbey Island, Island County, WA

Figure 4.2-5 Alternative 1A DNL Noise Contours for OLF Coupeville

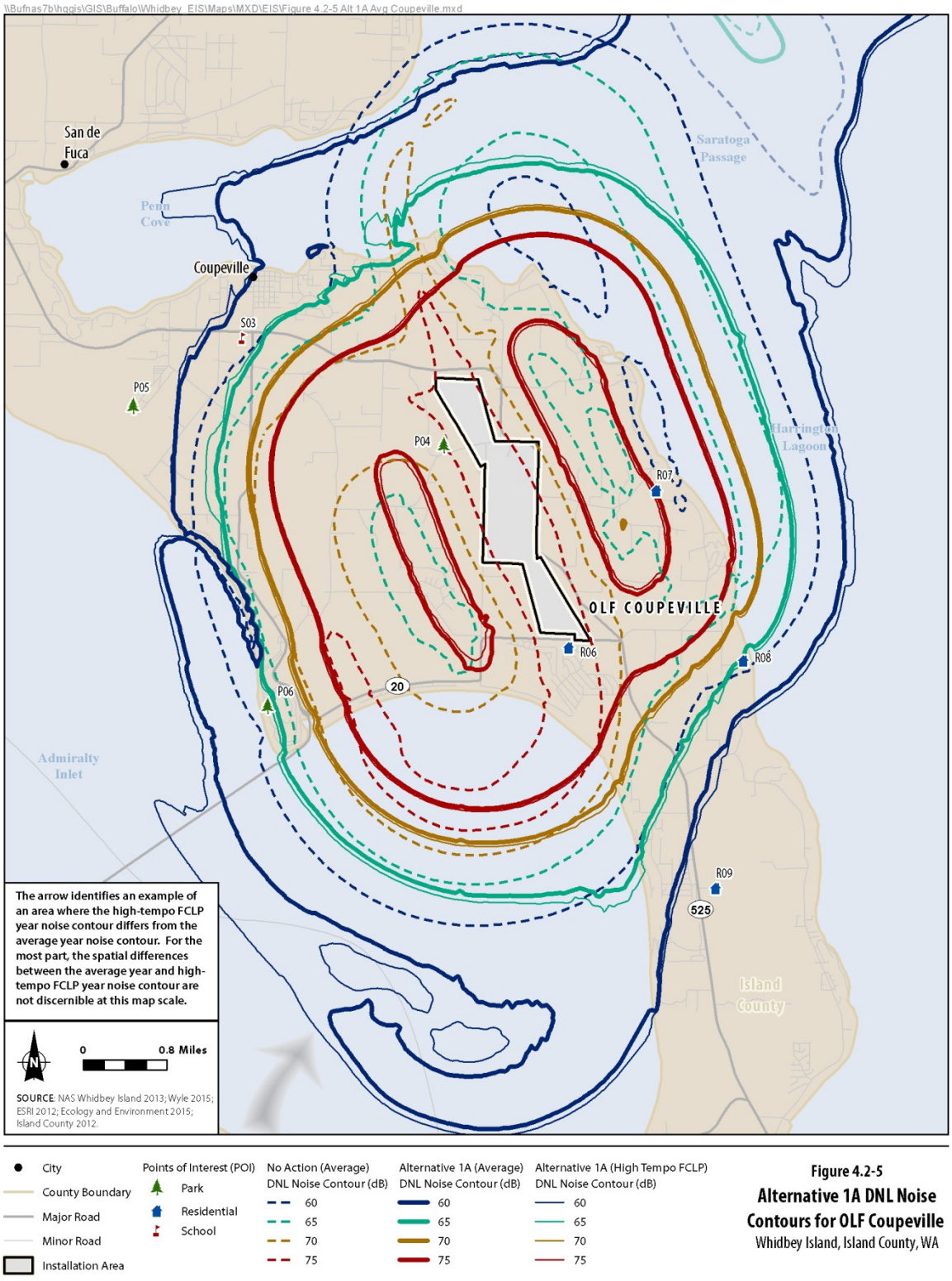


Figure 4.2-6 Alternative 1B DNL Noise Contours for OLF Coupeville

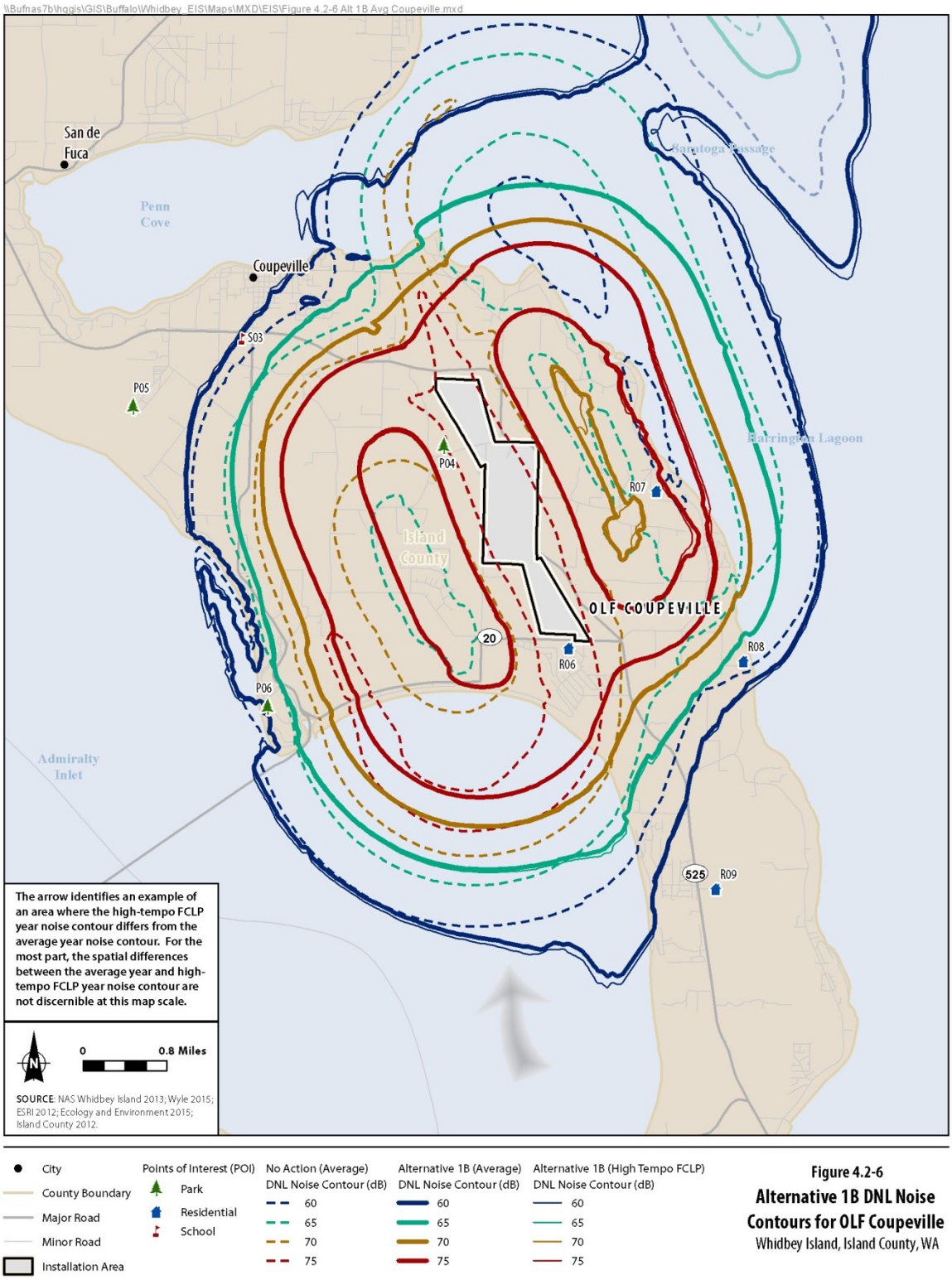


Figure 4.2-7 Alternative 1C DNL Noise Contours for OLF Coupeville

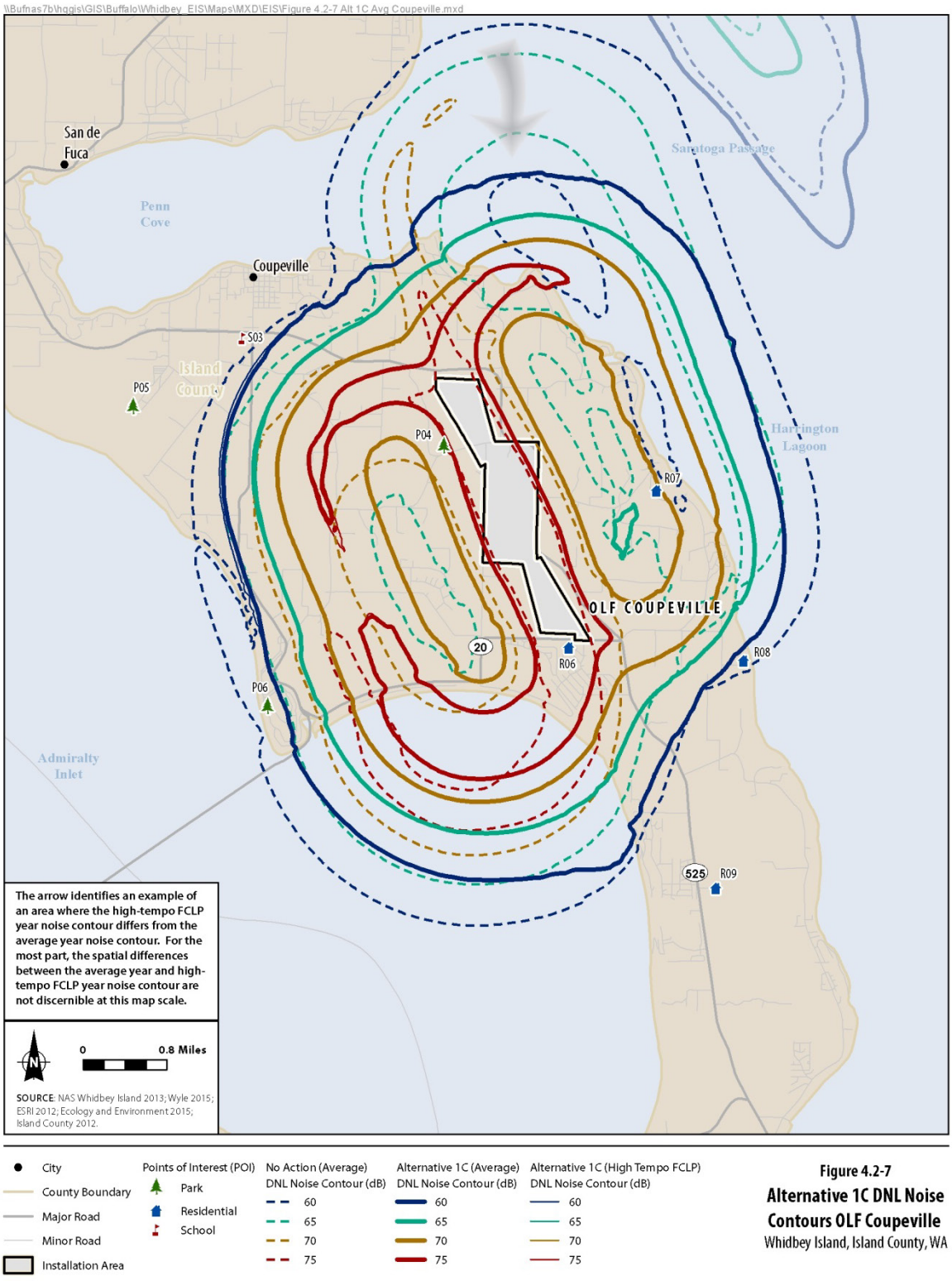


Figure 4.2-7
Alternative 1C DNL Noise Contours OLF Coupeville
Whidbey Island, Island County, WA

4.2.2.1.2 Supplemental Noise Analyses, Alternative 1

Additional supplemental noise analyses were conducted for a variety of representative POIs identified in the communities surrounding Ault Field and OLF Coupeville. The wide geographic distribution of POIs provides broad coverage and context to compare the noise effects under each of the alternatives with the noise effects for the No Action Alternative. These supplemental noise analyses include single event noise, speech interference, classroom/learning interference, sleep disturbance, potential noise effects on recreation, and potential hearing loss. The POIs chosen for this analysis are presented in Section 3.2, and they are depicted on Figure 3.2-6. Not all POIs are used for each analysis because as the location and type of POI dictates whether the particular analysis would apply.

Single Event Noise

Two noise metrics are used to evaluate single event noise: SEL and L_{max}. The SEL metric is a composite metric that represents both the intensity of a sound and its duration. SEL provides a measure of total sound energy of an entire acoustic event (i.e., arrival, departure, or T&G). The L_{max} metric is the maximum, instantaneous level of noise that a particular event produces, and it is most closely related to what an individual would hear. The SEL and L_{max} provide the noise level of a single aircraft event. These events are intermittent in nature, and, therefore, the noise levels do not represent a continuous source of noise. For more details on SEL or L_{max}, see Section 3.2.2 as well as Appendix A, Draft Aircraft Noise Study.

The SEL and L_{max} values for the loudest single event (i.e., arrival, departure, or T&G) for each POI under Alternative 1 at Ault Field and OLF Coupeville are presented in Table 4.2-3. Under Alternative 1, the maximum SEL/ L_{max} values vary depending on the location of the POI and its proximity to the airfields and flight tracks. These noise level measurements under Alternative 1 are compared to the noise level measurements that were modeled under the No Action Alternative, and the difference is noted in the table.

As shown in the data, many of the maximum SEL and L_{max} values modeled under Alternative 1 are identical to those modeled in the No Action Alternative analysis. Measurements at only six of the 30 POIs changed from the No Action Alternative to Alternative 1 (measurements increased at R06 and R07 and decreased at R08, R09, S03, and S07). In addition, the SEL and L_{max} values for the representative POIs are all identical under all of the three action alternatives. However, the number of annual aircraft events that would produce these noise levels would differ between the three action alternatives and in comparison to the No Action Alternative. Table 4.2-3 also presents the number of annual aircraft events that produces the loudest single event for each POI.

What this analysis shows is that while there may not be a substantive difference in the loudest event at a particular POI, there may be a difference in the number of times that loudest event would occur between alternatives and compared to the No Action Alternative. Under Alternative 1, some of the POIs would experience more annual events of the maximum SEL/ L_{max} than under the No Action Alternative, and other POIs would experience fewer annual events of the maximum SEL/L_{max}. The POI R06 (Admirals Dr. and Byrd Dr.) would experience the largest increase in annual events (+2,383 under Scenario A); the POI P04 Ebey's Landing – Rhododendron Park would experience the largest decrease in annual events (-95 under Scenario C). Generally, POIs near OLF Coupeville experienced more annual events under Scenario A than under Scenarios B or C.

Under Alternative 1, the number of events that would produce the maximum SEL/ L_{max} values varies between the scenarios, depending on the POI (see Table 4.2-3). For example, on the high end, at Admirals Drive and Byrd Drive (R06) under Scenario A, a person would be exposed to the maximum SEL/ L_{max} an average of approximately seven times per day compared to the low end, such as at Cama Beach State Park (P07) under Scenario C, where a person would be exposed to the maximum SEL/ L_{max} an average of approximately once every month.

Table 4.2-3 Maximum Sound Exposure Level (dB) and Maximum Sound Level (dB) for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 1 (Average Year)[1]

		Maximum SEL (dB)		*L_{max} (dB)*		*Number of Annual Events[2]*			
ID	*Description*	*No Action Alternative*	*Alt 1*	*No Action Alternative*	*Alt 1*	*No Action Alternative*	*Alt 1 A*	*Alt 1 B*	*Alt 1 C*
Residences									
R01	Sullivan Rd.	121	121 (0)	114	114 (0)	26	88 (+62)	55 (+29)	18 (-8)
R02	Salal St. and N. Northgate Dr.	109	109 (0)	96	96 (0)	12	117 (+105)	63 (+51)	34 (+22)
R03	Central Whidbey	101	101 (0)	93	93 (0)	34	41 (+7)	42 (+8)	40 (+6)
R04	Pull and Be Damned Point	96	96 (0)	88	88 (0)	208	267 (+59)	249 (+41)	249 (+41)
R05	Snee-Oosh Point	92	92 (0)	84	84 (0)	733	1,033 (+300)	946 (+213)	918 (+185)
R06	Admirals Dr. and Byrd Dr.	118	121 (+3)	114	118 (+4)	267	2,650 (+2,383)	1,613 (+1,346)	649 (+382)
R07	Race Lagoon	114	115 (+1)	106	110 (+4)	55	515 (+460)	346 (+291)	132 (+77)
R08	Pratts Bluff	112	101 (-11)	105	92 (-13)	75	515 (+440)	346 (+271)	132 (+57)
R09	Cox Rd. and Island Ridge Way	92	90 (-2)	82	81 (-1)	72	23 (-49)	29 (-43)	18 (-54)
R10	Skyline	100	100 (0)	90	90 (0)	261	366 (+105)	338 (+77)	387 (+126)
R11	Sequim	73	73 (0)	60	60 (0)	74	102 (+28)	98 (+24)	109 (+35)
R12	Port Angeles	75	75 (0)	65	65 (0)	208	267 (+59)	249 (+41)	249 (+41)
Schools									
S01	Oak Harbor High School	99	99 (0)	90	90 (0)	26	111 (+85)	67 (+41)	27 (+1)
S02	Crescent Harbor Elementary School	102	102 (0)	94	94 (0)	178	298 (+120)	301 (+123)	312 (+134)
S03	Coupeville Elementary School	98	94 (-4)	90	85 (-5)	367	1,325 (+958)	807 (+440)	324 (-43)
S04	Anacortes High School	93	93 (0)	83	83 (0)	112	157 (+45)	145 (+33)	166 (+54)
S05	Lopez Island School	76	76 (0)	68	68 (0)	110	173 (+63)	125 (+15)	169 (+59)

Table 4.2-3 Maximum Sound Exposure Level (dB) and Maximum Sound Level (dB) for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 1 (Average Year)[1]

		Maximum SEL (dB)		*L_{max} (dB)*		*Number of Annual Events[2]*			
ID	*Description*	*No Action Alternative*	*Alt 1*	*No Action Alternative*	*Alt 1*	*No Action Alternative*	*Alt 1 A*	*Alt 1 B*	*Alt 1 C*
S06	Friday Harbor Elementary School	53	53 (0)	39	39 (0)	26	20 (-6)	27 (+1)	33 (+7)
S07	Sir James Douglas Elementary	62	62 (0)	52	51 (-1)	147	207 (+60)	189 (+42)	184 (+37)
Parks									
P01	Joseph Whidbey State Park	93	93 (0)	82	82 (0)	34	41 (+7)	42 (+8)	40 (+6)
P02	Deception Pass State Park	110	110 (0)	104	104 (0)	161	694 (+533)	422 (+261)	172 (+11)
P03	Dugualla State Park	105	105 (0)	98	98 (0)	110	175 (+65)	166 (+56)	171 (+61)
P04	Ebey's Landing – Rhododendron Park	112	112 (0)	106	106 (0)	267	694 (+427)	422 (+155)	172 (-95)
P05	Ebey's Landing – Ebey's Prairie	88	88 (0)	77	77 (0)	367	1,437 (+1,070)	872 (+505)	357 (-10)
P06	Fort Casey State Park	96	96 (0)	85	85 (0)	267	1,325 (+1,058)	807 (+540)	324 (+57)
P07	Cama Beach State Park	83	83 (0)	73	73 (0)	5	43 (+38)	29 (+24)	11 (+6)
P08	Port Townsend	85	85 (0)	n/a	n/a (0)	24	19 (-5)	21 (-3)	22 (-2)
P09	Moran State Park	62	62 (0)	51	51 (0)	61	47 (-14)	62 (+1)	78 (+17)
P10	San Juan Island National Monument	95	95 (0)	85	85 (0)	372	524 (+152)	482 (+110)	553 (+181)
P11	San Juan Island Visitors Center	63	63 (0)	50	50 (0)	147	207 (+60)	189 (+42)	184 (+37)

Notes:

[1] The difference between the No Action Alternative and Alternative 1 is noted in parentheses for both the maximum SEL and L_{max} metrics, as well as the number of annual events.

[2] The number of annual events is the estimated number of times the single aircraft event with the maximum SEL or L_{max} at that POI would occur annually.

Key:

dB = decibel

L_{max} = maximum sound level

n/a = not available; the aircraft that generates the highest L_{max} at this POI is the P-8A.

SEL = sound exposure level

Speech Interference

Conversations or indoor speech are assumed to be interrupted when a single aircraft event exceeds the maximum sound level, or L_{max}, of 50 dB indoors (Wyle, 2009). Normal conversation is about 60 dB; therefore, the use of a 50 dB indoor level is a very conservative threshold such that a soft speaking voice could be heard. For this analysis, the model calculated the number of events occurring per daytime hour (7:00 a.m. to 10:00 p.m.) that are greater than the maximum sound level, or L_{max}, of 50 dB at the 12 residential POIs and the seven schools, since they are commonly located in residential areas. Because the individual is assumed to be indoors for this analysis, noise level reduction factors were applied because the walls, doors, insulation, and other building features reduce the noise levels inside. The analysis was conducted assuming both "windows-open" and "windows-closed" conditions. Table 4.2-4 presents the average daily (7:00 a.m. to 10:00 p.m.) events per hour that exceed an L_{max} of 50 dB indoors at these POIs under Alternative 1, Scenarios A, B, and C.

Compared to the No Action Alternative, Alternative 1 would result in between 0 and 4 additional events per hour at representative POIs during which conversations or indoor speech would be interrupted. The largest change (with four additional events per daytime hour) would occur at R01 (Sullivan Road) and R02 (Salal St. and N. Northgate Dr.), both under Scenario C. However, there are also several POIs at which no change would occur under any of the scenarios compared to the No Action Alternative.

Table 4.2-4 Average Number of Events per Hour of Indoor Speech Interference for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 1 (Average Year)[1]

		No Action Alternative		Scenario A		Scenario B		Scenario C	
		Average Number of Events per Daytime Hour[2]							
ID	Description	Windows Open[3]	Windows Closed[3]	Windows Open[3]	Windows Closed[3]	Windows Open[3]	Windows Closed[3]	Windows Open[3]	Windows s Closed[3]
Residences									
R01	Sullivan Rd.	8	8	10 (+2)	10 (+2)	11 (+3)	11 (+3)	12 (+4)	12 (+4)
R02	Salal St. and N. Northgate Dr.	8	7	10 (+2)	9 (+2)	11 (+3)	10 (+3)	11 (+3)	11 (+4)
R03	Central Whidbey	2	-	3 (+1)	- (0)	3 (+1)	- (0)	3 (+1)	- (0)
R04	Pull and Be Damned Point	4	2	5 (+1)	2 (0)	6 (+2)	2 (0)	6 (+2)	2 (0)
R05	Snee-Oosh Point	2	-	2 (0)	1 (+1)	2 (0)	1 (+1)	2 (0)	1 (+1)
R06	Admirals Dr. and Byrd Dr.	1	1	3 (+2)	3 (+2)	2 (+1)	2 (+1)	1 (0)	1 (0)
R07	Race Lagoon	-	-	2 (+2)	1 (+1)	1 (+1)	1 (+1)	1 (+1)	0 (0)
R08	Pratts Bluff	-	-	2 (+2)	1 (+1)	1 (+1)	1 (+1)	1 (+1)	- (0)
R09	Cox Rd and Island Ridge	1	-	3 (+2)	- (0)	2 (+1)	- (0)	1 (0)	- (0)
R10	Skyline	-	-	1 (+1)	- (0)	1 (+1)	- (0)	1 (+1)	- (0)
R11	Sequim	-	-	- (0)	- (0)	- (0)	- (0)	- (0)	- (0)
R12	Port Angeles	-	-	- (0)	- (0)	- (0)	- (0)	- (0)	- (0)
Schools									
S01	Oak Harbor High School	5	1	6 (+1)	2 (+1)	7 (+2)	2 (+1)	8 (+3)	2 (+1)
S02	Crescent Harbor Elementary	4	1	5 (+1)	2 (+1)	6 (+2)	1 (0)	6 (+2)	1 (0)
S03	Coupeville Elementary	1	1	3 (+2)	2 (+1)	2 (+1)	1 (0)	1 (0)	1 (0)
S04	Anacortes High School	-	-	- (0)	- (0)	- (0)	- (0)	- (0)	- (0)
S05	Lopez Island School	-	-	- (0)	- (0)	- (0)	- (0)	- (0)	- (0)
S06	Friday Harbor Elementary	-	-	- (0)	- (0)	- (0)	- (0)	- (0)	- (0)
S07	Sir James Douglas Elementary	-	-	- (0)	- (0)	- (0)	- (0)	- (0)	- (0)

Table 4.2-4 Average Number of Events per Hour of Indoor Speech Interference for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 1 (Average Year)[1]

		No Action Alternative		Scenario A		Scenario B		Scenario C	
		Average Number of Events per Daytime Hour[2]							
ID	Description	Windows Open[3]	Windows Closed[3]	Windows Open[3]	Windows Closed[3]	Windows Open[3]	Windows Closed[3]	Windows Open[3]	Windows Closed[3]

Notes:

1 The difference between the No Action Alternative and Alternative 1 is noted in parentheses. Hyphens (-) indicate result equals zero.

2 Number of annual average daily daytime (7:00 a.m. to 10:00 p.m.) events at or above an indoor maximum single event sound level (L_{max}) of 50 dB, which is a conservative threshold as normal conversation is about 60 decibels (dB). See Figure 3.2-1 for examples of sound levels (in dB) from some typical sources, such as "quiet urban daytime" at 40 dB and a garbage disposal at 80 dB.

3 Noise level reductions of 15 dB and 25 dB for windows open and closed, respectively, based upon the walls, doors, insulation and other building features that reduce the noise levels inside (FICON, 1992).

Classroom/learning Interference

Two metrics were analyzed to evaluate the potential for classroom/learning interference due to noise events from aircraft overflights: interior equivalent sound level ($L_{eq(8hr)}$) during an 8-hour school day (8:00 a.m. to 4:00 p.m.), and the average number of interfering aircraft events per hour during that time period. Single aircraft events that generate interior sound levels (L_{max}) greater than 50 dB have the potential to interfere with student and teacher interaction by affecting conversation and comprehension (Wyle, 2009). Because the classroom interaction occurs indoors for this analysis, noise level reduction factors were applied because the walls, doors, insulation, and other building features reduce the noise levels inside. The analysis considered both windows-open and windows-closed conditions. Table 4.2-5 presents the 8-hour equivalent sound level ($L_{eq(8h)}$) and the number of events that exceed an L_{max} of 50 dB indoors under Alternative 1, Scenarios A, B, and C at the representative POIs, which are schools (and the two residential POIs located in the vicinity of schools). It is important to note that Table 4.2-5 presents average values, and there may be periods when aircraft are operating more frequently, thereby generating more interfering events, and other periods when they are not operating at all and therefore have no potential for classroom/learning interference.

Table 4.2-5 Average Number of Events per Hour of Indoor Classroom/learning Interference for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 1 (Average Year)[1]

		No Action Alternative				Scenario A				Scenario B				Scenario C			
		Windows Open[2]		Windows Closed[2]		Windows Open[2]		Windows Closed[2]		Windows Open[2]		Windows Closed[2]		Windows Open[2]		Windows Closed[2]	
ID	Description	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]
School Surrogates																	
R03	Central Whidbey	<45	2	<45	-	49	3 (+1)	<45	- (0)	49	3 (+1)	<45	- (0)	49	3 (+1)	<45	- (0)
R11	Sequim	<45	-	<45	-	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)
Schools																	
S01	Oak Harbor High School	<45	5	<45	1	48	6 (+1)	<45	2 (+1)	48	7 (+2)	<45	2 (+1)	49	7 (+2)	<45	2 (+1)
S02	Crescent Harbor Elementary	49	4	<45	1	55	5 (+1)	45	2 (+1)	55	6 (+2)	45	2 (+1)	56	6 (+2)	46	2 (+1)
S03	Coupeville Elementary	<45	1	<45	-	48	2 (+1)	<45	2 (+2)	46	2 (+1)	<45	1 (+1)	<45	1 (0)	<45	- (0)
S04	Anacortes High School	<45	-	<45	-	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)
S05	Lopez Island School	<45	-	<45	-	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)
S06	Friday Harbor Elementary	<45	-	<45	-	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)
S07	Sir James Douglas Elementary	<45	-	<45	-	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)

Table 4.2-5 Average Number of Events per Hour of Indoor Classroom/learning Interference for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 1 (Average Year)[1]

		No Action Alternative				Scenario A				Scenario B				Scenario C			
		Windows Open[2]		Windows Closed[2]		Windows Open[2]		Windows Closed[2]		Windows Open[2]		Windows Closed[2]		Windows Open[2]		Windows Closed[2]	
ID	Description	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]

Notes:

1 The difference between the No Action Alternative and Alternative 1 is noted in parentheses. Hyphens (-) indicate result equals zero.

2 Noise level reductions of 15 dB and 25 dB for windows open and closed, respectively, based upon the walls, doors, insulation, and other building features that reduce the noise levels inside (FICON, 1992).

3 For this metric, daily classroom hours are assumed to be 8:00 a.m. to 4:00 p.m.

4 Number of average school-day events per hour during an 8-hour school day (8:00 a.m. to 4:00 p.m.) at or above an indoor maximum single event sound level (L_{max}) of 50 dB, which is a conservative threshold as normal conversation is about 60 dB. See Figure 3.2-1 for examples of sound levels (in dB) from some typical sources, such as "quiet urban daytime" at 40 dB and a garbage disposal at 80 dB.

Key:

dB = decibel

$L_{eq(8hr)}$ = 8-hour sound level equivalent

L_{max} = maximum sound level

Most schools would experience interior $L_{eq(8hr)}$ due to Navy aircraft operations close to ambient levels of 45 dB or less, which would not impact learning and conversation. Crescent Harbor Elementary School (S02) would experience the highest $L_{eq(8hr)}$ of 49 dB for No Action and the highest under all scenarios of 56 dB when windows are open. When windows are closed, the $L_{eq(8hr)}$ at Crescent Harbor Elementary School (S02) would drop to 45 or 46 dB, depending on the scenario. Given the relatively cool climate in the area, it is likely that windows at schools would be closed a majority of the time.

The potential for classroom interference from single aircraft events generating sound levels inside classrooms greater than 50 dB L_{max} would increase under Alternative 1 by up to two events per hour (at S01, S02, and S03) compared to the No Action Alternative; that is, on average, no school would experience an increase of more than two learning-disrupting events per hour under any scenario under Alternative 1 compared to the No Action Alternative. Oak Harbor High School (S01) and Crescent Harbor Elementary School (S02) under Scenarios B and C (with windows open) and Coupeville Elementary (S03) under Scenario A (with windows closed) show the highest increase of classroom/learning interference, at an additional two events per hour. All other schools either show no change from the No Action Alternative or an increase of one event per hour during the school day, primarily under the windows-open condition. Under the windows-closed condition, nearly all of the schools would be expected to experience more than one additional event per hour of classroom/learning interference, with most being unchanged from the No Action Alternative. Many modern schools have central air conditioning and heating systems; therefore, it is more likely that classroom windows would remain closed the majority of the time.

Sleep Disturbance

The analysis of sleep disturbance is a calculation of the probability of awakening from aircraft overflights. Thus, it is based on the outdoor SEL at each of the residential POIs, converted to an indoor SEL. Events that were considered are those that occur between 10:00 p.m. and 7:00 a.m. Although individuals sleep outside of these hours, these are considered typical sleeping hours for this type of analysis. Table 4.2-6 presents the results of the sleep disturbance analysis for the 12 POI locations that are in the residential category, as well as the seven schools, which are commonly located in residential areas.

Under Alternative 1, the majority of the POIs analyzed show an increase in the percent probability of awakening for all scenarios during nights of average aircraft activity. The highest percent increase is for R06 (Admirals Drive and Byrd Drive), where there would be an increase of 48 percent under Scenario A with windows open, meaning that there is a 48-percent greater probability, or chance of awakening at least once under windows-open conditions compared to the No Action Alternative. Generally, the POIs around OLF Coupeville had a higher percent probability of awakening under Scenario A than under Scenarios B or C, and for the POIs around Ault Field, there was a larger increase in the percent probability of awakening for Scenario C than Scenarios A or B.

Table 4.2-6 Average Indoor Nightly[1] Probability of Awakening[2] for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 1 (Average Year)[3]

		No Action Alternative		Scenario A		Scenario B		Scenario C	
ID	Description	Windows Open[4]	Windows Closed[4]	Windows Open[4]	Windows Closed[4]	Windows Open[4]	Windows Closed[4]	Windows Open[4]	Windows Closed[4]
Residences									
R01	Sullivan Rd.	69%	53%	78% (+9%)	63% (+10%)	84% (+15%)	69% (+16%)	89% (+20%)	76% (+23%)
R02	Salal St. and N. Northgate Dr.	51%	37%	60% (+9%)	45% (+8%)	66% (+15%)	50% (+13%)	74% (+23%)	58% (+21%)
R03	Central Whidbey	21%	10%	29% (+8%)	14% (+4%)	32% (+11%)	17% (+7%)	37% (+16%)	20% (+10%)
R04	Pull and Be Damned Point	25%	12%	32% (+7%)	16% (+4%)	36% (+11%)	18% (+6%)	41% (+16%)	19% (+7%)
R05	Snee-Oosh Point	20%	6%	26% (+6%)	10% (+4%)	29% (+9%)	10% (+4%)	34% (+14%)	11% (+5%)
R06	Admirals Dr. and Byrd Dr.	13%	8%	61% (+48%)	46% (+38%)	43% (+30%)	31% (+23%)	20% (+7%)	14% (+6%)
R07	Race Lagoon	6%	3%	35% (+29%)	23% (+20%)	24% (+18%)	15% (+12%)	13% (+7%)	6% (+3%)
R08	Pratts Bluff	6%	3%	25% (+19%)	17% (+14)	17% (+11%)	11% (+8%)	7% (+1%)	4% (+1%)
R09	Cox Rd and Island Ridge Way	4%	3%	21% (+17%)	14% (+11%)	13% (+9%)	9% (+6%)	6% (+2%)	3% (0%)
R10	Skyline	7%	2%	10% (+3%)	4% (+2%)	11% (+4%)	4% (+2%)	15% (+8%)	5% (+3%)
R11	Sequim	0%	0%	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)
R12	Port Angeles	0%	0%	1% (+1%)	0% (0%)	1% (+1%)	0% (0%)	1% (+1%)	0% (0%)
Schools (near residential areas)[5]									
S01	Oak Harbor High School	27%	16%	34% (+7%)	20% (+4%)	39% (+12%)	23% (+7%)	45% (+18%)	29% (+13%)
S02	Crescent Harbor Elementary	27%	16%	35% (+8%)	21% (+5%)	39% (+12%)	24% (+8%)	45% (+18%)	30% (+14%)
S03	Coupeville Elementary	7%	4%	29% (+22%)	19% (+15%)	19% (+12%)	12% (+8%)	9% (+2%)	5% (+1%)
S04	Anacortes High School	2%	1%	4% (+2%)	1% (0%)	4% (+2%)	1% (0%)	4% (+2%)	1% (0%)
S05	Lopez Island School	0%	0%	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)
S06	Friday Harbor Elementary	0%	0%	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)
S07	Sir James Douglas Elementary	0%	0%	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)

Table 4.2-6 Average Indoor Nightly[1] Probability of Awakening[2] for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 1 (Average Year)[3]

		No Action Alternative		Scenario A		Scenario B		Scenario C	
ID	Description	Windows Open[4]	Windows Closed[4]	Windows Open[4]	Windows Closed[4]	Windows Open[4]	Windows Closed[4]	Windows Open[4]	Windows Closed[4]

Notes:

1 For this metric, nightly sleeping hours are assumed to be 10:00 p.m. to 7:00 a.m.

2 This metric represents the probability of awakening at least once during a night of average aircraft noise activities.

3 The difference between the No Action Alternative and Alternative 1 is noted in parentheses.

4 Noise level reductions of 15 dB and 25 dB for windows open and closed, respectively, based upon the walls, doors, insulation, and other building features that reduce the noise levels inside (FICON, 1992).

5 All school POIs were included in the potential sleep disturbance analysis because of their typical proximity to residential areas.

Potential Noise Effects on Recreation

The analysis of potential noise effects on recreation is based on the number of events occurring per daytime hour (7:00 a.m. to 10:00 p.m.) that are greater than the maximum sound level of 65 dB outdoors (to capture outdoor speech interference). Details on the analysis of outdoor speech interference are available in Section 3.2, as well as in Appendix A, Draft Aircraft Noise Study. Table 4.2-7 presents the results of the analysis for Alternative 1 for the 11 POIs that are considered parks or recreational centers with primarily outdoor features.

Under Alternative 1, the data in the table show a slight increase for some POIs where there would be potential for up to three additional daytime events per hour during which a recreationist may experience outdoor speech interference. For many of the POIs, there is no change from the No Action Alternative. As the data indicate and as expected, when the POI is closer to OLF Coupeville, there would be more events under Scenario A, whereas if the POI is located closer to Ault Field, there would be more events under Scenario C. Section 4.5 has additional discussion on parks and recreation in the vicinity of the airfields. The data show that there is a range of potential outdoor speech interference that may disturb individuals participating in outdoor recreational activities depending on the location of the POI relative to the airfields and flight tracks. The average number of events is mostly consistent with those expected under the No Action Alternative conditions; however, some POIs may experience an increase in the average daily events. These increases range from zero to an increase of three events per hour (P03), depending on the scenario.

Table 4.2-7 Average Number of Events per Hour of Outdoor Speech Interference for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 1 (Average Year)[1]

		No Action Alternative	*Alternative 1*		
			Scenario A	*Scenario B*	*Scenario C*
		Annual Average Daily Daytime Events per Hour			
ID	*Description*	*NA65 L_{max} [2]*	*NA65 L_{max} [2]*	*NA65 L_{max} [2]*	*NA65 L_{max} [2]*
P01	Joseph Whidbey State Park	5	6 (+1)	6 (+1)	6 (+1)
P02	Deception Pass State Park	6	7 (+1)	8 (+2)	8 (+2)
P03	Dugualla State Park	7	8 (+1)	9 (+2)	10 (+3)
P04	Ebey's Landing National Historical Reserve	1	3 (+2)	2 (+1)	1 (0)
P05	Ebey's Landing State Park	1	2 (+1)	1 (0)	1 (0)
P06	Fort Casey State Park	1	3 (+2)	2 (+1)	1 (0)
P07	Cama Beach State Park	-	- (0)	- (0)	- (0)
P08	Port Townsend	-	- (0)	- (0)	- (0)
P09	Moran State Park	-	- (0)	- (0)	- (0)
P10	San Juan Island National Monument	2	3 (+1)	3 (+1)	3 (+1)
P11	San Juan Island Visitors Center	-	- (0)	- (0)	- (0)

Notes:

1 The difference between the No Action Alternative and Alternative 1 is noted in parentheses. Hyphens (-) indicate result equals zero.

2 Number of events at or above an outdoor maximum single event sound level (L_{max}) of 65 dB; this reflects potential for outdoor speech interference.

Key:

dB = decibel

L_{max} = 24-hour Equivalent Sound Level

NA65 = Number of Events above an L_{max} of 65 dB

Potential Hearing Loss

The available literature on the subject of permanent threshold shifts and aircraft noise exposure indicates that exposure to military aviation noise has not resulted in permanent threshold shifts, even in sensitive populations such as children. Ludlow and Sixsmith found permanent threshold shifts are unlikely to be caused by exposures to aircraft noise thought to be typical of those who have lived on or near jet air stations. Additionally, the report found that there were no major differences in audiometric test results between military personnel who, as children, had lived on or near installations where jet

aircraft operations were based and military personnel who, as children, had no such exposure (Ludlow and Sixsmith, 1999; ACRP 2008).

As part of this analysis, an evaluation of the risk of potential hearing loss for populations in the areas around the NAS Whidbey Island complex was conducted (including both Ault Field and OLF Coupeville). Details on the potential hearing loss metric, methodology for the analysis, and assumptions are outlined in Section 3.2, as well as Appendix A, Draft Aircraft Noise Study. The 1982 *U.S. EPA Guidelines for Noise Impact Analysis* provides that people who experience continuous, daily exposure to high noise over a normal working lifetime of 40 years, with exposure lasting 8 hours per day for 5 days per week, beginning at an age of 20 years old, may be at risk for a type of hearing loss called Noise Induced Permanent Threshold Shift (NIPTS). NIPTS defines a permanent change in hearing level, or threshold, caused by exposure to noise (USEPA, 1982). This workplace exposure standard, which is being applied to outdoor noise levels, is not intended to accurately describe the impact of intermittent noise events such as periodic aircraft overflights but is presented as a "worst-case" analytical tool. To put the conservative nature of this analysis into context, the national average of time spent indoors is approximately 87 percent (or almost 21 hours of the day) (Klepeis et al., n.d.). With intermittent aircraft operations and the time most people spend indoors, it is very unlikely that individuals would experience noise exposure that would result in hearing loss. In fact, it is highly unlikely for an individual living around Ault Field or OLF Coupeville to meet all of the criteria upon which the Potential Hearing Loss (PHL) metric is based. Nonetheless, this analysis is provided per DoD policy directive to support informed decision making and provide a standard for comparison across a wide range of proposed actions that result in community exposure to aircraft noise.

The procedure for determining potential hearing loss includes first identifying the number of persons residing in the greater than or equal to 80 dB DNL contour. Then, $L_{eq(24)}$ contours are developed by 1 dB increments in order to determine the potential for NIPTS for both the population with average sensitivity to noise and the population with the most sensitivity to noise. Table 4.2-8 presents the potentially affected populations in and near Ault Field and OLF Coupeville by 1 dB increments of the 24-hour equivalent sound level ($L_{eq(24)}$) as compared to the No Action Alternative numbers presented in Section 3.2.

According to the USEPA, changes in hearing level of less than 5 dB are generally not considered noticeable.

According to the USEPA, changes in hearing level of less than 5 dB are generally not considered noticeable (USEPA, 1974). Therefore, using the data provided in Table 4.2-8 for the population with average sensitivity to noise, the level at which there may be a noticeable NIPTS would be at the 84 to 85 dB $L_{eq(24)}$ range and above. There is an increase in the population within the 80 dB DNL noise contour (i.e., potential at-risk population) under Alternative 1 at both Ault Field and OLF Coupeville. The largest increase in the potential at-risk population in the vicinity of Ault Field would be under Scenario C (58 additional people) and for OLF Coupeville would be under Scenario A (136 additional people). The range of potential NIPTS could be up to 9.5 dB at Ault Field and 7.5 dB at OLF Coupeville. The potential NIPTS values presented in Table 4.2-8 are only applicable in the extreme case of continuous outdoor exposure at one's residence to all aircraft events occurring over a period of 40 years. Because it is highly unlikely for any individuals to meet all those criteria, the actual potential NIPTS for individuals would be far less than the values reported here.

In addition, the actual value of NIPTS for any given person will depend on his or her physical sensitivity to noise; some could experience more hearing loss than others (DNWG, 2013). Therefore, to capture this, the USEPA Guidelines provided information on the estimated NIPTS exceeded by the 10 percent of the population most sensitive to noise. Using the same 1 dB incremental data in Table 4.2-8 and the column identified as the 10^{th} Percentile NIPTS, those individuals are vulnerable to noticeable NIPTS at the 77 to 78 dB $L_{eq(24)}$ range and above. Using this even more conservative estimate, the range of potential NIPTS could be up to 18.0 dB for the most noise sensitive population around Ault Field and up to 15.0 dB for the most noise sensitive population around OLF Coupeville. As noted previously, it is highly unlikely that any individuals would meet all the criteria of being outdoors at one's residence and exposed to all aircraft events over a 40-year period; therefore, the actual potential NIPTS for individuals would be far less than the values reported here.

Table 4.2-8 Average and 10th Percentile Noise Induced Permanent Threshold Shifts (NIPTS) as a Function of Equivalent Sound Level under Alternative 1 at NAS Whidbey Island Complex (Average Year)

Band of $L_{eq(24)}$ (dB)[1]	Avg NIPTS (dB)[2,3]	10th Pct NIPTS (dB)[2,3]	Estimated Population[4,5,6] Ault Field No Action	Ault Field Alt 1A	Ault Field Alt 1B	Ault Field Alt 1C	OLF Coupeville No Action	OLF Coupeville Alt 1A	OLF Coupeville Alt 1B	OLF Coupeville Alt 1C
75-76	1.0	4.0	-	- (0)	1 (+1)	95 (+95)	67	62 (-5)	41 (-26)	28 (-39)
76-77	1.0	4.5	143	173 (+30)	276[7] (+133)	376[8] (+233)	55	184 (+129)	109 (+54)	59 (+4)
77-78	1.5	5.0	274	260 (-14)	401 (+127)	392 (+118)	51	165 (+114)	82 (+31)	55 (+4)
78-79	2.0	5.5	131	179 (+48)	299 (+168)	393 (+262)	36	118 (+82)	73 (+37)	60 (+24)
79-80	2.5	6.0	81	96 (+15)	208 (+127)	275 (+194)	16	81 (+65)	65 (+49)	70 (+54)
80-81	3.0	7.0	71	75 (+4)	99 (+28)	231 (+160)	4	72 (+68)	59 (+55)	2 (-2)
81-82	3.5	8.0	51	69 (+18)	75 (+24)	89 (+38)	-	66 (+66)	55 (+55)	1 (+1)
82-83	4.0	9.0	34	50 (+16)	66 (+32)	71 (+37)	-	60 (+60)	61 (+61)	- (0)
83-84	4.5	10.0	25	38 (+13)	41 (+16)	52 (+27)	-	54 (+54)	65 (+65)	- (0)
84-85	5.5	11.0	16	22 (+6)	28 (+12)	31 (+15)	-	59 (+59)	2 (+2)	- (0)
85-86	6.0	12.0	12	15 (+3)	21 (+9)	23 (+11)	-	72 (+72)	1 (+1)	- (0)
86-87	7.0	13.5	5	9 (+4)	15 (+10)	18 (+13)	-	4 (+4)	- (0)	- (0)
87-88	7.5	15.0	4	5 (+1)	9 (+5)	15 (+11)	-	1 (+1)	- (0)	- (0)
88-89	8.5	16.5	1	4 (+3)	4 (+3)	6 (+5)	-	- (0)	- (0)	- (0)
89-90	9.5	18.0	-	1 (+1)	2 (+2)	3 (+3)	-	- (0)	- (0)	- (0)

Table 4.2-8 Average and 10th Percentile Noise Induced Permanent Threshold Shifts (NIPTS) as a Function of Equivalent Sound Level under Alternative 1 at NAS Whidbey Island Complex (Average Year)

Band of $L_{eq(24)}$ (dB)[1]	Avg NIPTS (dB)[2,3]	10th Pct NIPTS (dB)[2,3]	Estimated Population[4,5,6]							
			Ault Field				OLF Coupeville			
			No Action	Alt 1A	Alt 1B	Alt 1C	No Action	Alt 1A	Alt 1B	Alt 1C

Notes:

1 L_{eq} bands with no population were omitted from table.

2 NIPTS values rounded to nearest 0.5 dB.

3 NIPTS below 5 dB are generally not considered noticeable.

4 This analysis assumes the population is outdoors at one's residence and exposed to all aircraft noise events, every day, for 40 years. Given the amount of time spent indoors and the intermittent occurrence of aircraft noise events, it is highly unlikely that individuals would meet all those criteria, and the actual potential for hearing loss would be far less than the values reported here.

5 Estimated Population was determined by those living within the 80 dB DNL noise contour around each airfield, including those living on-base at Ault Field (there is no on-base population at OLF Coupeville).

6 Population counts of people within the DNL contours were computed using 2010 census block-level data. The percent area of the census block covered by the DNL contour range was applied to the population of that census block to estimate the population within the DNL contour range (e.g., if 25 percent of the census block is within a DNL contour, then 25 percent of the population is included in the population count). This calculation assumes an even distribution of the population across the census block. A 5.4 percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period (Washington State Office of Financial Management, 2012). In addition, per guidance on potential hearing loss, on-base populations at Ault Field have been included in the analysis. These data should be used for comparative purposes only and are not considered actual numbers within the DNL contour range.

7 Of this estimated population, 87 are military personnel living on-base at Ault Field.

8 Of this estimated population, 720 are military personnel living on-base at Ault Field.

Key:

dB = decibel

$L_{eq(24)}$ = 24-hour Equivalent Sound Level

NIPTS = Noise Induced Permanent Threshold Shift

Nonauditory Health Effects

Per studies noted and evaluated in Section 3.2.3, the data and research are inconclusive with respect to the linkage between potential nonauditory health effects of aircraft noise exposure. As outlined within the analysis of DNL contours and supplemental metrics presented within this section, the data show that the Proposed Action would result in both an increase in the number of people exposed to noise as well as those individuals exposed to higher levels of noise. However, research conducted to date has not made a definitive connection between intermittent military aircraft noise and nonauditory health effects. The results of most cited studies are inconclusive and cannot identify a causal link between aircraft noise exposure and the various type of nonauditory health effects that were studied. An individual's health is greatly influenced by many factors known to cause health issues, such as hereditary factors, medical history, and life style choices regarding smoking, diet, and exercise. Research has demonstrated that these factors have a larger and more direct effect on a person's health than aircraft noise.

Vibration Effects from Aircraft Operations

In addition to the noise effects on the population outlined above, noticeable structural vibration may result from certain aircraft operations at either Ault Field or OLF Coupeville. Depending on the aircraft operation, altitude, heading, power settings, and the structure, certain vibration effects may be observed. Typically, the structural elements that are most susceptible to vibration from aircraft noise are windows and sometimes walls or ceilings. Conservatively, only sounds lasting more than one second above a sound level of 130 dB are potentially damaging to structural components of a building (CHABA, 1977). Noise-induced structural vibration may cause annoyance to dwelling occupants because of induced secondary vibrations, or "rattle," of objects within the dwelling, such as hanging pictures, dishes, plaques, and bric-a-brac. Loose window panes may also vibrate noticeably when exposed to high levels of airborne noise, causing homeowners to fear breakage. See Appendix A, Draft Aircraft Noise Study, and the Noise and Vibration Associated with Operational Impacts discussion in Section 4.6.2.1 for additional details on noise-induced vibration effects.

The data show that the Proposed Action will result in both an increase in the number of aircraft operations and area/structures exposed to noise. Therefore, there could be an increase in vibration effects due to the Proposed Action. However, as shown in Table 4.2-3, for the representative POIs analyzed, the highest L_{max} value was 118 dB, and therefore sound levels damaging to structural components of buildings are not likely to occur.

4.2.2.2 Noise Conclusion, Alternative 1

Overall, Alternative 1 would have significant noise impacts in the communities surrounding Ault Field and OLF Coupeville. Both the total number of acres and the total number of individuals within the DNL noise contours would increase for all scenarios analyzed. There would be a larger impact to the communities around Ault Field under Scenario C, while there would be a larger impact for the communities around OLF Coupeville under Scenario A.

There would be a slight increase in the number of incidents of indoor and outdoor speech interference, and classroom interference. There would also be a higher probability of awakening under all scenarios, especially for POIs located closer to the airfields. In addition, depending on the scenario, the population potentially at risk for potential hearing loss would increase. The range of potential NIPTS could be up to 9.5 dB at Ault Field and 7.5 dB at OLF Coupeville for the population with average sensitivity to noise and

up to 18.0 dB at Ault Field and 15.0 dB at OLF Coupeville for the population highly sensitive to noise (the 10 percent of the population with the most sensitivity to noise). The potential NIPTS values are only applicable in the extreme case of continuous outdoor exposure at one's residence to all aircraft events occurring over a period of 40 years. As it is highly unlikely any individuals would meet all these criteria, the actual potential NIPTS for individuals would be far less than the values reported here. With intermittent aircraft operations and the time most people spend indoors, it is very unlikely that individuals would experience noise exposure that would result in hearing loss. Nonetheless, this analysis is provided per DoD policy directive to support informed decision making.

4.2.3 Noise, Alternative 2

This section outlines the noise environment as modeled for Alternative 2 and describes the noise conditions associated with aircraft activity at Ault Field and OLF Coupeville using DNL and several supplemental noise metrics outlined in Section 3.2, including L_{eq}, SEL, L_{max}, and the number of events above a threshold, which are used to evaluate such noise effects as community noise exposure, indoor and outdoor speech interference, sleep disturbance, classroom/learning interference, and potential hearing loss. Additional information on the noise metrics is also available in Appendix A, Draft Aircraft Noise Study.

4.2.3.1 Noise Potential Impacts, Alternative 2

The following sections detail potential impacts using projected DNL contours (the federally approved noise metric) and several supplemental metrics (to more fully describe the noise effects).

4.2.3.1.1 Projected DNL Contours, Alternative 2

As part of the noise analysis and as discussed in Section 3.2.1.1, the DNL noise contours for the action alternatives were modeled for an "average year" at Ault Field and OLF Coupeville. An average year represents conditions that are projected to occur on an annual basis, or a typical operating tempo at the NAS Whidbey Island complex. In addition, the three scenarios, which present the optional FCLP allocations, were modeled individually to provide a comparative presentation of the potential noise levels.

Figure 4.2-8 presents the projected DNL noise contours for Scenarios A, B and C under Alternative 2. This overview figure of the NAS Whidbey Island complex (both Ault Field and OLF Coupeville) presents the 65 dB DNL contour for Scenarios A, B, and C for comparison.

Figures 4.2-9 through 4.2-11 present the three scenarios separately for Ault Field, and Figure 4.2-12 through 4.2-14 present the three scenarios separately for OLF Coupeville. In these sets of figures, the projected 60 dB, 65 dB, 70 dB, and greater than 75 dB DNL contours for Alternative 2 are compared to the No Action Alternative DNL contours. The 65 dB DNL contour at Ault Field extends approximately 10 miles from the four runway endpoints. Under Alternative 2, the length of these contour lobes is primarily due to the Growler on the approach portion of the GCA patterns (described in Section 3.1), where the aircraft generally descends on a 3-degree glide slope through 3,000 feet AGL 10 miles from the runway.

Similar to the No Action Alternative and other alternatives, the shape of the DNL contour at OLF Coupeville would be determined by the FCLPs conducted at the airfield. The 65 to less than 70 dB DNL contour range takes the shape of two ovals, one on each side of OLF Coupeville's runway, which correspond to the FCLP flight tracks. Generally speaking, around Ault Field, the 65 dB DNL contours associated with Scenario C extend the farthest from the airfield and cover the most area (14,230 acres, compared to 13,194 acres under Scenario A). Conversely, around OLF Coupeville, the 65 dB DNL contours associated with Scenario A extend the farthest from the airfield and cover the most area (10,449 acres, compared to 8,518 acres under Scenario C). The differences between the scenarios at the two airfields are sometimes small (nearly overlapping) and at other times can differ by approximately one mile. The differences are more prominent at Ault Field toward the ends of the four lobes of the noise contour, which is commonly located over water. The difference in the noise contours at OLF Coupeville between the scenarios is more pronounced than at Ault Field due to the larger proportional difference of operations at OLF Coupeville than at Ault Field.

Table 4.2-9 presents an overall comparison of the number of acres and population in each of the DNL contour ranges, as well as the difference in conditions between the No Action Alternative and Alternative 2, Scenarios A, B, and C. As indicated in the table, the total change in population within the entire 65 dB DNL contour increases from the No Action Alternative by between 395 and 1,785 at Ault Field, depending on the scenario and, for OLF Coupeville, increases from the No Action Alternative by between 512 and 1,256, depending on the scenario.

For purposes of comparison and to be fully transparent regarding the possible range of impacts that could arise from the Proposed Action, DNL noise contours were also modeled for a high-tempo FCLP year, which represents conditions when pre-deployment training for multiple units overlaps and, therefore, FCLP activity would be expected to increase over average conditions. The high-tempo FCLP year data are depicted on the same figures noted previously, as well as included in Appendix A, Draft Aircraft Noise Study. Figures 4.2-9 through 4.2-14 present both the average year and high-tempo FCLP year DNL noise contours on the same figures for the airfields to illustrate the relatively small differences in the overall noise environment, with many of the areas where the contours diverge occurring over water.

Table 4.2-9 Estimated Acreage and Population within the DNL Contour Ranges[1] for the NAS Whidbey Island Complex, Alternative 2 (Average Year)[2,3]

	DNL Contour Range							
	65 to <70 dB DNL		*70 to <75 dB DNL*		*Greater than or equal to 75 dB DNL*		*Total*	
	Area (acres)	*Pop[4]*	*Area (acres)*	*Pop[4]*	*Area (acres)*	*Pop[4]*	*Area (acres)*	*Pop[4]*
Ault Field								
No Action Alternative								
Average Year	3,557	2,995	3,030	2,345	5,587	3,377	12,174	8,717
Alternative 2								
Scenario A (20/80 FCLP split)	4,154 (+597)	3,554 (+559)	3,246 (+216)	2,103 (-242)	5,794 (+207)	3,455 (+78)	13,194 (+1,020)	9,112 (+395)
Scenario B (50/50 FCLP split)	4,150 (+593)	3,747 (+752)	3,076 (+46)	2,374 (+29)	6,491 (+904)	3,857 (+480)	13,717 (+1,543)	9,978 (+1,261)
Scenario C (80/20 FCLP split)	4,245 (+688)	4,010 (+1,015)	2,990 (-40)	2,349 (+4)	6,995 (+1,408)	4,143 (+766)	14,230 (+2,056)	10,502 (+1,785)
OLF Coupeville								
No Action Alternative								
Average Year	3,742	880	3,181	820	836	616	7,759	2,316
Alternative 2								
Scenario A (20/80 FCLP split)	1,573 (-2,169)	655 (-225)	3,177 (-4)	900 (+80)	5,699 (+4,863)	2,017 (+1,401)	10,449 (+2,690)	3,572 (+1,256)
Scenario B (50/50 FCLP split)	1,805 (-1,937)	508 (-372)	3,883 (+702)	1,171 (+351)	4,047 (+3,211)	1,521 (+905)	9,735 (+1,976)	3,200 (+884)
Scenario C (80/20 FCLP split)	3,681 (-61)	1,053 (+173)	3,595 (+414)	1,065 (+245)	1,242 (+406)	710 (+94)	8,518 (+759)	2,828 (+512)
NAS Whidbey Island Complex								
No Action Alternative								
Average Year	7,299	3,875	6,211	3,165	6,423	3,993	19,933	11,033
Alternative 2								
Scenario A (20/80 FCLP split)	5,727 (-1,572)	4,209 (+334)	6,423 (+212)	3,003 (-162)	11,493 (+5,070)	5,472 (+1,479)	23,643 (+3,710)	12,684 (+1,651)
Scenario B (50/50 FCLP split)	5,955 (-1,344)	4,255 (+380)	6,958 (+748)	3,545 (+380)	10,538 (+4,115)	5,378 (+1,385)	23,452 (+3,519)	13,178 (+2,145)
Scenario C (80/20 FCLP split)	7,926 (+627)	5,063 (+1,188)	6,585 (+374)	3,414 (+249)	8,237 (+1,814)	4,853 (+860)	22,748 (+2,815)	13,330 (+2,297)

Table 4.2-9 Estimated Acreage and Population within the DNL Contour Ranges[1] for the NAS Whidbey Island Complex, Alternative 2 (Average Year)[2,3]

	DNL Contour Range							
	65 to <70 dB DNL		*70 to <75 dB DNL*		*Greater than or equal to 75 dB DNL*		*Total*	
	Area (acres)	*Pop[4]*	*Area (acres)*	*Pop[4]*	*Area (acres)*	*Pop[4]*	*Area (acres)*	*Pop[4]*

Notes:

1 Scenarios A, B, and C are outlined in Section 2.3.3, where the split represents the percent of FCLPs conducted at Ault Field and OLF Coupeville, respectively (i.e., 20/80 FCLP split = 20 percent of FCLPs at Ault Field and 80 percent of FCLPs at OLF Coupeville).

2 Acreage presented does not include areas over water or areas over the NAS Whidbey Island complex.

3 The difference between the No Action Alternative and Alternative 2 is noted in parentheses.

4 Population counts of people within the DNL contour ranges were computed using 2010 census block-level data. The percent area of the census block covered by the DNL contour range was applied to the population of that census block to estimate the population within the DNL contour range (e.g., if 25 percent of the census block is within a DNL contour range, then 25 percent of the population is included in the population count). This calculation assumes an even distribution of the population across the census block, and it excludes population on military properties within the DNL contour ranges (NAS Whidbey Island [Ault Field], the Seaplane Base, and OLF Coupeville). In addition, a 5.4-percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period (Washington State Office of Financial Management, 2012). These data should be used for comparative purposes only and are not considered actual numbers within the DNL contour range.

5 Numbers have been rounded to ensure totals sum.

Key:
dB = decibel
DNL = day-night average sound level
FCLP = field carrier landing practice
OLF = outlying landing field

In addition, Table 4.2-10 shows the percentage change in acreage and population between the average year DNL contour ranges and the high-tempo FCLP year DNL contour ranges. The higher the percent change means the deviation between the average year DNL noise contours and the high-tempo FCLP year DNL contours is larger; however, most changes are within +/- 5 percent of zero.

Table 4.2-10 Percent Difference in the Estimated Acreage and Population within the Average and High-Tempo FCLP Year DNL Contour Ranges for the NAS Whidbey Island Complex, Alternative 2

	DNL Contour Range[1]							
	65 to <70 dB DNL		*70 to <75 dB DNL*		*Greater than or equal to 75 dB DNL*		*Total*	
DNL Contours	*Area (acres)*	*Pop*	*Area (acres)*	*Pop*	*Area (acres)*	*Pop*	*Area (acres)*	*Pop*
Ault Field								
Scenario A	0.4%	0.9%	0.5%	1.1%	0.6%	0.5%	0.5%	0.8%
Scenario B	1.1%	2.7%	-0.5%	1.3%	2.7%	2.8%	1.5%	2.4%
Scenario C	1.5%	1.9%	0.3%	0.8%	1.6%	2.2%	1.3%	1.8%
OLF Coupeville								
Scenario A	0.1%	3.7%	-4.2%	-4.6%	3.9%	3.2%	0.9%	1.3%
Scenario B	-3.7%	0.0%	-1.6%	-2.6%	4.7%	3.9%	0.6%	0.9%
Scenario C	-6.8%	-7.9%	1.8%	2.1%	31.8%	15.6%	2.5%	1.8%
NAS Whidbey Island Complex								
Scenario A	0.3%	1.3%	-1.8%	-0.6%	2.3%	1.5%	0.7%	0.9%
Scenario B	-0.3%	2.4%	-1.1%	0.1%	3.4%	3.1%	1.1%	2.0%
Scenario C	-2.3%	-0.2%	1.1%	1.2%	6.2%	4.2%	1.7%	1.8%

Key:
dB = decibel
DNL = day-night average sound level

Figure 4.2-8 Alternative 2 Overview of 65 dB DNL Noise Contours for the NAS Whidbey Island Complex

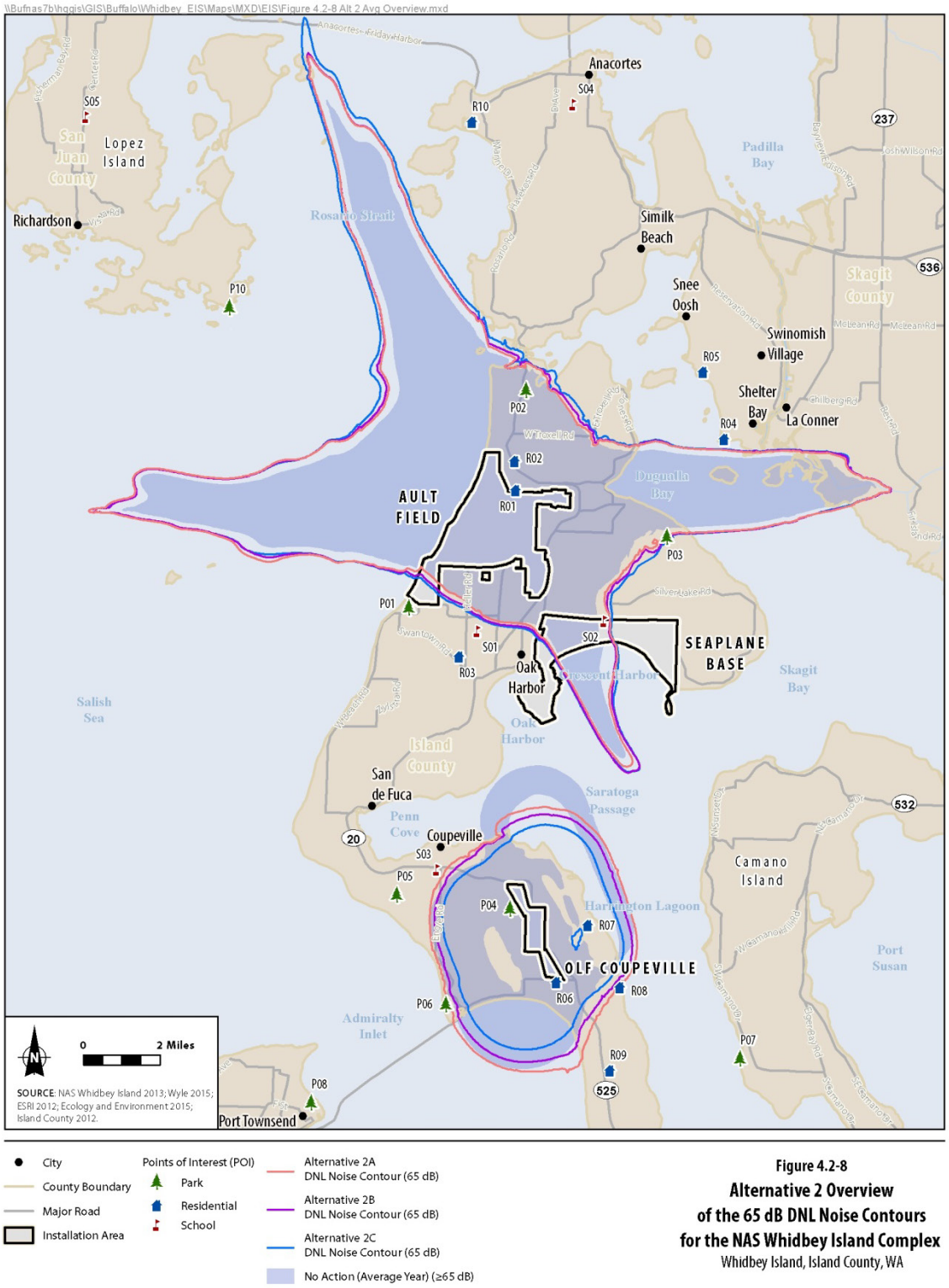


Figure 4.2-8
Alternative 2 Overview of the 65 dB DNL Noise Contours for the NAS Whidbey Island Complex
Whidbey Island, Island County, WA

Figure 4.2-9 Alternative 2A DNL Noise Contours for Ault Field

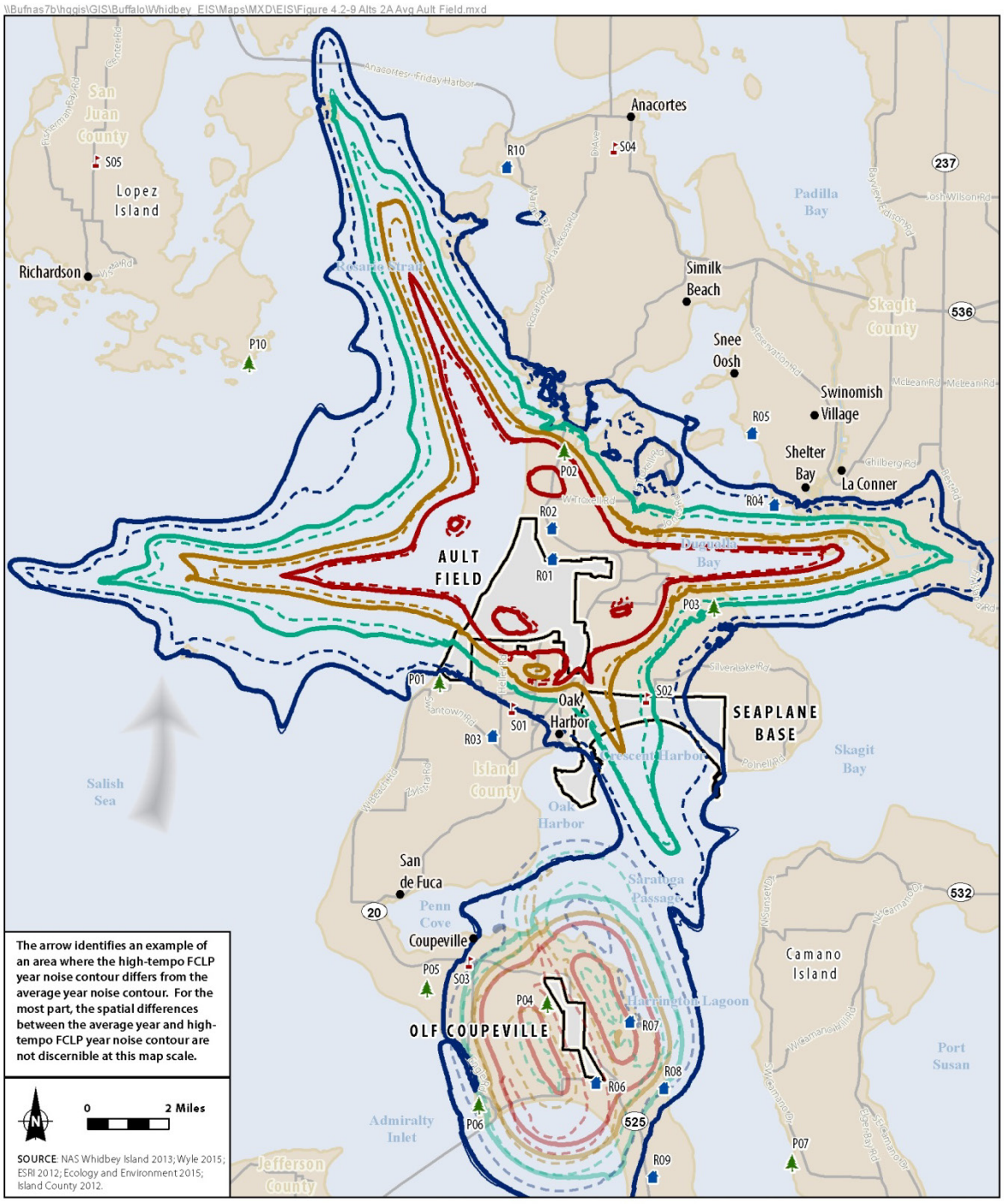


Figure 4.2-9
Alternative 2A DNL Noise Contours for Ault Field
Whidbey Island, Island County, WA

Figure 4.2-10 Alternative 2B DNL Noise Contours for Ault Field

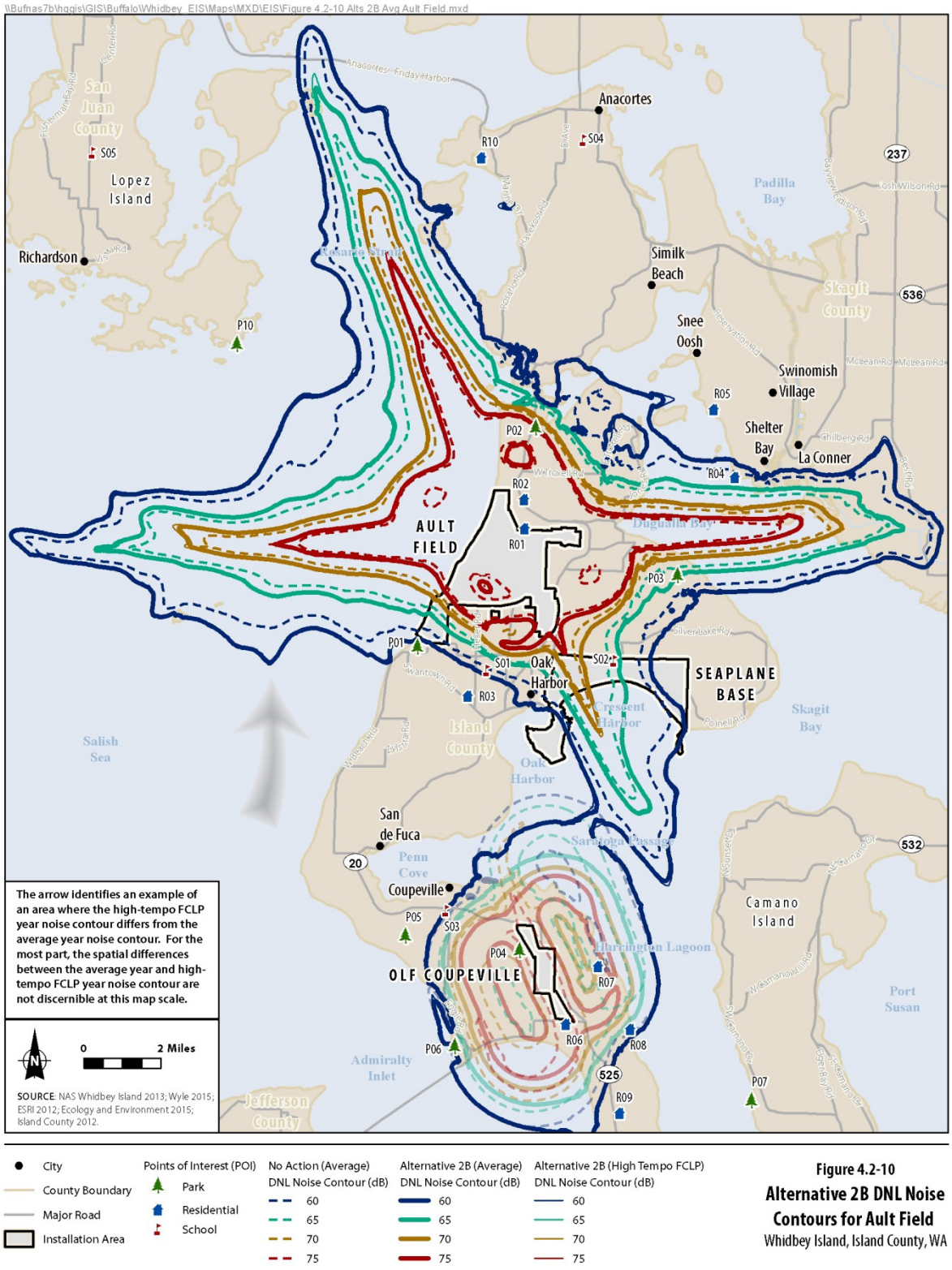


Figure 4.2-10
Alternative 2B DNL Noise Contours for Ault Field
Whidbey Island, Island County, WA

Figure 4.2-11 Alternative 2C DNL Noise Contours for Ault Field

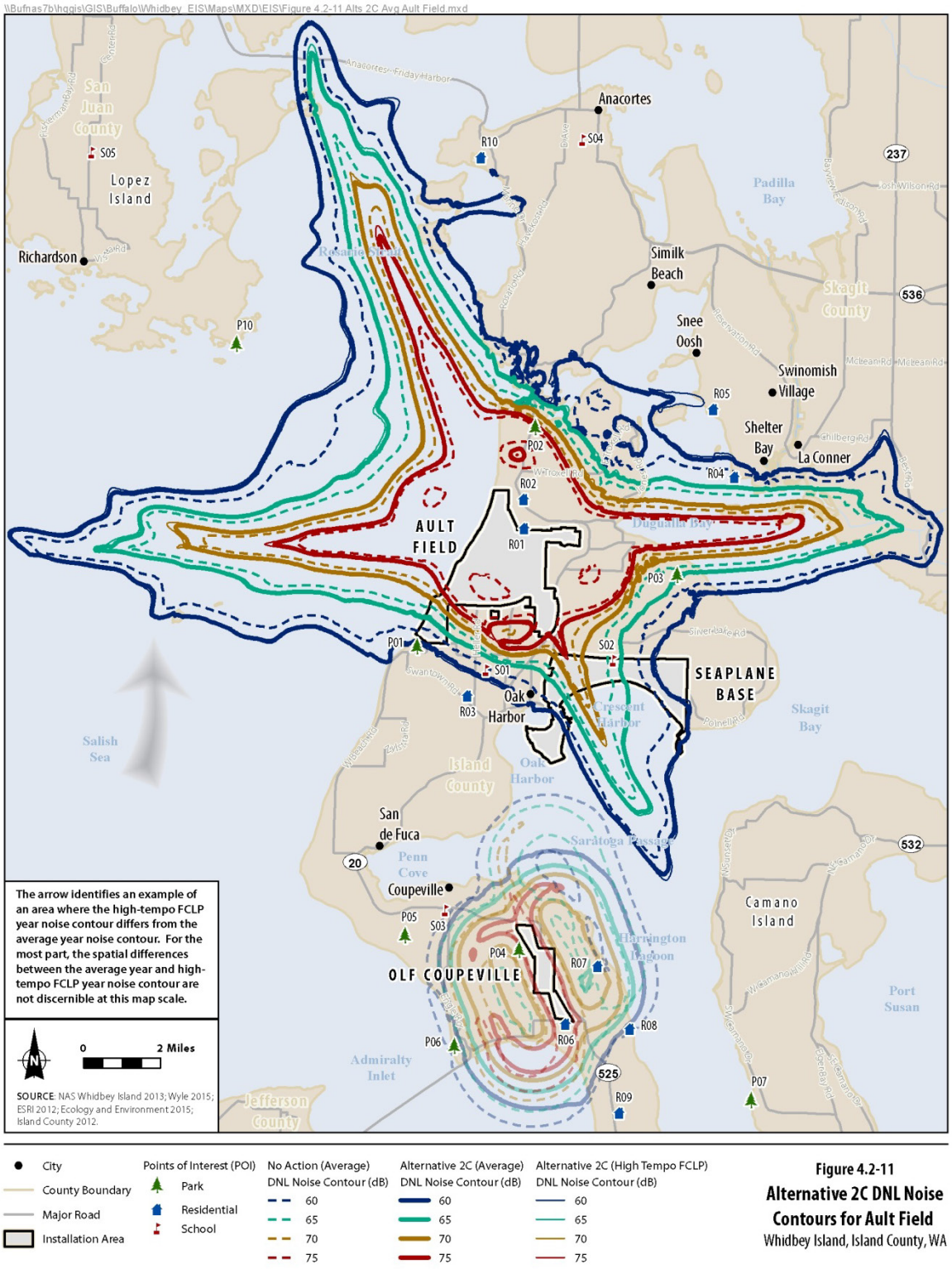


Figure 4.2-12 Alternative 2A DNL Noise Contours for OLF Coupeville

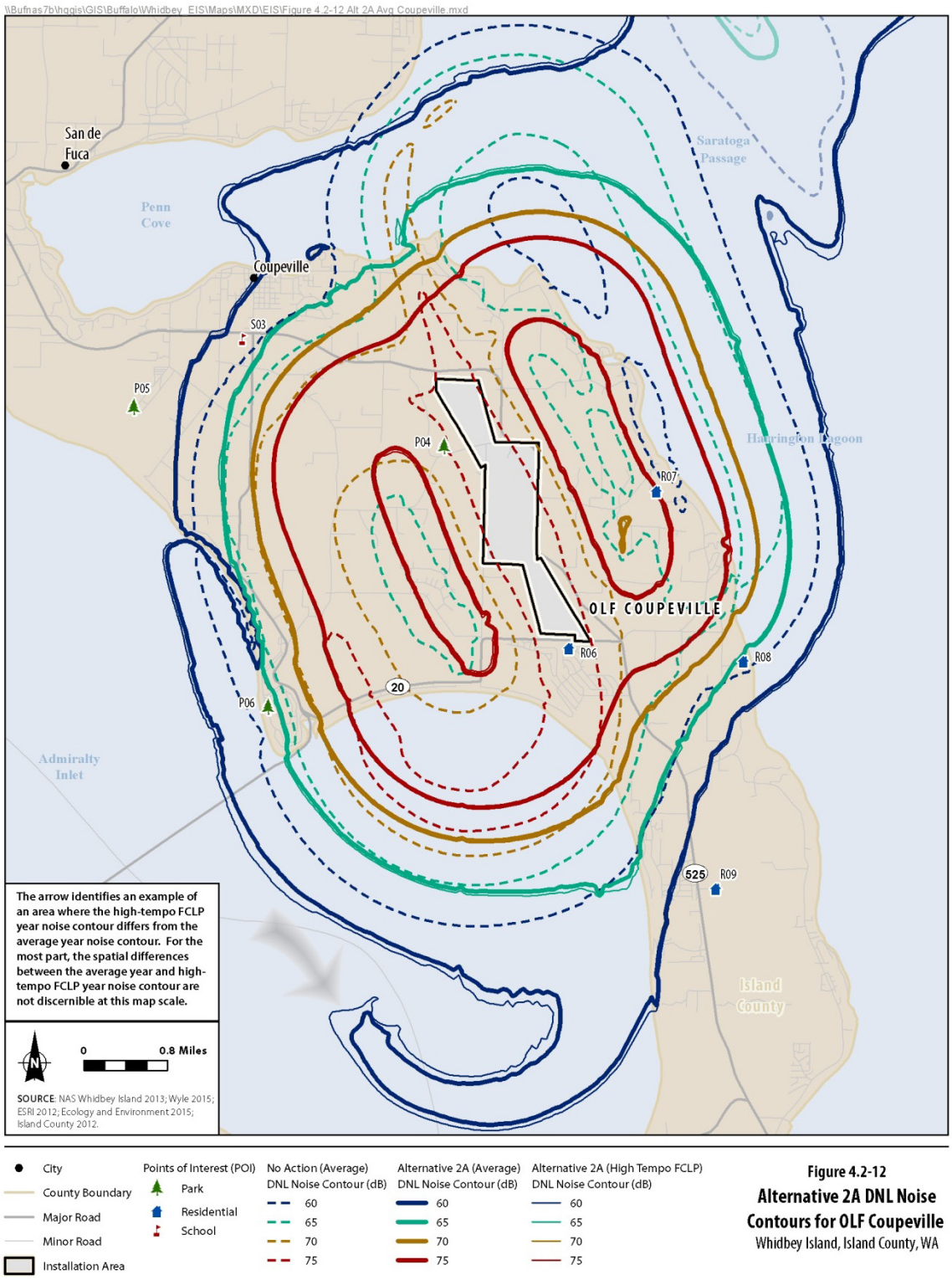


Figure 4.2-13 Alternative 2B DNL Noise Contours for OLF Coupeville

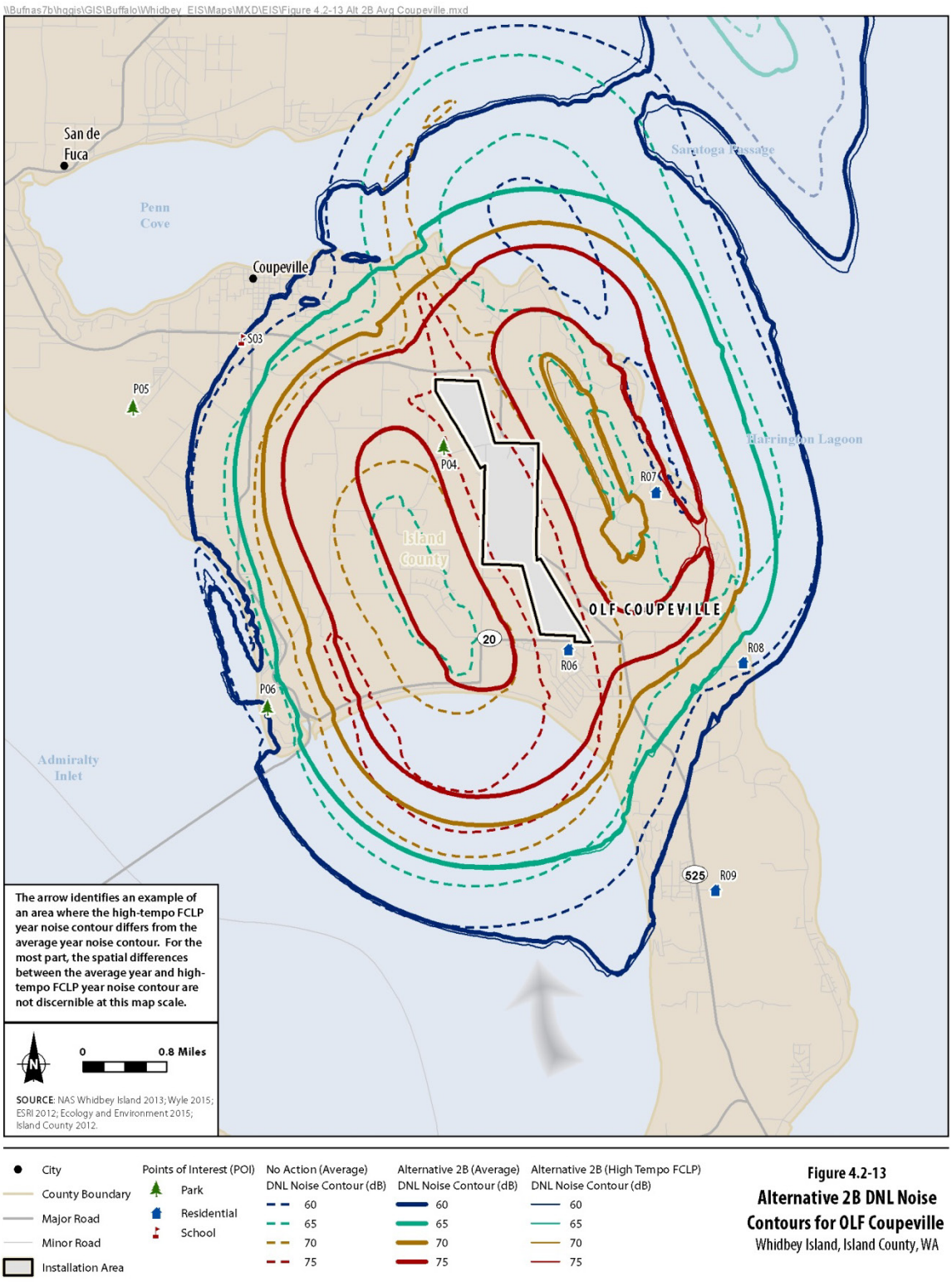


Figure 4.2-13
Alternative 2B DNL Noise Contours for OLF Coupeville
Whidbey Island, Island County, WA

Figure 4.2-14 Alternative 2C DNL Noise Contours for OLF Coupeville

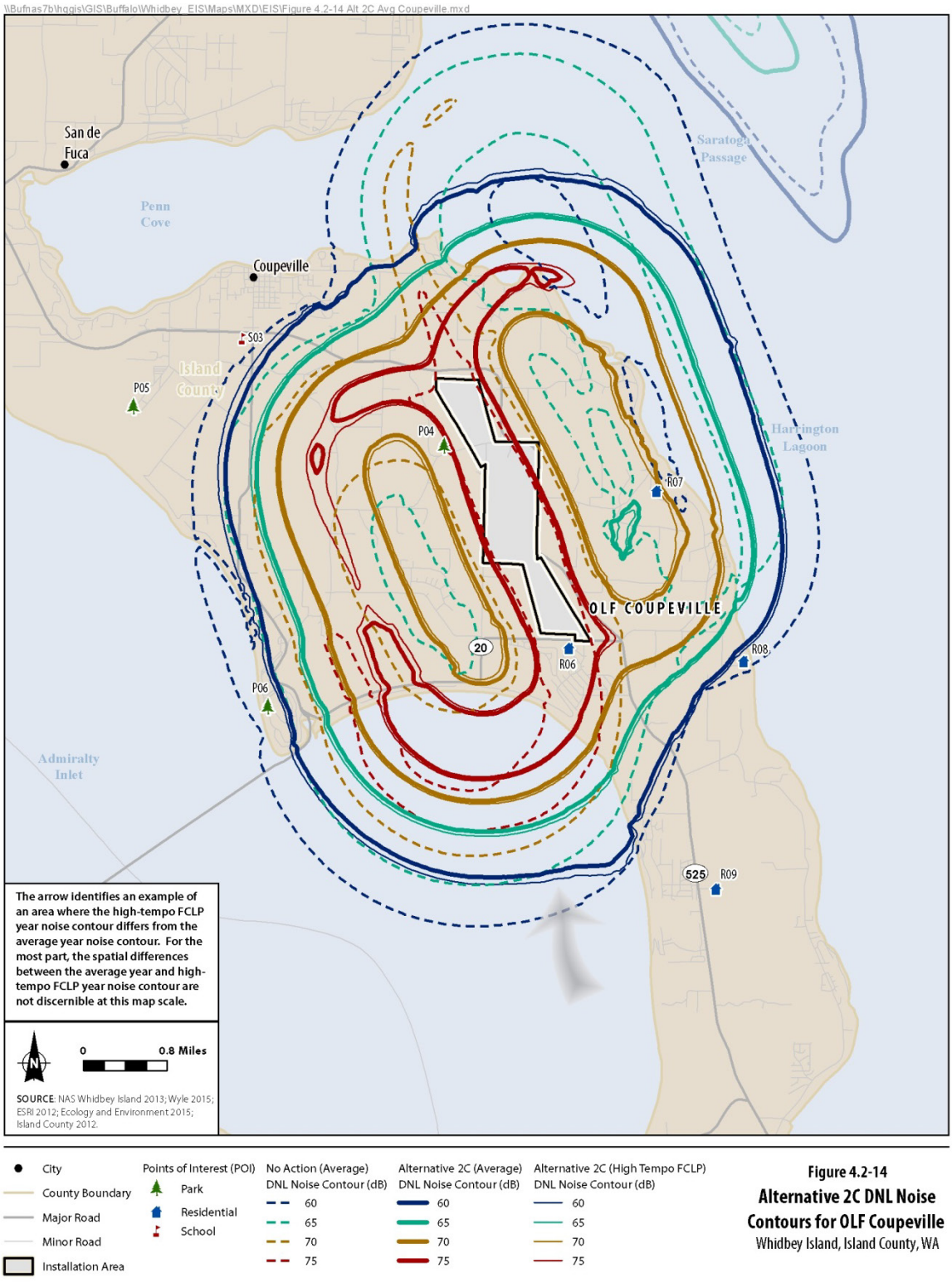


Figure 4.2-14
Alternative 2C DNL Noise Contours for OLF Coupeville
Whidbey Island, Island County, WA

4.2.3.1.2 Supplemental Noise Analyses, Alternative 2

Additional supplemental noise analyses were conducted for a variety of representative POIs identified in the communities surrounding Ault Field and OLF Coupeville. The wide geographic distribution of POIs provides broad coverage and context to compare the noise effects under each of the alternatives with the noise effects for the No Action Alternative. These supplemental noise analyses include single event noise, speech interference, classroom/learning interference, sleep disturbance, potential noise effects on recreation, and potential hearing loss. The POIs chosen for this analysis are presented in Section 3.2 and are depicted on Figure 3.2-6. Not all POIs are used for each analysis because the location and type of POI dictates whether the particular analysis would apply.

Single Event Noise

Two noise metrics are used to evaluate single event noise: SEL and L_{max}. The SEL metric is a composite metric that represents both the intensity of a sound and its duration. SEL provides a measure of total sound energy of an entire acoustic event (i.e., arrival, departure, or T&G). The L_{max} metric is the maximum, instantaneous level of noise that a particular event produces and is most closely related to what an individual would hear. The SEL and L_{max} provide the noise level of a single aircraft event. These events are intermittent in nature, and therefore the noise levels do not represent a continuous source of noise. For more details on SEL or L_{max}, see Section 3.2.2, as well as Appendix A, Draft Aircraft Noise Study.

The SEL and L_{max} values for the loudest single event (i.e., arrival, departure, or T&G) for each POI under Alternative 2 at Ault Field and OLF Coupeville are presented in Table 4.2-11. Under Alternative 2, the maximum SEL/ L_{max} values vary depending on the location of the POI and its proximity to the airfields and flight tracks. These noise level measurements under Alternative 2 are compared to the noise level measurements that were modeled under the No Action Alternative, and the difference is noted in the table.

As shown in the data, many of the maximum SEL and L_{max} values modeled under Alternative 2 are identical to those modeled in the No Action Alternative analysis. Measurements at only six of the 30 POIs changed from the No Action Alternative to Alternative 2 (measurements increased at R06 and R07 and decreased at R08, R09, S03, and S07). In addition, the SEL and L_{max} values for the representative POIs are all identical under all of the three action alternatives. However, the number of annual aircraft events that would produce these noise levels would differ between the three action alternatives and in comparison to the No Action Alternative. Table 4.2-11 also presents the number of annual aircraft events that produce the loudest single event for each POI.

This analysis shows that while there may not be a substantive difference in the loudest event at a particular POI, there may be a difference in the number of times that loudest event would occur between alternatives and compared to the No Action Alternative. Under Alternative 2, some of the POIs would experience more annual events of the maximum SEL/L_{max} than under the No Action Alternative, and other POIs would experience fewer annual events of the maximum SEL/L_{max}. The POI R06 (Admirals Dr. and Byrd Dr.) would experience the largest increase in annual events (+2,290 under Scenario A), while the POI P04 (Ebey's Landing – Rhododendron Park) would experience the largest decrease in annual events (-103 under Scenario C). Generally, POIs near OLF Coupeville experienced more annual events under Scenario A than under Scenarios B or C.

Under Alternative 2, the number of events that would produce the maximum SEL/L_{max} values vary between the scenarios, depending on the POI (see Table 4.2-11). For example, on the high end, at Admirals Drive and Byrd Drive (R06) under Scenario A, a person would be exposed to the maximum SEL/L_{max} an average of approximately seven times per day compared to the low end, such as at Cama Beach State Park (P07) under Scenario C, where a person would be exposed to the maximum SEL/L_{max} an average of approximately once every month.

Table 4.2-11 Maximum Sound Exposure Level (dB) and Maximum Sound Level (dB) for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 2 (Average Year)[1]

		Maximum SEL (dB)		*L_{max} (dB)*		*Number of Annual Events[2]*			
ID	*Description*	*No Action Alternative*	*Alt 2*	*No Action Alternative*	*Alt 2*	*No Action Alternative*	*Alt 2 A*	*Alt 2 B*	*Alt 2 C*
Residences									
R01	Sullivan Rd	121	121 (0)	114	114 (0)	26	80 (+54)	51 (+25)	18 (-8)
R02	Salal St. and N. Northgate Dr.	109	109 (0)	96	96 (0)	12	107 (+95)	58 (+46)	34 (+22)
R03	Central Whidbey	101	101 (0)	93	93 (0)	34	43 (+9)	43 (+9)	42 (+8)
R04	Pull and Be Damned Point	96	96 (0)	88	88 (0)	208	274 (+66)	256 (+48)	256 (+48)
R05	Snee-Oosh Point	92	92 (0)	84	84 (0)	733	1,029 (+296)	942 (+209)	905 (+172)
R06	Admirals Dr. and Byrd Dr.	118	121 (+3)	114	118 (+4)	267	2,557 (+2,290)	1,563 (+1,296)	627 (+360)
R07	Race Lagoon	114	115 (+1)	106	110 (+4)	55	497 (+442)	335 (+280)	128 (+73)
R08	Pratts Bluff	112	101 (-11)	105	92 (-13)	75	497 (+422)	335 (+260)	128 (+53)
R09	Cox Rd and Island Ridge Way	92	90 (-2)	82	81 (-1)	72	23 (-49)	28 (-44)	17 (-55)
R10	Skyline	100	100 (0)	90	90 (0)	261	378 (+117)	349 (+88)	400 (+139)
R11	Sequim	73	73 (0)	60	60 (0)	74	105 (+31)	101 (+27)	112 (+38)
R12	Port Angeles	75	75 (0)	65	65 (0)	208	274 (+66)	256 (+48)	256 (+48)
Schools									
S01	Oak Harbor High School	99	99 (0)	90	90 (0)	26	106 (+80)	64 (+38)	26 (0)
S02	Crescent Harbor Elementary School	102	102 (0)	94	94 (0)	178	310 (+132)	310 (+132)	329 (+151)
S03	Coupeville Elementary School	98	94 (-4)	90	85 (-5)	367	1,279 (+912)	782 (+415)	314 (-53)
S04	Anacortes High School	93	93 (0)	83	83 (0)	112	162 (+50)	149 (+37)	172 (+60)
S05	Lopez Island School	76	76 (0)	68	68 (0)	110	163 (+53)	110 (0)	155 (+45)

Table 4.2-11 Maximum Sound Exposure Level (dB) and Maximum Sound Level (dB) for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 2 (Average Year)[1]

ID	Description	Maximum SEL (dB)		L_{max} (dB)		Number of Annual Events[2]			
		No Action Alternative	Alt 2	No Action Alternative	Alt 2	No Action Alternative	Alt 2 A	Alt 2 B	Alt 2 C
S06	Friday Harbor Elementary School	53	53 (0)	39	39 (0)	26	20 (-6)	27 (+1)	34 (+8)
S07	Sir James Douglas Elementary	62	62 (0)	52	51 (-1)	147	206 (+59)	188 (+41)	181 (+34)
Parks									
P01	Joseph Whidbey State Park	93	93 (0)	82	82 (0)	34	43 (+9)	43 (+9)	42 (+8)
P02	Deception Pass State Park	110	110 (0)	104	104 (0)	161	665 (+504)	404 (+243)	164 (+3)
P03	Dugualla State Park	105	105 (0)	98	98 (0)	110	181 (+71)	171 (+61)	180 (+70)
P04	Ebey's Landing – Rhododendron Park	112	112 (0)	106	106 (0)	267	665 (+398)	404 (+137)	164 (-103)
P05	Ebey's Landing – Ebey's Prairie	88	88 (0)	77	77 (0)	367	1,367 (+1,000)	826 (+459)	338 (-29)
P06	Fort Casey State Park	96	96 (0)	85	85 (0)	267	1,279 (+1,012)	782 (+515)	314 (+47)
P07	Cama Beach State Park	83	83 (0)	73	73 (0)	5	41 (+36)	28 (+23)	11 (+6)
P08	Port Townsend	85	85 (0)	n/a	n/a (0)	24	20 (-4)	22 (-2)	22 (-2)
P09	Moran State Park	62	62 (0)	51	51 (0)	61	49 (-12)	64 (+3)	80 (+19)
P10	San Juan Island National Monument	95	95 (0)	85	85 (0)	372	539 (+167)	498 (+126)	572 (+200)
P11	San Juan Island Visitors Center	63	63 (0)	50	50 (0)	147	206 (+59)	188 (+41)	181 (+34)

Notes:

[1] The difference between the No Action Alternative and Alternative 2 is noted in parentheses for both the maximum SEL and L_{max} metrics, as well as the number of annual events.

[2] The number of annual events is the estimated number of times the single aircraft event with the maximum SEL or L_{max} at that POI would occur annually.

Key:

n/a = not available; the aircraft that generates the highest L_{max} at this POI is the P-8A.

SEL = sound exposure level

L_{max} = maximum A-weighted sound level

dB = decibel

Speech Interference

Conversation or indoor speech is assumed to be interrupted when a single aircraft event exceeds the maximum sound level, or L_{max}, of 50 dB indoors (Wyle, 2009). Normal conversation is about 60 dB; therefore, the use of a 50 dB indoor level is a very conservative threshold such that a soft speaking voice could be heard. For this analysis, the model calculated the number of events occurring per daytime hour (7:00 a.m. to 10:00 p.m.) that are greater than the maximum sound level, or L_{max}, of 50 dB at the 12 residential POIs and the seven schools, since they are commonly located in residential areas. Because the individual is assumed to be indoors for this analysis, noise level reduction factors were applied because the walls, doors, insulation, and other building features reduce the noise levels inside. The analysis was conducted assuming both windows-open and windows-closed conditions. Table 4.2-12 presents the average daily (7:00 a.m. to 10:00 p.m.) events per hour that exceed an L_{max} of 50 dB indoors at these POIs under Alternative 2, Scenarios A, B, and C.

Table 4.2-12 Average Number of Events per Hour of Indoor Speech Interference for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 2 (Average Year)[1]

ID	Description	No Action Alternative		Scenario A		Scenario B		Scenario C	
		Average Number of Events per Daytime Hour[2]							
		Windows Open[3]	Windows Closed[3]	Windows Open[3]	Windows Closed[3]	Windows Open[3]	Windows Closed[3]	Windows Open[3]	Windows Closed[3]
Residences									
R01	Sullivan Rd	8	8	10 (+2)	10 (+2)	11 (+3)	11 (+3)	12 (+4)	12 (+4)
R02	Salal St. and N. Northgate Dr.	8	7	10 (+2)	9 (+2)	11 (+3)	10 (+3)	11 (+3)	11 (+4)
R03	Central Whidbey	2	-	3 (+1)	- (0)	3 (+1)	- (0)	3 (+1)	- (0)
R04	Pull and Be Damned Point	4	2	6 (+2)	2 (0)	6 (+2)	2 (0)	6 (+2)	2 (0)
R05	Snee-Oosh Point	2	-	2 (0)	1 (+1)	2 (0)	1 (+1)	2 (0)	1 (+1)
R06	Admirals Dr. and Byrd Dr.	1	1	3 (+2)	3 (+2)	2 (+1)	2 (+1)	1 (0)	1 (0)
R07	Race Lagoon	-	-	2 (+2)	1 (+1)	1 (+1)	1 (+1)	1 (+1)	- (0)
R08	Pratts Bluff	-	-	2 (+2)	1 (+1)	1 (+1)	1 (+1)	1 (+1)	- (0)
R09	Cox Rd and Island Ridge	1	-	3 (+2)	- (0)	2 (+1)	- (0)	1 (0)	- (0)
R10	Skyline	-	-	1 (+1)	- (0)	1 (+1)	- (0)	1 (+1)	- (0)
R11	Sequim	-	-	- (0)	- (0)	- (0)	- (0)	- (0)	- (0)
R12	Port Angeles	-	-	- (0)	- (0)	- (0)	- (0)	- (0)	- (0)
Schools									
S01	Oak Harbor High School	5	1	7 (+2)	2 (+1)	7 (+2)	2 (+1)	8 (+3)	2 (+1)
S02	Crescent Harbor Elementary	4	1	5 (+1)	2 (+1)	6 (+2)	2 (+1)	6 (+2)	2 (+1)
S03	Coupeville Elementary	1	1	3 (+2)	2 (+1)	2 (+1)	1 (0)	1 (0)	1 (0)
S04	Anacortes High School	-	-	- (0)	- (0)	- (0)	- (0)	- (0)	- (0)
S05	Lopez Island School	-	-	- (0)	- (0)	- (0)	- (0)	- (0)	- (0)
S06	Friday Harbor Elementary	-	-	- (0)	- (0)	- (0)	- (0)	- (0)	- (0)
S07	Sir James Douglas Elementary	-	-	- (0)	- (0)	- (0)	- (0)	- (0)	- (0)

Table 4.2-12 Average Number of Events per Hour of Indoor Speech Interference for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 2 (Average Year)[1]

		No Action Alternative		Scenario A		Scenario B		Scenario C	
		Average Number of Events per Daytime Hour[2]							
ID	Description	Windows Open[3]	Windows Closed[3]	Windows Open[3]	Windows Closed[3]	Windows Open[3]	Windows Closed[3]	Windows Open[3]	Windows Closed[3]

Notes:

1 The difference between the No Action Alternative and Alternative 2 is noted in parentheses. Hyphens (-) indicate result equals zero.

2 Number of annual average daily daytime (7:00 a.m. to 10:00 p.m.) events at or above an indoor maximum single event sound level (L_{max}) of 50 dB, which is a conservative threshold as normal conversation is about 60 dB. See Figure 3.2-1 for examples of sound levels (in dB) from some typical sources, such as "quiet urban daytime" at 40 dB and a garbage disposal at 80 dB.

3 Noise level reductions of 15 dB and 25 dB for windows open and closed, respectively, based upon the walls, doors, insulation, and other building features that reduce the noise levels inside (FICON, 1992).

Compared to the No Action Alternative, Alternative 2 would result in between zero and four additional events per hour at representative POIs during which conversations or indoor speech would be interrupted. The largest change (with four additional events per daytime hour) would occur at R01 (Sullivan Road) and R02 (Salal St. and N. Northgate Dr.), both under Scenario C. However, there are several POIs at which no change would occur under any of the scenarios compared to the No Action Alternative.

Classroom/learning Interference

Two metrics were analyzed to evaluate the potential for classroom/learning interference due to noise events from aircraft overflights: interior equivalent sound level ($L_{eq(8hr)}$) during an 8-hour school day (8:00 a.m. to 4:00 p.m.), and the average number of interfering aircraft events per hour during that time period. Single aircraft events that generate interior sound levels (L_{max}) greater than 50 dB have the potential to interfere with student and teacher interaction by affecting conversation and comprehension (Wyle, 2009). Because the classroom interaction occurs indoors for this analysis, noise level reduction factors were applied because the walls, doors, insulation, and other building features reduce the noise levels inside. The analysis considered both windows-open and windows-closed conditions. Table 4.2-13 presents the 8-hour equivalent sound level ($L_{eq(8h)}$) and the number of events that exceed an L_{max} of 50 dB indoors under Alternative 2, Scenarios A, B, and C at the representative POIs that are schools (and the two residential POIs located in the vicinity of schools). It is important to note that Table 4.2-13 presents average values, and there may be periods when aircraft are operating more frequently, thereby generating more interfering events, and other periods when they are not operating at all, and therefore would have no potential for classroom/learning interference.

Most schools would experience interior $L_{eq(8hr)}$ due to Navy aircraft operations close to ambient levels of 45 dB or less, which would not impact learning and conversation. Crescent Harbor Elementary School (S02) would experience the highest $L_{eq(8hr)}$ of 49 dB for the No Action Alternative and the highest under Scenarios A and C of 56 dB when windows are open. When windows are closed, the $L_{eq(8hr)}$ at Crescent

Harbor Elementary School (S02) would drop to 45 or 46 dB. Given the relatively cool climate in the area, it is likely that windows at schools would be closed a majority of the time.

The potential for classroom interference from single aircraft events generating sound levels inside classrooms greater than 50 dB L_{max} would increase under Alternative 2 by up to two events per hour (at S01, S02, and S03) compared to the No Action Alternative; that is, on average, no school would experience an increase of more than two learning-disrupting events per hour under any scenario under Alternative 2 compared to the No Action Alternative. The highest increase of an additional two events is shown for Oak Harbor High School (S01) for all three scenarios with windows open, Crescent Harbor Elementary School (S02) under Scenarios B and C with windows open, and Coupeville Elementary School (S03) under Scenario A with windows closed. All other schools either show no change from the No Action Alternative or an increase of one event per hour during the school day, primarily under the windows-open condition. Under the windows-closed condition, nearly all of the schools would be expected to experience no more than one additional event per hour of classroom/learning interference, with most being unchanged from the No Action Alternative. Many modern schools have central air conditioning and heating systems; therefore, it is more likely that classroom windows would remain closed the majority of the time.

Sleep Disturbance

The analysis of sleep disturbance is a calculation of the probability of awakening from aircraft overflights. Thus, it is based on the outdoor SEL at each of the residential POIs being converted to an indoor SEL. Events that were considered are those that occur between 10:00 p.m. and 7:00 a.m. Although individuals sleep outside of these hours, these are considered typical sleeping hours for this type of analysis. Table 4.2-14 presents the results of the sleep disturbance analysis for the 12 POI locations that are in the residential category, as well as the seven schools, which are commonly located in residential areas.

Table 4.2-13 Average Number of Events per Hour of Indoor Classroom/learning Interference for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 2 (Average Year)[1]

		No Action Alternative				Scenario A				Scenario B				Scenario C			
		Windows Open[2]		Windows Closed[2]		Windows Open[2]		Windows Closed[2]		Windows Open[2]		Windows Closed[2]		Windows Open[2]		Windows Closed[2]	
ID	Description	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]
School Surrogates																	
R03	Central Whidbey	<45	2	<45	-	49	3 (+1)	<45	- (0)	49	3 (+1)	<45	- (0)	49	3 (+1)	<45	- (0)
R11	Sequim	<45	-	<45	-	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)
Schools																	
S01	Oak Harbor High School	<45	5	<45	1	48	7 (+2)	<45	2 (+1)	48	7 (+2)	<45	2 (+1)	49	7 (+2)	<45	2 (+1)
S02	Crescent Harbor Elementary	49	4	<45	1	56	5 (+1)	46	2 (+1)	55	6 (+2)	45	2 (+1)	56	6 (+2)	46	2 (+1)
S03	Coupeville Elementary	<45	1	<45	-	48	2 (+1)	<45	2 (+2)	46	1 (0)	<45	1 (+1)	<45	1 (0)	<45	- (0)
S04	Anacortes High School	<45	-	<45	-	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)
S05	Lopez Island School	<45	-	<45	-	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)
S06	Friday Harbor Elementary	<45	-	<45	-	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)
S07	Sir James Douglas Elementary	<45	-	<45	-	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)

Table 4.2-13 Average Number of Events per Hour of Indoor Classroom/learning Interference for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 2 (Average Year)[1]

		No Action Alternative				Scenario A				Scenario B				Scenario C			
		Windows Open[2]		Windows Closed[2]		Windows Open[2]		Windows Closed[2]		Windows Open[2]		Windows Closed[2]		Windows Open[2]		Windows Closed[2]	
ID	Description	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]

Notes:

1 The difference between the No Action Alternative and Alternative 2 is noted in parentheses. Hyphens (-) indicate result equals zero.

2 Noise level reductions of 15 dB and 25 dB for windows open and closed, respectively, based upon the walls, doors, insulation, and other building features that reduce the noise levels inside (FICON, 1992).

3 For this metric, daily classroom hours are assumed to be 8:00 a.m. to 4:00 p.m.

4 Number of average school-day events per hour during an 8-hour school day (8:00 a.m. to 4:00 p.m.) at or above an indoor maximum single event sound level (L_{max}) of 50 dB, which is a conservative threshold as normal conversation is about 60 dB. See Figure 3.2-1 for examples of sound levels (in dB) from some typical sources, such as "quiet urban daytime" at 40 dB and a garbage disposal at 80 dB.

Key:

dB = decibel

$L_{eq(8hr)}$ = 8-hour sound level equivalent

L_{max} = maximum A-weighted sound level

Table 4.2-14 Average Indoor Nightly[1] Probability of Awakening[2] for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 2 (Average Year)[3]

ID	Description	No Action Alternative		Scenario A		Scenario B		Scenario C	
		Windows Open[4]	Windows Closed[4]	Windows Open[4]	Windows Closed[4]	Windows Open[4]	Windows Closed[4]	Windows Open[4]	Windows Closed[4]
Residences									
R01	Sullivan Rd	69%	53%	77% (+8%)	61% (+8%)	83% (+14%)	68% (+15%)	88% (+19%)	74% (+21%)
R02	Salal St. and N. Northgate Dr.	51%	37%	59% (+8%)	44% (+7%)	65% (+14%)	49% (+12%)	72% (+21%)	56% (+19%)
R03	Central Whidbey	21%	10%	28% (+7%)	14% (+4%)	31% (+10%)	16% (+6%)	35% (+14%)	19% (+9%)
R04	Pull and Be Damned Point	25%	12%	31% (+6%)	16% (+4%)	35% (+10%)	17% (+5%)	39% (+14%)	18% (+6%)
R05	Snee-Oosh Point	20%	6%	26% (+6%)	9% (+3%)	29% (+9%)	10% (+4%)	33% (+13%)	11% (+5%)
R06	Admirals Dr. and Byrd Dr.	13%	8%	58% (+45%)	43% (+35%)	40% (+27%)	28% (+20%)	19% (+6%)	13% (+5%)
R07	Race Lagoon	6%	3%	32% (+26%)	21% (+19%)	23% (+17%)	14% (+11%)	12% (+6%)	6% (+3%)
R08	Pratts Bluff	6%	3%	23% (+17%)	15% (+12%)	15% (+9%)	10% (+7%)	7% (+1%)	4% (+1%)
R09	Cox Rd and Island Ridge Way	4%	3%	20% (+16%)	13% (+10%)	12% (+8%)	8% (+5%)	5% (+1%)	3% (0%)
R10	Skyline	7%	2%	10% (3%)	4% (2%)	11% (+4%)	4% (+2%)	14% (+7%)	4% (+2%)
R11	Sequim	0%	0%	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)
R12	Port Angeles	0%	0%	1% (+1%)	0% (0%)	1% (+1%)	0% (0%)	0% (0%)	0% (0%)
Schools (near residential areas)[5]									
S01	Oak Harbor High School	27%	16%	33% (+6%)	19% (+3%)	38% (+11%)	23% (+7%)	42% (+15%)	27% (+11%)
S02	Crescent Harbor Elementary	27%	16%	34% (+7%)	20% (+4%)	38% (+11%)	24% (+8%)	43% (+16%)	28% (+12%)
S03	Coupeville Elementary	7%	4%	27% (+20%)	17% (+13%)	18% (+11%)	11% (+7%)	9% (+2%)	5% (+1%)
S04	Anacortes High School	2%	1%	3% (+1%)	1% (0%)	3% (+1%)	1% (0%)	4% (+2%)	1% (0%)
S05	Lopez Island School	0%	0%	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)
S06	Friday Harbor Elementary	0%	0%	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)
S07	Sir James Douglas Elementary	0%	0%	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)

Table 4.2-14 Average Indoor Nightly[1] Probability of Awakening[2] for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 2 (Average Year)[3]

		No Action Alternative		Scenario A		Scenario B		Scenario C	
ID	Description	Windows Open[4]	Windows Closed[4]	Windows Open[4]	Windows Closed[4]	Windows Open[4]	Windows Closed[4]	Windows Open[4]	Windows Closed[4]

Notes:

1 For this metric, nightly sleeping hours are assumed to be 10:00 p.m. to 7:00 a.m.

2 This metric represents the probability of awakening at least once during a night of average aircraft noise activities.

3 The difference between the No Action Alternative and Alternative 2 is noted in parentheses.

4 Noise level reductions of 15 dB and 25 dB for windows open and closed, respectively, based upon the walls, doors, insulation, and other building features that reduce the noise levels inside (FICON, 1992).

5 All school points of interest were included in the potential sleep disturbance analysis because of their typical proximity to residential areas.

Under Alternative 2, the majority of the POIs analyzed show an increase in the percent probability of awakening for all scenarios during nights of average aircraft activity. The highest percent increase is for R06 (Admirals Dr. and Byrd Dr.), where there would be an increase of 45 percent under Scenario A with windows open, meaning that there is a 45 percent greater probability, or chance of awakening at least once under windows-open conditions compared to the No Action Alternative. Generally, the POIs around OLF Coupeville had a higher percent probability of awakening under Scenario A than under Scenarios B or C. However, for the POIs around Ault Field, there was a larger increase in the percent probability of awakening for Scenario C than for Scenarios A or B.

Potential Noise Effects on Recreation

The analysis of potential noise effects on recreation is based on the number of events occurring per DNL daytime hour (7:00 a.m. to 10:00 p.m.) that are greater than the maximum sound level of 65 dB outdoors (to capture outdoor speech interference). Details on the analysis of outdoor speech interference are available in Section 3.2, as well as Appendix A, Draft Aircraft Noise Study. Table 4.2-15 presents the results of the analysis for Alternative 2 for the 11 POIs that are considered parks or recreational centers with primarily outdoor features.

Table 4.2-15 Average Number of Events per Hour of Outdoor Speech Interference for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 2 (Average Year)[1]

		No Action Alternative	*Alternative 2*		
			Scenario A	*Scenario B*	*Scenario C*
		Annual Average Daily Daytime Events per Hour			
ID	*Description*	*NA65 L_{max} [2]*	*NA65 L_{max} [2]*	*NA65 L_{max} [2]*	*NA65 L_{max} [2]*
P01	Joseph Whidbey State Park	5	6 (+1)	6 (+1)	6 (+1)
P02	Deception Pass State Park	6	7 (+1)	8 (+2)	8 (+2)
P03	Dugualla State Park	7	8 (+1)	9 (+2)	10 (+3)
P04	Ebey's Landing – Rhododendron Park	1	3 (+2)	2 (+1)	1 (0)
P05	Ebey's Landing – Ebey's Prairie	1	2 (+1)	1 (0)	1 (0)
P06	Fort Casey State Park	1	2 (+1)	2 (+1)	1 (0)
P07	Cama Beach State Park	-	- (0)	- (0)	- (0)
P08	Port Townsend	-	- (0)	- (0)	- (0)
P09	Moran State Park	-	- (0)	- (0)	- (0)
P10	San Juan Island National Monument	2	3 (+1)	3 (+1)	3 (+1)
P11	San Juan Island Visitors Center	-	- (0)	- (0)	- (0)

Notes:

1 The difference between the No Action Alternative and Alternative 2 is noted in parentheses. Hyphens (-) indicate result equals zero.

2 Number of events at or above an outdoor maximum single event sound level (L_{max}) of 65 dB; this reflects potential for outdoor speech interference.

Key:

Lmax = maximum A-weighted sound level

NA65 = number of events above an L_{max} of 65 dB

Under Alternative 2, the data in the table show a slight increase for some POIs where there would be potential for one to three additional DNL daytime events per hour during which a recreationist may experience outdoor speech interference. P03 (Dugualla State Park) to the east of Ault Field shows the highest change, with three events per hour under Scenario C.

For many of the POIs, there is no change from the No Action Alternative. As the data in the table indicate and as expected, when the POI is closer to OLF Coupeville, there would be more events under Scenario A, whereas if the POI is located closer to Ault Field, there would be more events under Scenario C. Section 4.5 has additional discussion on parks and recreation in the vicinity of the airfields. The data show that there is a range of potential outdoor speech interference that may disturb individuals participating in outdoor recreational activities depending on the location of the POI in relation to the airfields and flight tracks. The average number of events is mostly consistent with those expected under the No Action Alternative conditions; however, some POIs may experience an increase in the average daily events. These increase range from zero to an increase of three events per hour (P03 under Scenario C), depending on the scenario.

Potential Hearing Loss

The available literature on the subject of permanent threshold shifts and aircraft noise exposure indicates that exposure to military aviation noise has not resulted in permanent threshold shifts, even in sensitive populations such as children. Ludlow and Sixsmith found permanent threshold shifts are unlikely to be caused by exposures to aircraft noise thought to be typical of those who have lived on or near jet air stations. Additionally, the report found that there were no major differences in audiometric test results between military personnel who, as children, had lived on or near installations where jet aircraft operations were based and military personnel who, as children, had no such exposure (Ludlow and Sixsmith, 1999; ACRP 2008).

As part of this analysis, an evaluation of the risk of potential hearing loss for populations in the areas around the NAS Whidbey Island complex was conducted (including both Ault Field and OLF Coupeville). Details on the potential hearing loss metric, methodology for the analysis, and assumptions are outlined in Section 3.2, as well as Appendix A, Draft Aircraft Noise Study. The 1982 *U.S. EPA Guidelines for Noise Impact Analysis* provides that people who experience continuous, daily exposure to high noise over a normal working lifetime of 40 years, with exposure lasting 8 hours per day for 5 days per week, beginning at an age of 20 years old, may be at risk for a type of hearing loss called Noise Induced Permanent Threshold Shift (NIPTS). NIPTS defines a permanent change in hearing level, or threshold, caused by exposure to noise (USEPA, 1982). This workplace exposure standard, which is being applied to outdoor noise levels, is not intended to accurately describe the impact of intermittent noise events such as periodic aircraft overflights but is presented as a "worst-case" analytical tool. To put the conservative nature of this analysis into context, the national average of time spent indoors is approximately 87 percent (or almost 21 hours of the day) (Klepeis et al., n.d.). With intermittent aircraft operations and the time most people spend indoors, it is very unlikely that individuals would experience noise exposure that would result in hearing loss. In fact, it is highly unlikely for an individual living around Ault Field or OLF Coupeville to meet all of the criteria upon which the PHL metric is based. Nonetheless, this analysis is provided per DoD policy directive to support informed decision making and provide a standard for comparison across a wide range of proposed actions that result in community exposure to aircraft noise.

The procedure for determining potential hearing loss includes first identifying the number of persons residing in the greater than or equal to 80 dB DNL contour. Then, $L_{eq(24)}$ contours are developed by 1 dB increments in order to determine the potential for NIPTS for both the population with average sensitivity to noise and the population with the most sensitivity to noise. Table 4.2-16 presents the potentially affected populations in and near Ault Field and OLF Coupeville by 1 dB increments of $L_{eq(24)}$ as compared to the No Action Alternative numbers presented in Section 3.2.

Table 4.2-16 Average and 10th Percentile Noise Induced Permanent Threshold Shifts (NIPTS) as a Function of Equivalent Sound Level under Alternative 2 at NAS Whidbey Island Complex (Average Year)

Band of $L_{eq(24)}$ (dB)[1]	Avg NIPTS (dB)[2,3]	10th Pct NIPTS (dB)[2,3]	Estimated Population[4,5,6]							
			Ault Field				OLF Coupeville			
			No Action	Alt 2A	Alt 2B	Alt 2C	No Action	Alt 2A	Alt 2B	Alt 2C
75-76	1.0	4.0	-	- (0)	- (0)	33 (+33)	67	42 (-25)	25 (-42)	22 (-45)
76-77	1.0	4.5	143	129 (-14)	246[7] (+103)	354[8] (+211)	55	167 (+112)	100 (+45)	59 (+4)
77-78	1.5	5.0	274	261 (-13)	405 (+131)	391 (+117)	51	153 (+102)	77 (+26)	54 (+3)
78-79	2.0	5.5	131	182 (+51)	293 (+162)	391 (+260)	36	117 (+81)	73 (+37)	62 (+26)
79-80	2.5	6.0	81	96 (+15)	206 (+125)	277 (+196)	16	73 (+57)	64 (+48)	58 (+42)
80-81	3.0	7.0	71	76 (+5)	97 (+26)	217 (+146)	4	72 (+68)	58 (+54)	1 (-3)
81-82	3.5	8.0	51	70 (+19)	75 (+24)	86 (+35)	-	64 (+64)	55 (+55)	- (0)
82-83	4.0	9.0	34	50 (+16)	66 (+32)	70 (+36)	-	59 (+59)	63 (+63)	- (0)
83-84	4.5	10.0	25	39 (+14)	42 (+17)	52 (+27)	-	53 (+53)	53 (+53)	- (0)
84-85	5.5	11.0	16	22 (+6)	28 (+12)	31 (+15)	-	61 (+61)	1 (+1)	- (0)
85-86	6.0	12.0	12	15 (+3)	21 (+9)	23 (+11)	-	63 (+63)	- (0)	- (0)
86-87	7.0	13.5	5	9 (+4)	15 (+10)	18 (+13)	-	1 (+1)	- (0)	- (0)
87-88	7.5	15.0	4	5 (+1)	9 (+5)	14 (+10)	-	1 (+1)	- (0)	- (0)
88-89	8.5	16.5	1	4 (+3)	4 (+3)	6 (+5)	-	- (0)	- (0)	- (0)
89-90	9.5	18.0	-	1 (+1)	2 (+2)	3 (+3)	-	- (0)	- (0)	- (0)

Table 4.2-16 Average and 10th Percentile Noise Induced Permanent Threshold Shifts (NIPTS) as a Function of Equivalent Sound Level under Alternative 2 at NAS Whidbey Island Complex (Average Year)

Band of $L_{eq(24)}$ (dB)[1]	Avg NIPTS (dB)[2,3]	10th Pct NIPTS (dB)[2,3]	Estimated Population[4,5,6]							
			Ault Field				OLF Coupeville			
			No Action	Alt 2A	Alt 2B	Alt 2C	No Action	Alt 2A	Alt 2B	Alt 2C

Notes:

1 L_{eq} bands with no population were omitted from table.

2 NIPTS values rounded to nearest 0.5 dB.

3 NIPTS below 5 dB are generally not considered noticeable.

4 This analysis assumes the population is outdoors at one's residence and exposed to all aircraft noise events, every day, for 40 years. Given the amount of time spent indoors and the intermittent occurrence of aircraft noise events, it is highly unlikely that individuals would meet all the criteria, and the actual potential for hearing loss would be far less than the values reported here.

5 Estimated Population was determined by those living within the 80 dB DNL noise contour around each airfield, including those living on-base at Ault Field (there is no on-base population at OLF Coupeville).

6 Population counts of people within the DNL contours were computed using 2010 census block-level data. The percent area of the census block covered by the DNL contour range was applied to the population of that census block to estimate the population within the DNL contour range (e.g., if 25 percent of the census block is within a DNL contour, then 25 percent of the population is included in the population count). This calculation assumes an even distribution of the population across the census block. A 5.4 percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period (Washington State Office of Financial Management, 2012). In addition, per guidance on potential hearing loss, on-base populations at Ault Field have been included in the analysis. These data should be used for comparative purposes only and are not considered actual numbers within the DNL contour range.

7 Of this estimated population, 55 are military personnel living on-base at Ault Field.

8 Of this estimated population, 470 are military personnel living on-base at Ault Field.

Key:

dB = decibel
DNL = day-night average sound level
$L_{eq(24)}$ = 24-hour Equivalent Sound Level
NIPTS = Noise Induced Permanent Threshold Shift
OLF = outlying landing field

According to the USEPA, changes in hearing level of less than 5 dB are generally not considered noticeable (USEPA, 1974). Therefore, using the data provided in Table 4.2-16 for the population with average sensitivity to noise, the level at which there may be a noticeable NIPTS would be at the 84 to 85 dB $L_{eq(24)}$ range and above. There is an increase in the population within the 80 dB DNL noise contour (i.e., potential at-risk population) under Alternative 2 at both Ault Field and OLF Coupeville. The largest increase in the potential at-risk population in the vicinity of Ault Field would be under Scenario C (57 additional people) and for OLF Coupeville would be under Scenario A (126 additional people). The range of potential NIPTS could be up to 9.5 dB at Ault Field and 7.5 dB at OLF Coupeville. The potential NIPTS values presented in Table 4.2-16 are only applicable in the extreme case of continuous outdoor exposure at one's residence to all aircraft events occurring over a period of 40 years. Because it is highly unlikely for any individuals to meet all those criteria, the actual potential NIPTS for individuals would be far less than the values reported here.

According to the USEPA, changes in hearing level of less than 5 dB are generally not considered noticeable.

In addition, the actual value of NIPTS for any given person will depend on his or her physical sensitivity to noise; some could experience more hearing loss than others (DNWG, 2013). Therefore, to capture this, the USEPA Guidelines provided information on the estimated NIPTS exceeded by the 10 percent of the population most sensitive to noise. Using the same 1 dB incremental data in Table 4.2-16 and the column identified as the 10th Percentile NIPTS, those individuals are vulnerable to noticeable NIPTS at the 77 to 78 dB $L_{eq(24)}$ range and above. Using this even more conservative estimate, the range of potential NIPTS could be up to 18.0 dB for the population most sensitive to noise around Ault Field and up to 15.0 dB for the population most sensitive to noise around OLF Coupeville. As noted previously, it is highly unlikely that any individuals would meet all the criteria of being outdoors at one's residence and exposed to all aircraft events over a 40-year period; therefore, the actual potential NIPTS for individuals would be far less than the values reported here.

Nonauditory Health Effects

Per studies noted and evaluated in Section 3.2.3, the data and research are inconclusive with respect to the linkage between potential nonauditory health effects of aircraft noise exposure. As outlined within the analysis of DNL contours and supplemental metrics presented within this section, the data show that the Proposed Action would result in both an increase in the number of people exposed to noise as well as those individuals exposed to higher levels of noise. However, research conducted to date has not made a definitive connection between intermittent military aircraft noise and nonauditory health effects. The results of most cited studies are inconclusive and cannot identify a causal link between aircraft noise exposure and the various types of nonauditory health effects that were studied. An individual's health is greatly influenced by many factors known to cause health issues, such as hereditary factors, medical history, and life style choices regarding smoking, diet, and exercise. Research has demonstrated that these factors have a larger and more direct effect on a person's health than aircraft noise.

Vibration Effects from Aircraft Operations

In addition to the noise effects on the population outlined above, noticeable structural vibration may result from certain aircraft operations at either Ault Field or OLF Coupeville. Depending on the aircraft operation, altitude, heading, power settings, and the structure, certain vibration effects may be observed. Typically, the structural elements that are most susceptible to vibration from aircraft noise

are windows and sometimes walls or ceilings. Conservatively, only sounds lasting more than one second above a sound level of 130 dB are potentially damaging to structural components of a building (CHABA, 1977). Noise-induced structural vibration may cause annoyance to dwelling occupants because of induced secondary vibrations, or "rattle," of objects within the dwelling, such as hanging pictures, dishes, plaques, and bric-a-brac. Loose window panes may also vibrate noticeably when exposed to high levels of airborne noise, causing homeowners to fear breakage. See Appendix A, Draft Aircraft Noise Study, and the Noise and Vibration Associated with Operational Impacts discussion in Section 4.6.2.1 for additional details on noise-induced vibration effects.

The data show that the Proposed Action would result in both an increase in the number of aircraft operations and area/structures exposed to noise. Therefore, there could be an increase in vibration effects due to the Proposed Action. However, as shown in Table 4.2-11, for the representative POIs analyzed, the highest L_{max} value was 118 dB, and, therefore, sound levels damaging to structural components of buildings are not likely to occur.

4.2.3.2 Noise Conclusion, Alternative 2

Overall, Alternative 2 would have significant noise impacts in the communities surrounding Ault Field and OLF Coupeville. Both the total number of acres and the total number of individuals within the DNL noise contours would increase for all scenarios analyzed. There would be a larger impact to the communities around Ault Field under Scenario C, while there would be a larger impact for the communities around OLF Coupeville under Scenario A.

The number of incidents of indoor and outdoor speech interference and classroom interference would increase slightly. There would also be a higher probability of awakening under all scenarios, especially for POIs located closer to the airfields. In addition, depending on the scenario, the population potentially at risk for potential hearing loss would increase. The range of potential NIPTS could be up to 9.5 dB at Ault Field and 7.5 dB at OLF Coupeville for the population with average noise sensitivity and up to 18.0 dB at Ault Field and 15.0 dB at OLF Coupeville for the population highly sensitive to noise (the 10 percent of the population with the most sensitive hearing). As it is highly unlikely that any individuals would meet all the criteria of being outdoors at one's residence and exposed to all aircraft events over a 40-year period, the actual potential NIPTS for individuals would be far less than the values reported here.

4.2.4 Noise, Alternative 3

This section outlines the noise environment as modeled for Alternative 3 and describes the noise conditions associated with aircraft activity at Ault Field and OLF Coupeville using DNL and several supplemental noise metrics outlined in Section 3.2, including L_{eq}, SEL, L_{max}, and the number of events above a threshold, which are used to evaluate such noise effects as community noise exposure, indoor and outdoor speech interference, sleep disturbance, classroom/learning interference, and potential hearing loss. Additional information on the noise metrics is also available in Appendix A, Draft Aircraft Noise Study.

4.2.4.1 Noise Potential Impacts, Alternative 3

The following sections detail potential impacts using projected DNL contours (the federally approved noise metric) and several supplemental metrics (to more fully describe the noise effects).

4.2.4.1.1 Projected DNL Contours, Alternative 3

As part of the noise analysis and as discussed in Section 3.2.1.1, the DNL noise contours for the action alternatives were modeled for an "average year" at Ault Field and OLF Coupeville. An average year represents conditions that are projected to occur on an annual basis, a typical operating tempo at the NAS Whidbey Island complex. In addition, the three scenarios, which present the optional FCLP allocations, were modeled individually to provide a comparative presentation of the potential noise levels.

Figure 4.2-15 presents the projected DNL noise contours for Scenarios A, B, and C under Alternative 3. This overview figure of the NAS Whidbey Island complex (both Ault Field and OLF Coupeville) presents the 65 dB DNL contour for Scenarios A, B, and C for comparison.

Figures 4.2-16 through 4.2-18 present the three scenarios separately for Ault Field, and Figures 4.2-19 through 4.2-21 present the three scenarios separately for OLF Coupeville. In these sets of figures, the projected 60 dB, 65 dB, 70 dB, and greater than 75 dB DNL contours for Alternative 3 are compared to the No Action Alternative DNL contours. The 65 dB DNL contour at Ault Field extends approximately 10 miles from the four runway endpoints. Under Alternative 3, the length of these contour lobes is primarily due to the Growler on the approach portion of the GCA patterns (described in Section 3.1), where the aircraft generally descends on a 3-degree glide slope through 3,000 feet AGL 10 miles from the runway.

Similar to the No Action Alternative and other alternatives, the DNL contour at OLF Coupeville would be driven by the FCLPs conducted at the airfield. The 65 to less than 70 dB DNL contour range takes the shape of two ovals, one on each side of OLF Coupeville's runway, which correspond to the FCLP flight tracks. Generally speaking, around Ault Field, the 65 dB DNL contours associated with Scenario C extend the farthest from the airfield and cover the most area (14,230 acres, compared to 13,210 acres under Scenario A). Conversely, around OLF Coupeville, the 65 dB DNL contours associated with Scenario A extend the farthest from the airfield and cover the most area (10,498 acres, compared to 8,581 acres under Scenario C). The differences between the scenarios at the two airfields are sometimes small (nearly overlapping) and at other times can differ by approximately one mile. The differences are more prominent at Ault Field toward the ends of the four lobes of the noise contour, which is commonly located over water. The difference in noise contours at OLF Coupeville between the scenarios is more pronounced than at Ault Field due to the larger proportional difference of operations at OLF Coupeville than at Ault Field.

Table 4.2-17 presents an overall comparison of the number of acres and population in each of the DNL contour ranges, as well as the difference between the No Action Alternative and Alternative 3, Scenarios A, B, and C. As indicated in the table, the total change in population within the entire 65 dB DNL contour increases from the No Action Alternative by between 399 and 1,766 at Ault Field, depending on the scenario, and for OLF Coupeville increases from the No Action Alternative by between 526 and 1,284, also depending on the scenario.

Table 4.2-17 Estimated Acreage and Population within the DNL Contour Ranges[1] for the NAS Whidbey Island Complex, Alternative 3 (Average Year)[2,3]

	DNL Contour Range							
	65 to <70 dB DNL		*70 to <75 dB DNL*		*Greater than or equal to 75 dB DNL*		*Total*	
	Area (acres)	*Pop[4]*	*Area (acres)*	*Pop[4]*	*Area (acres)*	*Pop[4]*	*Area (acres)*	*Pop[4]*
Ault Field								
No Action Alternative								
Average Year	3,557	2,995	3,030	2,345	5,587	3,377	12,174	8,717
Alternative 3								
Scenario A (20/80 FCLP split)	4,167 (+610)	3,562 (+567)	3,254 (+224)	2,104 (-241)	5,789 (+202)	3,450 (+73)	13,210 (+1,036)	9,116 (+399)
Scenario B (50/50 FCLP split)	4,189 (+632)	3,760 (+765)	3,097 (+67)	2,379 (+34)	6,487 (+900)	3,850 (+473)	13,773 (+1,599)	9,989 (+1,272)
Scenario C (80/20 FCLP split)	4,266 (+709)	4,011 (+1,016)	2,997 (-33)	2,354 (+9)	6,967 (+1,380)	4,118 (+741)	14,230 (+2,056)	10,483 (+1,766)
OLF Coupeville								
No Action Alternative								
Average Year	3,742	880	3,181	820	836	616	7,759	2,316
Alternative 3								
Scenario A (20/80 FCLP split)	1,570 (-2,172)	669 (-211)	3,110 (-71)	879 (+59)	5,818 (+4,982)	2,052 (+1,436)	10,498 (+2,739)	3,600 (+1,284)
Scenario B (50/50 FCLP split)	1,745 (-1,997)	513 (-367)	3,840 (+659)	1,147 (+327)	4,223 (+3,387)	1,577 (+961)	9,808 (+2,049)	3,237 (+921)
Scenario C (80/20 FCLP split)	3,592 (-150)	1,022 (+142)	3,642 (+461)	1,077 (+257)	1,347 (+511)	743 (+127)	8,581 (+822)	2,842 (+526)
NAS Whidbey Island Complex								
No Action Alternative								
Average Year	7,299	3,875	6,211	3,165	6,423	3,993	19,933	11,033
Alternative 3								
Scenario A (20/80 FCLP split)	5,737 (-1,562)	4,231 (+356)	6,364 (+153)	2,983 (-182)	11,607 (+5,184)	5,502 (+1,509)	23,708 (+3,775)	12,716 (+1,683)
Scenario B (50/50 FCLP split)	5,934 (-1,365)	4,273 (+398)	6,937 (+726)	3,526 (+361)	10,710 (+4,287)	5,427 (+1,434)	23,581 (+3,648)	13,226 (+2,193)
Scenario C (80/20 FCLP split)	7,858 (+559)	5,033 (+1,158)	6,639 (+428)	3,431 (+266)	8,314 (+1,891)	4,861 (+868)	22,811 (+2,878)	13,325 (+2,292)

Table 4.2-17 Estimated Acreage and Population within the DNL Contour Ranges[1] for the NAS Whidbey Island Complex, Alternative 3 (Average Year)[2,3]

	DNL Contour Range			
	65 to <70 dB DNL	*70 to <75 dB DNL*	*Greater than or equal to 75 dB DNL*	*Total*

Notes:

1 Scenarios A, B, and C are outlined in Section 2.3.3, where the split represents the percent of FCLPs conducted at Ault Field and OLF Coupeville, respectively (i.e., 20/80 FCLP split = 20 percent of FCLPs at Ault Field and 80 percent of FCLPs at OLF Coupeville).

2 Acreage presented does not include areas over water or areas over the NAS Whidbey Island complex.

3 The difference between the No Action Alternative and Alternative 3 is noted in parentheses.

4 Population counts of people within the DNL contour ranges were computed using 2010 census block-level data. The percent area of the census block covered by the DNL contour range was applied to the population of that census block to estimate the population within the DNL contour range (e.g., if 25 percent of the census block is within a DNL contour range, then 25 percent of the population is included in the population count). This calculation assumes an even distribution of the population across the census block, and it excludes population on military properties within the DNL contour ranges (NAS Whidbey Island [Ault Field], the Seaplane Base, and OLF Coupeville). In addition, a 5.4-percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period (Washington State Office of Financial Management, 2012). These data should be used for comparative purposes only and are not considered actual numbers within the DNL contour range.

5 Numbers have been rounded to ensure totals sum.

Key:
dB = decibel
DNL = day-night average sound level
FCLP = field carrier landing practice
NAS = Naval Air Station
OLF = Outlying Landing Field

For purposes of comparison and to be fully transparent regarding the possible range of impacts that could arise from the Proposed Action, DNL noise contours were also modeled for a high-tempo FCLP year, which represents conditions when pre-deployment training for multiple units overlaps and, therefore, FCLP activity would be expected to increase over average conditions. The high-tempo FCLP year data are depicted on the same figures noted previously, as well as included in Appendix A, Draft Aircraft Noise Study. Figures 4.2-16 through 4.2-21 present both the average year and high-tempo FCLP year DNL noise contours on the same figures for the airfields to illustrate the relatively small differences in the overall noise environment, with many of the areas where they diverge occurring over water.

In addition, Table 4.2-18 shows the percentage change in acreage and population between the average year DNL contour ranges and the high-tempo FCLP year DNL contour ranges. The higher the percent change, the larger the deviation between the average year DNL noise contours and the high-tempo FCLP year DNL noise contours; however, most changes are within +/- 5 percent of zero.

Table 4.2-18 Percent Difference in the Estimated Acreage and Population within the Average and High-Tempo FCLP Year DNL Contour Ranges for the NAS Whidbey Island Complex, Alternative 3

	DNL Contour Range[1]							
	65 to <70 dB DNL		*70 to <75 dB DNL*		*Greater than or equal to 75 dB DNL*		*Total*	
DNL Contours	*Area (acres)*	*Pop*	*Area (acres)*	*Pop*	*Area (acres)*	*Pop*	*Area (acres)*	*Pop*
Ault Field								
Scenario A	1.3%	1.8%	0.9%	3.0%	1.9%	1.5%	1.5%	2.0%
Scenario B	1.2%	2.2%	-0.3%	1.4%	2.1%	2.0%	1.3%	1.9%
Scenario C	-0.3%	0.9%	-0.3%	0.1%	1.4%	2.0%	0.5%	1.2%
OLF Coupeville								
Scenario A	3.6%	8.2%	-8.4%	-8.8%	7.4%	5.8%	2.1%	2.7%
Scenario B	-9.3%	1.4%	-1.8%	-4.8%	9.0%	8.1%	1.5%	2.5%
Scenario C	-3.9%	-4.5%	0.6%	1.0%	18.5%	9.2%	1.5%	1.2%
NAS Whidbey Island Complex								
Scenario A	1.9%	2.8%	-3.7%	-0.4%	4.7%	3.1%	1.8%	2.2%
Scenario B	-1.9%	2.1%	-1.1%	-0.6%	4.8%	3.8%	1.4%	2.1%
Scenario C	-1.9%	-0.2%	0.2%	0.3%	4.2%	3.1%	0.9%	1.1%

Key:
dB = decibel
DNL = day-night average sound level
NAS = Naval Air Station
OLF = Outlying Landing Field

Figure 4.2-15 Alternative 3 Overview of 65 dB DNL Noise Contours for the NAS Whidbey Island Complex

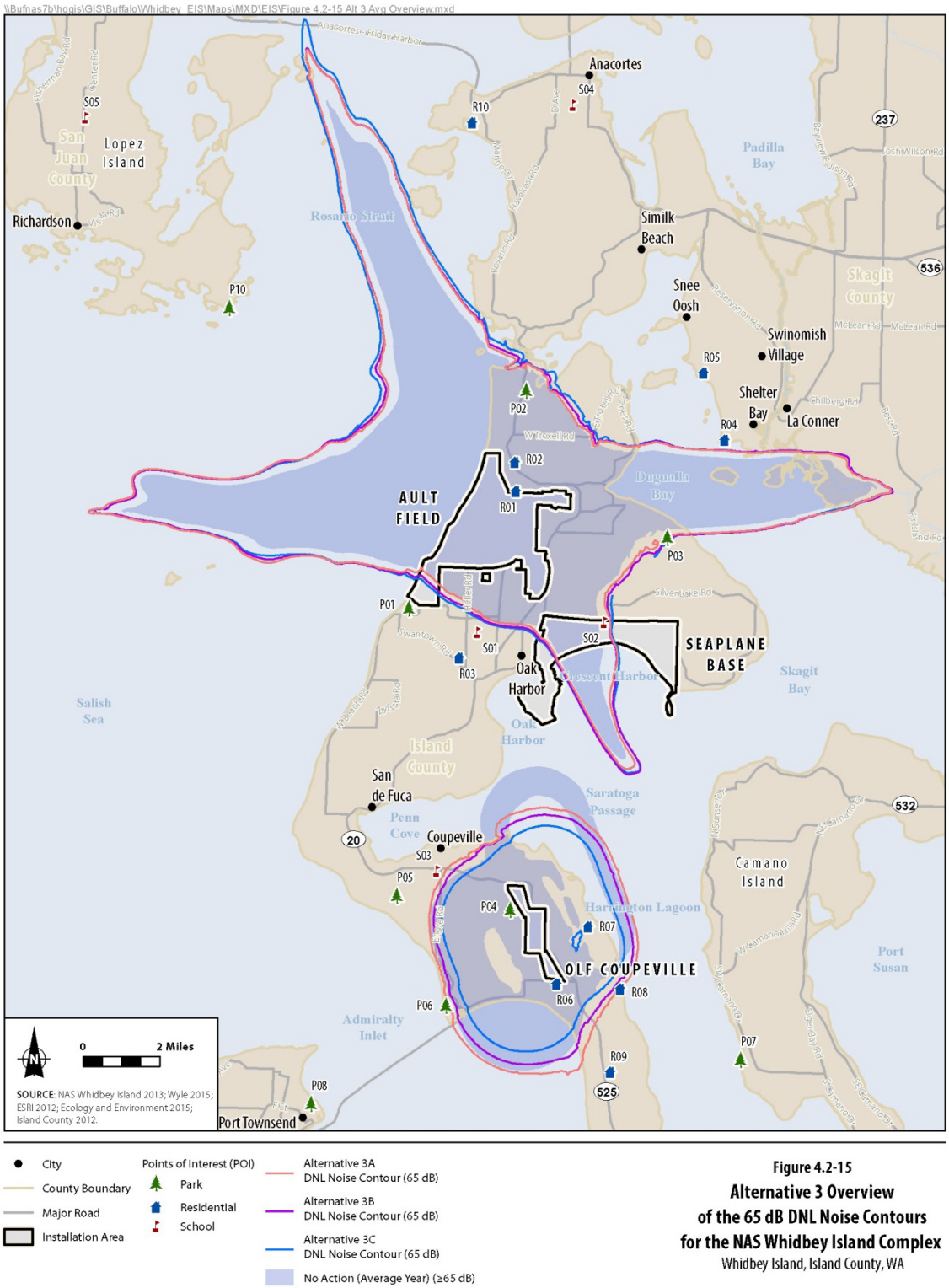


Figure 4.2-16 Alternative 3A DNL Noise Contours for Ault Field

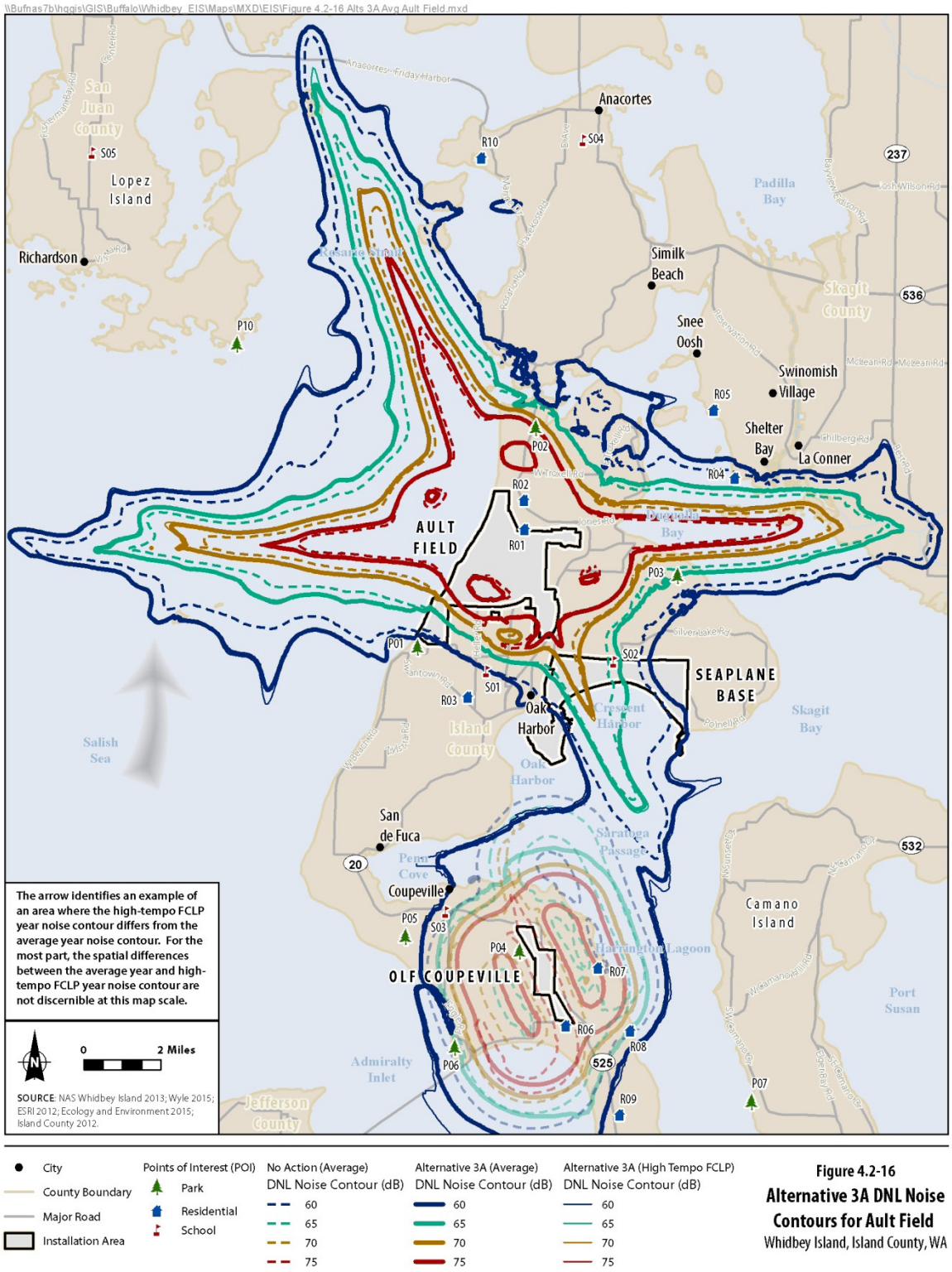


Figure 4.2-16
Alternative 3A DNL Noise Contours for Ault Field
Whidbey Island, Island County, WA

Figure 4.2-17 Alternative 3B DNL Noise Contours for Ault Field

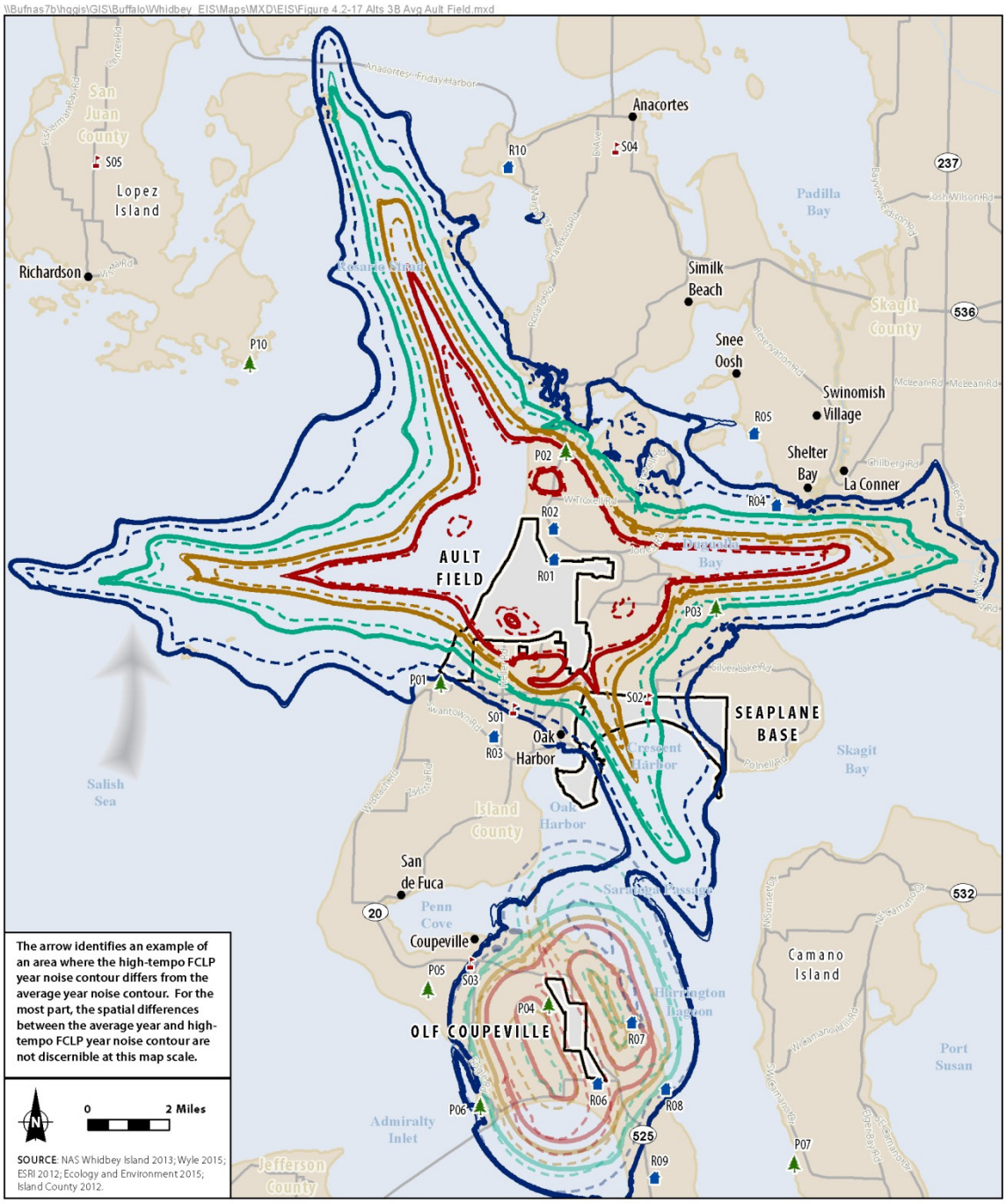


Figure 4.2-17
Alternative 3B DNL Noise Contours for Ault Field
Whidbey Island, Island County, WA

Figure 4.2-18 Alternative 3C DNL Noise Contours for Ault Field

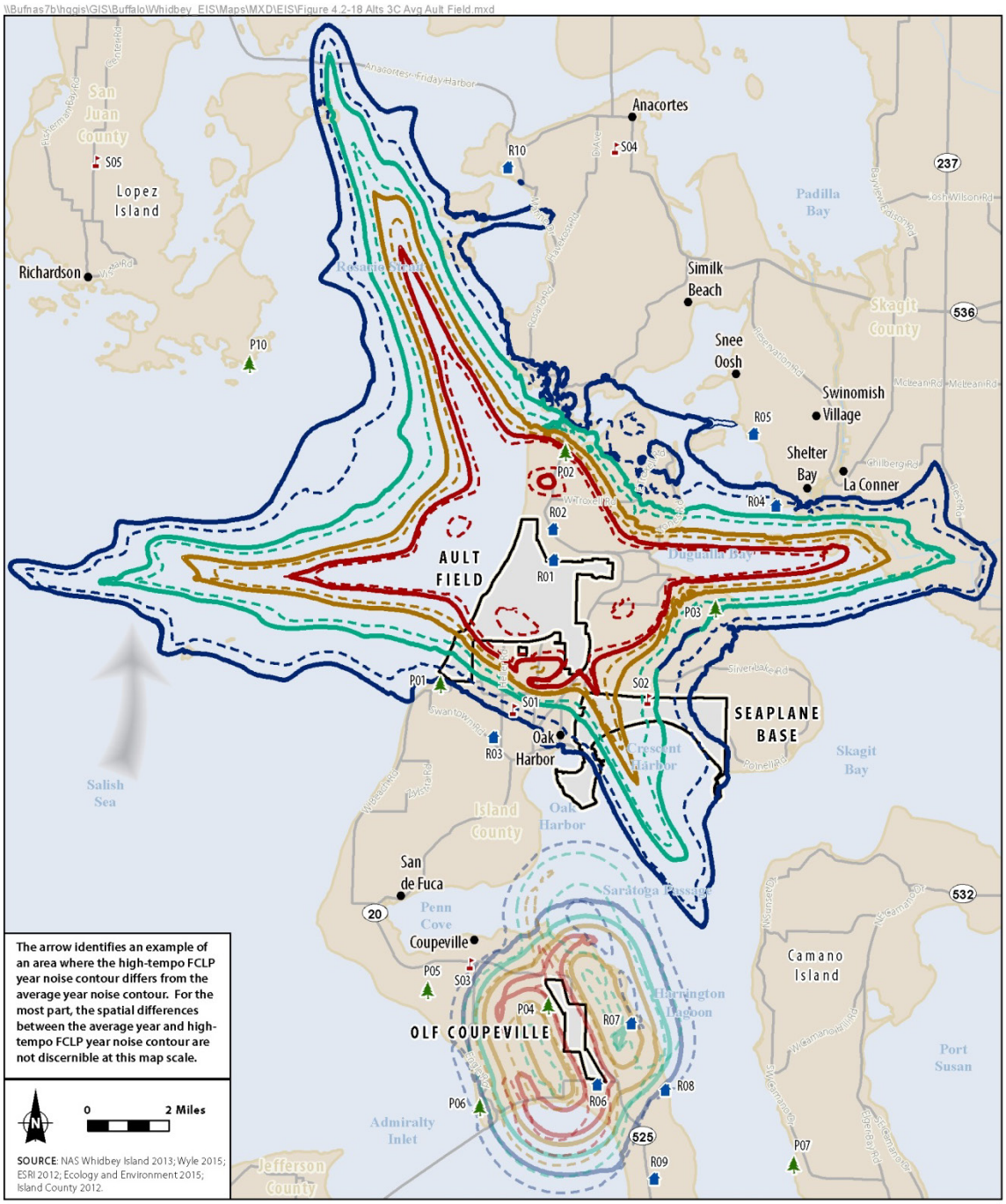


Figure 4.2-19 Alternative 3A DNL Noise Contours for OLF Coupeville

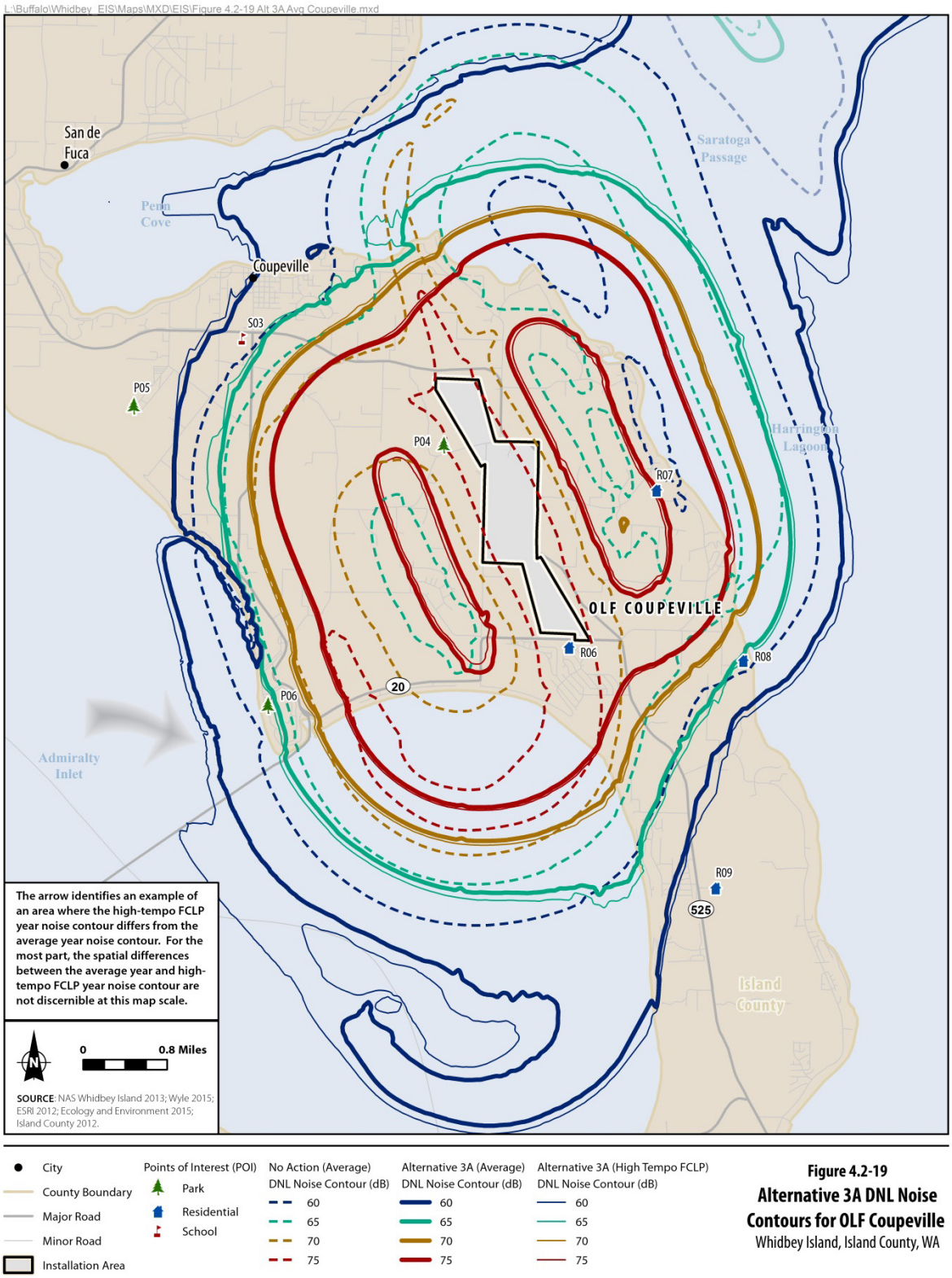


Figure 4.2-19
Alternative 3A DNL Noise Contours for OLF Coupeville
Whidbey Island, Island County, WA

Figure 4.2-20 Alternative 3B DNL Noise Contours for OLF Coupeville

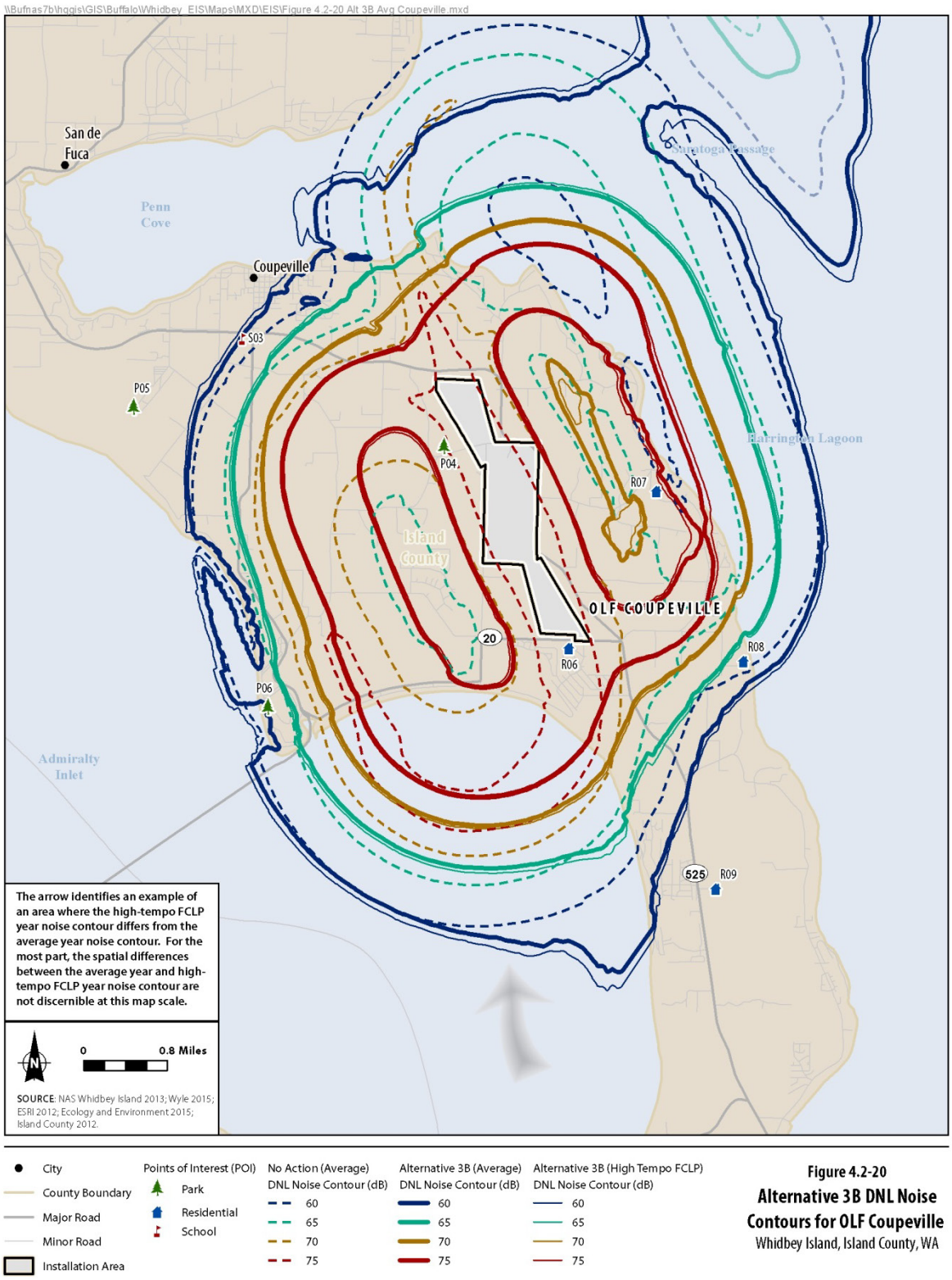


Figure 4.2-20
Alternative 3B DNL Noise Contours for OLF Coupeville
Whidbey Island, Island County, WA

Figure 4.2-21 Alternative 3C DNL Noise Contours for OLF Coupeville

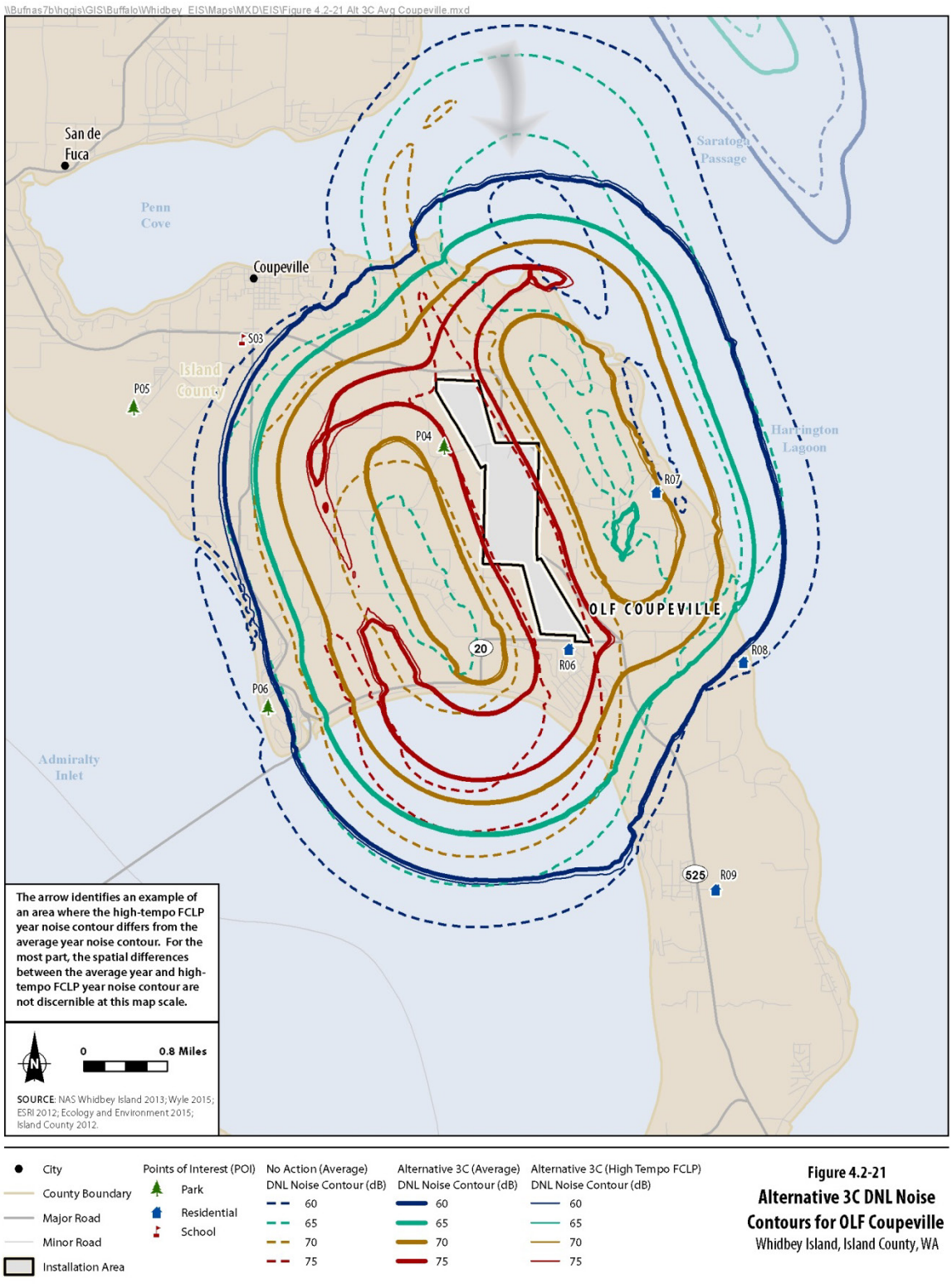


Figure 4.2-21
Alternative 3C DNL Noise Contours for OLF Coupeville
Whidbey Island, Island County, WA

4.2.4.1.2 Supplemental Noise Analyses, Alternative 3

Additional supplemental noise analyses were conducted for a variety of representative POIs identified in the communities surrounding Ault Field and OLF Coupeville. The wide geographic distribution of POIs provides broad coverage and context to compare the noise effects under each of the alternatives with the noise effects for the No Action Alternative. These supplemental analyses include single event noise, speech interference, classroom/learning interference, sleep disturbance, potential noise effects on recreation, and potential hearing loss. The POIs chosen for this analysis are presented in Section 3.2 and are depicted on Figure 3.2-6. Not all POIs are used for each analysis because the location and type of POI dictates whether the particular analysis would apply.

Single Event Noise

Two noise metrics are used to evaluate single event noise: SEL and L_{max}. The SEL metric is a composite metric that represents both the intensity of a sound and its duration. SEL provides a measure of total sound energy of an entire acoustic event (i.e., arrival, departure, or T&G). The L_{max} metric is the maximum, instantaneous level of noise that a particular event produces, and it is most closely related to what an individual would hear. The SEL and L_{max} provide the noise level of a single aircraft event. These events are intermittent in nature, and therefore the noise levels do not represent a continuous source of noise. For more details on SEL or L_{max}, see Section 3.2.2, as well as Appendix A, Draft Aircraft Noise Study.

The SEL and L_{max} values for the loudest single event (i.e., arrival, departure, or T&G) for each POI under Alternative 3 at Ault Field and OLF Coupeville are presented in Table 4.2-19. Under Alternative 3, the maximum SEL/ L_{max} values vary depending on the location of the POI and its proximity to the airfields and flight tracks. These noise level measurements under Alternative 3 are compared to the noise level measurements that were modeled under the No Action Alternative, and the difference is noted in the table.

As shown in the data, many of the maximum SEL and L_{max} values modeled under Alternative 3 are identical to those modeled in the No Action Alternative analysis. Measurements at only six of the 30 POIs changed from the No Action Alternative to Alternative 3 (measurements changed at R06, R07, R08, R09, S03, and S07). In addition, the SEL and L_{max} values for the representative POIs are all identical under all of the three action alternatives. However, the number of annual aircraft events that would produce these noise levels would differ between the three action alternatives and in comparison to the No Action Alternative. Table 4.2-19 also presents the number of annual aircraft events that produce the loudest single event for each POI.

This analysis shows that while there may not be a substantive difference in the loudest event at a particular POI, there may be a difference in the number of times that loudest event would occur between alternatives and compared to the No Action Alternative. Under Alternative 3, some of the POIs would experience more annual events of the maximum SEL/L_{max} than under the No Action Alternative, and other POIs would experience fewer annual events of the maximum SEL/L_{max}. The POI R06 (Admirals Dr. and Byrd Dr.) would experience the largest increase in annual events (+2,273 under Scenario A), while the POI P04 (Ebey's Landing – Rhododendron Park) would experience the largest decrease in annual events (-103 under Scenario C). Generally, POIs near OLF Coupeville experienced more annual events under Scenario A than under Scenarios B or C.

Under Alternative 3, the number of events that would produce the maximum SEL/ L_{max} values vary between the scenarios, depending on the POI (see Table 4.2-19). For example, on the high end, at Admirals Drive and Byrd Drive (R06) under Scenario A, a person would be exposed to the maximum SEL/ L_{max} an average of approximately seven times per day compared to the low end, such as at Central Whidbey (R03) under Scenario B, at Joseph Whidbey State Park (P01) under Scenario B, and at Cama Beach State Park (P07) under Scenario C, where a person would be exposed to the maximum SEL/ L_{max} an average of approximately once every month.

Table 4.2-19 Maximum Sound Exposure Level (dB) and Maximum Sound Level (dB) for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 3 (Average Year)[1]

		Maximum SEL (dB)		*L_{max} (dB)*		*Number of Annual Events[2]*			
ID	*Description*	*No Action Alternative*	*Alt 3*	*No Action Alternative*	*Alt 3*	*No Action Alternative*	*Alt 3 A*	*Alt 3 B*	*Alt 3 C*
Residences									
R01	Sullivan Rd	121	121 (0)	114	114 (0)	26	84 (+58)	55 (+29)	18 (-8)
R02	Salal St. and N. Northgate Dr.	109	109 (0)	96	96 (0)	12	113 (+101)	62 (+50)	34 (+22)
R03	Central Whidbey	101	101 (0)	93	93 (0)	34	42 (+8)	42 (+8)	41 (+7)
R04	Pull and Be Damned Point	96	96 (0)	88	88 (0)	208	273 (+65)	257 (+49)	255 (+47)
R05	Snee-Oosh Point	92	92 (0)	84	84 (0)	733	1,032 (+299)	936 (+203)	910 (+177)
R06	Admirals Dr. and Byrd Dr.	118	121 (+3)	114	118 (+4)	267	2,540 (+2,273)	1,545 (+1,278)	628 (+361)
R07	Race Lagoon	114	115 (+1)	106	110 (+4)	55	494 (+439)	331 (+276)	128 (+73)
R08	Pratts Bluff	112	101 (-11)	105	92 (-13)	75	494 (+419)	331 (+256)	128 (+53)
R09	Cox Rd and Island Ridge Way	92	90 (-2)	82	81 (-1)	72	22 (-50)	27 (-45)	17 (-55)
R10	Skyline	100	100 (0)	90	90 (0)	261	376 (+115)	349 (+88)	401 (+140)
R11	Sequim	73	73 (0)	60	60 (0)	74	104 (+30)	101 (+27)	111 (+37)
R12	Port Angeles	75	75 (0)	65	65 (0)	208	273 (+65)	257 (+49)	255 (+47)
Schools									
S01	Oak Harbor High School	99	99 (0)	90	90 (0)	26	105 (+79)	64 (+38)	26 (0)
S02	Crescent Harbor Elementary School	102	102 (0)	94	94 (0)	178	305 (+127)	312 (+134)	319 (+141)
S03	Coupeville Elementary School	98	94 (-4)	90	85 (-5)	367	1,270 (+903)	773 (+406)	314 (-53)
S04	Anacortes High School	93	93 (0)	83	83 (0)	112	161 (+49)	150 (+38)	172 (+60)

Table 4.2-19 Maximum Sound Exposure Level (dB) and Maximum Sound Level (dB) for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 3 (Average Year)[1]

ID	Description	Maximum SEL (dB)		L_{max} (dB)		Number of Annual Events[2]			
		No Action Alternative	Alt 3	No Action Alternative	Alt 3	No Action Alternative	Alt 3 A	Alt 3 B	Alt 3 C
S05	Lopez Island School	76	76 (0)	68	68 (0)	110	165 (+55)	131 (+21)	170 (+60)
S06	Friday Harbor Elementary School	53	53 (0)	39	39 (0)	26	20 (-6)	27 (+1)	34 (+8)
S07	Sir James Douglas Elementary	62	62 (0)	52	51 (-1)	147	206 (+59)	187 (+40)	182 (+35)
Parks									
P01	Joseph Whidbey State Park	93	93 (0)	82	82 (0)	34	42 (+8)	43 (+9)	41 (+7)
P02	Deception Pass State Park	110	110 (0)	104	104 (0)	161	664 (+503)	403 (+242)	164 (+3)
P03	Dugualla State Park	105	105 (0)	98	98 (0)	110	178 (+68)	172 (+62)	174 (+64)
P04	Ebey's Landing – Rhododendron Park	112	112 (0)	106	106 (0)	267	664 (+397)	403 (+136)	164 (-103)
P05	Ebey's Landing – Ebey's Prairie	88	88 (0)	77	77 (0)	367	1,370 (+1,003)	831 (+464)	337 (-30)
P06	Fort Casey State Park	96	96 (0)	85	85 (0)	267	1,270 (+1,003)	773 (+506)	314 (+47)
P07	Cama Beach State Park	83	83 (0)	73	73 (0)	5	41 (+36)	28 (+23)	11 (+6)
P08	Port Townsend	85	85 (0)	n/a	n/a (0)	24	19 (-5)	22 (-2)	22 (-2)
P09	Moran State Park	62	62 (0)	51	51 (0)	61	48 (-13)	64 (+3)	80 (+19)
P10	San Juan Island National Monument	95	95 (0)	85	85 (0)	372	538 (+166)	499 (+127)	572 (+200)
P11	San Juan Island Visitors Center	63	63 (0)	50	50 (0)	147	206 (+59)	187 (+40)	182 (+35)

Notes:

[1] The difference between the No Action Alternative and Alternative 3 is noted in parentheses for both the maximum SEL and L_{max} metrics, as well as the number of annual events.

[2] The number of annual events is the estimated number of times the single aircraft event with the maximum SEL or L_{max} at that point of interest would occur annually.

Key:

dB = decibel

L_{max} = maximum sound level

n/a = not available; the aircraft that generates the highest L_{max} at this POI is the P-8A.

SEL = sound exposure level

Speech Interference

Conversation or indoor speech is assumed to be interrupted when a single aircraft event exceeds the maximum sound level, or L_{max}, of 50 dB indoors (Wyle, 2009). Normal conversation is about 60 dB; therefore, the use of a 50 dB indoor level is a very conservative threshold such that a soft speaking voice could be heard. For this analysis, the model calculated the number of events occurring per daytime hour (7:00 a.m. to 10:00 p.m.) that are greater than the maximum sound level, or L_{max}, of 50 dB at the 12 residential POIs and the seven schools, since they are commonly located in residential areas. Because the individual is assumed to be indoors for this analysis, noise level reduction factors were applied because the walls, doors, insulation, and other building features reduce the noise levels inside. The analysis was conducted assuming both windows-open and windows-closed conditions. Table 4.2-20 presents the average daily (7:00 a.m. to 10:00 p.m.) events per hour that exceed an L_{max} of 50 dB indoors at these POIs under Alternative 3, Scenarios A, B, and C.

Table 4.2-20 Average Number of Events per Hour of Indoor Speech Interference for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 3 (Average Year)[1]

		No Action Alternative		*Scenario A*		*Scenario B*		*Scenario C*	
		Average Number of Events per Daytime Hour[2]							
ID	*Description*	*Windows Open[3]*	*Windows Closed[3]*	*Windows Open[3]*	*Windows Closed[3]*	*Windows Open[3]*	*Windows Closed[3]*	*Windows Open[3]*	*Windows Closed[3]*
Residences									
R01	Sullivan Rd	8	8	10 (+2)	10 (+2)	11 (+3)	11 (+3)	12 (+4)	12 (+4)
R02	Salal St. and N. Northgate Dr.	8	7	10 (+2)	9 (+2)	11 (+3)	10 (+3)	11 (+3)	11 (+4)
R03	Central Whidbey	2	-	3 (+1)	- (0)	3 (+1)	- (0)	3 (+1)	- (0)
R04	Pull and Be Damned Point	4	2	6 (+2)	2 (0)	6 (+2)	2 (0)	6 (+2)	2 (0)
R05	Snee-Oosh Point	2	-	2 (0)	1 (+1)	2 (0)	1 (+1)	2 (0)	1 (+1)
R06	Admirals Dr. and Byrd Dr.	1	1	3 (+2)	3 (+2)	2 (+1)	2 (+1)	1 (0)	1 (0)
R07	Race Lagoon	-	-	2 (+2)	1 (+1)	1 (+1)	1 (+1)	1 (+1)	- (0)
R08	Pratts Bluff	-	-	2 (+2)	1 (+1)	1 (+1)	1 (+1)	1 (+1)	- (0)
R09	Cox Rd and Island Ridge	1	-	3 (+2)	- (0)	2 (+1)	- (0)	1 (0)	- (0)
R10	Skyline	-	-	1 (+1)	- (0)	1 (+1)	- (0)	1 (+1)	- (0)
R11	Sequim	-	-	- (0)	- (0)	- (0)	- (0)	- (0)	- (0)
R12	Port Angeles	-	-	- (0)	- (0)	- (0)	- (0)	- (0)	- (0)
Schools									
S01	Oak Harbor High School	5	1	7 (+2)	2 (+1)	7 (+2)	2 (+1)	8 (+3)	2 (+1)
S02	Crescent Harbor Elementary	4	1	5 (+1)	2 (+1)	6 (+2)	2 (+1)	6 (+2)	2 (+1)
S03	Coupeville Elementary	1	1	3 (+2)	2 (+1)	2 (+1)	1 (0)	1 (0)	- (-1)
S04	Anacortes High School	-	-	- (0)	- (0)	- (0)	- (0)	- (0)	- (0)
S05	Lopez Island School	-	-	- (0)	- (0)	- (0)	- (0)	- (0)	- (0)
S06	Friday Harbor Elementary	-	-	- (0)	- (0)	- (0)	- (0)	- (0)	- (0)
S07	Sir James Douglas Elementary	-	-	- (0)	- (0)	- (0)	- (0)	- (0)	- (0)

Table 4.2-20 Average Number of Events per Hour of Indoor Speech Interference for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 3 (Average Year)[1]

		No Action Alternative		Scenario A		Scenario B		Scenario C	
		Average Number of Events per Daytime Hour[2]							
ID	Description	Windows Open[3]	Windows Closed[3]	Windows Open[3]	Windows Closed[3]	Windows Open[3]	Windows Closed[3]	Windows Open[3]	Windows Closed[3]

Notes:

1 The difference between the No Action Alternative and Alternative 3 is noted in parentheses. Hyphens (-) indicate result equals zero.

2 Number of annual average daily daytime (7:00 a.m. to 10:00 p.m.) events at or above an indoor maximum single event sound level (L_{max}) of 50 dB, which is a conservative threshold as normal conversation is about 60 dB. See Figure 3.2-1 for examples of sound levels (in dB) from some typical sources, such as "quiet urban daytime" at 40 dB and a garbage disposal at 80 dB.

3 Noise level reductions of 15 dB and 25 dB for windows open and closed, respectively.

Compared to the No Action Alternative, Alternative 3 would result in between zero and four additional events per hour at representative POIs during which conversations or indoor speech would be interrupted. The largest change (with four additional events per daytime hour) would occur at R01 (Sullivan Road) and R02 (Salal St. and N. Northgate Dr.), both under Scenario C. However, several POIs would have no change from the No Action Alternative.

Classroom/learning Interference

Two metrics were analyzed to evaluate the potential for classroom/learning interference due to noise events from aircraft overflights: interior equivalent sound level ($L_{eq(8hr)}$) during an 8-hour school day (8:00 a.m. to 4:00 p.m.), and the average number of interfering aircraft events per hour during that time period. Single aircraft events that generate interior sound levels (L_{max}) greater than 50 dB have the potential to interfere with student and teacher interaction by affecting conversation and comprehension (Wyle, 2009). Because the classroom interaction occurs indoors for this analysis, noise level reduction factors were applied because the walls, doors, insulation, and other building features reduce the noise levels inside. The analysis considered both windows-open and windows-closed conditions. Table 4.2-21 presents the 8-hour equivalent sound level ($L_{eq(8h)}$) and the number of events that exceed an L_{max} of 50 dB indoors under Alternative 3, Scenarios A, B, and C, at the representative POIs that are schools (and the two residential POIs located in the vicinity of schools). It is important to note that Table 4.2-21 presents average values, and there may be periods when aircraft are operating more frequently, thereby generating more interfering events, and other periods when they are not operating at all and therefore have no potential for classroom/learning interference.

Table 4.2-21 Average Number of Events per Hour of Indoor Classroom/learning Interference for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 3 (Average Year)[1]

		No Action Alternative				Scenario A				Scenario B				Scenario C			
		Windows Open[2]		Windows Closed[2]		Windows Open[2]		Windows Closed[2]		Windows Open[2]		Windows Closed[2]		Windows Open[2]		Windows Closed[2]	
ID	Description	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]
School Surrogates																	
R03	Central Whidbey	<45	2	<45	-	49	3 (+1)	<45	- (0)	49	3 (+1)	<45	- (0)	49	3 (+1)	<45	- (0)
R11	Sequim	<45	-	<45	-	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)
Schools																	
S01	Oak Harbor High School	<45	5	<45	1	48	7 (+2)	<45	2 (+1)	48	7 (+2)	<45	2 (+1)	49	7 (+2)	<45	2 (+1)
S02	Crescent Harbor Elementary	49	4	<45	1	56	5 (+1)	46	2 (+1)	55	6 (+2)	45	2 (+1)	56	6 (+2)	46	2 (+1)
S03	Coupeville Elementary	<45	1	<45	-	48	2 (+1)	<45	2 (+2)	46	2 (+1)	<45	1 (+1)	<45	1 (0)	<45	- (0)
S04	Anacortes High School	<45	-	<45	-	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)
S05	Lopez Island School	<45	-	<45	-	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)
S06	Friday Harbor Elementary	<45	-	<45	-	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)
S07	Sir James Douglas Elementary	<45	-	<45	-	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)	<45	- (0)

Table 4.2-21 Average Number of Events per Hour of Indoor Classroom/learning Interference for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 3 (Average Year)[1]

		No Action Alternative				Scenario A				Scenario B				Scenario C			
		Windows Open[2]		Windows Closed[2]		Windows Open[2]		Windows Closed[2]		Windows Open[2]		Windows Closed[2]		Windows Open[2]		Windows Closed[2]	
ID	Description	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]	$L_{eq(8h)}$[3] (dB)	Events per Hour[4]

Notes:

1 The difference between the No Action Alternative and Alternative 3 is noted in parentheses. Hyphens (-) indicate result equals zero.

2 Noise level reductions of 15 dB and 25 dB for windows open and closed, respectively (FICON, 1992).

3 For this metric, daily classroom hours are assumed to be 8:00 a.m. to 4:00 p.m.

4 Number of average school-day events per hour during an 8-hour school day (8:00 a.m. to 4:00 p.m.) at or above an indoor maximum single event sound level (L_{max}) of 50 dB, which is a conservative threshold because normal conversation is at about 60 dB. See Figure 3.2-1 for examples of sound levels (in dB) from some typical sources, such as "quiet urban daytime" at 40 dB and a garbage disposal at 80 dB.

Key:

dB = decibel

$L_{eq(8hr)}$ = 8-hour sound level equivalent

L_{max} = maximum sound level

Most schools would experience interior $L_{eq(8hr)}$ due to Navy aircraft operations close to ambient levels of 45 dB or less, which would not impact learning and conversation. Crescent Harbor Elementary School (S02) would experience the highest $L_{eq(8hr)}$ of 49 dB for the No Action Alternative and the highest under Scenarios A and C of 56 dB when windows are open. When windows are closed, the $L_{eq(8hr)}$ at Crescent Harbor Elementary School (S02) would drop to 45 or 46 dB. Given the relatively cool climate in the area, it is likely that windows at schools would be closed a majority of the time.

The potential for classroom interference from single aircraft events generating sound levels inside classrooms greater than 50 dB L_{max} would increase under Alternative 3 by up to two events per hour (at S01, S02, and S03) compared to the No Action Alternative; that is, on average, no school would experience an increase of more than two learning-disrupting events per hour under any scenario under Alternative 3 compared to the No Action Alternative. The highest increase of an additional two events is shown for Oak Harbor High School (S01) for all three scenarios with windows open, Crescent Harbor Elementary School (S02) under Scenarios B and C with windows open, and Coupeville Elementary School (S03) under Scenario A with windows closed. All other schools either show no change from the No Action Alternative or an increase of one event per daytime hour during the school day, primarily under the windows-open condition. Under the windows-closed condition, nearly all of the schools would be expected to experience an increase of no more than one event per hour of classroom/learning interference, with most being unchanged from the No Action Alternative. Many modern schools have central air conditioning and heating systems; therefore, it is more likely that classroom windows would remain closed the majority of the time.

Sleep Disturbance

The analysis of sleep disturbance is a calculation of the probability of awakening from aircraft overflights. Thus, it is based on the outdoor SEL at each of the residential POIs being converted to an indoor SEL. Events that were considered are those that occur between 10:00 p.m. and 7:00 a.m. Although individuals sleep outside of these hours, these are considered typical sleeping hours for this type of analysis. Table 4.2-22 presents the results of the sleep disturbance analysis for the 12 POI locations that are in the residential category, as well as the seven schools, which are commonly located in residential areas.

Table 4.2-22 Average Indoor Nightly[1] Probability of Awakening[2] for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 3 (Average Year)[3]

ID	Description	No Action Alternative		Scenario A		Scenario B		Scenario C	
		Windows Open[4]	Windows Closed[4]	Windows Open[4]	Windows Closed[4]	Windows Open[4]	Windows Closed[4]	Windows Open[4]	Windows Closed[4]
Residences									
R01	Sullivan Rd	69%	53%	77% (+8%)	62% (+9%)	83% (+14%)	68% (+15%)	87% (+18%)	74% (+21%)
R02	Salal St. and N. Northgate Dr.	51%	37%	60% (+9%)	44% (+7%)	65% (+14%)	49% (+12%)	72% (+21%)	55% (+18%)
R03	Central Whidbey	21%	10%	28% (+7%)	14% (+4%)	31% (+10%)	16% (+6%)	35% (+14%)	19% (+9%)
R04	Pull and Be Damned Point	25%	12%	32% (+7%)	16% (+4%)	35% (+10%)	17% (+5%)	39% (+14%)	18% (+6%)
R05	Snee-Oosh Point	20%	6%	26% (+6%)	10% (+4%)	29% (+9%)	10% (+4%)	32% (+12%)	11% (+5%)
R06	Admirals Dr. and Byrd Dr.	13%	8%	60% (+47%)	45% (+37%)	43% (+30%)	30% (+22%)	20% (+7%)	13% (+5%)
R07	Race Lagoon	6%	3%	34% (+28%)	22% (+19%)	24% (+18%)	15% (+12%)	13% (+7%)	6% (+3%)
R08	Pratts Bluff	6%	3%	24% (+18%)	16% (+13)	16% (+10%)	11% (+8%)	7% (+1%)	4% (+1%)
R09	Cox Rd and Island Ridge Way	4%	3%	21% (+17%)	13% (+10%)	13% (+9%)	8% (+5%)	5% (+1%)	3% (0%)
R10	Skyline	7%	2%	10% (+3%)	4% (+2%)	11% (+4%)	4% (+2%)	14% (+7%)	4% (+2%)
R11	Sequim	0%	0%	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)
R12	Port Angeles	0%	0%	1% (+1%)	0% (0%)	1% (+1%)	0% (0%)	1% (+1%)	0% (0%)
Schools (near residential areas)[5]									
S01	Oak Harbor High School	27%	16%	34% (+7%)	19% (+3%)	38% (+11%)	23% (+7%)	42% (+15%)	27% (+11%)
S02	Crescent Harbor Elementary	27%	16%	34% (+7%)	20% (+4%)	38% (+11%)	24% (+8%)	43% (+16%)	28% (+12%)
S03	Coupeville Elementary	7%	4%	28% (+21%)	18% (+14%)	19% (+12%)	12% (+8%)	9% (+2%)	5% (+1%)
S04	Anacortes High School	2%	1%	4% (+2%)	1% (0%)	4% (+2%)	1% (0%)	4% (+2%)	1% (0%)
S05	Lopez Island School	0%	0%	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)
S06	Friday Harbor Elementary	0%	0%	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)
S07	Sir James Douglas Elementary	0%	0%	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)

Table 4.2-22 Average Indoor Nightly[1] Probability of Awakening[2] for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 3 (Average Year)[3]

		No Action Alternative		*Scenario A*		*Scenario B*		*Scenario C*	
ID	*Description*	*Windows Open[4]*	*Windows Closed[4]*	*Windows Open[4]*	*Windows Closed[4]*	*Windows Open[4]*	*Windows Closed[4]*	*Windows Open[4]*	*Windows Closed[4]*

Notes:

1 For this metric, nightly sleeping hours are assumed to be 10:00 p.m. to 7:00 a.m.

2 This metric represents the probability of awakening at least once during a night of average aircraft noise activities.

3 The difference between the No Action Alternative and Alternative 3 is noted in parentheses.

4 Noise level reductions of 15 decibels (dB) and 25 dB for windows open and closed, respectively.

5 All school points of interest were included in the potential sleep disturbance analysis because of their typical proximity to residential areas.

Under Alternative 3, the majority of the POIs analyzed show an increase in the percent probability of awakening for all scenarios during nights of average aircraft activity. The highest percent increase is for R06 (Admirals Drive and Byrd Drive), where there would be an increase of 47 percent under Scenario A with windows open, meaning that there is a 47-percent greater probability, or chance of awakening at least once under windows-open conditions compared to the No Action Alternative. Generally, the POIs around OLF Coupeville had a higher percent probability of awakening under Scenario A than under Scenarios B or C. However, for the POIs around Ault Field, there was a larger increase in the percent probability of awakening for Scenario C than for Scenarios A or B.

Potential Noise Effects on Recreation

The analysis of potential noise effects on recreation is based on the number of events occurring per daytime hour (7:00 a.m. to 10:00 p.m.) that are greater than the maximum sound level of 65 dB outdoors (to capture outdoor speech interference). Details on the analysis of outdoor speech interference are available in Section 3.2, as well as Appendix A, Draft Aircraft Noise Study. Table 4.2-23 presents the results of the analysis for Alternative 3 for the 11 POIs that are considered parks or recreational centers with primarily outdoor features.

Under Alternative 3, the table shows a slight increase for some POIs where there would be potential for one to three additional DNL daytime events per hour during which a recreationist may experience outdoor speech interference. For many of the POIs, there is no change from the No Action Alternative. As the table indicates and as expected, when the POI is closer to OLF Coupeville, there would be more events under Scenario A, whereas if the POI is located closer to Ault Field, there would be more events under Scenario C. Section 4.5 has additional discussion on parks and recreation in the vicinity of the airfields. The data show that there is a range of potential outdoor speech interference that may disturb individuals participating in outdoor recreational activities depending on the location of the POI in relation to the airfields and flight tracks. The average number of events is mostly consistent with those expected under the No Action Alternative conditions; however, some POIs may experience an increase in the average daily events. These increases range from zero to an increase of three events per hour (P03 under Scenario C), depending on the scenario.

Table 4.2-23 Average Number of Events per Hour of Outdoor Speech Interference for Representative Points of Interest in the Vicinity of the NAS Whidbey Island Complex, Alternative 3 (Average Year)[1]

		No Action Alternative	Alternative 3		
			Scenario A	Scenario B	Scenario C
		Annual Average Daily Daytime Events per Hour			
ID	Description	NA65 L_{max} [2]	NA65 L_{max} [2]	NA65 L_{max} [2]	NA65 L_{max} [2]
P01	Joseph Whidbey State Park	5	6 (+1)	6 (+1)	6 (+1)
P02	Deception Pass State Park	6	7 (+1)	8 (+2)	8 (+2)
P03	Dugualla State Park	7	8 (+1)	9 (+2)	10 (+3)
P04	Ebey's Landing – Rhododendron Park	1	3 (+2)	2 (+1)	1 (0)
P05	Ebey's Landing – Ebey's Prairie	1	2 (+1)	1 (0)	0 (-1)
P06	Fort Casey State Park	1	2 (+1)	2 (+1)	1 (0)
P07	Cama Beach State Park	-	- (0)	- (0)	- (0)
P08	Port Townsend	-	- (0)	- (0)	- (0)
P09	Moran State Park	-	- (0)	- (0)	- (0)
P10	San Juan Island National Monument	2	3 (+1)	3 (+1)	3 (+1)
P11	San Juan Island Visitors Center	-	- (0)	- (0)	- (0)

Notes:

1 The difference between the No Action Alternative and Alternative 3 is noted in parentheses. Hyphens (-) indicate result equals zero.

2 Number of events at or above an outdoor maximum single event sound level (L_{max}) of 65 decibels; this reflects potential for outdoor speech interference.

Key:

L_{max} = maximum A-weighted sound level

NA65 = number of events above an L_{max} of 65 decibels

Potential Hearing Loss

The available literature on the subject of permanent threshold shifts and aircraft noise exposure indicates that exposure to military aviation noise has not resulted in permanent threshold shifts, even in sensitive populations such as children. Ludlow and Sixsmith found permanent threshold shifts are unlikely to be caused by exposures to aircraft noise thought to be typical of those who have lived on or near jet air stations. Additionally, the report found that there were no major differences in audiometric test results between military personnel who, as children, had lived on or near installations where jet aircraft operations were based and military personnel who, as children, had no such exposure (Ludlow and Sixsmith, 1999; ACRP 2008).

As part of this analysis, an evaluation of the risk of potential hearing loss for populations in the areas around the NAS Whidbey Island complex was conducted (including both Ault Field and OLF Coupeville). Details on the potential hearing loss metric, methodology for the analysis, and assumptions are outlined in Section 3.2, as well as Appendix A, Draft Aircraft Noise Study. The 1982 *U.S. EPA Guidelines for Noise Impact Analysis* provides that people who experience continuous, daily exposure to high noise over a normal working lifetime of 40 years, with exposure lasting 8 hours per day for 5 days per week, beginning at an age of 20 years old, may be at risk for a type of hearing loss called Noise Induced Permanent Threshold Shift (NIPTS). NIPTS defines a permanent change in hearing level, or threshold, caused by exposure to noise (USEPA, 1982). This workplace exposure standard, which is being applied to outdoor noise levels, is not intended to accurately describe the impact of intermittent noise events such as periodic aircraft overflights but is presented as a "worst-case" analytical tool. To put the conservative nature of this analysis into context, the national average of time spent indoors is approximately 87 percent (or almost 21 hours of the day) (Klepeis et al., n.d.). With intermittent aircraft operations and the time most people spend indoors, it is very unlikely that individuals would experience noise exposure that would result in hearing loss. In fact, it is highly unlikely for an individual living around Ault Field or OLF Coupeville to meet all of the criteria upon which the PHL metric is based. Nonetheless, this analysis is provided per DoD policy directive to support informed decision making and provide a standard for comparison across a wide range of proposed actions that result in community exposure to aircraft noise.

The procedure for determining potential hearing loss includes first identifying the number of persons residing in the greater than or equal to 80 dB DNL contour. Then, $L_{eq(24)}$ contours are developed by 1 dB increments in order to determine the potential for NIPTS for both the population with average sensitivity to noise and the population with the most sensitivity to noise. Table 4.2-24 presents the potentially affected populations in and near Ault Field and OLF Coupeville by 1 dB increments of the 24-hour equivalent sound level ($L_{eq(24)}$) as compared to the No Action Alternative numbers presented in Section 3.2.

Table 4.2-24 Average and 10th Percentile Noise Induced Permanent Threshold Shifts (NIPTS) as a Function of Equivalent Sound Level under Alternative 3 at NAS Whidbey Island Complex (Average Year)

Band of $L_{eq(24)}$ (dB)[1]	Avg NIPTS (dB)[2,3]	10th Pct NIPTS (dB)[2,3]	Estimated Population[4,5,6]							
			Ault Field				OLF Coupeville			
			No Action	Alt 3A	Alt 3B	Alt 3C	No Action	Alt 3A	Alt 3B	Alt 3C
75-76	1.0	4.0	-	0 (0)	0 (0)	21 (+21)	67	61 (-6)	45 (-22)	35 (-32)
76-77	1.0	4.5	143	121 (-22)	243 (+100)	348[7] (+205)	55	180 (+125)	106 (+51)	59 (+4)
77-78	1.5	5.0	274	261 (-13)	407 (+133)	390 (+116)	51	152 (+101)	77 (+26)	54 (+3)
78-79	2.0	5.5	131	181 (+50)	291 (+160)	390 (+259)	36	117 (+81)	73 (+37)	62 (+26)
79-80	2.5	6.0	81	96 (+15)	203 (+122)	277 (+196)	16	73 (+57)	64 (+48)	58 (+42)
80-81	3.0	7.0	71	76 (+5)	96 (+25)	214 (+143)	4	72 (+68)	58 (+54)	1 (-3)
81-82	3.5	8.0	51	70 (+19)	75 (+24)	86 (+35)	-	64 (+64)	55 (+55)	0 (0)
82-83	4.0	9.0	34	50 (+16)	66 (+32)	70 (+36)	-	59 (+59)	63 (+63)	0 (0)
83-84	4.5	10.0	25	39 (+14)	42 (+17)	51 (+26)	-	53 (+53)	53 (+53)	0 (0)
84-85	5.5	11.0	16	22 (+6)	28 (+12)	31 (+15)	-	61 (+61)	1 (+1)	0 (0)
85-86	6.0	12.0	12	15 (+3)	21 (+9)	23 (+11)	-	62 (+62)	0 (0)	0 (0)
86-87	7.0	13.5	5	9 (+4)	15 (+10)	18 (+13)	-	1 (+1)	0 (0)	0 (0)
87-88	7.5	15.0	4	5 (+1)	9 (+5)	14 (+10)	-	1 (+1)	0 (0)	0 (0)
88-89	8.5	16.5	1	4 (+3)	4 (+3)	6 (+5)	-	0 (0)	0 (0)	0 (0)
89-90	9.5	18.0	-	1 (+1)	2 (+2)	3 (+3)	-	0 (0)	0 (0)	0 (0)

Table 4.2-24 Average and 10th Percentile Noise Induced Permanent Threshold Shifts (NIPTS) as a Function of Equivalent Sound Level under Alternative 3 at NAS Whidbey Island Complex (Average Year)

Band of $L_{eq(24)}$ (dB)[1]	Avg NIPTS (dB)[2,3]	10th Pct NIPTS (dB)[2,3]	Estimated Population[4,5,6]							
			Ault Field				OLF Coupeville			
			No Action	Alt 3A	Alt 3B	Alt 3C	No Action	Alt 3A	Alt 3B	Alt 3C

Notes:

1 L_{eq} bands with no population were omitted from table.

2 NIPTS values rounded to nearest 0.5 dB.

3 NIPTS below 5 dB are generally not considered noticeable.

4 This analysis assumes the population is outdoors at one's residence and exposed to all aircraft noise events, every day, for 40 years. Given the amount of time spent indoors and the intermittent occurrence of aircraft noise events, it is highly unlikely that individuals would meet all the criteria, and the actual potential for hearing loss would be far less than the values reported here.

5 Estimated Population was determined by those living within the 80 dB DNL noise contour around each airfield, including those living on-base at Ault Field (there is no on-base population at OLF Coupeville).

6 Population counts of people within the DNL contours were computed using 2010 census block-level data. The percent area of the census block covered by the DNL contour range was applied to the population of that census block to estimate the population within the DNL contour range (e.g., if 25 percent of the census block is within a DNL contour, then 25 percent of the population is included in the population count). This calculation assumes an even distribution of the population across the census block. A 5.4 percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period (Washington State Office of Financial Management, 2012). In addition, per guidance on potential hearing loss, on-base populations at Ault Field have been included in the analysis. These data should be used for comparative purposes only and are not considered actual numbers within the DNL contour range.

7 Of this estimated population, 446 are military personnel living on-base at Ault Field.

Key:

dB = decibel
DNL = day-night average sound level
NIPTS = Noise Induced Permanent Threshold Shift
OLF = Outlying Landing Field

According to the USEPA, changes in hearing level of less than 5 dB are generally not considered noticeable.

According to the USEPA, changes in hearing level of less than 5 dB are generally not considered noticeable (USEPA, 1974). Therefore, using the data provided in Table 4.2-24, for the population with average sensitivity to noise, the level at which there may be a noticeable NIPTS would be at the 84 to 85 dB $L_{eq(24)}$ range and above. There is an increase in the population within the 80 dB DNL noise contour (i.e., potential at-risk population) under Alternative 3 at both Ault Field and OLF Coupeville. The largest increase in the potential at-risk population in the vicinity of Ault Field would be under Scenario C (57 additional people) and for OLF Coupeville would be under Scenario A (125 additional people). The range of potential NIPTS could be up to 9.5 dB at Ault Field and 7.5 dB at OLF Coupeville. The potential NIPTS values presented in Table 4.2-24 are only applicable in the extreme case of continuous outdoor exposure at one's residence to all aircraft events occurring over a period of 40 years. Because it is highly unlikely for any individuals to meet all those criteria, the actual potential NIPTS for individuals would be far less than the values reported here.

In addition, the actual value of NIPTS for any given person will depend on his or her physical sensitivity to noise; some could experience more hearing loss than others (DNWG, 2013). Therefore, to capture this, the USEPA guidelines provided information on the estimated NIPTS exceeded by the 10 percent of the population most sensitive to noise. Using the same 1 dB incremental data in Table 4.2-24 and the column identified as the 10^{th} Percentile NIPTS, those individuals are vulnerable to noticeable NIPTS at the 77 to 78 dB $L_{eq(24)}$ range and above. Using this even more conservative estimate, the range of potential NIPTS could be up to 18 dB for the population most sensitive to noise around Ault Field and up to 15.0 dB for the population most sensitive to noise around OLF Coupeville. As noted previously, it is highly unlikely that any individuals would meet all the criteria of being outdoors at one's residence and exposed to all aircraft events over a 40-year period; therefore, the actual potential NIPTS for individuals would be far less than the values reported here.

Nonauditory Health Effects

Per studies noted and evaluated in Section 3.2.3, the data and research are inconclusive with respect to the linkage between potential nonauditory health effects of aircraft noise exposure. As outlined within the analysis of DNL contours and supplemental metrics presented within this section, the data show that the Proposed Action would result in both an increase in the number of people exposed to noise as well as those individuals exposed to higher levels of noise. However, research conducted to date has not made a definitive connection between intermittent military aircraft noise and nonauditory health effects. The results of most cited studies are inconclusive and cannot identify a causal link between aircraft noise exposure and the various types of nonauditory health effects that were studied. An individual's health is greatly influenced by many factors known to cause health issues, such as hereditary factors, medical history, and life style choices regarding smoking, diet, and exercise. Research has demonstrated that these factors have a larger and more direct effect on a person's health than aircraft noise.

Vibration Effects from Aircraft Operations

In addition to the noise effects on the population outlined above, noticeable structural vibration may result from certain aircraft operations at either Ault Field or OLF Coupeville. Depending on the aircraft operation, altitude, heading, power settings, and the structure, certain vibration effects may be observed. Typically, the structural elements that are most susceptible to vibration from aircraft noise

are windows and sometimes walls or ceilings. Conservatively, only sounds lasting more than one second above a sound level of 130 dB are potentially damaging to structural components of a building (CHABA, 1977). Noise-induced structural vibration may cause annoyance to dwelling occupants because of induced secondary vibrations, or "rattle," of objects within the dwelling, such as hanging pictures, dishes, plaques, and bric-a-brac. Loose window panes may also vibrate noticeably when exposed to high levels of airborne noise, causing homeowners to fear breakage. See Appendix A, Draft Aircraft Noise Study, and the Noise and Vibration Associated with Operational Impacts discussion in Section 4.6.2.1 for additional details on noise-induced vibration effects.

The data show that the Proposed Action would result in both an increase in the number of aircraft operations and area/structures exposed to noise. Therefore, there could be an increase in vibration effects due to the Proposed Action. However, as shown in Table 4.2-19, for the representative POIs analyzed, the highest L_{max} value was 118 dB, and, therefore, sound levels damaging to structural components of buildings are not likely to occur.

4.2.4.2 Noise Conclusion, Alternative 3

Overall, Alternative 3 would have significant noise impacts in the communities surrounding Ault Field and OLF Coupeville. Both the total number of acres and the total number of individuals within the DNL noise contours would increase for all scenarios analyzed at Ault Field, and the total number of individuals within the DNL noise contours would increase for all scenarios analyzed at OLF Coupeville. There would be a larger impact to the communities around Ault Field under Scenario C, while there would be a larger impact for the communities around OLF Coupeville under Scenario A.

There would be a slight increase in the number of incidents of indoor and outdoor speech interference, and classroom interference. There would also be a higher probability of awakening under all scenarios, especially at POIs located closer to the airfields. In addition, depending on the scenario, the population potentially at risk for potential hearing loss would increase. The range of potential NIPTS could be up to 9.5 dB at Ault Field and 7.5 dB at OLF Coupeville for the population with average noise sensitivity and up to 18.0 dB at Ault Field and 15.0 dB at OLF Coupeville for the population highly sensitive to noise (the 10 percent of the population with the most sensitive hearing). As it is highly unlikely that any individuals would meet all the criteria of being outdoors at one's residence and exposed to all aircraft events over a 40-year period, the actual potential NIPTS for individuals would be far less than the values reported here.

4.2.5 Noise Impact Comparison, Alternatives 1 through 3

This summary provides a comparison of the three action alternatives discussed in the preceding sections using the noise metrics provided within the discussion.

Acreage and Population

The most appropriate means of differentiating between the impacts caused by the different alternatives and scenarios is by comparing the total estimated population within the DNL noise contours between the alternatives.

The DNL noise contour that covered the highest estimated population was Alternative 1, Scenario C, with a total of 13,547 (an increase of 2,514). However, the range of population potentially within the 65 dB DNL noise contour did not vary drastically between alternatives. The lowest estimated population was under Alternative 2, Scenario A, with a total of 12,684 (an addition of 1,651 people and an

approximately 7-percent difference from the high range). Comparing the three scenarios under each alternative, Scenario A always resulted in the highest estimated population within the 65 dB DNL noise contour associated with OLF Coupeville, while the highest estimated population associated with Ault Field was always in Scenario C. This would be expected and is consistent with the proportion of FCLPs assigned to those airfields under the three scenarios.

It addition, the estimated population within the greater than 75 dB DNL noise contour increases under each scenario of each alternative at both Ault Field and OLF Coupeville. Around Ault Field, this ranges from a high of 889 more people under Alternative 1, Scenario C, to a low of 73 more people under Alternative 3, Scenario A. For OLF Coupeville, specific to the greater than 75 dB DNL noise contour, the largest increase in the number of people would be 1,479 people under Alternative 1, Scenario A, and the smallest increase would be 94 more people under Alternative 2, Scenario C. Table 4.2-25 shows a DNL noise comparison, by action alternative and scenario, of the overall increase in the number of people within the 65 dB DNL noise contour.

Supplemental Metrics

The supplemental metric analyses for the three alternatives are associated with the 30 POIs that were identified as part of this project. Their individual locations cover a wide geographic area in many directions from the two airfields. Therefore, the results are more dependent on the location/distance of the POI with respect to Ault Field or OLF Coupeville than the specific alternative. However, as discussed within the context of each metric, the noise effects on those POIs that are closer to Ault Field are generally higher (i.e., more events) under Scenario C, while the noise effects on those POIs that are closer to OLF Coupeville are generally higher under Scenario A. Similar to the conclusions reached with respect to acreage and population, this would be expected and is consistent with the proportion of FCLPs assigned to those airfields under the three scenarios.

With respect to the evaluation of potential hearing loss, the 80 dB DNL contour around Ault Field would include a higher at-risk population under the Proposed Action than under the No Action Alternative, which may increase their vulnerability to experience a greater than or equal to 5 dB potential threshold shift in their hearing under all alternatives and scenarios. The largest increases in population potentially vulnerable around Ault Field would occur under Scenario C, which corresponds to 80 percent of the FCLPs being conducted at Ault Field.

At OLF Coupeville, the analysis also showed a higher population in the 80 dB DNL contour than under the No Action Alternative, which may increase their vulnerability to experience a greater than or equal to 5 dB potential threshold shift in their hearing under most alternatives and scenarios. The largest increases in population potentially vulnerable around OLF Coupeville would occur under Scenario A, which corresponds to 80 percent of the FCLPs being conducted at OLF Coupeville.

Table 4.2-25 DNL Noise Contour Comparison - Overall Increase in the Number of People within the 65 dB DNL Noise Contour

	No Action	*Alt 1A*	*Alt 1B*	*Alt 1C*	*Alt 2A*	*Alt 2B*	*Alt 2C*	*Alt 3A*	*Alt 3B*	*Alt 3C*
Ault Field	8,717 people	Additional 442 people (+5.1%)	Additional 1,327 people (+15.2%)	Additional 1,979 people (+22.7%)	Additional 395 people (+4.5%)	Additional 1,261 people (+14.5%)	Additional 1,785 people (+20.5%)	Additional 399 people (+4.6%)	Additional 1,272 people (+14.6%)	Additional 1,766 people (+20.3%)
OLF Coupeville	2,316 people	Additional 1,316 people (+56.8%)	Additional 939 people (+40.5%)	Additional 535 people (+23.1%)	Additional 1,256 people (+54.2%)	Additional 884 people (+38.2%)	Additional 512 people (+22.1%)	Additional 1,284 people (+55.4%)	Additional 921 people (+39.8%)	Additional 526 people (+22.7%)
NAS Whidbey Island Complex	11,033 people	Additional 1,758 people (+15.9%)	Additional 2,266 people (+20.5%)	Additional 2,514 people (+22.8%)	Additional 1,651 people (+15.0%)	Additional 2,145 people (+19.4%)	Additional 2,297 people (+20.8%)	Additional 1,683 people (+15.3%)	Additional 2,193 people (+19.9%)	Additional 2,292 people (+20.8%)

Key:
NAS = Naval Air Station
OLF = Outlying Landing Field

Noise Conclusion, Alternatives 1 through 3

The Proposed Action and alternatives would have a significant impact on the noise environment as it relates to aircraft operations at Ault Field and OLF Coupeville. The number of persons exposed to noise levels 65 dB and above would increase under all alternatives and scenarios. In addition, the population that may be vulnerable to potential hearing loss would increase under all alternatives and scenarios, with the largest population increases under Scenario C for each of the alternatives, as this scenario assigns 80 percent of the FCLP to Ault Field, where there is a higher surrounding residential population density. However, the analysis used to assess the population that may be vulnerable to potential hearing loss is based upon an extremely conservative set of parameters, including being outdoors at one's residence and exposed to all aircraft events over a 40-year period. Therefore, since it is highly unlikely that an individual would meet those criteria, the actual potential NIPTS for individuals would be far less than the values reported, and hearing loss is not expected.

Noise Mitigation

In addition to the force-structure alternatives, the Navy analyzed three sub-alternatives (Scenarios A, B, and C) to provide a total of nine alternatives. The Secretary of the Navy will be able to select a final alternative/scenario combination from the range of nine analyzed in this EIS. From a purely operational perspective, the Navy would prefer to use OLF Coupeville for all FCLPs because it more closely replicates the pattern and conditions at sea, and therefore provides superior training. In response to public comments regarding noise at Coupeville, the Navy analyzed whether different operational scenarios would mitigate noise at OLF Coupeville. Therefore, the Navy considered conducting just 20 percent of FCLPs at the OLF and 80 percent at Ault Field; however, the Navy also recognizes this sub-alternative has the consequence of increasing operations, and therefore noise impacts, at Ault Field, which is more densely populated than Coupeville.

The Navy is also considering other noise-reduction measures, such as construction and operation of a noise-suppression facility for engine maintenance (also known as a "hush house") at NAS Whidbey Island and actively researching engine design solutions to reduce overall sound emissions from the engines of the FA-18E/F "Super Hornet" and Growler as well as other measures that may reduce the number of FCLPs required in the future. These measures include the following:

- **Chevrons.** The Navy is testing the use of chevrons (ceramic strips placed in the exhaust nozzle of a jet engine for sound reduction). Chevron testing in October 2014 confirmed that this technology has some positive effect, but it also disclosed that some redesign of the exhaust nozzle chevrons will be necessary to achieve noise reduction benefits in the Super Hornet and Growler. The Navy will continue to explore different technologies to reduce the noise impacts from aircraft.
- **MAGIC CARPET.** MAGIC CARPET (Maritime Augmented Guidance with Integrated Controls for Carrier Approach and Recovery Precision Enabling Technologies) is a flight control system that automates some controls to assist pilots with landing on aircraft carriers, making the process easier. In addition, the technology potentially reduces the workload and training required for pilots to develop and maintain proficiency for shipboard landings. This technology could eventually result in a decrease of future training requirements, resulting in fewer FCLPs at locations such as the NAS Whidbey Island complex. Initial capabilities of MAGIC CARPET completed its first shore-based flight on the Super Hornet and the Growler on February 6, 2015. It has already been successfully demonstrated on the F-35C Joint Strike Fighter during

operational testing. The full capabilities of MAGIC CARPET will be released in 2019 timeframe. While this system's impact on future training has not been fully realized, it has the potential to significantly reduce training requirements for FCLPs.

Specifically related to the noise suppression facility/hush house, the noise study analyzed the proposed hush house operations (656 annual events under the average year conditions and 944 annual events under the high-tempo FCLP year) and demonstrated the effect the hush house would have on noise from high-power run-ups by the Growler, in terms of single events (L_{max}) and DNL (see Appendix A, Draft Aircraft Noise Study [Section 9.0, Effect of Proposed Hush House]).

From a single-event perspective, the noise study compared the L_{max} contours of 60 to 90 dBA, in 10-dB increments, for the Growler at minimum afterburner power at the current (unsuppressed) outdoor high-power location/orientation and at a potential hush house location/orientation (suppressed). The unsuppressed run-ups' 60 dB L_{max} contour extends as far as 3.3 miles from the NAS Whidbey Island boundary (primarily to the east), whereas the hush house's 60 dB L_{max} contour is wholly within the installation boundary. The L_{max} contour results from the noise generated while the aircraft engine is at afterburner power, typically 3 minutes per maintenance event. The average year analysis incudes 665 annual events, meaning the average time spent at afterburner power during Growler maintenance run-ups would be approximately 5 minutes per day. For the average annual noise environment, using the DNL metric, the results showed that the hush house's effect would mostly be on station with the 85 dB DNL contour, and there would be between a 0.2 dB and 0.3 dB reduction estimated to occur off station south of West Sleeper Road. This small change is primarily due to the engine maintenance activities not being a major contributor to the overall noise environment.

Beyond those mentioned above, the Navy has other policies, programs, and procedures to assist in mitigating the potential existing and future noise impacts from aircraft activities.

Noise Abatement Policy

It is Commanding Officer, NAS Whidbey Island policy to conduct required training and operational flights with as minimal impact as practicable on surrounding communities. All aircrews using Ault Field, OLF Coupeville, Naval Weapons System Training Facility Boardman, and the numerous northwest instrument and visual military training routes (IR/VR) throughout the Pacific Northwest are responsible for the safe conduct of their mission while complying with published course rules, established noise-abatement procedures, and good common sense. Each aircrew must be familiar with the noise profiles of its aircraft and is expected to minimize noise impacts without compromising operational and safety requirements.

The Navy must follow governing FAA rules and regulations when flying. Arrival and departure corridors into and out of NAS Whidbey Island have been developed in conjunction with the FAA over decades with an emphasis on flying over water and to avoid more densely populated areas. Additionally, these corridors are designed to deconflict military, commercial, and general aviation routes.

NAS Whidbey Island has noise-abatement procedures for assigned and transient aircraft to minimize aircraft noise. Airfield procedures used to minimize/abate noise for operations conducted at the NAS Whidbey Island airfields include restricting maintenance run-up hours, runway optimization, and other procedures as provided in NASWHIDBEYINST 3710.7Z as noted below. Additionally, aircrews are directed, to the maximum extent practicable, to employ prudent airmanship techniques to reduce aircraft noise impacts and to avoid sensitive areas except when operational safety dictates otherwise.

Noise sensitivity awareness is practiced at all levels of the chain of command and is discussed at the daily Airfield Operations briefing, weekly Commanding Officer's Tenant Command meeting, bi-weekly Instrument Ground School Aircrew refresher training, monthly Aviation Safety Council meetings, and quarterly Noise working group meetings.

Some examples of the full list of noise-abatement procedures in the NAS Whidbey Island Air Operations Manual (NASWHIDBEYINST 3710.7Z, March 9, 2015 et seq.) include:

- Aircrews shall, to the maximum extent possible, employ prudent airmanship techniques to reduce aircraft noise impacts and to avoid noise-sensitive areas except when being vectored by radar ATC or specifically directed by the control tower.
- Sunday Operations: From 7:30 a.m. to noon local on Sundays, noise-abatement procedures require arrivals, except scheduled FCLP/CCA aircraft, VR-61 drilling reservists, and VP-69 drilling reservists, to make full-stop landings.
- Due to noise-abatement procedures, high-power turn-ups should not be conducted prior to noon on Sundays or between the hours of 10:00 p.m. to 7:30 a.m. for jets and midnight to 7:30 a.m. for turboprops. For specific operational necessity requirements, defined as preparation for missions other than routine local training and functional check flights terminating at NAS Whidbey Island, high-power turn-ups may be authorized outside these established hours.
- Wind component and traffic permitting, morning departures prior to 8:00 a.m. shall use Runway 25, and evening arrivals after 10:00 p.m. shall use Runway 7 to maximize flight over open water.
- Make smooth power changes. Large, abrupt changes in power result in large, abrupt changes in sound level on the ground.
- The maximum number of aircraft in the FCLP flight pattern is five. This is so the FCLP pattern stays within the 5-mile radius of the class "Charlie" airspace, aircraft do not get extended creating additional noise impacts, and allowances may be made for non-FCLP aircraft to operate concurrently.
- Avoiding noise-sensitive and wilderness areas by flying at altitudes of no less than 3,000 feet AGL except when in compliance with an approved traffic or approach pattern, military training route, or within Special Use Airspace.

The Navy has an active AICUZ program that informs the public about its aircraft noise environment and recommends specific actions for the local jurisdictions with planning and zoning authority that can enhance the health, safety, and welfare of those living near Ault Field and OLF Coupeville (see Section 3.5.2.2). The current version of the AICUZ plan for NAS Whidbey Island was published in 2005.

NAS Whidbey Island has historically worked with elected officials from surrounding communities to best minimize impacts where practicable, including not flying at the OLF on weekends and minimizing flight activity during major school testing dates and major community events. The Navy will continue to minimize impacts as much as practicable.

NAS Whidbey Island's Commanding Officer takes public concerns seriously and has processes in place that allow members of the public to comment about and seek answers to questions about operations at the base, and ensure those comments are reviewed by appropriate members in his command.

It is the policy of NAS Whidbey Island to investigate complaints to determine compliance with FAA regulations and base standard operating procedures. These investigations ensure that both Navy and

public interests are protected and provide ongoing communication between the base and the local communities. Persons with complaints or comments may call a recorded complaint hotline at (360) 257-6665 or email: comments.NASWI@navy.mil. The information from these comments is gathered by the Operations Duty Officer (ODO), who records pertinent information such as the location, time, and description of the noise-generating event. Callers may also request a response or feedback, and should provide their name and contact information.

The ODO provides copies of the complaints to the Commanding Officer, Executive Officer, Operations Officer, Community Planning and Liaison Officer (CPLO), and Public Affairs Officer (PAO) the following day, and each complaint receives a thorough analysis and a recommendation to address it. Routinely, a playback of audio and video recordings from air traffic control is reviewed to verify that all FAA and local procedures were followed and to determine the probable causes of the complaint. When necessary, the base officials may communicate directly with the complainant. The CPLO maintains a file of noise complaints for historical and trend data.

NAS Whidbey Island has an active public relations process to inform members of the public of upcoming FCLPs so that individuals have the ability to plan their personal activities. Information on FCLP schedules is shared every week with the media in the Puget Sound region and is posted on the command's Facebook and webpage sites every week. Members of the public also have the option to obtain these releases directly by signing up for them on the command's webpage news section. The command uses the same process to tell the public about other events that may increase noise, or have more impacts on specific areas for short periods of time.

4.3 Public Health and Safety

This section addresses potential impacts to safety at Ault Field and OLF Coupeville as it relates to flight safety, Bird/Animal Aircraft Strike Hazard (BASH), and Accident Potential Zones (APZs).

Public Health and Safety

Increased operations increase the potential for flight incidents and BASH, but existing management strategies would minimize this risk.

Scenarios with high operations at OLF Coupeville may require the development of APZs through the AICUZ update process.

There would be an increase in the number of children under the noise contours under all alternatives and scenarios. Noise impacts on children are discussed in Section 4.2.

4.3.1 Public Health and Safety, No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur, and there would be no change to safety related to flight safety, BASH, changes to APZs/Clear Zones at Ault Field or OLF Coupeville (see Figures 3.3-2 and 3.3-3), or environmental health and safety risks to children. Therefore, no significant impacts would occur with implementation of the No Action Alternative.

4.3.2 Public Health and Safety, Alternatives 1 through 3

4.3.2.1 Public Health and Safety, Potential Impacts

Flight Safety

There is no generally recognized threshold of air safety that defines acceptable or unacceptable conditions. Instead, the focus of airspace managers is to reduce potential for a mishap 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. When these measures are implemented, risks are minimized, even though they can never be eliminated. To complement airspace management measures, all Navy pilots use state-of-the-art simulators. Simulator training includes flight operations and comprehensive emergency procedures, which minimizes risk associated with pilot error. Additionally, highly trained maintenance crews perform inspections on each aircraft in accordance with Navy regulations, and maintenance activities are monitored to ensure that aircraft are equipped to withstand the rigors of operational and training events safely. Analysis of flight risks correlates Class A mishap rates and BASH with projected airfield utilization. The Proposed Action would add 35 or 36 Growler aircraft and increase overall airfield flight operations at the NAS Whidbey Island complex, thereby increasing the risk of a mishap. However, current airspace safety procedures, maintenance, training, and inspections would continue to be implemented, and airfield flight operations would adhere to established safety procedures. While it is generally difficult to project future safety/mishap rates for any aircraft, the Growler has a well-documented and established safety record as a reliable aircraft.

Potential aircraft mishaps are the primary safety concern with regard to military training flights. NAS Whidbey Island maintains detailed emergency and mishap response plans to react to an aircraft accident, should one occur. These plans assign agency responsibilities and prescribe functional activities necessary to react to mishaps, whether on or off the installation. 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, which involves an

array of organizations whose participation would be governed by the circumstances associated with the mishap and actions required to be performed (DoD Instruction 6055.07, *Mishap Notification, Investigation, Reporting, and Record Keeping*) (DoD, 2011).

Bird/animal Aircraft Strike Hazard

No aspect of the alternatives would create attractants with the potential to increase the concentration of birds in the vicinity of the airfields. While there is an increase in air operations proposed under each of the alternatives, there is no proposed change planned to existing flight procedures for Ault Field or OLF Coupeville. With an increase in operations, the potential for BASH increases slightly; however, the risk is managed through continued application of BASH measures, and the risk of BASH would be expected to remain similar to existing levels.

Clear Zones and Accident Potential Zones

Much like civilian airports, Clear Zones are always established at the ends of active runways at military airfields and were generated at Ault Field and OLF Coupeville. APZs are created based on projected operations for approach, departure, and flight tracks. APZs are based on historical accident and operations data throughout the military and the specific areas (which have been determined to be potential impact areas) if an accident were to occur. Ault Field has had established APZs since 1986, and the APZs were re-confirmed during the 2005 Air Installations Compatible Use Zones (AICUZ) Update process. The runways associated with Ault Field have both Clear Zones and APZs that follow predominant flight tracks at the airfield. It is not expected that these APZs would change regardless of alternative selected under this Proposed Action; however, this would be confirmed through the Navy's subsequent AICUZ update process (see Figure 3.3-2 for 2005 AICUZ Clear Zones and APZs at Ault Field).

At OLF Coupeville, it was determined during the 2005 AICUZ process that additional APZ coverage was not warranted at that time because operational numbers were below the threshold (approximately 5,000 operations per approach or departure flight track) for the establishment of APZs at that location. Therefore, only Clear Zones are currently present at OLF Coupeville runways. Based on proposed airfield operations under the three action alternatives, APZs could be warranted at OLF Coupeville (see Table 4.3-1) under some operational scenarios. APZ development would depend on the alternative selected, and the APZs could resemble the conceptual APZs depicted in Figures 4.3-1 or 4.3-2, based on operational numbers as described above. They would follow a standard FCLP pattern (typically, APZ-II is extended to connect along the entire FCLP pattern). The conceptual APZs depicted on the figures were developed to support the analysis in this document. New APZs specific to OLF Coupeville would be recommended through the AICUZ study process and would depend on the alternative selected.

Conceptual APZs are presented for the purpose of analyzing potential land use impacts of the Proposed Action. At this time, no decision has been made with regard to additional APZs. At the conclusion of this EIS, a Record of Decision will be issued. At which time, the Navy will perform an AICUZ update and share official recommendations with the community.

Figure 4.3-1 Existing 2005 AICUZ Clear Zones and Conceptual APZs for OLF Coupeville, Option 1

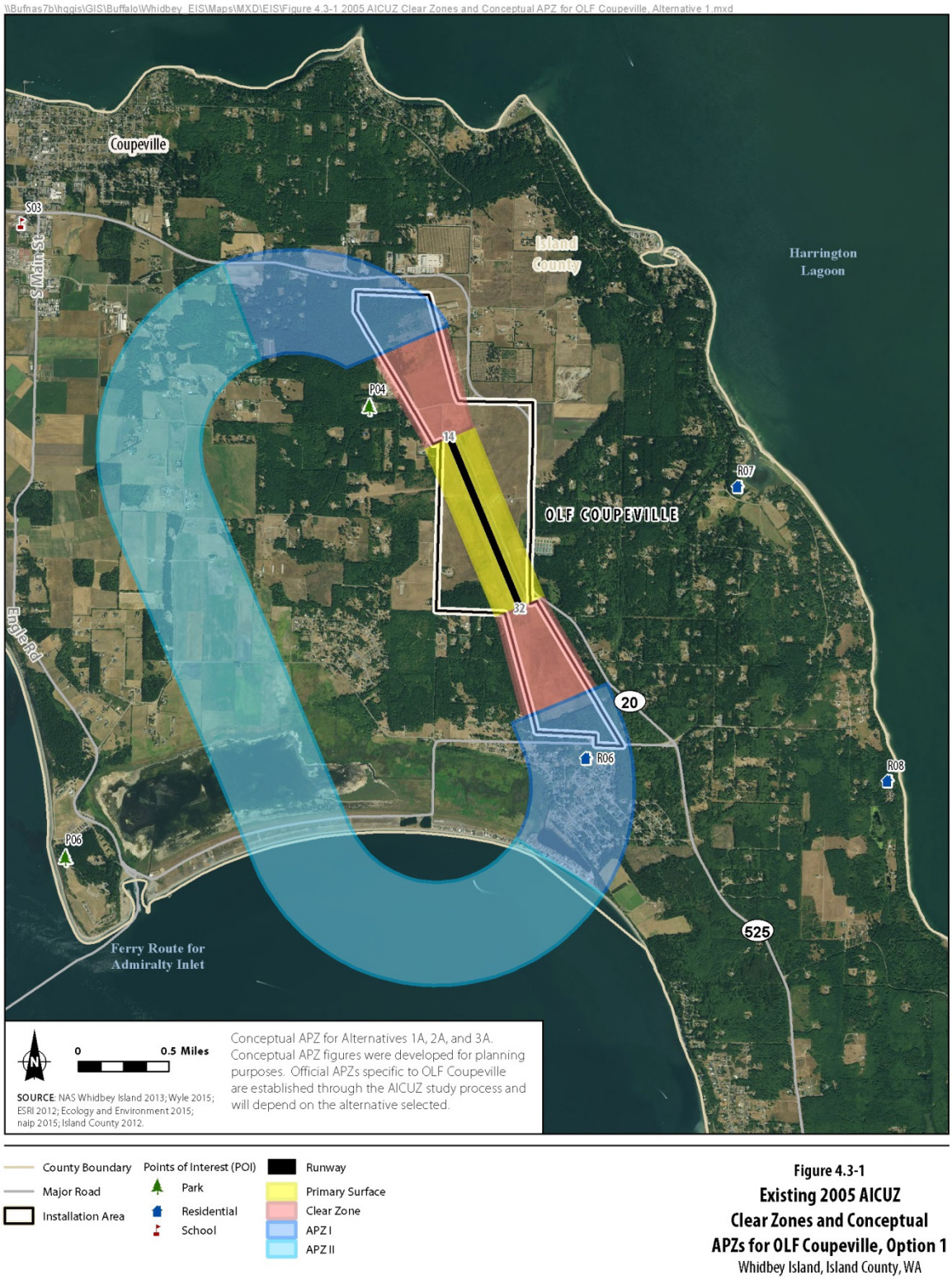


Figure 4.3-1
Existing 2005 AICUZ Clear Zones and Conceptual APZs for OLF Coupeville, Option 1
Whidbey Island, Island County, WA

Figure 4.3-2 Existing 2005 AICUZ Clear Zones and Conceptual APZs for OLF Coupeville, Option 2

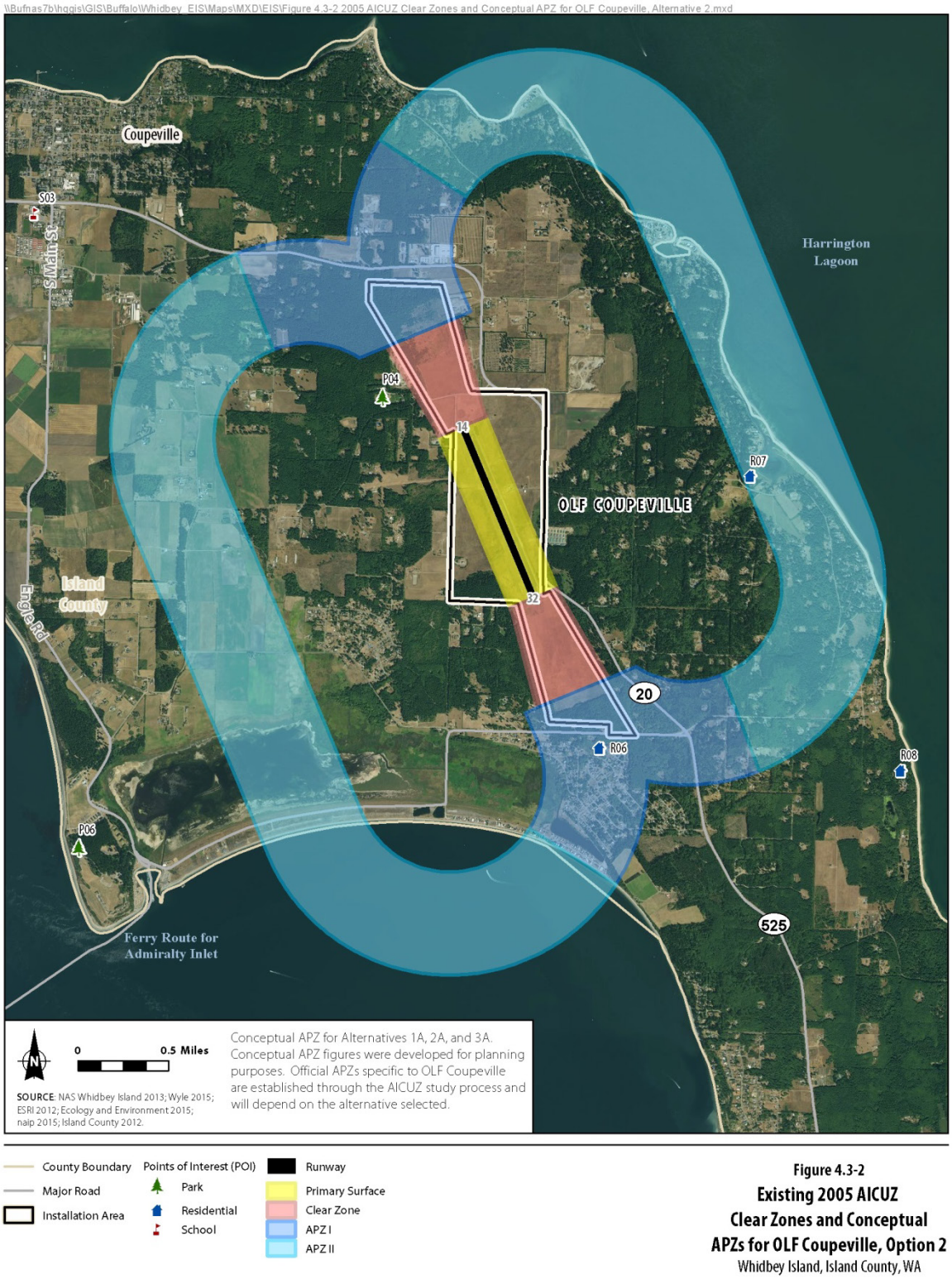


Figure 4.3-2
Existing 2005 AICUZ Clear Zones and Conceptual APZs for OLF Coupeville, Option 2
Whidbey Island, Island County, WA

As part of this analysis, the flight operations for each alternative were combined where they generally utilized the same arrival, departure, or pattern flight tracks to determine whether the 5,000 operations threshold was met, thereby identifying where potential new APZs would be needed. Table 4.3-1 shows the results of this evaluation and where the threshold for new APZs would be met at OLF Coupeville. The No Action Alternative is included and it would not meet the threshold for additional APZs. However, under most alternative scenarios (particularly Scenario A [80 percent of FCLPs at OLF Coupeville] and Scenario B [50 percent of FCLPs at OLF Coupeville]), Runway 32 would meet the APZ threshold defined in the Office of the Chief of Naval Operations Instruction (OPNAVINST) 11010.36C. Additionally, under Alternative 1, Scenario A; Alternative 2, Scenario A; and Alternative 3, Scenario A, Runway 14 would meet the OPNAVINST APZ threshold (see Figure 1.2-3 for a depiction of runways at OLF Coupeville). Average year and high-tempo FCLP years were both considered and support the findings in Table 4.3.1. Official APZs are established through the AICUZ study process and would depend on the alternative selected. If APZs are created, they could influence future land use decisions by the community and may have a minor impact on the land under the APZs. See Section 4.5.2 for an analysis of land use under conceptual APZs.

Table 4.3-1 Existing Clear Zones and Conceptual APZ Develoment based on Projected Operations at OLF Coupeville

	Existing Clear Zones and Conceptual APZs		
Alternatives	***Existing Clear Zone***	***Runway 32 Conceptual APZ***	***Runway 14 Conceptual APZ***
Existing 2005 AICUZ	⦿[1]		
Alternative 1, Scenario A	⦿[1]	⦿[2]	⦿[3]
Alternative 1, Scenario B	⦿[1]	⦿[2]	
Alternative 1, Scenario C	⦿[1]		
Alternative 2, Scenario A	⦿[1]	⦿[2]	⦿[3]
Alternative 2, Scenario B	⦿[1]	⦿[2]	
Alternative 2, Scenario C	⦿[1]		
Alternative 3, Scenario A	⦿[1]	⦿[2]	⦿[3]
Alternative 3, Scenario B	⦿[1]	⦿[2]	
Alternative 3, Scenario C	⦿[1]		
No Action Alternative	⦿[1]		

Source: Wyle, 2015

Notes:
1 Presently, Clear Zones have existed since 1986 for Runway 32 and Runway 14 and no change is expected.
2 Conceptual depiction of APZs for Runway 32 (Option 1); if this alternative is selected, it is likely the Navy would recommend establishing an APZ for this runway.
3 Conceptual depiction of APZs for Runway 32 and Runway 14 (Option 2).

Key:
⦿ = Symbol indicates a continued Clear Zone or potential for new APZs based on alternative selected
AICUZ = Air Installations Compatible Use Zone
APZ = Accident Potential Zone

Environmental Health Risks and Safety Risks to Children

In accordance with the requirements of Executive Order (EO) 13405, this section also evaluates the potential impacts on children residing near Ault Field and OLF Coupeville. Tables 4.3-2 through 4.3-4 present information on the number of children who reside within the 65 or greater db DNL contours under the action alternatives and scenarios during the average year. Tables 4.3-5 through 4.3-7 present information on the number of children who are likely to be affected by the action alternatives and scenarios during high-tempo FCLP years.

As shown on the tables, the total number of children likely to be affected by the greater than 65 db DNL contours would range from a low of 3,080 children under Alternative 2, Scenario A, to a high of 3,380 children under Alternative 1, Scenario C, under the average year. Under the high-tempo FCLP year, these figures would range from a low of 3,107 children under Alternative 2, Scenario A, to a high of 3,446 children under Alternative 1, Scenario C.

When compared to the No Action Alternative, this would equate to 317 additional children being affected by the greater than 65 db DNL contours under Alternative 2, Scenario A, to 617 additional children being affected by the greater than 65 db DNL contours under Alternative 1, Scenario C, in the average year (see Tables 4.3-2 through 4.3-7). Under the high-tempo FCLP year, these figures would equate to 186 additional children being affected by the greater than 65 db DNL contours under Alternative 2, Scenario A, to 525 additional children being affected under Alternative 1, Scenario C.

Under each of the alternatives and for each of the scenarios in the average year, additional children would be impacted by noise over the No Action Alternative. Total additional children affected by the greater than 65 dB DNL contours would range between 317 and 617 children (or a percent increase of between 11.5 percent and 22.4 percent, respectively) under all alternatives and scenarios under the average year compared to the No Action Alternative. An estimated 186 to 525 additional children (or a percent increase of between 6.4 percent and 17.9 percent, respectively) would be affected by the greater than 65 db DNL contours under all alternatives and scenarios under the high-tempo FCLP year compared to the No Action Alternative.

Children living under the greater than 65 db DNL contours have the potential to be impacted by aircraft noise and mishaps. Section 3.2, Section 4.2, and Appendix A provide a detailed discussion of the health and learning impacts on the community associated with aircraft noise. As stated in Section 3.2.3, a review of the scientific literature (see Appendix A, Draft Aircraft Noise Study) indicated that there has been limited research in the area of aircraft noise effects on children and classroom/learning interference. Research suggests that environments with sustained high background noise can have a variety of effects on children, including effects on learning and cognitive abilities and various noise-related physiological changes. 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 school children. Physiological effects in children exposed to aircraft noise and the potential for health effects have been the focus of limited investigation. Two studies that have been conducted, both in Germany, examined potential physiological effects on children from noise. One examined the relationship between stress hormone levels and elevated blood pressure in children residing around the Munich airport. The other study was conducted in diverse geographic regions and evaluated potential physiological changes (e.g., change in heart rate and muscle tension) related to noise. The studies showed that there may be some relationship between noise and these health factors; however, the researchers noted that further study

is needed in order to differentiate the specific cause and effect to understand the relationship (DNWG, 2013).

Based on the limited scientific literature available, there is no proven positive correlation between noise-related events and physiological changes in children. Additionally, the aircraft noise associated with the action alternatives is intermittent; therefore, the Navy does not anticipate any significant disproportionate health impacts to children caused by aircraft noise.

As described in Section 3.3.2.4, unless there is a place where children congregate within an APZ, such as a school, there is not a disproportionate safety risk to children. As shown on Figures 4.3-1 and 4.3-2, there are no schools located within the APZs at Ault Field and OLF Coupeville under any of the alternatives or scenarios; therefore, there is no disproportionate environmental health and safety risk to children as a result of possible aircraft mishaps.

Table 4.3-2 Total Populations Aged 19 Years or Younger at NAS Whidbey Island Complex under the No Action Alternative and Alternative 1, Scenarios A, B, and C, Average Year

DNL Contours	Total Affected Populations			Population Change from No Action Alternative	
	Total Affected Population	Total Population Aged 19 Years or Younger	Percent Population Aged 19 Years or Younger	Total Population Aged 19 Years or Younger	Percent Population Aged 19 Years or Younger
No Action Alternative					
65-70 DNL	3,875	969	25.0%	-	-
70-75 DNL	3,165	805	25.4%	-	-
75+ DNL	3,993	989	24.8%	-	-
Total Affected Population	**11,033**	**2,763**	**25.0%**	**-**	**-**
Alternative 1, Scenario A					
65-70 DNL	4,250	1,079	25.4%	110	-
70-75 DNL	2,967	733	24.7%	-72	-
75+ DNL	5,574	1,291	23.2%	302	-
Total Affected Population	**12,791**	**3,103**	**24.3%**	**340**	**19.3%**
Alternative 1, Scenario B					
65-70 DNL	4,289	1,106	25.8%	137	-
70-75 DNL	3,515	866	24.6%	61	-
75+ DNL	5,495	1,311	23.9%	322	-
Total Affected Population	**13,299**	**3,283**	**24.7%**	**520**	**22.9%**
Alternative 1, Scenario C					
65-70 DNL	5,095	1,283	25.2%	314	-
70-75 DNL	3,424	848	24.8%	43	-
75+ DNL	5,028	1,249	24.8%	260	-
Total Affected Population	**13,547**	**3,380**	**25.0%**	**617**	**24.5%**

Sources: USCB, 2012a, 2012b, 2012c, 2012d, n.d.[a], n.d.[b], n.d.[c]

Notes: DNL contours extend into Jefferson and San Juan Counties; however, no permanent residences are located within these DNL contours; therefore, these counties have been excluded from the analysis. Populations on military properties within the DNL contours (NAS Whidbey Island [Ault Field], the Seaplane Base, and OLF Coupeville) have also been excluded from the analysis.

Some totals may not sum due to rounding.

All population estimates for areas under the DNL contours utilized 2010 U.S. Census Bureau data. A 5.4-percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period (Washington State Office of Financial Management, 2012).

Key:
DNL = day-night average sound level

Table 4.3-3 Total Populations Aged 19 Years or Younger at NAS Whidbey Island Complex under the No Action Alternative and Alternative 2, Scenarios A, B, and C, Average Year

	Total Affected Populations			*Population Change from No Action Alternative*	
DNL Contours	*Total Affected Population*	*Total Population Aged 19 Years or Younger*	*Percent Population Aged 19 Years or Younger*	*Total Population Aged 19 Years or Younger*	*Percent Population Aged 19 Years or Younger*
No Action Alternative					
65-70 DNL	3,875	969	25.0%	-	-
70-75 DNL	3,165	805	25.4%	-	-
75+ DNL	3,993	989	24.8%	-	-
Total Affected Population	**11,033**	**2,763**	**25.0%**	**-**	**-**
Alternative 2, Scenario A					
65-70 DNL	4,209	1,072	25.5%	103	-
70-75 DNL	3,003	738	24.6%	-67	-
75+ DNL	5,472	1,270	23.2%	281	-
Total Affected Population	**12,684**	**3,080**	**24.3%**	**317**	**19.2%**
Alternative 2, Scenario B					
65-70 DNL	4,255	1,097	25.8%	128	-
70-75 DNL	3,545	871	24.6%	66	-
75+ DNL	5,378	1,287	23.9%	298	-
Total Affected Population	**13,178**	**3,255**	**24.7%**	**492**	**22.9%**
Alternative 2, Scenario C					
65-70 DNL	5,063	1,273	25.1%	304	-
70-75 DNL	3,414	848	24.8%	43	-
75+ DNL	4,853	1,205	24.8%	216	-
Total Affected Population	**13,330**	**3,326**	**25.0%**	**563**	**24.5%**

Sources: USCB, 2012a, 2012b, 2012c, 2012d, n.d.[a], n.d.[b], n.d.[c])

Notes: DNL contours extend into Jefferson and San Juan Counties; however, no permanent residences are located within these DNL contours; therefore, these counties have been excluded from the analysis. Populations on military properties within the DNL contours (NAS Whidbey Island [Ault Field], the Seaplane Base, and OLF Coupeville) have also been excluded from the analysis.

Some totals may not sum due to rounding.

All population estimates for areas under the DNL contours utilized 2010 U.S. Census Bureau data. A 5.4 percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period (Washington State Office of Financial Management, 2012).

Key:
DNL = day-night average sound level

Table 4.3-4 Total Populations Aged 19 Years or Younger at NAS Whidbey Island Complex under the No Action Alternative and Alternative 3, Scenarios A, B, and C, Average Year

DNL Contours	Total Affected Populations			Population Change from No Action Alternative	
	Total Affected Population	Total Population Aged 19 Years or Younger	Percent Population Aged 19 Years or Younger	Total Population Aged 19 Years or Younger	Total Population Aged 19 Years or Younger
No Action Alternative					
65-70 DNL	3,875	969	25.0%	-	-
70-75 DNL	3,165	805	25.4%	-	-
75+ DNL	3,993	989	24.8%	-	-
Total Affected Population	**11,033**	**2,763**	**25.0%**	**-**	**-**
Alternative 3, Scenario A					
65-70 DNL	4,231	1,076	25.4%	107	-
70-75 DNL	2,983	734	24.6%	-71	-
75+ DNL	5,502	1,276	23.2%	287	-
Total Affected Population	**12,716**	**3,086**	**24.3%**	**323**	**19.2%**
Alternative 3, Scenario B					
65-70 DNL	4,273	1,101	25.8%	132	-
70-75 DNL	3,526	868	24.6%	63	-
75+ DNL	5,427	1,295	23.9%	306	-
Total Affected Population	**13,226**	**3,264**	**24.7%**	**501**	**22.8%**
Alternative 3, Scenario C					
65-70 DNL	5,033	1,267	25.2%	298	-
70-75 DNL	3,431	851	24.8%	46	-
75+ DNL	4,861	1,205	24.8%	216	-
Total Affected Population	**13,325**	**3,323**	**24.9%**	**560**	**24.4%**

Sources: USCB, 2012a, 2012b, 2012c, 2012d, n.d.[a], n.d.[b], n.d.[c]

Notes: DNL contours extend into Jefferson and San Juan Counties; however, no permanent residences are located within these DNL contours; therefore, these counties have been excluded from the analysis. Populations on military properties within the DNL contours (NAS Whidbey Island [Ault Field], the Seaplane Base, and OLF Coupeville) have also been excluded from the analysis.

Some totals may not sum due to rounding.

All population estimates for areas under the DNL contours utilized 2010 U.S. Census Bureau data. A 5.4-percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period (Washington State Office of Financial Management, 2012).

Key:
DNL = day-night average sound level

Table 4.3-5 Total Populations Aged 19 Years or Younger at the NAS Whidbey Island Complex under Alternative 1, Scenarios A, B, and C, High-Tempo FCLP

DNL Contours	Total Affected Populations			Population Change from No Action Alternative	
	Total Affected Population	Total Population Aged 19 Years or Younger	Percent Population Aged 19 Years or Younger	Total Population Aged 19 Years or Younger	Percent Population Aged 19 Years or Younger
No Action Alternative					
65-70 DNL	4,141	1,040	25.1%	-	-
70-75 DNL	3,293	842	25.6%	-	-
75+ DNL	4,170	1,039	24.9%	-	-
Total Affected Population	**11,604**	**2,921**	**25.2%**	**-**	**-**
Alternative 1, Scenario A					
65-70 DNL	4,355	1,101	25.3%	61	-
70-75 DNL	2,958	737	24.9%	-105	-
75+ DNL	5,734	1,324	23.1%	285	-
Total Affected Population	**13,047**	**3,162**	**24.2%**	**241**	**16.7%**
Alternative 1, Scenario B					
65-70 DNL	4,359	1,125	25.8%	85	-
70-75 DNL	3,505	865	24.7%	23	-
75+ DNL	5,646	1,344	23.8%	305	-
Total Affected Population	**13,510**	**3,334**	**24.7%**	**413**	**21.7%**
Alternative 1, Scenario C					
65-70 DNL	5,183	1,304	25.2%	264	-
70-75 DNL	3,400	840	24.7%	-2	-
75+ DNL	5,223	1,302	24.9%	263	-
Total Affected Population	**13,806**	**3,446**	**25.0%**	**525**	**23.8%**

Sources: USCB 2012a, 2012b, 2012c, 2012d; USCB n.d.[a], n.d.[b], n.d.[c].

Notes: DNL contours extend into Jefferson and San Juan Counties; however, no permanent residences are located within these DNL contours; therefore, these counties have been excluded from the analysis. Populations on military properties within the DNL contours (NAS Whidbey Island [Ault Field], the Seaplane Base, and OLF Coupeville) have also been excluded from the analysis.

Some totals may not sum due to rounding.

All population estimates for areas under the DNL contours utilized 2010 U.S. Census Bureau data. A 5.4-percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period (Washington State Office of Financial Management, 2012).

Key:
DNL = day-night average sound level

Table 4.3-6 Total Populations Aged 19 Years or Younger at the NAS Whidbey Island Complex under Alternative 2, Scenarios A, B, and C, High-Tempo FCLP

	Total Affected Populations			*Change from No Action Alternative*	
DNL Contours	*Total Affected Population*	*Total Population Aged 19 or Younger*	*Percent Population Aged 19 or Younger*	*Total Population Aged 19 Years or Younger*	*Percent Population Aged 19 or Younger*
No Action Alternative					
65-70 DNL	4,141	1,040	25.1%	-	-
70-75 DNL	3,293	842	25.6%	-	-
75+ DNL	4,170	1,039	24.9%	-	-
Total Affected Population	**11,604**	**2,921**	**25.2%**	**-**	**-**
Alternative 2, Scenario A					
65-70 DNL	4,264	1,084	25.4%	44	-
70-75 DNL	2,985	737	24.7%	-105	-
75+ DNL	5,554	1,286	23.2%	247	-
Total Affected Population	**12,803**	**3,107**	**24.3%**	**186**	**15.5%**
Alternative 2, Scenario B					
65-70 DNL	4,355	1,124	25.8%	84	-
70-75 DNL	3,547	874	24.6%	32	-
75+ DNL	5,545	1,327	23.9%	288	-
Total Affected Population	**13,447**	**3,325**	**24.7%**	**404**	**21.9%**
Alternative 2, Scenario C					
65-70 DNL	5,055	1,275	25.2%	235	-
70-75 DNL	3,454	854	24.7%	12	-
75+ DNL	5,056	1,252	24.8%	213	-
Total Affected Population	**13,565**	**3,381**	**24.9%**	**460**	**23.5%**

Sources: USCB 2012a, 2012b, 2012c, 2012d; USCB n.d.[a], n.d.[b], n.d.[c].

Notes: DNL contours extend into Jefferson and San Juan Counties; however, no permanent residences are located within these DNL contours; therefore, these counties have been excluded from the analysis. Populations on military properties within the DNL contours (NAS Whidbey Island [Ault Field], the Seaplane Base, and OLF Coupeville) have also been excluded from the analysis.

Totals may not sum due to rounding.

All population estimates for areas under the DNL contours utilized 2010 U.S. Census Bureau data. A 5.4-percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period (Washington State Office of Financial Management, 2012).

Key:
DNL = day-night average sound level

Table 4.3-7 Total Populations Aged 19 Years or Younger at the NAS Whidbey Island Complex under Alternative 3, Scenarios A, B, and C, High-Tempo FCLP

	Total Affected Populations			*Change from No Action Alternative*	
DNL Contours	*Total Affected Population*	*Total Population Aged 19 Years or Younger*	*Percent Population Aged 19 Years and Younger*	*Total Population Aged 19 Years or Younger*	*Percent Population Aged 19 Years or Younger*
No Action Alternative					
65-70 DNL	4,141	1,040	25.1%	-	-
70-75 DNL	3,293	842	25.6%	-	-
75+ DNL	4,170	1,039	24.9%	-	-
Total Affected Population	**11,604**	**2,921**	**25.2%**	**-**	**-**
Alternative 3, Scenario A					
65-70 DNL	4,348	1,101	25.3%	61	-
70-75 DNL	2,970	739	24.9%	-103	-
75+ DNL	5,675	1,311	23.1%	272	-
Total Affected Population	**12,993**	**3,151**	**24.3%**	**230**	**16.6%**
Alternative 3, Scenario B					
65-70 DNL	4,363	1,125	25.8%	85	-
70-75 DNL	3,505	866	24.7%	24	-
75+ DNL	5,633	1,339	23.8%	300	-
Total Affected Population	**13,501**	**3,330**	**24.7%**	**409**	**21.6%**
Alternative 3, Scenario C					
65-70 DNL	5,024	1,268	25.2%	228	-
70-75 DNL	3,443	852	24.7%	10	-
75+ DNL	5,010	1,240	24.8%	201	-
Total Affected Population	**13,477**	**3,360**	**24.9%**	**439**	**23.4%**

Sources: USCB 2012a, 2012b, 2012c, 2012d; USCB n.d.[a], n.d.[b], n.d.[c].

Notes: DNL contours extend into Jefferson and San Juan Counties; however, no permanent residences are located within these DNL contours; therefore, these counties have been excluded from the analysis. Populations on military properties within the DNL contours (NAS Whidbey Island [Ault Field], the Seaplane Base, and OLF Coupeville) have also been excluded from the analysis.

Some totals may not sum due to rounding.

All population estimates for areas under the DNL contours utilized 2010 U.S. Census Bureau data. A 5.4-percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period (Washington State Office of Financial Management, 2012).

Key:
DNL = day-night average sound level

Public Health and Safety Conclusion

In summary, the Navy would continue to meet the primary goal of the AICUZ program, which is to protect the public's health, safety, and welfare through collaboration with the local community. Following completion of this EIS and the Record of Decision, the Navy would review the need for changes to the APZs. If warranted, the APZs could be updated by completing an AICUZ update and coordinating with local communities to provide appropriate new land use recommendations as necessary.

The Proposed Action would increase the volume of air operations; however, it would not change the installation's ability to comply with military airfield safety procedures for aircraft arrival and departure flight tracks and for operations surrounding the airfield. Therefore, no significant impact to safety related to flight safety or BASH is expected under any of the alternatives as part of the Proposed Action.

There would be an increase in the number of children under the noise contours under all alternatives and scenarios. Noise impacts on children are discussed in Section 4.2.

4.4 Air Quality

Air Quality

Construction impacts would be temporary and minor, and would not result in significant impacts on air quality.

Operations would result in an increase in stationary and mobile sources. Increased stationary sources would not require revisions to the NAS Whidbey Island Air Permit and would have no significant impact. Increases in mobile emissions may affect compliance with NAAQS.

Effects on air quality are based on the estimated changes in direct and indirect emissions associated with the action alternatives and the impact of the projected changes in emissions on local and regional air quality. The Proposed Action is located within Island County and the Northwest Washington Intrastate Air Quality Control Region. Permit reporting requirements for greenhouse gas (GHG) emissions are addressed, and additional GHG information is included in Section 4.16, Climate Change and GHG Emissions. The General Conformity Rule does not apply to this action because the region is in attainment for all National Ambient Air Quality Standards (NAAQS).

4.4.1 Air Quality, No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur. No new stationary sources would be installed, and no existing stationary sources would have an increase in emissions. There would be no significant change in aircraft operations. Therefore, no significant impacts to air quality or air resources would occur with implementation of the No Action Alternative.

4.4.2 Air Quality, Alternative 1

Alternative 1 would expand carrier capabilities by adding three additional aircraft to each existing carrier squadron and augmenting the FRS with eight additional aircraft (a net increase of 35 aircraft). While no new squadrons would be created, this expansion would require new buildings and the renovation of space for maintenance hangers, armament storage and classroom space. The Navy would also construct additional paved areas for vehicle parking and aircraft runway improvements and parking areas. The expansion of Growler operations would require an increase of 371 personnel at the NAS Whidbey Island complex. Alternative 1 represents the largest increase in aircraft operations of the three alternatives. The three different scenarios reflect different operation levels at Ault Field and OLF Coupeville. See Chapter 2 for a full description of the action under Alternative 1.

4.4.2.1 Air Quality Potential Impacts, Alternative 1

Under Alternative 1, the Proposed Action would result in temporary, direct emissions of criteria air pollutants during construction. Changes in operations after implementation of the action would also result in an increase in direct and indirect stationary emissions from new building energy use and increased maintenance and fuel use. Mobile emissions from aircraft operations and the commuting of new personnel in personally owned vehicles (POVs) and other equipment would also increase. Refer to Appendix B for detailed assumptions, emission factors, and calculations used to provide emissions estimates.

4.4.2.1.1 Construction-related Emissions, Alternative 1

Construction would result in temporary and minor increases in air emissions from the combustion of fossil fuels in equipment and vehicles, volatile organic compound (VOC) emissions from paving and painting, and emissions of fugitive dust and dirt during site ground disturbance. Construction emissions would occur before on- going operation emissions. Each of the three scenarios considered under Alternative 1 would result in the same construction activities. Table 4.4-1 shows estimated criteria pollutant emissions from construction activities for Alternative 1.

Table 4.4-1 NAS Whidbey Island Complex Emissions from Construction, Alternative 1

	Total Emissions (tons per year [TPY])						*Metric tons per year*
Activity	*NO_X*	*VOC*	*CO*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*	*CO_2*
Alternative 1							
Construction equipment	5.47	0.72	3.23	0.010	0.49	0.47	1,701
VOCs from paving and painting		1.61					
PM from grading and demolition					0.27	0.03	
Worker Commute and Deliveries	0.29	0.02	0.62	0.005	0.79	0.09	107
Total Alternative 1	**5.77**	**2.35**	**3.85**	**0.015**	**1.54**	**0.59**	**1,808**

Key:
CO = carbon monoxide
CO_2 = carbon dioxide
NO_x = nitrogen oxides
PM = particulate matter
PM_{10} = particulate matter less than 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
SO_2 = sulfur dioxide
VOC = volatile organic compound

Construction-related emissions for Alternative 1 were calculated assuming 55,923 square feet of new construction, 5.3 acres of new paved area, and 6.6 acres of ground disturbance. Construction activities are conservatively assumed to be conducted within 1 year. Emission factors for vehicles and equipment were obtained from the USEPA's MOVES 2014 (USEPA, 2015e). Appendix B provides the assumptions and calculations used to estimate the total emissions.

Based on the projected total construction emissions summarized in Table 4.4-1, the impact on air quality in the region would be minor and temporary and would not result in any significant impacts.

Construction emissions would be reduced using Best Management Practices (BMPs). Exhaust emissions from construction vehicles can be reduced by using fuel-efficient vehicles with emission controls and ensuring that all equipment is properly maintained. Dust emissions from ground disturbance and road traffic should be controlled by spraying water on soil piles and graded areas and keeping roadways clean.

4.4.2.1.2 Stationary Operation-related Emissions, Alternative 1

Under Alternative 1, changes to facilities and the maintenance of more aircraft would result in increases in stationary source emissions at NAS Whidbey Island. These emissions are subject to NAS Whidbey Island's Air Operating Permit (AOP) (NWCAA, 2013); however, because they are below permit revision

requirement thresholds, they are not likely to result in changes to the AOP. New buildings would require additional direct (natural gas) and indirect (electricity) energy use that would result in an increase in direct and indirect emissions. Emissions from electricity use are estimated using the Energy Information Administration's average emission factors for the State of Washington (EIA, 2015). Direct emissions from natural gas combustion are estimated using emission factors provided in the NAS Whidbey Island AOP (NWCAA, 2013). The Growler's F414-GE-400 engines would not be tested in the test cells, and, therefore, there would be no changes to this stationary source (NAS Whidbey Island Operations Command, 2016).

Table 4.4-2 provides a summary of the estimated increase in direct and indirect building energy emissions that would result from the action. Increased maintenance and operations of aircraft may also result in an increase in painting, degreasing, and fueling operations and fuel storage, which could increase reported emissions from these permitted sources. These emissions would be difficult to quantify at this time, but in addition to the increase in building-related emissions, they should be negligible and covered by the permit's assumed maximum totals.

Table 4.4-2 Stationary Direct and Indirect Criteria Pollutant Emissions, Alternative 1

Operations	*NO_x (tpy)*	*VOC (tpy)*	*CO (tpy)*	*SO_2 (tpy)*	*PM_{10} (tpy)*	*$PM_{2.5}$ (tpy)*
New Building Electricity Use (Indirect)	0.07	N/A	N/A	0.05	N/A	N/A
New Building Natural Gas Use (Direct)	0.03	0.00	0.06	0.00	0.01	0.01
Total Change in Stationary Emissions	**0.10**	**0.00**	**0.06**	**0.05**	**0.01**	**0.01**

Key:
CO = carbon monoxide
NO_x = nitrogen oxides
PM = particulate matter
PM_{10} = particulate matter less than 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
SO_2 = sulfur dioxide
tpy = tons per year
VOC = volatile organic compound

4.4.2.1.3 Mobile Operation-related Emissions, Alternative 1

Under Alternative 1, changes to aircraft operations and personnel commuting would result in an increase in annual emissions. Mobile emissions are not covered by the NAS Whidbey Island AOP; however, these emissions contribute to regional emission totals and can affect compliance with NAAQS. Each of the A, B, and C scenarios would have different numbers of different types of operations at OLF Coupeville and Ault Field, resulting in different levels of emissions from each scenario.

Emissions estimates were developed using the Navy's Aircraft Environmental Support Office emission factors for aircraft emissions (AESO 2014, 2015a, 2015b) and the USEPA's Motor Vehicle Emission Simulator (MOVES2014) (USEPA, 2015e) emission factors for Island County for personnel commuting emissions. Since air emissions calculations require specific operation counts by type, the operations data used for these calculations were consistent with the detailed operations count and type estimates used in the noise analysis (see Appendix A, Draft Aircraft Noise Study). The Aircraft Environmental Support Office estimates a 30-minute maximum setting (with afterburner) time-in-mode for Growler take off; however, emission factors have been adjusted to account for a more accurate estimate at NAS Whidbey Island of 20 seconds at this setting (NAS Whidbey Island Operations Command, 2016). Total

emissions presented below have been estimated using projected average Growler flight and in-frame maintenance operations, and increases in personnel.

Criteria pollutant emissions from the mobile operations associated with this action under Alternative 1, Scenario A, are provided in Table 4.4-3; Scenario B emissions are provided in Table 4.4-4; and Scenario C emissions are provided in Table 4.4-5. Detailed assumptions, emission factors, and calculations, as well as additional emissions estimates based on high-tempo Growler operations, have been presented in Appendix B.

Table 4.4-3 NAS Whidbey Island Complex Criteria Pollutant Mobile Air Emissions Comparison with No Action, Alternative 1, Scenario A

Operations	*NO_x*	*VOC*	*CO*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*
No Action Emissions						
Ault Field Growler Aircraft	404.46	595.27	1,587.03	59.33	179.37	179.37
OLF Growler Aircraft	51.85	1.21	26.21	5.76	14.39	14.39
In-frame Maintenance Operations	33.35	101.63	447.59	7.09	20.01	20.01
POV (Personnel Commuting)	8.88	1.63	75.07	0.07	88.56	9.81
Total No Action Mobile Operation Emissions	**498.54**	**699.74**	**2,135.87**	**72.24**	**302.33**	**223.58**
Alternative 1, Scenario A						
Alternative 1A Emissions						
Ault Field Growler Aircraft	514.10	831.54	2,215.81	77.29	236.43	236.43
OLF Growler Aircraft	260.06	6.05	131.37	28.88	72.18	72.18
In-frame Maintenance Operations	47.58	145.00	638.63	10.12	28.55	28.55
POV (Personnel Commuting)	9.69	1.78	81.86	0.07	96.57	10.70
Total Mobile Operation Emissions	**831.43**	**984.37**	**3,067.62**	**116.37**	**433.73**	**347.86**
Change in Emissions between No Action and Alternative 1A						
Ault Field Growler Aircraft	109.64	236.27	628.78	17.97	57.79	57.79
OLF Growler Aircraft	208.20	4.84	105.16	23.12	56.76	56.76
In-frame Maintenance Operations	14.23	43.38	191.04	3.03	8.54	8.54
POV (Personnel Commuting)	0.80	0.15	6.79	0.01	8.01	0.89
Total Change in Mobile Operation Emissions	**332.88**	**284.63**	**931.76**	**44.12**	**131.40**	**124.28**

Note: all measurements in tons per year

Key:
CO = carbon monoxide
NO_x = nitrogen oxides
OLF = Outlying Landing Field Coupeville
PM_{10} = particulate matter less than 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
POV = personally owned vehicle
SO_2 = sulfur dioxide
VOC = volatile organic compound

Table 4.4-4 NAS Whidbey Island Complex Criteria Pollutant Mobile Air Emissions Comparison with No Action, Alternative 1, Scenario B

Operations	*NO_x*	*VOC*	*CO*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*
No Action Alternative Emissions						
Ault Field Growler Aircraft	404.46	595.27	1,587.00	59.33	179.37	179.37
OLF Growler Aircraft	51.85	1.21	26.21	5.76	14.39	14.39
In-frame Maintenance Operations	33.35	101.63	447.59	7.09	20.01	20.01
POV (Personnel Commuting)	8.88	1.63	75.07	0.07	88.56	9.81
Total No Action Alternative Operation Emissions	**498.54**	**699.74**	**2,135.87**	**72.24**	**302.33**	**223.58**
Alternative 1, Scenario B						
Alternative 1B Emissions						
Ault Field Growler Aircraft	556.53	792.68	2,113.46	80.89	243.55	243.55
OLF Growler Aircraft	162.57	3.78	82.23	18.06	45.12	45.12
In-frame Maintenance Operations	47.58	145.00	638.63	10.12	28.55	28.55
POV (Personnel Commuting)	9.69	1.78	81.86	0.07	96.57	10.70
Total Operation Emissions	**776.37**	**943.25**	**2,916.18**	**109.14**	**413.80**	**327.93**
Change in Emissions between No Action Alternative and Alternative 1B						
Ault Field Growler Aircraft	152.07	197.41	526.47	21.56	64.18	64.18
OLF Growler Aircraft	110.72	2.58	56.02	12.30	30.73	30.73
In-frame Maintenance Operations	14.23	43.38	191.04	3.03	8.54	8.54
POV (Personnel Commuting)	0.80	0.15	6.79	0.01	8.01	0.89
Total Change in Operation Emissions	**277.83**	**243.51**	**780.32**	**36.89**	**111.46**	**104.34**

Note: all measurements in tons per year

Key:
CO = carbon monoxide
NO_x = nitrogen oxides
OLF = Outlying Landing Field Coupeville
PM_{10} = particulate matter less than 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
POV = personally owned vehicle
SO_2 = sulfur dioxide
VOC = volatile organic compound

Table 4.4-5 NAS Whidbey Island Complex Criteria Pollutant Mobile Air Emissions Comparison with No Action Alternative, Alternative 1, Scenario C

Operations	*NO_x*	*VOC*	*CO*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*
No Action Alternative Emissions						
Ault Field Growler Aircraft	404.46	595.27	1,587.00	59.33	179.37	179.37
OLF Growler Aircraft	51.85	1.21	26.21	5.76	14.39	14.39
In-frame Maintenance Operations	33.35	101.63	447.59	7.09	20.01	20.01
POV (Personnel Commuting)	8.88	1.63	75.07	0.07	88.56	9.81
Total No Action Alternative Operation Emissions	**498.54**	**699.74**	**2,135.87**	**72.24**	**302.33**	**223.58**
Alternative 1, Scenario C						
Alternative 1C Emissions						
Ault Field Growler Aircraft	600.88	760.87	2,029.91	84.89	252.05	252.05
OLF Growler Aircraft	65.07	1.52	33.04	7.23	18.06	18.06
In-frame Maintenance Operations	47.58	145.00	638.63	10.12	28.55	28.55
POV (Personnel Commuting)	9.69	1.78	81.86	0.07	96.57	10.70
Total Operation Emissions	**723.22**	**909.18**	**2,783.44**	**102.31**	**395.23**	**309.36**
Change in Emissions between No Action Alternative and Alternative 1C						
Ault Field Growler Aircraft	196.42	165.60	442.92	25.56	72.68	72.68
OLF GROWLER Aircraft	13.22	0.31	6.83	1.47	3.67	3.67
In-frame Maintenance Operations	14.23	43.38	191.04	3.03	8.54	8.54
POV (Personnel Commuting)	0.80	0.15	6.79	0.01	8.01	0.89
Total Change in Operation Emissions	**224.68**	**209.44**	**647.57**	**30.06**	**92.90**	**85.78**

Note: all measurements in tons per year

Key:
CO = carbon monoxide
NO_x = nitrogen oxides
OLF = Outlying Landing Field Coupeville
PM_{10} = particulate matter less than 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
POV = personally owned vehicle
SO_2 = sulfur dioxide
VOC = volatile organic compound

4.4.3 Air Quality, Alternative 2

Alternative 2 would expand expeditionary and carrier capabilities by establishing two new expeditionary squadrons, adding two additional aircraft to each existing carrier squadron, and augmenting the FRS with eight additional aircraft (a net increase of 36 aircraft). This expansion would require more construction of new buildings than Alternative 1, for maintenance hangars, armament storage, and classroom space. The Navy would also construct additional paved areas for vehicle parking and aircraft runway improvements and parking areas. The expansion of Growler operations would require an increase of 664 personnel at the NAS Whidbey Island complex. The three different scenarios reflect different operation levels at Ault Field and OLF Coupeville. See Chapter 2 for a full description of the action under Alternative 2.

4.4.3.1 Air Quality Potential Impacts, Alternative 2

Under Alternative 2, the Proposed Action would result in temporary, direct emissions of criteria air pollutants during construction. Changes in operations after implementation of the action would also result in an increase in direct and indirect stationary emissions from new building energy use and increased maintenance and fuel use. Mobile emissions from aircraft operations and the commuting of new personnel in POVs and other equipment would also increase. Refer to Appendix B for detailed assumptions, emission factors, and calculations used to provide emissions estimates.

4.4.3.1.1 Construction-related Emissions, Alternative 2

Construction would result in temporary and minor increases in air emissions from the combustion of fossil fuels in equipment and vehicles, VOC emissions from paving and painting, and emissions of fugitive dust and dirt during site ground disturbance. Each of the three scenarios considered under Alternative 2 would result in the same construction activities. Table 4.4-6 shows estimated criteria pollutant emissions from construction activities for Alternative 2.

Table 4.4-6 NAS Whidbey Island Complex Emissions from Construction, Alternative 2

	Total Emissions (tpy)						*Metric tons per year*
Activity	***NO_X***	***VOC***	***CO***	***SO_2***	***PM_{10}***	***$PM_{2.5}$***	***CO_2***
Alternative 2							
Construction equipment	7.48	1.01	4.59	0.014	0.683	0.663	2,303
VOCs from paving and painting		2.54					
PM from grading and demolition					0.28	0.03	
Worker Commute and Deliveries	0.43	0.03	0.84	0.007	1.07	0.12	148
Total Alternative 2	**7.91**	**3.59**	**5.43**	**0.021**	**2.03**	**0.81**	**2,451**

Key:
CO = Carbon monoxide
CO_2 = carbon dioxide
NO_x = Nitrogen oxides
PM = particulate matter
PM_{10} = Particulate matter less than 10 microns in diameter
$PM_{2.5}$ = Particulate matter less than 2.5 microns in diameter
SO_2 = Sulfur dioxide
tpy = tons per year
VOC = Volatile organic compound

Construction related criteria pollutant emissions for Alternative 2 were calculated assuming 93,423 square feet of new construction, 5.3 acres of new paved area, and 7.5 acres of ground disturbance, and construction activities would be conducted within 1 year. Emission factors for vehicles and equipment were obtained from the USEPA's MOVES2014 (USEPA, 2015e). Appendix B provides the assumptions and calculations used to estimate the total emissions.

Based on the projected total construction emissions summarized in Table 4.4-6, the impact on air quality in the region would be minor and temporary and would not result in any significant impacts.

Construction emissions would be reduced using BMPs. Exhaust emissions from construction vehicles can be reduced by using fuel-efficient vehicles with emission controls and ensuring that all equipment is

properly maintained. Dust emissions from ground disturbance and road traffic should be controlled by spraying water on soil piles and graded areas and keeping roadways clean.

4.4.3.1.2 Stationary Operation-related Emissions, Alternative 2

Under Alternative 2, changes to facilities and the maintenance of more aircraft would result in increases in stationary source emissions at NAS Whidbey Island similar to those described under Alternative 1. Emissions estimates were developed as described in Section 4.4.2.1.2.

Table 4.4-7 provides a summary of the estimated increase in building energy emissions that would result from the action. Increased maintenance and operations of aircraft may also result in an increase in painting, degreasing, and fueling operations and fuel storage, which could increase reported emissions from these permitted sources. These emissions would be difficult to quantify at this time but should be negligible and covered by the permit's assumed maximum totals. Therefore, a revision to the AOP would not be required.

Table 4.4-7 Stationary Direct and Indirect Criteria Pollutant Emissions, Alternative 2

Operations	*NO_x (tpy)*	*VOC (tpy)*	*CO (tpy)*	*SO_2 (tpy)*	*PM_{10} (tpy)*	*$PM_{2.5}$ (tpy)*
New Building Electricity Use (Indirect)	0.16	N/A	N/A	0.11	N/A	N/A
New Building Natural Gas Use (Direct)	0.07	0.01	0.14	0.00	0.01	0.01
Total Change in Stationary Emissions	**0.23**	**0.01**	**0.14**	**0.11**	**0.01**	**0.01**

Key:
CO = Carbon monoxide
NO_x = Nitrogen oxides
PM_{10} = Particulate matter less than 10 microns in diameter
$PM_{2.5}$ = Particulate matter less than 2.5 microns in diameter
SO_2 = Sulfur dioxide
tpy = tons per year
VOC = Volatile organic compound

4.4.3.1.3 Mobile Operation-related Emissions, Alternative 2

Under Alternative 2, changes to aircraft operations and personnel commuting would result in an increase in annual emissions. Mobile emissions are not covered by the NAS Whidbey Island AOP; however, these emissions contribute to regional emission totals and can affect compliance with NAAQS. Each of the A, B, and C scenarios would have different numbers of different types of operations at OLF Coupeville and Ault Field, resulting in different levels of emissions from each scenario. Emissions estimates were developed as described in Section 4.4.2.1.3.

Criteria pollutant emissions from the operations associated with this action under Alternative 2, Scenario A are provided in Table 4.4-8; Scenario B emissions are provided in Table 4.4-9; and Scenario C emissions are provided in Table 4.4-10. Total emissions presented below have been estimated using projected average Growler flight operations and increases in personnel. Detailed assumptions, emission factors, and calculations, as well as additional emissions estimates based on high-tempo Growler operations, have been presented in Appendix B.

Table 4.4-8 NAS Whidbey Island Complex Criteria Pollutant Mobile Air Emissions Comparison with No Action Alternative, Alternative 2, Scenario A

Operations	*NO_x*	*VOC*	*CO*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*
No Action Alternative Emissions						
Ault Field GROWLER Aircraft	404.46	595.27	1,587.00	59.33	179.37	179.37
OLF GROWLER Aircraft	51.85	1.21	26.21	5.76	14.39	14.39
In-frame Maintenance Operations	33.35	101.63	447.59	7.09	20.01	20.01
POV (Personnel Commuting)	8.88	1.63	75.07	0.07	88.56	9.81
Total No Action Alternative Mobile Operation Emissions	**498.54**	**699.74**	**2,135.87**	**72.24**	**302.33**	**223.58**
Alternative 2, Scenario A						
Alternative 2A Emissions						
Ault Field GROWLER Aircraft	520.00	846.62	2,255.90	78.33	239.81	239.81
OLF GROWLER Aircraft	249.06	5.79	125.85	27.66	69.13	69.13
In-frame Maintenance Operations	47.99	146.24	644.09	10.21	28.79	28.79
POV (Personnel Commuting)	10.32	1.90	87.22	0.08	102.89	11.40
Total Mobile Operation Emissions	**827.37**	**1,000.55**	**3,113.06**	**116.28**	**440.63**	**349.14**
Change in Emissions between No Action Alternative and Alternative 2A						
Ault Field GROWLER Aircraft	115.54	251.34	668.91	19.01	60.44	60.44
OLF GROWLER Aircraft	197.21	4.59	99.64	21.90	54.74	54.74
In-frame Maintenance Operations	14.64	44.62	196.50	3.11	8.78	8.78
POV (Personnel Commuting)	1.44	0.26	12.15	0.01	14.33	1.59
Total Change in Mobile Operation Emissions	**328.83**	**300.81**	**977.19**	**44.03**	**138.30**	**125.56**

Note: all measurements in tons per year

Key:
CO = carbon monoxide
NO_x = nitrogen oxides
OLF = Outlying Landing Field Coupeville
PM_{10} = particulate matter less than 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
POV = personally owned vehicle
SO_2 = sulfur dioxide
VOC = volatile organic compound

Table 4.4-9 NAS Whidbey Island Complex Criteria Pollutant Mobile Air Emissions Comparison with No Action Alternative, Alternative 2, Scenario B

Operations	*NO_x*	*VOC*	*CO*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*
No Action Alternative Emissions						
Ault Field GROWLER Aircraft	404.46	595.27	1,587.00	59.33	179.37	179.37
OLF GROWLER Aircraft	51.85	1.21	26.21	5.76	14.39	14.39
In-frame Maintenance Operations	33.35	101.63	447.59	7.09	20.01	20.01
POV (Personnel Commuting)	8.88	1.63	75.07	0.07	88.56	9.81
Total No Action Alternative Mobile Operation Emissions	**498.54**	**699.74**	**2,135.87**	**72.24**	**302.33**	**223.58**
Alternative 2, Scenario B						
Alternative 2B Emissions						
Ault Field GROWLER Aircraft	560.25	809.01	2,156.89	81.73	246.50	246.50
OLF GROWLER Aircraft	155.67	3.62	78.70	17.29	43.21	43.21
In-frame Maintenance Operations	47.99	146.24	644.09	10.21	28.79	28.79
POV (Personnel Commuting)	10.32	1.90	87.22	0.08	102.89	11.40
Total Mobile Operation Emissions	**774.23**	**960.78**	**2,966.89**	**109.30**	**421.39**	**329.90**
Change in Emissions between No Action Alternative and Alternative 2B						
Ault Field GROWLER Aircraft	155.79	213.74	569.89	22.40	67.13	67.13
OLF GROWLER Aircraft	103.82	2.42	52.49	11.53	28.82	28.82
In-frame Maintenance Operations	14.64	44.62	196.50	3.11	8.78	8.78
POV (Personnel Commuting)	1.44	0.26	12.15	0.01	14.33	1.59
Total Change in Mobile Operation Emissions	**275.68**	**261.03**	**831.02**	**37.06**	**119.06**	**106.32**

Note: all measurements in tons per year

Key:
CO = carbon monoxide
NO_x = nitrogen oxides
OLF = outlying Landing Field Coupeville
PM_{10} = particulate matter less than 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
POV = personally owned vehicle
SO_2 = sulfur dioxide
VOC = volatile organic compound

Table 4.4-10 NAS Whidbey Island Complex Criteria Pollutant Mobile Air Emissions Comparison with No Action Alternative, Alternative 2, Scenario C

Operations	*NO_x*	*VOC*	*CO*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*
No Action Alternative Emissions						
Ault Field GROWLER Aircraft	404.46	595.27	1,587.00	59.33	179.37	179.37
OLF GROWLER Aircraft	51.85	1.21	26.21	5.76	14.39	14.39
In-frame Maintenance Operations	33.35	101.63	447.59	7.09	20.01	20.01
POV (Personnel Commuting)	8.88	1.63	75.07	0.07	88.56	9.81
Total No Action Alternative Mobile Operation Emissions	**498.54**	**699.74**	**2,135.87**	**72.24**	**302.33**	**223.58**
Alternative 2, Scenario C						
Alternative 2C Emissions						
Ault Field GROWLER Aircraft	601.60	778.21	2,075.97	85.43	254.29	254.29
OLF GROWLER Aircraft	62.27	1.45	31.49	6.92	17.28	17.28
In-frame Maintenance Operations	47.99	146.24	644.09	10.21	28.79	28.79
POV (Personnel Commuting)	10.32	1.90	87.22	0.08	102.89	11.40
Total Mobile Operation Emissions	**722.18**	**927.81**	**2,838.76**	**102.63**	**403.26**	**311.77**
Change in Emissions between No Action Alternative and Alternative 2C						
Ault Field GROWLER Aircraft	197.14	182.94	488.97	26.10	74.92	74.92
OLF GROWLER Aircraft	10.42	0.24	5.28	1.16	2.89	2.89
In-frame Maintenance Operations	14.64	44.62	196.50	3.11	8.78	8.78
POV (Personnel Commuting)	1.44	0.26	12.15	0.01	14.33	1.59
Total Change in Mobile Operation Emissions	**223.64**	**228.06**	**702.90**	**30.38**	**100.93**	**88.19**

Note: all measurements in tons per year

Key:
CO = carbon monoxide
NO_x = nitrogen oxides
OLF = Outlying Landing Field Coupeville
PM_{10} = particulate matter less than 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
POV = personally owned vehicle
SO_2 = sulfur dioxide
VOC = volatile organic compound

4.4.4 Air Quality, Alternative 3

Alternative 3 would expand expeditionary and carrier capabilities by adding three additional aircraft to each existing expeditionary squadron, adding two additional aircraft to each existing carrier squadron, and augmenting the FRS with nine additional aircraft (a net increase of 36 aircraft). This expansion would require less construction than Alternative 2, including new buildings and the renovation of space for maintenance hangars, armament storage, and classroom space. The Navy would also construct additional paved areas for vehicle parking and aircraft runway improvements and parking areas. The expansion of the Growler community would require an increase of 337 personnel at the NAS Whidbey Island complex. The three different scenarios reflect different operation levels at Ault Field and OLF Coupeville. See Chapter 2 for a full description of the action under Alternative 3.

4.4.4.1 Air Quality Potential Impacts, Alternative 3

Under Alternative 3, the Proposed Action would result in temporary direct emissions of criteria air pollutants during construction. Changes in operations after implementation of the action would also result in an increase in direct and indirect stationary emissions from new building energy use and increased maintenance and fuel use. Mobile emissions from aircraft operations and the commuting of new personnel in POVs and other equipment would also increase. Refer to Appendix B for detailed assumptions, emission factors, and calculations used to provide emissions estimates.

4.4.4.1.1 Construction-related Emissions, Alternative 3

Construction would result in temporary and minor increases in air emissions from the combustion of fossil fuels in equipment and vehicles, VOC emissions from paving and painting, and emissions of fugitive dust and dirt during site ground disturbance. Each of the three scenarios considered under Alternative 2 would result in the same construction activities. Table 4.4-11 shows estimated criteria pollutant emissions from construction activities for Alternative 3.

Table 4.4-11 NAS Whidbey Island Complex Emissions from Construction, Alternative 3

	Total Emissions (tpy)						*Metric tons per year*
Activity	*NO_X*	*VOC*	*CO*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*	*CO_2*
Alternative 3							
Construction equipment	5.47	0.72	3.23	0.010	0.49	0.47	1,701
VOCs from paving and painting		1.61					
PM from grading and demolition					0.27	0.03	
Worker commuting and deliveries	0.29	0.02	0.62	0.005	0.79	0.09	107
Total Alternative 3	**5.77**	**2.35**	**3.85**	**0.015**	**1.54**	**0.59**	**1,808**

Key:
CO = Carbon monoxide
CO_2 = carbon dioxide
NO_x = Nitrogen oxides
PM_{10} = Particulate matter less than 10 microns in diameter
$PM_{2.5}$ = Particulate matter less than 2.5 microns in diameter
SO_2 = Sulfur dioxide
tpy = tons per year
VOC = Volatile organic compound

Construction-related criteria pollutant emissions for Alternative 3 were calculated assuming 65,573 square feet of new construction, 5.3 acres of new paved area, and 6.8 acres of ground disturbance. Construction activities would be conducted within 1 year. Emission factors for vehicles and equipment were obtained from the USEPA's MOVES2014 (USEPA, 2015e). Appendix B provides the assumptions and calculations used to estimate the total emissions.

Based on the projected total construction emissions summarized in Table 4.4-11, the impact on air quality in the region would be minor and temporary and would not result in any significant impacts.

Construction emissions would be reduced using BMPs. Exhaust emissions from construction vehicles can be reduced by using fuel-efficient vehicles with emission controls and ensuring that all equipment is

properly maintained. Dust emissions from ground disturbance and road traffic should be controlled by spraying water on soil piles and graded areas and keeping roadways clean.

4.4.4.1.2 Stationary Operation-related Emissions, Alternative 3

Under Alternative 3, changes to facilities and the maintenance of more aircraft would result in increases in stationary source emissions at NAS Whidbey Island, similar to those described under Alternative 1. Emissions estimates were developed as described in Section 4.4.2.1.2.

Table 4.4-12 provides a summary of the estimated increase in building energy emissions that would result from the action. Increased maintenance and operations of aircraft may also result in an increase in painting, degreasing, and fueling operations and fuel storage, which could increase reported emissions from these permitted sources. These emissions would be difficult to quantify at this time but should be negligible and covered by the permit's assumed maximum totals.

Table 4.4-12 Stationary Direct and Indirect Criteria Pollutant Emissions, Alternative 3

Operations	*NO_x (tpy)*	*VOC (tpy)*	*CO (tpy)*	*SO_2 (tpy)*	*PM_{10} (tpy)*	*$PM_{2.5}$ (tpy)*
New Building Electricity Use (Indirect)	0.07	N/A	N/A	0.05	N/A	N/A
New Building Natural Gas Use (Direct)	0.03	0.00	0.06	0.00	0.01	0.01
Total Change in Stationary Emissions	**0.10**	**0.00**	**0.06**	**0.05**	**0.01**	**0.01**

Key:
CO = Carbon monoxide
N/A = not applicable
NO_x = Nitrogen oxides
PM_{10} = Particulate matter less than 10 microns in diameter
$PM_{2.5}$ = Particulate matter less than 2.5 microns in diameter
SO_2 = Sulfur dioxide
tpy = tons per year

4.4.4.1.3 Mobile Operation-related Emissions, Alternative 3

Under Alternative 3, changes to aircraft operations and personnel commuting would result in an increase in annual emissions. Mobile emissions are not covered by the NAS Whidbey Island AOP; however, these emissions contribute to regional emission totals and can affect compliance with NAAQS. Each of the A, B, and C scenarios would have different numbers of different types of operations at OLF Coupeville and Ault Field, resulting in different levels of emissions from each scenario. Emissions estimates were developed as described in Section 4.4.2.1.3.

Criteria pollutant emissions from the operations associated with this action under Alternative 3, Scenario A, are provided in Table 4.4-13; Scenario B emissions are provided in Table 4.4-14; and Scenario C emissions are provided in Table 4.4-15. Total emissions presented below have been estimated using projected average Growler flight operations and increases in personnel. Detailed assumptions, emission factors, and calculations, as well as emissions estimates based on high-tempo Growler operations, have been presented in Appendix B.

Table 4.4-13 NAS Whidbey Island Complex Criteria Pollutant Mobile Air Emissions Comparison with No Action Alternative, Alternative 3, Scenario A

Operations	*NO_x*	*VOC*	*CO*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*
No Action Alternative Emissions						
Ault Field Growler Aircraft	404.46	595.27	1,587.00	59.33	179.37	179.37
OLF Growler Aircraft	51.85	1.21	26.21	5.76	14.39	14.39
In-frame Maintenance Operations	33.35	101.63	447.59	7.09	20.01	20.01
POV (Personnel Commuting)	8.88	1.63	75.07	0.07	88.56	9.81
Total No Action Alternative Operation Emissions	**498.54**	**699.74**	**2,135.87**	**72.24**	**302.33**	**223.58**
Alternative 3, Scenario A						
Alternative 3A Emissions						
Ault Field Growler Aircraft	519.06	844.59	2,250.51	78.18	239.32	239.32
OLF Growler Aircraft	248.54	5.78	125.61	27.60	68.99	68.99
In-frame Maintenance Operations	47.99	146.24	644.09	10.21	28.79	28.79
POV (Personnel Commuting)	9.70	1.78	81.97	0.07	96.70	10.71
Total Operation Emissions	**825.29**	**998.40**	**3,102.17**	**116.06**	**433.80**	**347.81**
Change in Emissions between No Action Alternative and Alternative 3A						
Ault Field Growler Aircraft	114.60	249.32	663.51	18.85	59.95	59.95
OLF Growler Aircraft	196.69	4.57	99.40	21.85	54.60	54.60
In-frame Maintenance Operations	14.64	44.62	196.50	3.11	8.78	8.78
POV (Personnel Commuting)	0.82	0.15	6.90	0.01	8.14	0.90
Total Change in Operation Emissions	**326.75**	**298.66**	**966.31**	**43.82**	**131.47**	**124.23**

Note: all measurements in tons per year

Key:
CO = carbon monoxide
NO_x = nitrogen oxides
OLF = Outlying Landing Field Coupeville
PM_{10} = particulate matter less than 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
POV = personally owned vehicle
SO_2 = sulfur dioxide
VOC = volatile organic compound

Table 4.4-14 NAS Whidbey Island Complex Criteria Pollutant Mobile Air Emissions Comparison with No Action Alternative, Alternative 3, Scenario B

Operations	*NO_x*	*VOC*	*CO*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*
No Action Alternative Emissions						
Ault Field Growler Aircraft	404.46	595.27	1,587.00	59.33	179.37	179.37
OLF Growler Aircraft	51.85	1.21	26.21	5.76	14.39	14.39
In-frame Maintenance Operations	33.35	101.63	447.59	7.09	20.01	20.01
POV (Personnel Commuting)	8.88	1.63	75.07	0.07	88.56	9.81
Total No Action Alternative Operation Emissions	**498.54**	**699.74**	**2,135.87**	**72.24**	**302.33**	**223.58**
Alternative 3, Scenario B						
Alternative 3B Emissions						
Ault Field Growler Aircraft	561.10	814.82	2,172.29	81.97	247.39	247.39
OLF Growler Aircraft	155.35	3.62	78.58	17.25	43.12	43.12
In-frame Maintenance Operations	47.99	146.24	644.09	10.21	28.79	28.79
POV (Personnel Commuting)	9.70	1.78	81.97	0.07	96.70	10.71
Total Operation Emissions	**774.14**	**966.46**	**2,976.92**	**109.50**	**416.00**	**330.02**
Change in Emissions between No Action Alternative and Alternative 3B						
Ault Field Growler Aircraft	156.64	219.54	585.30	22.64	68.02	68.02
OLF Growler Aircraft	103.50	2.41	52.36	11.50	28.73	28.73
In-frame Maintenance Operations	14.64	44.62	196.50	3.11	8.78	8.78
POV (Personnel Commuting)	0.82	0.15	6.90	0.01	8.14	0.90
Total Change in Operation Emissions	**275.60**	**266.72**	**841.06**	**37.26**	**113.67**	**106.44**

Note: all measurements in tons per year

Key:
CO = carbon monoxide
NO_x = nitrogen oxides
OLF = Outlying Landing Field Coupeville
PM_{10} = particulate matter less than 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
POV = personally owned vehicle
SO_2 = sulfur dioxide
VOC = volatile organic compound

Table 4.4-15 NAS Whidbey Island Complex Criteria Pollutant Mobile Air Emissions Comparison with No Action Alternative, Alternative 3, Scenario C

Operations	*NO_x*	*VOC*	*CO*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*
No Action Alternative Emissions						
Ault Field Growler Aircraft	404.46	595.27	1,587.00	59.33	179.37	179.37
OLF Growler Aircraft	51.85	1.21	26.21	5.76	14.39	14.39
In-frame Maintenance Operations	33.35	101.63	447.59	7.09	20.01	20.01
POV (Personnel Commuting)	8.88	1.63	75.07	0.07	88.56	9.81
Total No Action Alternative Operation Emissions	**498.54**	**699.74**	**2,135.87**	**72.24**	**302.33**	**223.58**
Alternative 3, Scenario C						
Alternative 3C Emissions						
Ault Field Growler Aircraft	600.53	777.17	2,073.19	85.28	253.88	253.88
OLF Growler Aircraft	62.14	1.45	31.43	6.90	17.25	17.25
In-frame Maintenance Operations	47.99	146.24	644.09	10.21	28.79	28.79
POV (Personnel Commuting)	9.70	1.78	81.97	0.07	96.70	10.71
Total Operation Emissions	**720.36**	**926.65**	**2,830.67**	**102.47**	**396.63**	**310.64**
Change in Emissions between No Action Alternative and Alternative 3C						
Ault Field Growler Aircraft	196.07	181.90	486.19	25.96	74.51	74.51
OLF Growler Aircraft	10.29	0.24	5.22	1.14	2.86	2.86
In-frame Maintenance Operations	14.64	44.62	196.50	3.11	8.78	8.78
POV (Personnel Commuting)	0.82	0.15	6.90	0.01	8.14	0.90
Total Change in Operation Emissions	**221.82**	**226.90**	**694.81**	**30.22**	**94.29**	**87.06**

Note: all measurements in tons per year

Key:
CO = carbon monoxide
NO_x = nitrogen oxides
OLF = Outlying Landing Field Coupeville
PM_{10} = particulate matter less than 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
POV = personally owned vehicle
SO_2 = sulfur dioxide
VOC = volatile organic compound

Air Quality Conclusions, Alternatives 1 through 3

Potential impacts to air quality from implementation of the Proposed Action when compared to the No Action Alternative would be similar between all three action alternatives and scenarios but greatest under Alternative 2, Scenario A (see Table 4.4-8). For air emissions, the difference in aircraft emissions between the scenarios within each alternative is more distinctive than the differences between the alternatives (see Table 4.4-16).

For all three alternatives, Scenario A, the option to conduct 80 percent of FCLPs at OLF Coupeville and 20 percent of FCLPs at Ault Field, would result in the greater increase in emissions. Since air emissions calculations require specific operation counts by type, the data used for these calculations were obtained from the noise analysis (see Appendix A). Differences are less a result of the number of operations as they are due to the different type of operations (e.g., more Landing and Take-off Operations (LTOs) may be conducted at Ault Field if FCLPs are relocated to OLF Coupeville, and LTOs

produce more emissions per operation than FCLPs. A smaller increase is a result of the transit back and forth from the OLF.

Table 4.4-16 Total Change in Criteria Pollutant and GHG Emissions, All Alternatives

Alternative	Emissions (tpy)[2]						MT CO_2e
	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2
Alternative 1							
Scenario A	333.0	284.6	931.8	44.2	131.4	124.3	56,829
Scenario B	277.9	243.5	780.4	36.9	111.5	104.4	47,672
Scenario C	224.8	209.4	647.6	30.1	92.9	85.8	39,000
Alternative 2							
Scenario A	329.1	300.8	977.3	44.1	138.3	125.6	57,447
Scenario B	275.9	261.0	831.2	37.2	119.1	106.3	48,609
Scenario C	223.9	228.1	703.0	30.5	100.9	88.2	40,134
Alternative 3							
Scenario A	326.9	298.7	966.4	43.9	131.5	124.2	56,381
Scenario B	275.7	266.7	841.1	37.3	113.7	106.4	48,051
Scenario C	221.9	226.9	694.9	30.3	94.3	87.1	39,137

Key:
CO = carbon monoxide
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
MT = metric tons
NO_x = nitrogen oxides
PM_{10} = particulate matter less than 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
SO_2 = sulfur dioxide
tpy = tons per year
VOC = volatile organic compound

Emissions would also be higher under the high-tempo FCLP year conditions across all three action alternatives, although the difference varies depending on the type of emissions (see Table 4.4-17 and Appendix B for details). High-tempo FCLP conditions would produce 2 to 9 percent more emissions under Alternative 2, compared to average conditions. Under Alternatives 1 and 3, High-tempo FCLP conditions would produce 3 to 7 percent more NO_x, SO_2, PM_{10} and $PM_{2.5}$ emissions, while VOC and carbon monoxide emissions would be the same or 1 to 3 percent less than average conditions. The variation in increases by type of emission is a result of not only changes in the number of operations, but also in the type of operation.

Changes in construction and stationary source emissions would not be significant. Changes in mobile emissions are not subject to permit requirements or emission thresholds, therefore the level of impact from these emissions is inconclusive. These emissions contribute to regional emission totals and can affect compliance with NAAQS. The region is currently in attainment for all NAAQS, and the Northwest Clean Air Agency continues to monitor ambient air emission levels to confirm continued compliance.

Table 4.4-17 Total Change in Criteria Pollutant and GHG Emissions, High Tempo, All Alternatives

Alternative/Scenario	Emissions (tpy)[2]						MT CO_2e
	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2
Alternative 1							
Scenario A	356.7	281.7	935.5	46.7	137.6	133.5	60,138
Scenario B	296.1	239.0	775.5	38.8	115.9	110.5	50,137
Scenario C	237.3	203.9	635.6	31.3	95.7	88.8	40,624
Alternative 2							
Scenario A	355.2	310.2	1,013.4	47.3	146.5	136.6	61,434
Scenario B	296.1	266.0	851.1	39.5	125.1	113.9	51,595
Scenario C	239.0	231.3	714.3	32.2	105.4	92.8	42,349
Alternative 3							
Scenario A	349.9	302.0	986.7	46.5	138.1	133.8	59,748
Scenario B	292.7	263.8	840.5	39.1	118.0	112.3	50,380
Scenario C	234.3	223.0	687.2	31.5	97.2	90.2	40,766

Key:
CO = carbon monoxide
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
MT = metric tons
NO_x = nitrogen oxides
PM_{10} = particulate matter less than 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
SO_2 = sulfur dioxide
tpy = tons per year
VOC = volatile organic compound

The DoD, Navy, and NAS Whidbey Island have implemented policies and programs to reduce energy and GHG emissions, which have also reduced criterial pollutant emissions. NAS Whidbey Island has implemented strategies and programs to reduce emissions from the NAS Whidbey Island complex. Improved energy efficiency through implementation of several building renovation projects has reduced overall facility energy usage by 40 percent between 2003 and 2015. NAS Whidbey Island will continue to work toward the achievement of DoD's GHG and energy reduction goals (NAS Whidbey Island, 2016).

Further discussion of the impacts of GHG emissions and climate change are provided in Section 4.16. Cumulative impacts to air quality are discussed in Chapter 5.

4.5 Land Use

The location and extent of a Proposed Action needs to be evaluated for its potential effects on a project site and adjacent land uses. The foremost factor affecting a Proposed Action in terms of land use is its compatibility with any applicable land use or zoning regulations. Other relevant factors include matters such as existing land use at the project site, the types of land uses on adjacent properties and their proximity to a Proposed Action, the duration of a proposed activity, and its permanence.

The study area for analysis of potential impacts to land use compatibility and recreation and wilderness is land within the DNL contours and conceptual APZs for the No Action Alternative and each action alternative. Areas of water within DNL contours were not included in the study area or analysis. Small gaps in the land use data used in this analysis exist (i.e., land use data did not cover areas of water or wetlands), and these gaps are represented as "Other" in the analysis below. These gaps do not represent a significant gap in data and do not impact the analysis presented in this section.

4.5.1 Land Use, No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur, and there would be no change to land use. Therefore, no impacts would occur with implementation of the No Action Alternative.

4.5.2 Land Use, Alternatives 1 through 3

The analysis was conducted to compare land use between the DNL contours and within conceptual APZs under each action alternative with the No Action Alternative in terms of on-station land use, regional land use, land use controls, and land use compatibility in Island County, Skagit County, the City of Oak Harbor, and the Town of Coupeville. The assessment for potential impacts to recreation and wilderness areas under the Proposed Action considers the potential for aircraft noise resulting from the proposed changes in operations under the alternatives and operational scenarios to noticeably affect the recreational experiences of a majority of visitors to these areas. The impacts assessment also considers the potential for the Proposed Action to impact the implementation of park management plans. No activities are proposed that would occur directly within the property boundaries of parks or recreation areas.

Land Use

Land Use Compatibility
The Proposed Action would result in an increase in the land area within the projected greater than 65 dB DNL noise contours (range of 14 to 19 percent).

Under all action alternatives and scenarios, the Proposed Action would have no impact to on-station land use, on-station land use controls or regional land use.

For the purposes of this analysis, conceptual APZs for OLF Coupeville are proposed for some action alternatives. Land within the conceptual APZs associated with OLF Coupeville would increase under each action alternative. Official APZs specific to OLF Coupeville could be established through the AICUZ study process and will depend on the alternative selected. If APZs are created, they could influence future land use decisions by the community and may have a minor impact on the land under the APZs

Recreation and Wilderness
All alternative would have localized significant impacts on one or two county and municipal parks as a result of increased annual average noise levels. There would be no significant impacts to recreation as a result of increased demand under these alternatives and no significant impacts to wilderness areas.

The Proposed Action would have no significant impacts on the management, use of, or demand for recreational areas and no significant impacts to wilderness areas.

As noted in Section 3.1, this analysis is concentrated on the average year; however, for purposes of comparison, the high-tempo FCLP year is included in Appendix E, Land Use Data, High-tempo FCLP Year.

4.5.2.1 Potential Impacts, Land Use Compatibility

On-station Land Use

Primary construction projects associated with all action alternatives would occur at Ault Field. New construction under all alternatives to support new Growler aircraft and personnel would include additional armament storage, hangar facilities, mobile maintenance facility storage area, and expanded personnel parking areas. The three action alternatives would require repairs to inactive taxiways for aircraft parking, in addition to expanded hangar space. Under Alternative 2, a two-squadron hangar would be constructed on the flight line either adjacent to Hangar 5 or at the site of existing Hangar 1. For the three action alternatives, Hangar 12 would be expanded to accommodate additional training squadron aircraft. The locations of the proposed construction projects are shown in Figure 2.3-1.

Most of the new construction would occur at the north end of Ault Field, on or adjacent to areas currently developed to support airfield operations. Construction of new facilities in this area would be consistent with existing land uses, and no impacts to on-station land use at the NAS Whidbey Island complex would occur. No construction would be required at OLF Coupeville; therefore, no impacts to on-station land use would occur at the OLF.

On-station Land Use Controls

The NAS Whidbey Island Installation Development Plan provides a comprehensive framework for the orderly physical development of the installation and reflects the NAS Whidbey Island complex's official direction on facility and site development planning. The installation development plan establishes a vision for the installation's physical infrastructure and places intentional emphasis on mission requirements, developmental constraints and opportunities, and courses of action that will lead to the optimal use of lands, facilities, and resources that elevate the installation's long-range (25-year) performance. The Proposed Action would meet the needs of a changing mission, and, therefore, implementation of the Proposed Action under all alternatives would be consistent with the goals and objectives of the NAS Whidbey Island Installation Development Plan and therefore a beneficial impact.

The Proposed Action would have no effect on management practices currently implemented under the Integrated Natural Resources Management Plan or the Integrated Cultural Resources Management Plan. The Navy would coordinate construction occurring within any sites listed in the Land Use Controls Implementation Plan with the USEPA to ensure institutional controls would remain in place.

Regional Land Use

The impact analysis for regional land use focuses on the changes in personnel, DNL noise contours, and land area within conceptual APZs at OLF Coupeville, as well as growth-induced development related to the Proposed Action. A land use analysis comparing the proposed DNL noise contours and conceptual APZs to the No Action Alternative is included later in this section.

The Proposed Action would increase total population in Island County by less than 2 percent and total population in Skagit County by approximately 0.2 percent across all alternatives. See Section 4.10.2.1 for more details. The Proposed Action would not result in indirect growth-induced development in Island County or Skagit County. The slight increase in personnel that would occur under the action alternatives would not be anticipated to result in any growth-induced impacts or change existing land use patterns. Consequently, regional land use would not be adversely impacted by the Proposed Action.

Regional (Off-station) Land Use Controls

The Proposed Action would result in larger DNL noise contours and noise exposure, encompassing a larger land area. The Navy's AICUZ guidance recommends lower-density land uses within DNL noise contours. With expected changes in land uses within the DNL noise contours associated with the Proposed Action, land uses previously considered compatible may become incompatible per AICUZ recommendations; therefore, off-station land use controls may be impacted as a result. The Navy would continue to work with Island County, the City of Oak Harbor, and the Town of Coupeville as needed to plan for compatible use development within the projected DNL contours and conceptual APZs under all alternatives.

Pursuant to the federal Coastal Zone Management Act and the state's Washington Coastal Zone Management Program, results of consultation with the State of Washington will be presented in the Final EIS.

Land Use in the Noise Environment

DNL Noise Contours

Aircraft operations associated with home basing 35 or 36 additional Growler aircraft at the NAS Whidbey Island complex would result in an increase in the land area within the greater than 65 dB DNL noise contours when compared to the No Action Alternative. An analysis was conducted to compare projected DNL noise contours with the No Action Alternative in terms of compatibility with land uses in Island County, Skagit County, the City of Oak Harbor, and the Town of Coupeville. This was accomplished by comparing projected DNL contours and land use within Island County, Skagit County, the City of Oak Harbor, and the Town of Coupeville (see Figure 3.5-1).

Tables 4.5-1 through 4.5-3 show the changes in land use acreage around the NAS Whidbey Island complex under Alternatives 1 through 3 resulting from the addition of 35 or 36 Growler aircraft when compared to the No Action Alternative.

Table 4.5-1 NAS Whidbey Island Complex Land Use Acreage (+/-)[1] within the DNL Contours[2] for Alternative 1 during an Average Year

	No Action Alternative (NAA) (dB DNL)				*Scenario A (dB DNL)*				*Scenario B (dB DNL)*				*Scenario C (dB DNL)*			
Land Use	*65-69*	*70-74*	*>75*	*Total*	*65-69*	*70-74*	*>75*	*Total (% change from NAA)*	*65-69*	*70-74*	*>75*	*Total (% change from NAA)*	*65-69*	*70-74*	*>75*	*Total (% change from NAA)*
Ault Field																
Agriculture	369	284	412	1,065	535 (+166)	361 (+77)	420 (+8)	1,316 (+24%)	562 (+193)	337 (+53)	483 (+71)	1,382 (+30%)	551 (+182)	350 (+66)	523 (+111)	1,424 (+34%)
Commercial	53	225	60	338	74 (+21)	193 (-32)	74 (+14)	341 (+1%)	46 (-7)	206 (-19)	101 (+41)	353 (+4%)	60 (+7)	179 (-46)	134 (+74)	373 (+10%)
Federal[3]	1	0	12	13	1 (0)	0 (0)	12 (0)	13 (0%)	1 (0)	0 (0)	12 (0)	13 (0%)	1 (0)	0 (0)	12 (0)	13 (0%)
Industrial	14	318	230	562	29 (+15)	336 (+18)	196 (-34)	561 (-<1%)	0 (-14)	238 (-80)	323 (+93)	561 (-<1%)	0 (-14)	174 (-144)	387 (+157)	561 (-<1%)
Open Space/Forest	608	295	179	1,082	478 (-130)	406 (+111)	254 (+75)	1,138 (+5%)	445 (-163)	438 (+143)	272 (+93)	1,155 (+7%)	430 (-178)	441 (+146)	303 (+124)	1,174 (+9%)
Parks	462	160	300	922	615 (+153)	222 (+62)	301 (+1)	1,138 (+23%)	692 (+230)	237 (+77)	336 (+36)	1,265 (+37%)	723 (+261)	298 (+138)	377 (+77)	1,398 (+52%)
Residential	1,504	1,210	2,692	5,406	1,831 (+327)	1,178 (-32)	2,810 (+118)	5,819 (+8%)	1,840 (+336)	1,079 (-131)	3,127 (+435)	6,046 (+12%)	1,906 (+402)	1,029 (-181)	3,367 (+675)	6,302 (+17%)
Rural[4]	422	432	1,354	2,208	438 (+16)	449 (+17)	1,415 (+61)	2,302 (+4%)	429 (+7)	438 (+6)	1,500 (+146)	2,367 (+7%)	405 (-17)	404 (-28)	1,619 (+265)	2,428 (+10%)
Transportation[5]	113	106	348	567	135 (+22)	94 (-12)	362 (+14)	591 (+4%)	128 (+15)	96 (-10)	385 (+37)	609 (+7%)	136 (+23)	91 (-15)	406 (+58)	633 (+12%)
Other[6]	11	0	0	11	28 (+17)	0 (0)	0 (0)	28 (+155%)	29 (+18)	0 (0)	0 (0)	29 (+164%)	45 (+34)	4 (+4)	0 (0)	49 (+345%)
Subtotal	3,557	3,030	5,587	12,174	4,164 (+607)	3,239 (+209)	5,844 (+257)	13,247 (+9%)	4,172 (+615)	3,069 (+39)	6,539 (+952)	13,780 (+13%)	4,257 (+700)	2,970 (-60)	7,128 (+1,541)	14,355 (+18%)

Table 4.5-1 NAS Whidbey Island Complex Land Use Acreage (+/-)[1] within the DNL Contours[2] for Alternative 1 during an Average Year

	No Action Alternative (NAA) (dB DNL)				*Scenario A (dB DNL)*				*Scenario B (dB DNL)*				*Scenario C (dB DNL)*			
Land Use	*65-69*	*70-74*	*>75*	*Total*	*65-69*	*70-74*	*>75*	*Total (% change from NAA)*	*65-69*	*70-74*	*>75*	*Total (% change from NAA)*	*65-69*	*70-74*	*>75*	*Total (% change from NAA)*
OLF Coupeville																
Agriculture	796	810	33	1,639	336 (-460)	454 (-356)	1,167 (+1,134)	1,957 (+19%)	343 (-453)	551 (-259)	878 (+845)	1,772 (+8%)	517 (-279)	941 (+131)	80 (+47)	1,538 (-6%)
Commercial	1	0	0	1	6 (+5)	0 (0)	0 (0)	6 (+500%)	1 (0)	0 (0)	0 (0)	1 (0%)	0 (-1)	0 (0)	0 (0)	0 (-100%)
Federal[3]	0	2	8	10	0 (0)	0 (-2)	10 (+2)	10 (0%)	0 (0)	0 (-2)	10 (+2)	10 (0%)	0 (0)	0 (-2)	9 (+1)	9 (-10%)
Industrial	0	11	16	27	0 (0)	0 (-11)	27 (+11)	27 (0%)	0 (0)	0 (-11)	27 (+11)	27 (0%)	0 (0)	0 (-11)	27 (+11)	27 (0%)
Open Space/Forest	409	274	132	815	305 (-104)	420 (+146)	521 (+389)	1,246 (+53%)	328 (-81)	414 (+140)	375 (+243)	1,117 (+37%)	437 (+28)	286 (+12)	147 (+15)	870 (+7%)
Parks	48	6	0	54	83 (+35)	7 (+1)	0 (0)	90 (+67%)	42 (-6)	1 (-5)	0 (0)	43 (-20%)	4 (-44)	0 (-6)	0 (0)	4 (-93%)
Residential	1,418	1,081	262	2,761	452 (-966)	1,305 (+224)	2,337 (+2,075)	4,094 (+48%)	567 (-851)	1,799 (+718)	1,553 (+1,291)	3,919 (+42%)	1,602 (+184)	1,380 (+299)	542 (+280)	3,524 (+28%)
Rural[4]	928	910	331	2,169	310 (-618)	746 (-164)	1,677 (+1,346)	2,733 (+26%)	348 (-580)	940 (+30)	1,300 (+969)	2,588 (+19%)	885 (-43)	903 (-7)	545 (+214)	2,333 (+8%)
Transportation[5]	137	87	54	278	82 (-55)	81 (-6)	232 (+178)	395 (+42%)	69 (-68)	115 (+28)	177 (+123)	361 (+30%)	98 (-39)	134 (+47)	71 (+17)	303 (+9%)
Other[6]	5	0	0	5	0 (-5)	0 (0)	5 (+5)	5 (0%)	0 (-5)	0 (0)	5 (+5)	5 (0%)	0 (-5)	5 (+5)	0 (0)	5 (0%)
Subtotal	3,742	3,181	836	7,759	1,574 (-2,168)	3,013 (-168)	5,976 (+5,140)	10,563 (+36%)	1,698 (-2,044)	3,820 (+639)	4,325 (+3,489)	9,843 (+27%)	3,543 (-199)	3,649 (+468)	1,421 (+585)	8,613 (+11%)
TOTAL[7]	**7,299**	**6,211**	**6,423**	**19,933**	**5,738 (-1,561)**	**6,252 (+41)**	**11,820 (+5,397)**	**23,810 (+19%)**	**5,870 (-1,429)**	**6,889 (+678)**	**10,864 (+4,441)**	**23,623 (+19%)**	**7,800 (+501)**	**6,619 (+408)**	**8,549 (+2,126)**	**22,968 (+15%)**

Table 4.5-1 NAS Whidbey Island Complex Land Use Acreage (+/-)[1] within the DNL Contours[2] for Alternative 1 during an Average Year

	No Action Alternative (NAA) (dB DNL)				Scenario A (dB DNL)				Scenario B (dB DNL)				Scenario C (dB DNL)			
Land Use	65-69	70-74	>75	Total	65-69	70-74	>75	Total (% change from NAA)	65-69	70-74	>75	Total (% change from NAA)	65-69	70-74	>75	Total (% change from NAA)

Notes:

1 The difference between No Action Alternative and Action Alternative 1 is noted in parentheses.

2 Scenarios A, B and C are outlined in Section 2.3.3, where the split represents the percent of FCLPs conducted at Ault Field and OLF Coupeville, respectively (i.e., 20/80 FCLP split = 20 percent of FCLPs at Ault Field and 80 percent of FCLPs at OLF Coupeville).

3 "Federal" land use includes federally zoned land. "Federal" does not include the installation boundary.

4 Rural includes a variety of living and working uses to provide for a rural lifestyle. In order to further delineate land categorized as 'Rural', parcel property use codes were examined. Parcel properties with use codes 11 (Household, single family units), 111 (single section), 112 (double section), 113 (triple section), 114 (quad or greater), 12 (Household, 2-4 units), 13 (Household, multiunit 5 or more), 14 (residential condominiums), 15 (mobile home parks or courts), and 18 (all other residential not elsewhere coded), were re-categorized as 'Residential' to more accurately assess impacts.

5 The transportation land use category includes gaps in land use data that appeared to be roads; however this transportation category does not cover all streets within the counties/municipalities. This layer was created in order to minimize data gaps within the land use data.

6 "Other" includes lands with no zoning attributes assigned to them. Land use data do not include open water, offshore water, shoals, tidal wetlands, or uninhabited islands within San Juan County.

7 Acreages have been rounded to ensure totals sum.

Key:

dB = decibel

DNL = day-night average sound level

Table 4.5-2 NAS Whidbey Island Complex Land Use Acreage (+/-)[1] within the DNL Contours[2] for Alternative 2 during an Average Year

	No Action Alternative (NAA) (dB DNL)				*Scenario A (dB DNL)*				*Scenario B (dB DNL)*				*Scenario C (dB DNL)*			
Land Use	*65-69*	*70-74*	*>75*	*Total*	*65-69*	*70-74*	*>75*	*Total (% change from NAA)*	*65-69*	*70-74*	*>75*	*Total (% change from NAA)*	*65-69*	*70-74*	*>75*	*Total (% change from NAA)*
Ault Field																
Agriculture	369	284	412	1,065	530 (+161)	367 (+83)	416 (+4)	1,313 (+23%)	551 (+182)	340 (+56)	480 (+68)	1,371 (+29%)	541 (+172)	353 (+69)	515 (+103)	1,409 (+32%)
Commercial	53	225	60	338	78 (+25)	190 (-35)	73 (+13)	341 (+1%)	45 (-8)	207 (-18)	100 (+40)	352 (+4%)	57 (+4)	188 (-37)	123 (+63)	368 (+9%)
Federal[3]	1	0	12	13	1 (0)	0 (0)	12 (0)	13 (0%)	1 (0)	0 (0)	12 (0)	13 (0%)	1 (0)	0 (0)	13 (+1)	14 (+8%)
Industrial	14	318	230	562	34 (+20)	335 (+17)	193 (-37)	562 (0%)	1 (-13)	245 (-73)	316 (+86)	562 (0%)	0 (-14)	193 (-125)	369 (+139)	562 (0%)
Open Space/Forest	608	295	179	1,082	483 (-125)	402 (+107)	250 (+71)	1,135 (+5%)	453 (-155)	430 (+135)	268 (+89)	1,151 (+6%)	437 (-171)	436 (+141)	296 (+117)	1,169 (+8%)
Parks	462	160	300	922	599 (+137)	219 (+59)	297 (-3)	1,115 (21%)	684 (+222)	232 (+72)	334 (+34)	1,250 (+36%)	717 (+255)	287 (+127)	366 (+66)	1,370 (+49%)
Residential	1,504	1,210	2,692	5,406	1,832 (+328)	1,186 (-24)	2,787 (+95)	5,805 (+7%)	1,829 (+325)	1,087 (-123)	3,107 (+415)	6,023 (+11%)	1,898 (+394)	1,030 (-180)	3,320 (+628)	6,248 (+16%)
Rural[4]	422	432	1,354	2,208	436 (+14)	452 (+20)	1,407 (+53)	2,295 (+4%)	430 (+8)	439 (+7)	1,492 (+138)	2,361 (+7%)	418 (-4)	409 (-23)	1,591 (+237)	2,418 (+10%)
Transportation[5]	113	106	348	567	135 (+22)	95 (-11)	359 (+11)	589 (+4%)	129 (+16)	96 (-10)	382 (+34)	607 (+7%)	134 (+21)	92 (-14)	402 (+54)	628 (+11%)
Other[6]	11	0	0	11	26 (+15)	0 (0)	0 (0)	26 (+136%)	27 (+16)	0 (0)	0 (0)	27 (+145%)	42 (+31)	2 (+2)	0 (0)	44 (+300%)
Subtotal	3,557	3,030	5,587	12,174	4,154 (+597)	3,246 (+216)	5,794 (+207)	13,194 (+8%)	4,150 (+593)	3,076 (+46)	6,491 (+904)	13,717 (+13%)	4,245 (+688)	2,990 (-40)	6,995 (+1,408)	14,230 (+17%)

Table 4.5-2 NAS Whidbey Island Complex Land Use Acreage (+/-)[1] within the DNL Contours[2] for Alternative 2 during an Average Year

	No Action Alternative (NAA) (dB DNL)				*Scenario A (dB DNL)*				*Scenario B (dB DNL)*				*Scenario C (dB DNL)*			
Land Use	***65-69***	***70-74***	***>75***	***Total***	***65-69***	***70-74***	***>75***	***Total (% change from NAA)***	***65-69***	***70-74***	***>75***	***Total (% change from NAA)***	***65-69***	***70-74***	***>75***	***Total (% change from NAA)***
OLF Coupeville																
Agriculture	796	810	33	1,639	323 (-473)	467 (-343)	1,127 (+1,094)	1,917 (+17%)	354 (-442)	569 (-241)	826 (+793)	1,749 (+7%)	536 (-260)	939 (+129)	42 (+9)	1,517 (-7%)
Commercial	1	0	0	1	3 (+2)	0 (0)	0 (0)	3 (+200%)	1 (0)	0 (0)	0 (0)	1 (0%)	0 (-1)	0 (0)	0 (0)	0 (-100%)
Federal[3]	0	2	8	10	0 (0)	0 (-2)	10 (+2)	10 (0%)	0 (0)	0 (-2)	10 (+2)	10 (0%)	0 (0)	0 (-2)	9 (+1)	9 (-10%)
Industrial	0	11	16	27	0 (0)	0 (-11)	27 (+11)	27 (0%)	0 (0)	0 (-11)	27 (+11)	27 (0%)	0 (0)	1 (-10)	27 (+11)	28 (+4%)
Open Space/Forest	409	274	132	815	312 (-97)	427 (+153)	492 (+360)	1,231 (+51%)	330 (-79)	410 (+136)	353 (+221)	1,093 (+34%)	440 (+31)	277 (+3)	138 (+6)	855 (+5%)
Parks	48	6	0	54	76 (+28)	6 (0)	0 (0)	82 (+52%)	36 (-12)	0 (-6)	0 (0)	36 (-33%)	3 (-45)	0 (-6)	0 (0)	3 (-94%)
Residential	1,418	1,081	262	2,761	456 (-962)	1,394 (+313)	2,215 (+1,953)	4,065 (+47%)	639 (-779)	1,843 (+762)	1,408 (+1,146)	3,890 (+41%)	1,682 (+264)	1,329 (+248)	478 (+216)	3,489 (+26%)
Rural[4]	928	910	331	2,169	322 (-606)	798 (-112)	1,599 (+1,268)	2,719 (+25%)	377 (-551)	939 (+29)	1,253 (+922)	2,569 (+18%)	914 (-14)	916 (+6)	482 (+151)	2,312 (+7%)
Transportation[5]	137	87	54	278	81 (-56)	85 (-2)	224 (+170)	390 (+40%)	68 (-69)	122 (+35)	165 (+111)	355 (+28%)	106 (-31)	128 (+41)	66 (+12)	300 (+8%)
Other[6]	5	0	0	5	0 (-5)	0 (0)	5 (+5)	5 (0%)	0 (-5)	0 (0)	5 (+5)	5 (0%)	0 (-5)	5 (+5)	0 (0)	5 (0%)
Subtotal	3,742	3,181	836	7,759	1,573 (-2,169)	3,177 (-4)	5,699 (+4,863)	10,449 (+35%)	1,805 (-1,937)	3,883 (+702)	4,047 (+3,211)	9,735 (+25%)	3,681 (-61)	3,595 (+414)	1,242 (+406)	8,518 (+10%)
TOTAL[7]	**7,299**	**6,211**	**6,423**	**19,933**	**5,727 (-1,572)**	**6,423 (+212)**	**11,493 (+5,070)**	**23,643 (+19%)**	**5,955 (-1,344)**	**6,959 (+748)**	**10,538 (+4,115)**	**23,452 (+18%)**	**7,926 (+627)**	**6,585 (+374)**	**8,237 (+1,814)**	**22,748 (+14%)**

Table 4.5-2 NAS Whidbey Island Complex Land Use Acreage (+/-)[1] within the DNL Contours[2] for Alternative 2 during an Average Year

	No Action Alternative (NAA) (dB DNL)				Scenario A (dB DNL)				Scenario B (dB DNL)				Scenario C (dB DNL)			
Land Use	65-69	70-74	>75	Total	65-69	70-74	>75	Total (% change from NAA)	65-69	70-74	>75	Total (% change from NAA)	65-69	70-74	>75	Total (% change from NAA)

Notes:

1 The difference between No Action Alternative and Action Alternative 2 is noted in parentheses.

2 Scenarios A, B and C are outlined in Section 2.3.3, where the split represents the percent of FCLPs conducted at Ault Field and OLF Coupeville, respectively (i.e., 20/80 FCLP split = 20 percent of FCLPs at Ault Field and 80 percent of FCLPs at OLF Coupeville).

3 "Federal" land use includes federally zoned land. "Federal" does not include the installation boundary.

4 Rural includes a variety of living and working uses to provide for a rural lifestyle. In order to further delineate land categorized as 'Rural', parcel property use codes were examined. Parcel properties with use codes 11 (Household, single family units), 111 (single section), 112 (double section), 113 (triple section), 114 (quad or greater), 12 (Household, 2-4 units), 13 (Household, multiunit 5 or more), 14 (residential condominiums), 15 (mobile home parks or courts), and 18 (all other residential not elsewhere coded), were re-categorized as 'Residential' to more accurately assess impacts.

5 The transportation land use category includes gaps in land use data that appeared to be roads; however this transportation category does not cover all streets within the counties/municipalities. This layer was created in order to minimize data gaps within the land use data.

6 "Other" includes lands with no zoning attributes assigned to them. Land use data do not include open water, offshore water, shoals, tidal wetlands, or uninhabited islands within San Juan County.

7 Acreages have been rounded to ensure totals sum.

Key:
dB = decibel
DNL = day-night average sound level

Table 4.5-3 NAS Whidbey Island Complex Land Use Acreage (+/-)[1] within the DNL Contours[2] for Alternative 3 during an Average Year

	No Action Alternative (NAA) (dB DNL)				*Scenario A (dB DNL)*				*Scenario B (dB DNL)*				*Scenario C (dB DNL)*			
Land Use	*65-69*	*70-74*	*>75*	*Total*	*65-69*	*70-74*	*>75*	*Total (% change from NAA)*	*65-69*	*70-74*	*>75*	*Total (% change from NAA)*	*65-69*	*70-74*	*>75*	*Total (% change from NAA)*
Ault Field																
Agriculture	369	284	412	1,065	538 (+169)	366 (+82)	414 (+2)	1,318 (+24%)	573 (+204)	342 (+58)	478 (+66)	1,393 (+31%)	533 (+164)	354 (+70)	514 (+102)	1,401 (+32%)
Commercial	53	225	60	338	78 (+25)	189 (-36)	73 (+13)	340 (+<1%)	46 (-7)	207 (-18)	100 (+40)	353 (+4%)	56 (+3)	189 (-36)	121 (+61)	366 (+8%)
Federal[3]	1	0	12	13	1 (0)	0 (0)	12 (0)	13 (0%)	1 (0)	0 (0)	12 (0)	13 (0%)	1 (0)	0 (0)	12 (0)	13 (0%)
Industrial	14	318	230	562	34 (+20)	335 (+17)	193 (-37)	562 (0%)	1 (-13)	247 (-71)	313 (+83)	561 (-<1%)	0 (-14)	197 (-121)	364 (+134)	561 (-<1%)
Open Space/Forest	608	295	179	1,082	478 (-130)	406 (+111)	252 (+73)	1,136 (+5%)	446 (-162)	440 (+145)	271 (+92)	1,157 (+7%)	441 (-167)	433 (+138)	294 (+115)	1,168 (+8%)
Parks	462	160	300	922	603 (+141)	222 (+62)	297 (-3)	1,122 (+22%)	691 (+229)	234 (+74)	333 (+33)	1,258 (+36%)	716 (+254)	285 (+125)	367 (+67)	1,368 (+48%)
Residential	1,504	1,210	2,692	5,406	1,835 (+331)	1,189 (-21)	2,782 (+90)	5,806 (+7%)	1,844 (+340)	1,090 (-120)	3,104 (+412)	6,038 (+12%)	1,914 (+410)	1,033 (-177)	3,310 (+618)	6,257 (+16%)
Rural[4]	422	432	1,354	2,208	437 (+15)	452 (+20)	1,407 (+53)	2,296 (+4%)	430 (+8)	441 (-9)	1,494 (+140)	2,365 (+7%)	429 (+7)	411 (-21)	1,585 (+231)	2,425 (+10%)
Transportation[5]	113	106	348	567	135 (+22)	95 (-11)	359 (+11)	589 (+4%)	129 (+16)	96 (-10)	382 (+34)	607 (+7%)	134 (+21)	93 (-13)	400 (+52)	627 (+11%)
Other[6]	11	0	0	11	28 (+17)	0 (0)	0 (0)	28 (+155%)	28 (+17)	0 (0)	0 (0)	28 (+155%)	42 (+31)	2 (+2)	0 (0)	44 (+300%)
Subtotal	3,557	3,030	5,587	12,174	4,167 (+610)	3,254 (+224)	5,789 (+202)	13,210 (+9%)	4,189 (+632)	3,097 (+67)	6,487 (+900)	13,773 (+13%)	4,266 (+709)	2,997 (-33)	6,967 (+1,380)	14,230 (+17%)

Table 4.5-3 NAS Whidbey Island Complex Land Use Acreage (+/-)[1] within the DNL Contours[2] for Alternative 3 during an Average Year

	No Action Alternative (NAA) (dB DNL)				*Scenario A (dB DNL)*				*Scenario B (dB DNL)*				*Scenario C (dB DNL)*			
Land Use	*65-69*	*70-74*	*>75*	*Total*	*65-69*	*70-74*	*>75*	*Total (% change from NAA)*	*65-69*	*70-74*	*>75*	*Total (% change from NAA)*	*65-69*	*70-74*	*>75*	*Total (% change from NAA)*
OLF Coupeville																
Agriculture	796	810	33	1,639	326 (-470)	462 (-348)	1,144 (+1,111)	1,932 (+18%)	348 (-448)	557 (-253)	859 (+826)	1,764 (+8%)	523 (-273)	947 (+137)	61 (+28)	1,531 (-7%)
Commercial	1	0	0	1	4 (+3)	0 (0)	0 (0)	4 (+300%)	1 (0)	0 (0)	0 (0)	1 (0%)	0 (-1)	0 (0)	0 (0)	0 (-100%)
Federal[3]	0	2	8	10	0 (0)	0 (-2)	10 (+2)	10 (0%)	0 (0)	0 (-2)	10 (+2)	10 (0%)	0 (0)	0 (-2)	9 (+1)	9 (-10%)
Industrial	0	11	16	27	0 (0)	0 (-11)	27 (+11)	27 (0%)	0 (0)	0 (-11)	27 (+11)	27 (0%)	0 (0)	0 (-11)	27 (+11)	27 (0%)
Open Space/Forest	409	274	132	815	310 (-99)	424 (+150)	504 (+372)	1,238 (+52%)	331 (-78)	411 (+137)	367 (+235)	1,109 (+36%)	438 (+29)	283 (+9)	144 (+12)	865 (+6%)
Parks	48	6	0	54	79 (+31)	7 (+1)	0 (0)	86 (+59%)	40 (-8)	1 (-5)	0 (0)	41 (-24%)	4 (-44)	0 (-6)	0 (0)	4 (-93%)
Residential	1,418	1,081	262	2,761	453 (-965)	1,357 (+276)	2,268 (+2,006)	4,078 (+48%)	597 (-821)	1,815 (+734)	1,498 (+1,236)	3,910 (+42%)	1,631 (+213)	1,366 (+285)	516 (+254)	3,515 (+27%)
Rural[4]	928	910	331	2,169	317 (-611)	777 (-133)	1,632 (+1,301)	2,726 (+26%)	359 (-569)	939 (+29)	1,284 (+953)	2,582 (+19%)	895 (-33)	909 (-1)	521 (+190)	2,325 (+7%)
Transportation[5]	137	87	54	278	81 (-56)	83 (-4)	228 (+174)	392 (+41%)	69 (-68)	117 (+30)	173 (+119)	359 (+29%)	101 (-36)	132 (+45)	69 (+15)	302 (+9%)
Other[6]	5	0	0	5	0 (-5)	0 (0)	5 (+5)	5 (0%)	0 (-5)	0 (0)	5 (+5)	5 (0%)	0 (-5)	5 (+5)	0 (0)	5 (0%)
Subtotal	3,742	3,181	836	7,759	1,570 (-2,172)	3,110 (-71)	5,818 (+4,982)	10,498 (+35%)	1,745 (-1,997)	3,840 (+659)	4,223 (+3,387)	9,808 (+26%)	3,592 (-150)	3,642 (+461)	1,347 (+511)	8,581 (+11%)
TOTAL[7]	**7,299**	**6,211**	**6,423**	**19,933**	**5,737 (-1,562)**	**6,364 (+153)**	**11,607 (+5,184)**	**23,708 (+19%)**	**5,934 (-1,365)**	**6,937 (+726)**	**10,710 (+4,287)**	**23,581 (+18%)**	**7,858 (+559)**	**6,639 (+428)**	**8,314 (+1,891)**	**22,811 (+14%)**

Table 4.5-3 NAS Whidbey Island Complex Land Use Acreage (+/-)[1] within the DNL Contours[2] for Alternative 3 during an Average Year

	No Action Alternative (NAA) (dB DNL)				Scenario A (dB DNL)				Scenario B (dB DNL)				Scenario C (dB DNL)			
Land Use	65-69	70-74	>75	Total	65-69	70-74	>75	Total (% change from NAA)	65-69	70-74	>75	Total (% change from NAA)	65-69	70-74	>75	Total (% change from NAA)

Notes:

1 The difference between the No Action Alternative and Action Alternative 3 is noted in parentheses.

2 Scenarios A, B and C are outlined in Section 2.3.3, where the split represents the percent of FCLPs conducted at Ault Field and OLF Coupeville, respectively (i.e., 20/80 FCLP split = 20 percent of FCLPs at Ault Field and 80 percent of FCLPs at OLF Coupeville).

3 "Federal" land use includes federally zoned land. "Federal" does not include the installation boundary.

4 Rural includes a variety of living and working uses to provide for a rural lifestyle. In order to further delineate land categorized as 'Rural', parcel property use codes were examined. Parcel properties with use codes 11 (Household, single family units), 111 (single section), 112 (double section), 113 (triple section), 114 (quad or greater), 12 (Household, 2-4 units), 13 (Household, multiunit 5 or more), 14 (residential condominiums), 15 (mobile home parks or courts), and 18 (all other residential not elsewhere coded), were re-categorized as 'Residential' to more accurately assess impacts.

5 The transportation land use category includes gaps in land use data that appeared to be roads; however this transportation category does not cover all streets within the counties/municipalities. This layer was created in order to minimize data gaps within the land use data.

6 "Other" includes lands with no zoning attributes assigned to them. Land use data do not include open water, offshore water, shoals, tidal wetlands, or uninhabited islands within San Juan County.

7 Acreages have been rounded to ensure totals sum.

Key:
dB = decibel
DNL = day-night average sound level

When compared with the No Action Alternative, the action alternatives would result in an 14 percent to 19 percent increase in the acreage of land within the projected greater than 65 dB DNL noise contours.

- The largest increases in land use impacted by the greater than 65 dB DNL noise contours occur across Alternative 1, Scenario A and Scenario B, and Alternatives 2 and 3 under Scenario A (20 percent of operations at Ault Field and 80 percent at OLF Coupeville).
- The smallest increases in land use impacted by the greater than 65 dB DNL noise contours occur under Scenario C (80 percent of operations at Ault Field and 20 percent at OLF Coupeville).
- Under Alternative 1, each scenario results in an increase of 15 percent to 19 percent in land impacted by the greater than 65 dB DNL noise contours. Across all action alternatives and scenarios under the projected DNL contours surrounding Ault Field, agricultural land, parks, and residential land categories experience the greatest increase in acreage under the greater than 65 dB DNL noise contours.
- Across all action alternatives for Scenario A surrounding OLF Coupeville, commercial, open space/forest, and park land categories experience the greatest increase in acreage under the greater than 65 dB DNL noise contours.
- Across all action alternatives for Scenario B surrounding OLF Coupeville, open space/forest, residential, and transportation land categories experience the greatest increase, while park land decreases in acreage under the greater than 65 dB DNL noise contours.
- Across all action alternatives under Scenario C surrounding OLF Coupeville, residential, rural, and transportation land categories experience the greatest increase, while agriculture, commercial, federal, and park land acreage decrease under the greater than 65 dB DNL noise contours.

Per the AICUZ program, residential land use is not recommended within the greater than 65 dB DNL noise contour (OPNAVINST 11010.36C). Land use designation is the responsibility of the municipality and/or county.

- The largest increases in residential land use impacted by the greater than 65 dB DNL noise contours surrounding Ault Field occur under Alternative 1, Scenario C; Alternative 2, Scenario C; and Alternative 3, Scenario C which has 80 percent of FCLPs being conducted at Ault Field, relative to the No Action Alternative.
- Under Alternative 1, Scenario C, residential land use within the projected greater than 65 dB DNL noise contours surrounding Ault Field would experience the greatest increase.
- The largest increases in residential land use impacted by the greater than 65 dB DNL contours surrounding OLF Coupeville occur under Scenario A of all action alternatives, which has 80 percent of FCLPs being conducted at OLF Coupeville.

Accident Potential Zones

There would be no change in APZs at Ault Field under any of the action alternatives. No impacts to land use would occur under the current APZs at Ault Field.

Regarding OLF Coupeville, Alternative 1, Scenario B; Alternative 2, Scenario B; and Alternative 3, Scenario B, would have conceptual APZs for Runway 32 only (see Table 4.3-1 and Figure 4.3-1). The land use acreages within the conceptual APZs for Runway 32 are shown below in Table 4.5-4; these acreages represent the change from the No Action Alternative. Generally, the majority of impacted land under

APZ-I is residential and rural land, and the majority of impacted land under APZ-II is agricultural and rural land.

Table 4.5-4 Land Use Acreage within Conceptual APZs for Runway 32 at OLF Coupeville, Option 1

	APZ- I	*APZ- II*	*TOTAL*
Land Use			
Agriculture	8	555	563
Commercial	0	0	0
Federal[1]	4	0	4
Industrial	1	0	1
Open Space/Forest	90	0	90
Parks	0	0	0
Residential	267	236	503
Rural[2]	147	376	523
Transportation[3]	50	24	74
Other[4]	2	650	652
Total	***569***	***1,841***	***2,410***

Notes:

1 "Federal" land use includes federally zoned land. "Federal" does not include the installation boundary.

2 Rural includes a variety of living and working uses to provide for a rural lifestyle. In order to further delineate land categorized as "Rural," parcel property use codes were examined. Parcel properties with use codes 11 (Household, single family units), 111 (single section), 112 (double section), 113 (triple section), 114 (quad or greater), 12 (Household, 2-4 units), 13 (Household, multiunit 5 or more), 14 (residential condominiums), 15 (mobile home parks or courts), and 18 (all other residential not elsewhere coded), were re-categorized as 'Residential' to more accurately assess impacts.

3 The transportation land use category includes gaps in land use data that appeared to be roads; however this transportation category does not cover all streets within the counties/municipalities. This layer was created in order to minimize data gaps within the land use data.

4 "Other" includes lands with no zoning attributes assigned to them. Land use data do not include open water, offshore water, shoals, tidal wetlands, or uninhabited islands within San Juan County.

Key:
APZ = Accident Potential Zone

Alternative 1, Scenario A; Alternative 2, Scenario A; and Alternative 3, Scenario A, have conceptual APZs for Runway 32 and Runway 14 (see Table 4.3-1 and Figure 4.3-1). The land use acreage within these conceptual APZs is shown in Table 4.5-5 below. These acreages represent the change from the No Action Alternative. Generally, the majority of impacted land under APZ-I and APZ-II is residential and rural land.

Because there would be no change in APZs at OLF Coupeville under Scenario C for all action alternatives, no impacts to land use would occur due to the designation of new APZs.

There would be no change in Clear Zones at Ault Field or OLF Coupeville under any of the action alternatives and, therefore, no impacts to land use would occur in the current Clear Zones.

Table 4.5-5 Land Use Acreage within Conceptual APZs for Runway 32 and Runway 14 at OLF Coupeville, Option 2

	APZ-I	*APZ-II*	*TOTAL*
Land Use			
Agriculture	20	555	575
Commercial	0	0	0
Federal[1]	4	0	4
Industrial	27	0	27
Open Space/Forest	91	75	166
Parks	0	0	0
Residential	419	882	1,301
Rural[2]	363	540	903
Transportation[3]	67	79	146
Other[4]	2	1,551	1,553
Total	***993***	***3,682***	***4,675***

Notes:

1 "Federal" land use includes federally zoned land. "Federal" does not include the installation boundary.

2 Rural includes a variety of living and working uses to provide for a rural lifestyle. In order to further delineate land categorized as "Rural," parcel property use codes were examined. Parcel properties with use codes 11 (Household, single family units), 111 (single section), 112 (double section), 113 (triple section), 114 (quad or greater), 12 (Household, 2-4 units), 13 (Household, multiunit 5 or more), 14 (residential condominiums), 15 (mobile home parks or courts), and 18 (all other residential not elsewhere coded), were re-categorized as 'Residential' to more accurately assess impacts

3 The transportation land use category includes gaps in land use data that appeared to be roads; however, this transportation category does not cover all streets within the counties/municipalities. This layer was created in order to minimize data gaps within the land use data.

4 "Other" includes lands with no zoning attributes assigned to them. Land use data do not include open water, offshore water, shoals, tidal wetlands, or uninhabited islands within San Juan County.

Key:
APZ = Accident Potential Zone

4.5.2.2 Recreation and Wilderness Potential Impacts

As noted in Section 3.2, Noise, annoyance is a primary human response to recurring high noise levels, and the level of annoyance experienced by a human noise receptor tends to vary based on activity. Noise may detract from the experience and enjoyment of visitors to parks and their perception of a landscape, particularly if the type of noise is not perceived to "fit" with the setting (i.e., a technological noise in a natural setting) (Krog, Engdahl, and Tambs, 2010a). Studies of the effects of aircraft noise on outdoor recreation outside of wilderness areas are limited; however, aircraft noise has been found to be a primary environmental factor causing visitors to parks to become annoyed and may detract from their overall experience of a park or recreational activity (Krog, Engdahl, and Tambs, 2010a). Studies of aircraft noise effects on outdoor recreationists show that reported annoyance by outdoor recreationists or changes in their use of parks and other outdoor recreation areas depend upon multiple factors such as their frequency of use of the recreation area, the recreation activities in which they are engaged, and the degree of change in noise exposure (Krog, Engdahl, and Tambs, 2010b). People who use a park less frequently are more likely to change their patterns of use in response to changes in noise exposure. The type of activity also plays a role in response to noise, with outdoor recreationists who value natural

experiences more likely to change their patterns of use in response to aircraft operations (Krog, Engdahl, and Tambs, 2010b).

No Congressionally designated wilderness areas or Bureau of Land Management (BLM)-owned lands with wilderness characteristics are located in any of the areas beneath the 65 DNL contour in any alternative or scenario, including the No Action Alternative; therefore no significant impacts would occur to wilderness areas.

4.5.2.2.1 Parks and Recreation Areas Potential Noise Impacts

Regardless of the alternative chosen, the additional Growler aircraft would generally use the same operating procedures, flight routes, and altitudes used by Growler aircraft currently home based at Ault Field. The types of aircraft operations at Ault Field and OLF Coupeville would not change. The discussion below focuses on potential changes resulting from differences in average annual operations and the overall numbers of noise events per DNL daytime hour that are greater than the maximum sound level of 65 dB outdoors (to capture outdoor speech interference, which is used as an indicator for potential annoyance). For parks and recreation areas for which the annual average number of noise events greater than 65 dB outdoors has not been modeled, potential changes in annual average DNL at that location were assessed. The action alternatives are compared to conditions under the No Action Alternative, which do not vary to a significant degree from affected environment conditions. The data referenced below also are presented in Section 4.2.

A. San Juan Islands National Monument

Potential Impacts on Recreation

None of the BLM-administered lands constituting the San Juan Islands National Monument would be located within the greater than 65 dB DNL noise contours under any of the proposed alternatives. Between 10,600 acres of water (under Alternative 2, Scenario A) and 12,200 acres of water (under Alternative 1, Scenario C) within the San Juan National Conservation Area Boundary that marks the extent of the national monument would be within the greater than 65 dB DNL average year noise contours, depending on the alternative selected. While no water areas are included in the national monument, visitors to national monument lands may access those lands by water—i.e., by kayak or boat. Table 4.5-6 provides the approximate water acreages within the San Juan National Conservation Area Boundary that would be in the noise contour ranges under each alternative and scenario, compared to conditions under the No Action Alternative. As shown in the table, each of the alternatives and scenarios would increase the water area within the greater than 65 dB DNL noise contours, compared to conditions under the No Action Alternative. This increase would range from 2,098 acres of water area under Alternative 2, Scenario A, to 3,884 acres of water area under Alternative 1, Scenario C. Scenario A, which would shift 80 percent of FCLPs to OLF Coupeville, would result in less of an impact on water recreation within the San Juan National Conservation Area Boundary. Based on the increased water area within the San Juan National Conservation Area Boundary that would be intermittently exposed to high noise levels, which would be over 2,000 acres regardless of alternative or scenario selected, the Proposed Action would have a long-term moderate impact on water-based recreation at the San Juan Islands National Monument when aircraft are operating in the area. Because of the distance of the impacted area from the majority of lands within the national monument, this impact would not be significant.

Table 4.5-6 Estimated San Juan National Conservation Area Waters (Acres) within the Noise Contours under Each Alternative and Scenario (Average Year)[1]

dB DNL Noise Contour Range	*No Action Alternative Conditions* *Acres[2]*	*Scenario A (Change from No Action Alternative)*	*Scenario B (Change from No Action Alternative)*	*Scenario C (Change from No Action Alternative)*
Alternative 1				
65 – 70 dB DNL	4,165	5,238 (1,073)	5,351 (1,186)	5,888 (1,723)
70 – 75 dB DNL	2,676	3,254 (578)	3,277 (601)	3,432 (756)
> 75 dB DNL	1,433	2,293 (860)	2,334 (901)	2,837 (1,404)
Total	**8,273**	**10,785 (2,512)**	**10,962 (2,689)**	**12,157 (3,884)**
Alternative 2				
65 – 70 dB DNL	4,201	5,182 (981)	5,287 (1,086)	5,766 (1,565)
70 – 75 dB DNL	2,807	3,233 (426)	3,255 (448)	3,411 (604)
> 75 dB DNL	1,536	2,227 (691)	2,273 (737)	2,740 (1,204)
Total	**8,544**	**10,642 (2,098)**	**10,815 (2,271)**	**11,917 (3,373)**
Alternative 3				
65 – 70 dB DNL	4,201	5,237 (1,036)	5,358 (1,157)	5,757 (1,556)
70 – 75 dB DNL	2,807	3,250 (443)	3,275 (468)	3,408 (601)
> 75 dB DNL	1,536	2,277 (741)	2,326 (790)	2,727 (1,191)
Total	**8,544**	**10,764 (2,557)**	**10,960 (2,416)**	**11,891 (3,347)**

Notes:
1 Totals may not sum exactly due to rounding.
2 The difference in acreage between the No Action Alternative and the action alternatives is shown in parentheses.

Key:
dB = decibel
DNL = day-night average sound level

Point Colville, at the southern end of Lopez Island and one of the closest national monument lands to the area that would be within the greater than 65 dB DNL noise contours, was included as a POI in the supplemental noise analysis for the Proposed Action. Under the No Action Alternative, this location would experience two noise events per DNL daytime hour greater than 65 dB outdoors. This rate would not change under any alternative or operational scenario, because of the distance of Point Colville from Ault Field (see Tables 4.2-5, 4.2-11, 4.2-17, and 4.2-23). The majority of national monument lands, as well as the waters surrounding national monument lands, are farther from Ault Field than Point Colville. Therefore, the Proposed Action would not result in noticeable effects on outdoor recreation across most of the San Juan Islands National Monument as a result of noise.

Potential Impacts on Recreation Management

BLM currently is preparing the San Juan Islands National Monument Resource Management Plan, which is expected to be complete in the spring of 2018 (BLM, n.d.[b]).The Proposed Action under any of the alternatives would not directly conflict with or impact the BLM's management of the national monument because safe and efficient aircraft operations by the Armed Forces are not restricted by the designation of the national monument (The White House Office of the Press Secretary, 2013). According to BLM policy for managing National Land Conservation System units, including national monuments,

land use planning decisions and BLM activities pertaining to these lands must be consistent with the applicable designating legislation or proclamation (BLM, 2012a, 2012b).

The 2013 presidential proclamation creating the national monument mentions the "historical and cultural significance" and "unique and varied natural and scientific resources" of the lands included in the national monument (The White House Office of the Press Secretary, 2013). Aircraft operations at Ault Field under the Proposed Action, regardless of alternative or operational scenario selected, are not expected to indirectly impact management of the national monument by impacting the ability of the BLM to manage its cultural and natural resources, specifically as these resources are used or enjoyed by people visiting the national monument for recreation. Recreational values were not specifically noted in the 2013 presidential proclamation; however, BLM Manual 6220 – National Monuments, National Conservation Areas, and Similar Designations notes that "monuments…will be available for a variety of recreation purposes," including "hunting and fishing, consistent with the designating authority" (BLM, 2012b). Regardless of alternative or operational scenario selected, Growler aircraft would be intermittently visible and audible from national monument lands as they fly along flight tracks that pass over or near the national monument (see Figures 3.1-2, 3.1-3, and 3.1-4). In addition, from 10,300 acres (under Alternative 2, Scenario A) to 12,300 acres (under Alternative 1, Scenario C) of the waters southeast of Lopez Island and east of Decatur Island would be within the greater than 65 dB DNL noise zones. Aircraft overflights would not directly impact, or restrict, use of this area for fishing but may result in indirect impacts, primarily annoyance, as a result of average annual noise levels greater than 65 dB DNL. Because the vast majority of the national monument and the surrounding waters is located outside of the greater than 65 dB DNL noise contours, the Proposed Action, regardless of alternative or operational scenario selected, would have long-term, minor, indirect impacts on management of the San Juan Islands National Monument for recreation.

Based on the above, no significant impacts on recreational use or recreation management of the national monument as a result of the Proposed Action are expected (see Figure 4.5-1).

B. Ebey's Landing National Historical Reserve

Potential Impacts on Recreation

With implementation of the Proposed Action, between approximately 33 percent and 43 percent of the 17,000-acre Ebey's Landing National Historical Reserve would be within the greater than 65 dB DNL contours, depending on the alternative selected. Noise contours under each alternative and operational scenario provide a means of assessing relative impacts on recreation at the national historical reserve.

As shown in Table 4.5-7, the operational scenario selected would affect the degree of intermittent noise exposure at the national historical reserve more than the alternative. Under the No Action Alternative, approximately 6,300 acres would be within the noise contours. Therefore, all three alternatives with either Scenario A or B would result in a greater degree of noise impact on recreation than the No Action Alternative; Scenario C would result in a slight long-term, beneficial impact on recreation because 80 percent of FCLPs would be conducted at Ault Field and less area at the national historical reserve would be exposed to noise above 65 dB DNL. Alternative 1, Scenario A, would result in the largest area encompassed by the greater than 65 dB DNL noise contours, while Alternative 2, Scenario C, would result in the smallest.

Figure 4.5-1 Greater than 65 dB DNL Noise Contours in the Vicinity of the San Juan Islands National Monument

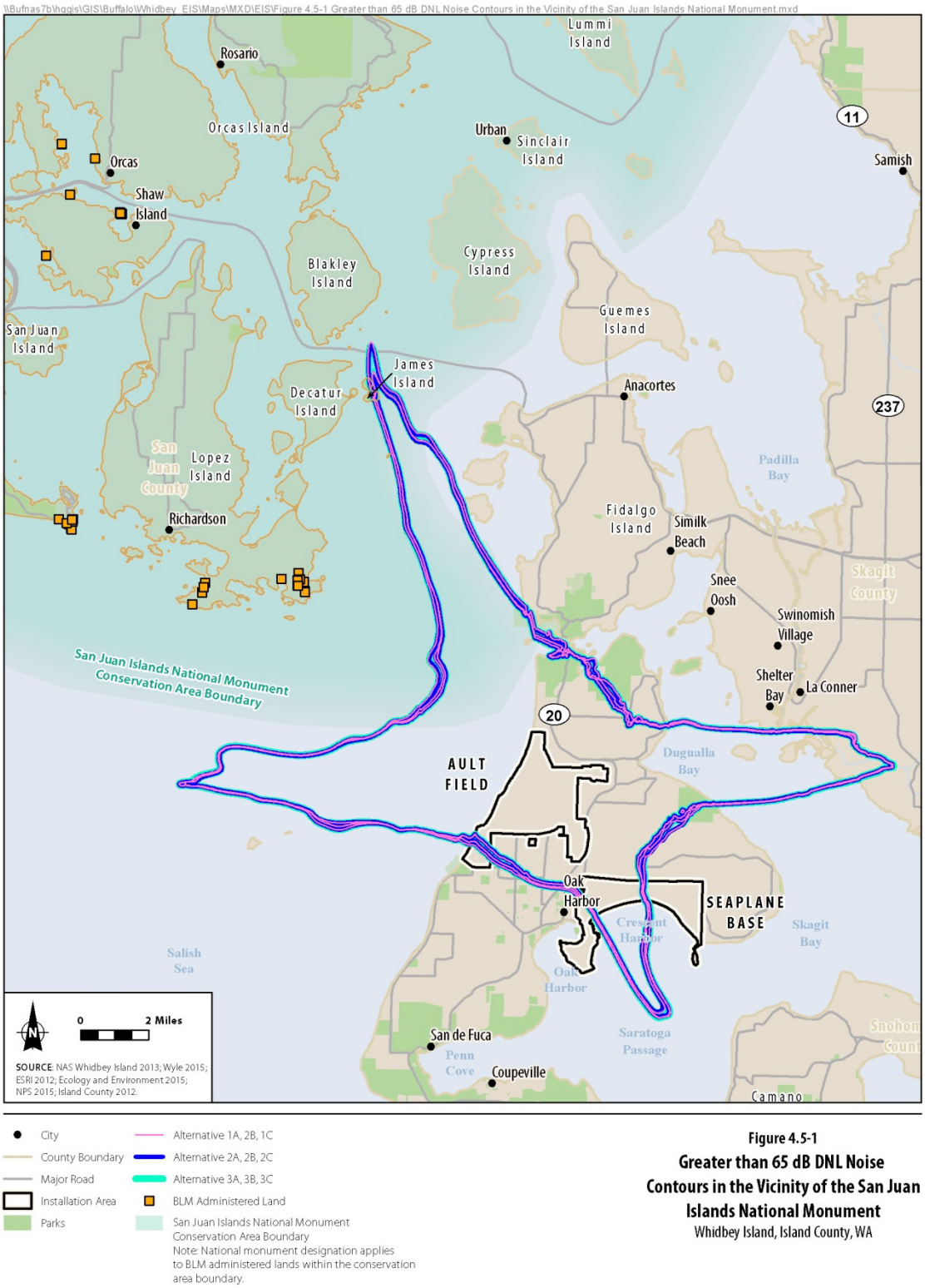


Figure 4.5-1
Greater than 65 dB DNL Noise Contours in the Vicinity of the San Juan Islands National Monument
Whidbey Island, Island County, WA

Table 4.5-7 Area of Ebey's Landing National Historical Reserve Encompassed by the Greater than 65 dB DNL Noise Contours under the Proposed Action (Acres)

Alternative	*Scenario A*	*Scenario B*	*Scenario C*
Alternative 1	7,273	6,646	5,618
Alternative 2	7,159	6,549	5,549
Alternative 3	7,203	6,615	5,595

Depending on the alternative and scenario selected, annual aircraft operations would increase approximately 46 percent to 47 percent over affected environment conditions. These operational conditions would be similar to historic operational levels in the 1970s, 1980s, and 1990s for the NAS Whidbey Island complex and, thus, similar to operational conditions that would have occurred at the time the Ebey's Landing National Historical Reserve was created in 1978 and over most of the reserve's existence.

Three outdoor locations within the national historical reserve were included as POIs in the supplemental noise analysis: Rhododendron Park northwest of OLF Coupeville, Ebey's Prairie west of the OLF, and the Admiralty Head Lighthouse at Fort Casey State Park in the southwestern corner of the national historical reserve (Wyle, 2016). The following section assesses the potential impacts of the Proposed Action on these POIs by alternative, compared to conditions under the No Action Alternative, as a result of the average number of noise events above 65 dB DNL.

As shown in Table 4.5-8, Alternatives 1 and 2 would result in the same increases in the annual average number of outdoor noise events over 65 dB at each POI under each operational scenario. Under both alternatives, Scenario A would result in the greatest impacts, with increases in the number of noise events ranging from one to two noise events per hour on average. Scenario C would result in no change in the number of noise events, compared to conditions under the No Action Alternative. Alternative 3, Scenario A, would have the same impacts as Alternative 1, Scenario A or Alternative 2, Scenario A. Alternative 3, Scenarios B and C, would result in less of an impact to outdoor recreation than Alternatives 1, Scenarios B and C, and Alternative 2, Scenarios B and C, as shown in the table, with Alternative 3, Scenario C, resulting in no change or a decrease in the number of noise events over 65 dB DNL.

Recreational users of these areas already experience disruptions that may affect recreational experiences as a result of current operations at OLF Coupeville. The Proposed Action, particularly under Alternatives 1 through 3, Scenario A, may increase the rate of disruptive noise events at the national historical reserve but would not change the types of operations at OLF Coupeville or other factors that would affect the characteristics of individual noise events.

In general, Scenarios A and B of any of the three action alternatives would result in long-term, moderate impacts on recreation at Ebey's Landing National Historical Reserve because of the potential for increased noise events above 65 dB to degrade the visitor experience compared to affected environment conditions. As noted previously in this section, operational conditions experienced at the reserve under the Proposed Action would be similar to conditions at the time of the reserve's creation and throughout much of the reserve's existence through the 1990s. Noise impacts on recreation also would be intermittent, occurring only when aircraft operate in the area. Each of the alternatives listed above also would result in an increase in the area of the national historical reserve exposed to average annual noise levels above 65 dB DNL.

Table 4.5-8 Number of Events per Hour of Outdoor Speech Interference for Representative Points of Interest at Ebey's Landing National Historical Reserve (Average Year)

Point of Interest	*No Action Alternative Conditions*	*Scenario A*	*Scenario B*	*Scenario C*
	Annual Average Outdoor Daily DNL Daytime Events per Hour (NA65 L_{max})			
Alternative 1				
Ebey's Landing National Historical Reserve (Rhododendron Park)	1	3 (+2)	2 (+1)	1 (-)
Ebey's Landing State Park (Ebey's Prairie)	1	2 (+1)	1 (-)	1 (-)
Fort Casey State Park	1	3 (+2)	2 (+1)	1 (-)
Alternative 2				
Ebey's Landing National Historical Reserve (Rhododendron Park)	1	3 (+2)	2 (+1)	1 (-)
Ebey's Landing State Park (Ebey's Prairie)	1	2 (+2)	1 (-)	1 (-)
Fort Casey State Park	1	2 (+1)	2 (+1)	1 (-)
Alternative 3				
Ebey's Landing National Historical Reserve (Rhododendron Park)	1	3 (+2)	2 (+1)	1 (-)
Ebey's Landing State Park (Ebey's Prairie)	1	2 (+1)	1 (-)	- (-1)
Fort Casey State Park	1	2 (+1)	2 (+1)	1 (-)

Note:
[1] Hyphens (-) indicate result equals zero. The difference between the No Action Alternative and action alternative conditions under each scenario are noted in parentheses.

Key:
DNL = day-night average sound level
Lmax = maximum A-weighted sound level

Scenario C under any of the three action alternatives would have a long-term, slightly beneficial impact on recreation at the national historical reserve because each of these alternatives would either result in no changes or decreases in the number of noise events, and would decrease the area of the national historical reserve exposed to average annual noise levels above 65 dB DNL, compared to the No Action Alternative.

Potential Impacts on Recreation Management

The *Final General Management Plan and EIS for Ebey's Landing National Historical Reserve* notes that the "natural soundscape" associated with the national historical reserve consists of "sounds traditionally associated with rural agriculture and natural quiet" (NPS, 2005). The document notes that the majority of impacts to the soundscape of the national historical reserve are the result of outside activities and development, including increased residential development in and near the reserve, vehicle traffic, and aircraft operations at OLF Coupeville that, the document notes, "are short-term, highly variable in their frequency, and range from minor to moderate in their intensity" (NPS, 2005). The document also notes the potential for "significant noise impacts…on a regular, but inconsistent basis" when OLF Coupeville is in use (NPS, 2005). No formal studies have been completed to assess the impact of aircraft noise on the

visitor experience at Ebey's Landing National Historical Reserve. However, it is likely that aircraft noise impacts the perceived experience of visitors who "come with expectations of seeing, hearing, and experiencing phenomena associated with a specific natural or cultural environment" (NPS, 2014).

Neither the Final General Management Plan nor the Long-range Interpretive Plan for the national historical reserve include management measures that specifically address or are in response to the effects of aircraft noise on visitor experience. The Final General Management Plan and Environmental Impact Statement (NPS, 2006) for the national historical reserve notes that, "The NPS [National Park Service] and Reserve staff have no influence over…[OLF Coupeville] practice [operations]".

The Proposed Action would not directly impact implementation of management plans for Ebey's Landing National Historical Reserve. However, aircraft operations at OLF Coupeville and, to a lesser degree, at Ault Field may indirectly impact management of the national historical reserve by degrading overall visitor experience. Based on the above and considering that OLF Coupeville has been in operation and part of the soundscape of the national historical reserve since the reserve's establishment in 1978 and often supporting higher numbers of operations, Alternatives 1, Scenarios A and B; Alternative 2, Scenarios A and B; and Alternative 3, Scenarios A and B would have a long-term, moderate indirect impact on management of Ebey's Landing National Historical Reserve as a result of the potential increase in the numbers of noise events over 65 dB DNL to degrade visitor experience. Scenario C under Alternatives 1, 2, and 3 would have no impact on management of the national historical reserve because these alternatives would not increase the numbers of noise events over 65 dB DNL compared to the No Action Alternative.

C. Pacific Northwest National Scenic Trail

Potential Impacts on Recreation

The recreational experience of hikers and other travelers on the Pacific Northwest National Scenic Trail on Whidbey Island would continue to be affected on an intermittent basis during aircraft operations at Ault Field or OLF Coupeville. Noise impacts on recreation as a result of Prowler, Growler, and other aircraft operations at Ault Field and OLF Coupeville currently occur along an estimated 10.7 miles of the trail. This impact would occur along a section of the trail that passes through developed urban areas that are subject to noise from traffic and other human activities and not in more remote sections of the trail characterized by a greater degree of natural scenery and ambient noise.

Table 4.5-9 shows the length of trail that would fall within the greater than 65 dB DNL noise contours under each alternative and operational scenario. The trail segment that would be impacted under all alternatives and scenarios is the segment that travels through the northern part of Whidbey Island, generally from Deception Pass State Park to the shoreline just north of Joseph Whidbey State Park. Near OLF Coupeville, a segment of the trail along Whidbey Island's western shoreline north of the Keystone Ferry Terminal also would be within the noise contours under the three alternatives with Scenarios A or B. Both segments of the trail would be within the greater than 65 dB DNL noise contours under the No Action Alternative. Under Scenario C, under which 80 percent of FCLPs would be conducted at Ault Field, no segments of the trail would be within the greater than 65 dB DNL noise contours for OLF Coupeville. Therefore, any of the three alternatives with Scenario C would result in a slight benefit on recreation on this segment of the trail, compared to conditions under the No Action Alternative.

As shown in the table, each alternative with Scenarios A or B would impact a longer segment of the trail than the segment impacted under the No Action Alternative (12.7 miles), while each alternative with

Scenario C would impact slightly less of the trail. Scenario A would impact the longest segment of the trail; however, the difference between the alternatives with the most impact (Scenario A under Alternatives 1, 2, and 3) and the alternatives with the least impact (Scenario C under Alternatives 1, 2, and 3) would only be approximately 0.7 mile.

Table 4.5-9 Length of the Pacific Northwest National Scenic Trail Encompassed by the Greater than 65 dB DNL Noise Contours under the Proposed Action (Miles)

Alternative	*Scenario A*	*Scenario B*	*Scenario C*
Alternative 1	13.0	13.0	12.4
Alternative 2	13.0	12.9	12.3
Alternative 3	13.0	13.0	12.3

The Proposed Action would impact hiking along approximately 1 percent of the 1,200-mile Pacific Northwest National Scenic Trail and would not significantly increase the length of trail impacted, compared to the No Action Alternative. As noted, this segment of the trail travels through urban areas, and hikers in this area are exposed to multiple sources of technological noise. Therefore, the Proposed Action would have a long-term, intermittent, minor impact on recreational use of the trail, regardless of alternative or scenario selected.

Potential Impacts on Recreation Management

As noted in Section 3.5, the U.S. Forest Service is preparing a comprehensive plan to guide management of the Pacific Northwest National Scenic Trail corridor. The comprehensive plan will establish a corridor route and define standards and guidelines for management of the corridor (USDA Forest Service, n.d.). These standards and guidelines will address the need to protect the trail experience, among other planning considerations (USDA Forest Service, 2015). While technological noise from outside sources is intrinsically part of the trail experience in urban areas of Whidbey Island, the change in noise exposure along the trail as a result of the Proposed Action would affect the trail experience. The potential impacts of the Proposed Action cannot be assessed against the comprehensive plan for the Pacific Northwest National Scenic Trail at this time, but based on the discussion above, the Proposed Action would have long-term, minor indirect impacts on the trail when aircraft are operating in the area, as a result of the changes in the length of trail exposed to average annual noise levels above 65 dB DNL compared to the No Action Alternative. The Proposed Action would have no direct impacts on the trail corridor or public access to the trail.

D. State Parks and Recreation Areas

Potential Impacts on Recreation

Table 4.5-10 shows the average number of noise events above 65 dB DNL by alternative and scenario, compared to conditions under the No Action Alternative. In general, impacts on recreation on the parks near Ault Field would be increased under all alternatives and scenarios; impacts on parks closer to OLF Coupeville would be decreased under Scenarios A and B and increased under Scenario C, because of the proposed distribution of FCLPs. As shown in the table, Scenario A under each alternative would increase the number of noise events at Deception Pass State Park, Dugualla State Park, and Fort Casey State Park by one to two daytime events per hour, resulting in long-term, intermittent, minor direct impacts on recreation at these parks when aircraft are operating in the area. Scenarios B and C generally would result in long-term, moderate direct impacts on recreation as a result of the larger increases in noise

events. Scenario C would result in greater impacts on Dugualla State Park, with the number of daytime noise events per hour estimated to increase from six to 10 noise events. Fort Casey State Park would be less impacted than the two state parks at the northern end of Whidbey Island. Regardless of alternative or scenario chosen, the number of daytime noise events per hour at this park would not increase or would increase only by one event.

Table 4.5-10 Number of Events per Hour of Outdoor Speech Interference for Representative Points of Interest at State Parks (Average Year)

Point of Interest	*No Action Alternative Conditions*	*Scenario A*	*Scenario B*	*Scenario C*
	Annual Average Outdoor Daily DNL Daytime Events per Hour (NA65 L_{max})			
Alternative 1				
Deception Pass State Park	6	7 (+1)	8 (+2)	8 (+2)
Dugualla State Park	6	8 (+2)	9 (+3)	10 (+4)
Fort Casey State Park	1	3 (+2)	2 (+1)	1 (-)
Alternative 2				
Deception Pass State Park	6	7 (+1)	8 (+2)	8 (+2)
Dugualla State Park	6	8 (+2)	9 (+3)	10 (+4)
Fort Casey State Park	1	2 (+1)	2 (+1)	1 (-)
Alternative 3				
Deception Pass State Park	6	7 (+1)	8 (+2)	8 (+2)
Dugualla State Park	6	8 (+2)	9 (+3)	10 (+4)
Fort Casey State Park	1	2 (+1)	2 (+1)	1 (-)

Note:
[1] Hyphens (-) indicate result equals zero. The difference between the No Action Alternative and action alternative conditions under each scenario are noted in parentheses.

Key:
DNL = day-night average sound level
Lmax = maximum A-weighted sound level

Potential impacts on recreation at James Island State Park were assessed based on overall changes in the extent of the greater than 65 dB DNL noise contours under each alternative and scenario. Regardless of the alternative or operational scenario selected, a portion of James Island State Park—which would be outside the greater than 65 dB DNL noise contours under the No Action Alternative—would be encompassed by the 65 to less than 70 dB DNL contour range. As shown on Figures 4.2-1, 4.2-8, and 4.2-18, the contours in the vicinity of James Island State Park are narrow, occurring primarily along the departure and arrival tracks from and to the northeast of Ault Field. Therefore, under each alternative and scenario, the 65 to less than 70 dB DNL contour range primarily would encompass the eastern shoreline of James Island, and overall differences in noise exposure under each alternative and scenario would be imperceptible to most recreational users. Each of the alternatives and scenarios would result in long-term, intermittent, moderate impacts on recreation at James Island State Park when aircraft are operating in the area, as a result of the additional areas that would be exposed to average noise levels between 65 and 70 dB DNL compared to the No Action Alternative.

Potential Impacts on Recreation Management

The Proposed Action would not directly affect any parklands. Therefore, the ability of the Washington State Parks and Recreation Commission to implement the Centennial 2013 Plan would not directly be impacted. However, aircraft noise may impact visitor experience, particularly for those visitors who come to the parks with the expectation of seeing, hearing, and experiencing phenomena associated with a specific natural or cultural environment as described above. Based on the previous section, Scenario A of Alternatives 1, 2, and 3 would result in long-term, minor indirect impacts on recreation management at Deception Pass and Dugualla state parks when aircraft are operating in the area. Alternative 1, Scenarios B and C; Alternative 2, Scenarios B and C; and Alternative 3, Scenarios B and C would result in long-term, moderate indirect impacts on recreation management on Deception Pass and Dugualla state parks because of the estimated greater impact to the visitor experience as a result of aircraft noise. Long-term, indirect impacts on recreation management at Fort Casey State Park would be minor under all alternatives and operational scenarios for the reasons described in the previous section. Long-term, indirect impacts on recreation management on James Island State Park under all alternatives and scenarios would be moderate because the Proposed Action would result in this park being partially encompassed by the 65 to less than 70 dB DNL noise contours.

Based on the above, no significant impacts on recreational use or recreation management at Deception Pass, Dugualla, Fort Casey, or James Island state parks would occur as a result of the Proposed Action.

E. County and Municipal Parks and Recreation Areas

Potential Impacts on Recreation

Impacts on visitor experience at county and municipal parks and recreation areas would be similar to those impacts described above and would vary based on personal factors as well as factors such as the proximity of a park to Ault Field or OLF Coupeville, the setting of a particular park, and the recreational activities in which visitors are engaged. Visitor experience at parks in urban settings may be less affected because of the variety of existing sights and noises associated with urban environments.

Potential impacts on county and municipal parks and recreation areas in the study area are assessed based on the noise contour range encompassing the largest area of the park, for all parks wholly or partially included in the greater than 65 dB DNL noise contours. Tables 4.5-11 and 4.5-12 show the noise contour range that encompasses the largest area of each park/recreation area under each alternative and operational scenario. The tables compare each alternative and scenario to projected conditions under the No Action Alternative at each park. Under each scenario and alternative, the difference in the amount of land at each park included in a particular DNL contour range compared to the No Action Alternative is indicated by a plus (+) or minus (-) sign in parentheses (i.e., more or less land would be included in the DNL contour range than the land included under the No Action Alternative). A hyphen indicates that a park or recreation area would not be encompassed by the greater than 65 dB DNL contours under a particular alternative and operational scenario.

As noted at the beginning of this section, recreational users' experience of, and reaction to, noise varies depending on a number of factors. The general comparison below provides a method of comparing the alternatives and scenarios and their relative noise effects on recreation while acknowledging the subjective nature of potential impacts to the user experience.

As shown in Table 4.5-11, the county parks that would be most affected by increased noise exposure under the Proposed Action include Driftwood Park and Rhododendron Park in Island County and Ika

Island and the Skagit Wildlife Area at Goat Island and the Skagit Bay estuary. The potential impacts on recreation in these areas would be the same, regardless of alternative selected. Noise exposure at each of these areas would increase by at least one DNL contour range (i.e., the contour range encompassing the majority of the park/recreation area would increase from the 65 to less than 70 dB DNL contour range to the 70 to less than 75 dB DNL contour range, or from the 70 to less than 75 dB DNL contour range to the greater than 75 dB DNL contour range). Under each alternative, Driftwood Park would be the most affected, with noise exposure increasing from the 65 to less than 70 dB DNL contour range under the No Action Alternative to the greater than 75 dB DNL contour range under Scenarios A and B. Impacts on this park under Scenarios A and B would be long-term and significant. Under Scenario C, noise exposure at this park would increase to the 70 to less than 75 dB DNL contour range. Impacts on Driftwood Park under Scenario C and on the other parks listed above under all alternatives and scenarios would be long term and moderate as a result of the increase in noise exposure when aircraft operate in the area, compared to the No Action Alternative.

Table 4.5-11 dB DNL Contour Range at County Parks and Recreation Areas under each Alternative and Operational Scenario

County Park or Recreation Area	*No Action Alternative Conditions*	*Scenario A*	*Scenario B*	*Scenario C*
	dB DNL Contour Range			
Alternative 1				
Clover Valley (Island)	>75	>75 (negl.)	>75 (negl.)	>75 (negl.)
Moran Beach (Island)	>75	>75 (negl.)	>75 (negl.)	>75 (negl.)
Driftwood Park (Island)	65-70	>75 (+)	>75 (+)	70-75 (+)
Crockett Blockhouse (Island)	70-75	70-75 (negl.)	70-75 (negl.)	65-70 (-)
Rhododendron Park (Island)	70-75	>75 (+)	>75 (+)	>75 (+)
Patmore Pit (Island)	>75	>75 (negl.)	>75 (negl.)	>75 (negl.)
Recreational trails between Keystone Spit and Hill Road (Island)	65-70	- (-)	- (-)	- (-)
Ika Island (Skagit)	70-75	>75 (+)	>75 (+)	>75 (+)
Skagit Wildlife Area (Goat Island)	65-70	70-75 (+)	70-75 (+)	70-75 (+)
Skagit Wildlife Area (Fir Island Farms Reserve)	65-70	65-70 (+)	65-70 (+)	65-70 (+)
Skagit Wildlife Area (Skagit Bay Estuary)	65-70	70-75 (+)	70-75 (+)	70-75 (+)
Alternative 2				
Clover Valley (Island)	>75	>75 (negl.)	>75 (negl.)	>75 (negl.)
Moran Beach (Island)	>75	>75 (negl.)	>75 (negl.)	>75 (negl.)
Driftwood Park (Island)	65-70	>75 (+)	>75 (+)	70-75 (+)
Crockett Blockhouse (Island)	70-75	70-75 (negl.)	70-75 (negl.)	65-70 (-)
Rhododendron Park (Island)	70-75	>75 (+)	>75 (+)	>75 (+)
Patmore Pit (Island)	>75	>75 (negl.)	>75 (negl.)	>75 (negl.)
Recreational trails between Keystone Spit and Hill Road (Island)	65-70	- (-)	- (-)	- (-)
Ika Island (Skagit)	70-75	>75 (+)	>75 (+)	>75 (+)
Skagit Wildlife Area (Goat Island)	65-70	70-75 (+)	70-75 (+)	70-75 (+)

Table 4.5-11 dB DNL Contour Range at County Parks and Recreation Areas under each Alternative and Operational Scenario

County Park or Recreation Area	*No Action Alternative Conditions*	*Scenario A*	*Scenario B*	*Scenario C*
	dB DNL Contour Range			
Skagit Wildlife Area (Fir Island Farms Reserve)	65-70	65-70 (+)	65-70 (+)	65-70 (+)
Skagit Wildlife Area (Skagit Bay Estuary)	65-70	70-75 (+)	70-75 (+)	70-75 (+)
Alternative 3				
Clover Valley (Island)	>75	>75 (negl.)	>75 (negl.)	>75 (negl.)
Moran Beach (Island)	>75	>75 (negl.)	>75 (negl.)	>75 (negl.)
Driftwood Park (Island)	65-70	>75 (+)	>75 (+)	70-75 (+)
Crockett Blockhouse (Island)	70-75	70-75 (negl.)	70-75 (negl.)	65-70 (-)
Rhododendron Park (Island)	70-75	>75 (+)	>75 (+)	>75 (+)
Patmore Pit (Island)	>75	>75 (negl.)	>75 (negl.)	>75 (negl.)
Recreational trails between Keystone Spit and Hill Road (Island)	65-70	- (-)	- (-)	- (-)
Ika Island (Skagit)	70-75	>75 (+)	>75 (+)	>75 (+)
Skagit Wildlife Area (Goat Island)	65-70	70-75 (+)	70-75 (+)	70-75 (+)
Skagit Wildlife Area (Fir Island Farms Reserve)	65-70	65-70 (+)	65-70 (+)	65-70 (+)
Skagit Wildlife Area (Skagit Bay Estuary)	65-70	70-75 (+)	70-75 (+)	70-75 (+)

Key:
DNL = day-night average sound level
Lmax = maximum A-weighted sound level

Contour ranges:
65 – 70 dB DNL
70 – 75 dB DNL
>75 dB DNL
(+) – The area included in the DNL contour range would increase compared to the No Action Alternative, or the DNL contour range encompassing the majority of the park or recreational area would increase.
(-) – The area included in the DNL contour range would decrease compared to the No Action Alternative, or the DNL contour range encompassing the majority of the park or recreational area would decrease.
(negl.) – Negligible change in the area included in the DNL contour range compared to the No Action Alternative.
Hyphen [-] – Area is outside of the greater than 65 dB DNL contours.

The area exposed to high noise levels at the Skagit Wildlife Area, Fir Island Farms Reserve, also would increase under each alternative and scenario. However, Fir Island Farms Reserve would remain within the same noise contour range (the 65 to less than 70 dB DNL contour range) under the Proposed Action, compared to the No Action Alternative. All alternatives and scenarios would have long-term, intermittent, minor impacts on the Fir Island Farms Reserve. All alternatives and scenarios would have long-term, beneficial impacts on the recreational trails between Keystone Spit and Hill Road in Island County, which would no longer be located within the greater than 65 dB DNL noise contours.

While some parks, such as Clover Valley, Moran Beach, and Patmore Pit in Island County, would remain in the greater than 75 dB DNL contour range under all or most of the alternatives and scenarios, the differences in the areas exposed to high noise levels between the No Action Alternative and the Proposed Action would be negligible. Therefore, the Proposed Action would have long-term, negligible impacts on these parks. The Proposed Action may have slight long-term beneficial impacts on some parks as a result of a long-term decrease in noise exposure compared to the No Action Alternative. These parks include the Crockett Blockhouse in Island County under Scenario C and the Island County recreational trails as described above.

Potential impacts on municipal parks in the greater than 65 dB DNL noise contours generally would be less than potential impacts on the county parks under all alternatives and scenarios. Scenarios B and C would result in a change in noise exposure that would increase the DNL contour range at one of the parks listed in Table 4.5-12 (i.e., the contour range encompassing the majority of the park/recreation area would increase from the 65 to less than 70 dB DNL contour range to the 70 to less than 75 dB DNL contour range, or from the 70 to less than 75 dB DNL contour range to the greater than 75 dB DNL contour range). Both scenarios would increase noise exposure at the Off-leash Dog Park in Oak Harbor from the 70 to less than 75 dB DNL contour range to the greater than 75 dB DNL contour range, resulting in long-term significant impacts on this park. Scenarios B and C would otherwise result in slight long-term minor or beneficial impacts on municipal recreational areas. Scenario A would result in long-term, intermittent, minor impacts on Parker Road Trail under each alternative and recreational facilities at Coupeville High School under Alternatives 1 and 3, which would remain in the 65 to less than 70 dB DNL contour range. Impacts not described above would be long-term, intermittent, and negligible.

Table 4.5-12 dB DNL Contour Range at Municipal Parks and Recreation Areas under each Alternative and Operational Scenario

Municipal Park or Recreation Area	*No Action Alternative Conditions*	*Scenario A*	*Scenario B*	*Scenario C*
	dB DNL Contour Range			
Alternative 1				
Off-leash Dog Park (Oak Harbor)	70-75	70-75 (negl.)	>75 (+)	>75 (+)
Ridgewood Park (Oak Harbor)	65-70	65-70 (negl.)	65-70 (negl.)	65-70 (negl.)
Parker Road Trail (Coupeville)	65-70	65-70 (+)	65-70 (+)	- (-)
Coupeville High School	-[1]	65-70 (+)	65-70 (+)	- (-)
Alternative 2				
Off-leash Dog Park (Oak Harbor)	70-75	70-75 (negl.)	>75 (+)	>75 (+)
Ridgewood Park (Oak Harbor)	65-70	65-70 (negl.)	65-70 (negl.)	65-70 (negl.)
Parker Road Trail (Coupeville)	65-70	65-70 (+)	65-70 (+)	- (-)
Coupeville High School	-[1]	65-70 (+)	- (-)	- (-)
Alternative 3				
Off-leash Dog Park (Oak Harbor)	70-75	70-75 (negl.)	>75 (+)	>75 (+)
Ridgewood Park (Oak Harbor)	65-70	65-70 (negl.)	65-70 (negl.)	65-70 (negl.)
Parker Road Trail (Coupeville)	65-70	65-70 (+)	65-70 (+)	- (-)
Coupeville High School	-[1]	65-70 (+)	65-70 (+)	- (-)

Note:
[1] Coupeville High School, including the school's outdoor recreational facilities, is located outside of the greater than 65 dB DNL noise contours under the No Action Alternative.

Key:
DNL = day-night average sound level
Lmax = maximum A-weighted sound level

Contour ranges:
65 – 70 dB DNL
70 – 75 dB DNL
>75 dB DNL
(+) – The area included in the DNL contour range would increase compared to the No Action Alternative, or the DNL contour range encompassing the majority of the park or recreational area would increase.
(-) – The area included in the DNL contour range would decrease compared to the No Action Alternative, or the DNL contour range encompassing the majority of the park or recreational area would decrease.
(negl.) – Negligible change in the area included in the DNL contour range compared to the No Action Alternative.
Hyphen [-] – Area is outside of the greater than 65 dB DNL contours.

Potential Impact on Recreation Management

The ability of county and municipal governments to manage parks and recreation areas would not be directly impacted. However, aircraft noise may impact the visitor experience, particularly for those visitors who come to the recreation areas with the expectation of seeing, hearing, and experiencing phenomena associated with a specific natural or cultural environment as described above. Because of the large area included in the NAS Whidbey Island complex AICUZ footprint and the shifts in noise exposure under each of the operational scenarios, the degree of impact under each alternative and

scenario is highly location dependent. Therefore, long-term indirect impacts on recreation management at county and municipal parks as a result of noise exposure when aircraft are operating in the area mirror the impacts discussed above and shown in Tables 4.5-11 and 4.5-12.

The Proposed Action may also result in increased demand for local parks and recreation areas near the places personnel transferring to NAS Whidbey Island would be expected to live. The Proposed Action would result in minor increases in the populations of Island and Skagit Counties (see Section 4.10). The Proposed Action is not expected to impact population in San Juan County. The potential population impacts of the Proposed Action were determined at the county level; therefore, the following discussion of demand for parks and recreation areas also is focused at the county level. Regardless of alternative selected, the Proposed Action would result in population increases of less than 1.5 percent in Island County and less than 0.2 percent in Skagit County compared to No Action conditions (see Table 4.10-2). Personnel and their families residing off station would likely rent or buy homes in different neighborhoods and communities; therefore, individual municipalities are not expected to experience substantial increased demand for recreational facilities in specific locations. In addition, some of the increased demand for recreation would be met by parks and recreational facilities on NAS Whidbey Island.

The *Island County Comprehensive Plan* assesses recreational needs through geographic analysis, information provided by county residents, and observations by county recreational staff (MIG, Inc., 2011). A geographic analysis was used to determine areas underserved by recreational trails and water-access points. Needs for other types of recreational facilities, including boat launches, dog parks, camp sites, specialty trails, and designated hunting lands, were identified through a county-led public involvement process and through observations of recreational facility use. Therefore, a quantitative analysis of the potential increase in demand for Island County recreational facilities resulting from the Proposed Action is not possible. However, the projected increase in county population under each alternative would be small: 0.81 percent of Island County's 2013 population (117,641 people) under Alternative 1, 1.41 percent under Alternative 2, and 0.82 percent under Alternative 3. Regardless of the alternative selected, this increase would result in minor impacts from use of recreation areas in Island County as a result of increased demand.

Table 4.5-13 compares the estimated existing (2013) demand for parks and recreation areas in Skagit County to the estimated demand under each action alternative. As shown in the table, the Proposed Action, regardless of alternative selected, would not add significantly to existing demand or deficits in the county's parks and recreation areas. The Proposed Action would create demand for an additional 1 acre (under Alternative 1) to 3 acres (under Alternative 2) of regional parkland, which would add to the existing county deficit for regional parks. The Proposed Action would not create additional deficits in any other parks or recreation areas as a result of increased demand. While the Proposed Action may result in additional demand for open space, the county has an estimated surplus of open space, which would not change under the Proposed Action. Therefore, the Proposed Action, regardless of alternative selected, would not result in significant impacts on recreation in Skagit County as a result of increased demand.

Table 4.5-13 Potential Changes to Recreational Levels of Service in Skagit County as a result of the Proposed Action

Skagit County Levels of Service (LOS) Standard for Recreation Facilities (2010)[1]		*Skagit County Estimated 2013 Demand and Deficit*[2] *(Acres)*	*Estimated Skagit County Demand (Acres) under the Proposed Action, by Alternative*[3]		
Park Type	*LOS Standard (acres/1,000 people)*		*Alternative 1*	*Alternative 2*	*Alternative 3*
Regional Park	11.93/1,000	1,403 (861)	1,404	1,406	1,405
Community Park	1.12/1,000	132 (83)	132	132	132
Neighborhood Park	0.19/1,000	22 (20)	22	22	22
Open Space / Undeveloped	10.41/1,000	1,225 (-345)	1,226	1,226	1,226

Source: Skagit County Parks and Recreation, 2013

Notes:
1 LOS standards for Skagit County are based on an aggregate LOS including LOS measures for Snohomish, Spokane, and Whatcom Counties.
2 Estimated deficit based on the county's 2013 population of 117,641 people, compared to the 2010 park inventory acreages provided in Skagit County Parks and Recreation 2013. Park deficits in acres are shown in parentheses.
3 Based on Skagit County's 2013 population of 117,641 people and the estimated population increase under each alternative (see Section 4.10).

Land Use Conclusion

Table 4.5-14 provides a summary of potential impacts on land use and recreation under each action alternative.

Table 4.5-14 Summary of Impacts on Land Use and Recreation, All Action Alternatives

Alternative	*Summary of Impacts*
1A	**Land Use:** • No impact to on-station land use • No impact to regional land use • Proposed Action is consistent with on-station land use controls • An increase of 19 percent of land, and consequently an increase in people, within the greater than 65 dB DNL contours. This change may impact off-station land use controls.
	Recreation and Wilderness: • Long-term, intermittent, moderate impact on water-based recreation at the San Juan Islands National Monument. Long-term, minor indirect impacts on management of the national monument for recreation. • Long-term, intermittent, moderate impacts on Ebey's Landing National Historical Reserve. • Long-term, intermittent, minor impact on the Pacific Northwest National Scenic Trail. • Long-term, intermittent, minor impacts on Deception Pass State Park, Dugualla State Park, and Fort Casey State Park. Long-term, intermittent, moderate impacts on James Island State Park. • Long-term significant impacts on Driftwood Park. Long-term, intermittent, moderate impacts on Rhododendron Park, Ika Island, the Skagit Wildlife Area at Goat Island, and the Skagit Bay Estuary. Impacts on other county and municipal parks would be long term and minor or negligible. • No significant impacts from use of recreation areas in Island or Skagit Counties as a result of increased demand. • No impacts to Congressionally designated wilderness areas or BLM-owned lands with wilderness characteristics.

Table 4.5-14 Summary of Impacts on Land Use and Recreation, All Action Alternatives

Alternative	*Summary of Impacts*
1B	**Land Use:** • No impact to on-station land use • No impact to regional land use • Proposed Action is consistent with on-station land use controls • An increase of 19 percent of land, and consequently an increase in people, within the greater than 65 dB DNL contours. This change may impact off-station land use controls.
	Recreation and Wilderness: • Long-term, intermittent, moderate impact on water-based recreation at the San Juan Islands National Monument. Long-term, minor indirect impacts on management of the national monument for recreation. • Long-term, intermittent, moderate impacts on Ebey's Landing National Historical Reserve. • Long-term, intermittent, minor impact on the Pacific Northwest National Scenic Trail. • Long-term, intermittent, moderate impacts on Deception Pass State Park, Dugualla State Park, and James Island State Park. Long-term, intermittent, moderate impacts on recreation, and long-term, minor impacts on recreation management at Fort Casey State Park. • Long-term significant impacts on Driftwood Park and the Oak Harbor Off-leash Dog Park. Long-term, intermittent, moderate impacts on Rhododendron Park, Ika Island, the Skagit Wildlife Area at Goat Island, and the Skagit Bay Estuary. Long-term, slightly beneficial impacts on the Island County recreational trails. Impacts on other county and municipal parks would be long term and minor or negligible. • No significant impacts from use of recreation areas in Island or Skagit Counties as a result of increased demand. • No impacts to Congressionally designated wilderness areas or BLM-owned lands with wilderness characteristics.
1C	**Land Use:** • No impact to on-station land use • No impact to regional land use • Proposed Action is consistent with on-station land use controls • An increase of 15 percent of land, and consequently an increase in people, within the greater than 65 dB DNL contours. This change may impact off-station land use controls.
	Recreation and Wilderness: • Long-term, intermittent, moderate impact on water-based recreation at the San Juan Islands National Monument. Long-term, minor indirect impacts on management of the national monument for recreation. • Long-term, slightly beneficial impact on recreation at Ebey's Landing National Historical Reserve. No impact on management of the national historical reserve for recreation. • Long-term, intermittent, minor impact on the Pacific Northwest National Scenic Trail. • Long-term, intermittent, moderate impacts on Deception Pass State Park, Dugualla State Park, and James Island State Park. Long-term, intermittent, moderate impacts on recreation, and long-term, minor impacts on recreation management at Fort Casey State Park. • Long-term, significant impacts at the Oak Harbor Off-leash Dog Park. Long-term, intermittent, moderate impacts on Driftwood Park, Rhododendron Park, Ika Island, the Skagit Wildlife Area at Goat Island, and the Skagit Bay Estuary. Long-term, slightly beneficial impacts on the Island County recreational trails and the Crockett Blockhouse. Impacts on other county and municipal parks would be long term and minor or negligible. • No significant impacts from use of recreation areas in Island or Skagit Counties as a result of increased demand.

Table 4.5-14 Summary of Impacts on Land Use and Recreation, All Action Alternatives

Alternative	*Summary of Impacts*
	• No impacts to Congressionally designated wilderness areas or BLM-owned lands with wilderness characteristics.
2A	**Land Use:** • No impact to on-station land use • No impact to regional land use • Proposed Action is consistent with on-station land use controls • An increase of 19 percent of land, and consequently an increase in people, within the greater than 65 dB DNL contours. This change may impact off-station land use controls.
	Recreation and Wilderness: • Long-term, intermittent, moderate impact on water-based recreation at the San Juan Islands National Monument. Long-term, minor indirect impacts on management of the national monument for recreation. • Long-term, intermittent, moderate impacts on Ebey's Landing National Historical Reserve. • Long-term, intermittent, minor impact on the Pacific Northwest National Scenic Trail. • Long-term, intermittent, minor impacts on Deception Pass State Park, Dugualla State Park, and Fort Casey State Park. Long-term, intermittent, moderate impacts on James Island State Park. • Long-term, significant impacts on Driftwood Park. Long-term, intermittent, moderate impacts on Rhododendron Park, Ika Island, the Skagit Wildlife Area at Goat Island, and the Skagit Bay Estuary. Impacts on other county and municipal parks would be long term and minor or negligible. • No significant impacts from use of recreation areas in Island or Skagit Counties as a result of increased demand. • No impacts to Congressionally designated wilderness areas or BLM-owned lands with wilderness characteristics.
2B	**Land Use:** • No impact to on-station land use • No impact to regional land use • Proposed Action is consistent with on-station land use controls • An increase of 18 percent of land, and consequently an increase in people, within the greater than 65 dB DNL contours. This change may impact off-station land use controls.
	Recreation and Wilderness: • Long-term, intermittent, moderate impact on water-based recreation at the San Juan Islands National Monument. Long-term, minor indirect impacts on management of the national monument for recreation. • Long-term, intermittent, moderate impacts on Ebey's Landing National Historical Reserve. • Long-term, intermittent, minor impact on the Pacific Northwest National Scenic Trail. • Long-term, intermittent moderate impacts on Deception Pass State Park, Dugualla State Park, and James Island State Park. Long-term, intermittent, moderate impacts on recreation and long-term, minor impacts on recreation management at Fort Casey State Park. • Long-term significant impacts on Driftwood Park and the Oak Harbor Off-leash Dog Park. Long-term, intermittent, moderate impacts on Rhododendron Park, Ika Island, the Skagit Wildlife Area at Goat Island, and the Skagit Bay Estuary. Long-term, slightly beneficial impacts on the Island County recreational trails. Impacts on other county and municipal parks would be long term and minor or negligible. • No significant impacts from use of recreation areas in Island or Skagit Counties as a result of increased demand. • No impacts to Congressionally designated wilderness areas or BLM-owned lands with wilderness characteristics.

Table 4.5-14 Summary of Impacts on Land Use and Recreation, All Action Alternatives

Alternative	*Summary of Impacts*
2C	**Land Use:** • No impact to on-station land use • No impact to regional land use • Proposed Action is consistent with on-station land use controls • An increase of 14 percent of land, and consequently an increase in people, within the greater than 65 dB DNL contours. This change may impact off-station land use controls.
	Recreation and Wilderness: • Long-term, intermittent, moderate impact on water-based recreation at the San Juan Islands National Monument. Long-term, minor indirect impacts on management of the national monument for recreation. • Long-term, slightly beneficial impact on recreation at Ebey's Landing National Historical Reserve. No impact on management of the national historical reserve for recreation. • Long-term, intermittent, minor impact on the Pacific Northwest National Scenic Trail. • Long-term, intermittent, moderate impacts on Deception Pass State Park, Dugualla State Park, and James Island State Park. Long-term, intermittent, moderate impacts on recreation and long-term, minor impacts on recreation management at Fort Casey State Park. • Long-term, significant impacts at the Oak Harbor Off-leash Dog Park. Long-term, intermittent, moderate impacts on Driftwood Park, Rhododendron Park, Ika Island, the Skagit Wildlife Area at Goat Island, and the Skagit Bay Estuary. Long-term, slightly beneficial impacts on the Island County recreational trails and the Crockett Blockhouse. Impacts on other county and municipal parks would be long term and minor or negligible. • No significant impacts from use of recreation areas in Island or Skagit Counties as a result of increased demand. • No impacts to Congressionally designated wilderness areas or BLM-owned lands with wilderness characteristics.
3A	**Land Use:** • No impact to on-station land use • No impact to regional land use • Proposed Action is consistent with on-station land use controls • An increase of 19 percent of land, and consequently an increase in people, within the greater than 65 dB DNL contours. This change may impact off-station land use controls.
	Recreation and Wilderness: • Long-term, intermittent, moderate impact on water-based recreation at the San Juan Islands National Monument. Long-term, minor indirect impacts on management of the national monument for recreation. • Long-term, intermittent, moderate impacts on Ebey's Landing National Historical Reserve. • Long-term, intermittent, minor impact on the Pacific Northwest National Scenic Trail. • Long-term, intermittent, minor impacts on Deception Pass State Park, Dugualla State Park, and Fort Casey State Park. Long-term, intermittent, moderate impacts on James Island State Park. • Long-term significant impacts on Driftwood Park. Long-term, intermittent, moderate impacts on Rhododendron Park, Ika Island, the Skagit Wildlife Area at Goat Island, and the Skagit Bay Estuary. Impacts on other county and municipal parks would be long term and minor or negligible. • No significant impacts from use of recreation areas in Island or Skagit Counties as a result of increased demand. • No impacts to Congressionally designated wilderness areas or BLM-owned lands with wilderness characteristics.

Table 4.5-14 Summary of Impacts on Land Use and Recreation, All Action Alternatives

Alternative	*Summary of Impacts*
3B	**Land Use:** • No impact to on-station land use • No impact to regional land use • Proposed Action is consistent with on-station land use controls • An increase of 18 percent of land, and consequently an increase in people, within the greater than 65 dB DNL contours. This change may impact off-station land use controls.
	Recreation and Wilderness: • Long-term, intermittent, moderate impact on water-based recreation at the San Juan Islands National Monument. Long-term, minor indirect impacts on management of the national monument for recreation. • Long-term, intermittent, moderate impacts on Ebey's Landing National Historical Reserve. • Long-term, intermittent, minor impact on the Pacific Northwest National Scenic Trail. • Long-term, intermittent, moderate impacts on Deception Pass State Park, Dugualla State Park, and James Island State Park. Long-term, intermittent, moderate impacts on recreation and long-term, minor impacts on recreation management at Fort Casey State Park. • Long-term significant impacts on Driftwood Park and the Oak Harbor Off-leash Dog Park. Long-term, intermittent, moderate impacts on Rhododendron Park, Ika Island, the Skagit Wildlife Area at Goat Island, and the Skagit Bay Estuary. Long-term, slightly beneficial impacts on the Island County recreational trails. Impacts on other county and municipal parks would be long term and minor or negligible. • No significant impacts from use of recreation areas in Island or Skagit Counties as a result of increased demand. • No impacts to Congressionally designated wilderness areas or BLM-owned lands with wilderness characteristics.
3C	**Land Use:** • No impact to on-station land use • No impact to regional land use • Proposed Action is consistent with on-station land use controls • An increase of 14 percent of land, and consequently an increase in people, within the greater-than-65 dB DNL contours. This change may impact off-station land use controls.
	Recreation and Wilderness: • Long-term, intermittent, moderate impact on water-based recreation at the San Juan Islands National Monument. Long-term, minor indirect impacts on management of the national monument for recreatio • Long-term, slightly beneficial impact on recreation at Ebey's Landing National Historical Reserve. No impact on management of the national historical reserve for recreation. • Long-term, intermittent, minor impact on the Pacific Northwest National Scenic Trail. • Long-term, intermittent, moderate impacts on Deception Pass State Park, Dugualla State Park, and James Island State Park. Long-term, intermittent, moderate impacts on recreation and long-term, minor impacts on recreation management at Fort Casey State Park. • Long-term, significant impacts at the Oak Harbor Off-leash Dog Park. Long-term, intermittent, moderate impacts on Driftwood Park, Rhododendron Park, Ika Island, the Skagit Wildlife Area at Goat Island, and the Skagit Bay Estuary. Long-term, slightly beneficial impacts on the Island County recreational trails, the Crockett Blockhouse, Parker Road Trail, and Coupeville High School. Impacts on other county and municipal parks would be long term and minor or negligible. • No significant impacts from use of recreation areas in Island or Skagit Counties as a result of increased demand. • No impacts to Congressionally designated wilderness areas or BLM-owned lands with wilderness characteristics.

Table 4.5-14 Summary of Impacts on Land Use and Recreation, All Action Alternatives

Alternative	*Summary of Impacts*

Key:
DNL = day-night average sound level
Lmax = maximum A-weighted sound level

In summary, implementation of the action alternatives, average and high-tempo FCLP years, at the NAS Whidbey Island complex would not result in any impact to on-station land use. Construction proposed under the action alternatives would not result in direct or indirect impacts to regional land uses because all construction would be located entirely within the NAS Whidbey Island complex. The minor increase in personnel associated with the Proposed Action would result in no significant impact to regional land use.

The Proposed Action is consistent with on-station land use controls. Regarding off-station land use controls, the increase in size of the DNL noise contours associated with the Proposed Action during an average operating year would result in an increase in land area and people within the greater than 65 DNL noise contours. Off-station land use controls may be insufficient and may require update in light of new DNL contours and new APZs (at OLF Coupeville, only).

Land use compatibility surrounding the NAS Whidbey Island complex would be impacted under each action alternative. The acreage of land within the projected greater than 65 dB DNL noise contours would increase by 14 percent to 19 percent during an average operating year. Incompatible land use (i.e., residential land) within the DNL noise contours would increase under all action alternatives and scenarios, during average operating years.

During a high-tempo FCLP year, the Proposed Action would result in a slightly larger increase in land, and therefore people, within the DNL noise contours relative to an average year. The acreage of land within the projected greater than 65 dB DNL noise contours would increase by 14 percent to 20 percent during a high-tempo FCLP year, relative to the No Action year. Incompatible land use (i.e., residential land) within the DNL noise contours would increase under all action alternatives and scenarios during high-tempo FCLP years. Furthermore, off-station land use controls should consider the temporary impacts of the high-tempo year or designate as an area to monitor.

Land within the conceptual APZs at OLF Coupeville would increase under each action alternative. If warranted, the APZs could be updated by completing an AICUZ update and coordinating with local communities to provide appropriate new land use recommendations as necessary. The Navy would continue to work with Island County, Skagit County, the City of Oak Harbor, and the Town of Coupeville as necessary to plan for compatible land use development within current and proposed APZs under any alternative selected for implementation.

Overall, implementation of the Proposed Action at NAS Whidbey Island would result in localized significant impacts to recreation at one county park, Driftwood Park, under Scenarios A and B and regardless of alternative selected, as a result of increased noise exposure. There would be localized significant impacts to recreation at the Oak Harbor Off-leash Dog Park under Alternative 1, Scenario C, as a result of increased noise exposure. Impacts on other parks and recreational areas would predominantly be long term and minor or moderate at individual parks as a result of increases in the area within the greater than 65 dB DNL noise contours or in the average number of daytime noise

events above 65 dB DNL per hour. Noise impacts would be intermittent over the long term, occurring only when aircraft are operating in the area. It is important to note, however, that the different operational scenarios may result in localized beneficial impacts on individual parks and recreation areas by shifting the majority of Growler operations to either Ault Field or OLF Coupeville. The Proposed Action may result in increased demand for parks and recreation areas as a result of personnel transfers; however, impacts resulting from this demand would be minor.

The Proposed Action would not directly impact management of parks or recreation areas by federal, state, or local agencies or departments but may indirectly affect recreation management as a result of long-term changes in noise exposure that would affect the recreational experiences of visitors when aircraft are operating in the area. No Congressionally designated wilderness areas or BLM-owned lands with wilderness characteristics would be located within the greater than 65 dB DNL contours, regardless of alternative or operational scenario chosen.

4.6 Cultural Resources

This section evaluates the potential impacts of the Proposed Action on cultural resources, including architectural or built resources, archaeological resources, and American Indian resources within the Area of Potential Effect (APE), in accordance with NEPA guidance. Measures developed by the Navy to avoid, minimize, or mitigate impacts on cultural resources were identified as part of evaluating environmental consequences.

In coordination with its NEPA analysis, the Navy also has evaluated the potential to affect cultural resources in compliance with Section 106 of the National Historic Preservation Act (NHPA), including its implementing regulations codified in 36 CFR Part 800 (Table 4.6-1). As the Proposed Action is an undertaking with the potential to affect historic properties, the Navy is required to identify historic properties within the APE, as defined in Section 3.6, and to consider the effects of a Proposed Action on these properties. The effects of the Proposed Action on historic properties within the APE were evaluated pursuant to guidance on determining effects under 36 CFR 800.4(d) and 800.5(1). The Navy is consulting with the Washington State Historic Preservation Office (SHPO), the Advisory Council on Historic Preservation (ACHP), American Indian tribes and nations, and consulting parties regarding the potential to affect archaeological and architectural resources that are historic properties.

The analysis in this EIS regarding historic properties applies criteria delineated in ACHP regulations found in 36 CFR Part 800 to assess impacts within the APE (see Section 3.6 for a further discussion of the APE). A project affects a historic property when it alters the characteristics (and integrity) of a historic property that qualify it for inclusion in or eligibility for the National Register. Examples of adverse effects are included in Table 4.6-1. Effects to traditional Native American tribal properties can be determined only through consultation with the affected American Indian tribes and nations. However, ground disturbance to prehistoric archaeological sites and graves has often been cited as an adverse impact.

Cultural Resources

Archaeological Resources
Minimal to no impact will result to known or intact archaeological sites within Ault Field and OLF Coupeville during construction and operation.

No off-station impacts are anticipated because ground disturbance is limited to Ault Field.

The Navy is consulting with the Washington SHPO, American Indian tribes and nations, and consulting parties regarding archaeological resources.

Architectural Resources
Minimal to no direct and indirect impacts are anticipated to occur to on-station historic resources during construction. Minimal indirect impacts are anticipated to occur during operations.

Minimal to no impacts are anticipated to occur during construction to off-station resources because activities are limited to Ault Field. Minimal to moderate indirect impacts are anticipated to occur to off-station historic resources during operation.

The Navy is consulting with the Washington SHPO, American Indian tribes and nations, and consulting parties regarding architectural resources.

Table 4.6-1 Definitions of Effects on Historic Properties

Finding of No Historic Properties Affected (No Effect on Historic Properties)
• 36 CFR 800.4(d)(1) No historic properties affected. If the agency official finds that either there are no historic properties present or there are historic properties present but the undertaking will have no effect upon them as defined in § 800.16(i), the agency official shall provide documentation of this finding, as set forth in 36 CFR 800.11(d), to the SHPO/THPO.
Finding of No Adverse Effect
• 36 CFR 800.4(d)(2) – Historic Properties Affected If the agency official finds that there are historic properties which may be affected by the undertaking, the agency official shall notify all consulting parties, including Indian Tribes and Native Hawaiian organizations, invite their views on the effects and assess adverse effects, if any, in accordance with §800.5. • 36 CFR 800.5(b) – Finding of No Adverse Effect The agency official, in consultation with the SHPO/THPO, may propose a finding of no adverse effect when the undertakings' effects do not meet the criteria of paragraph (a)(1) or the undertaking is modified or conditions are imposed, such as the subsequent review of plans for rehabilitation by the SHPO/THPO...to avoid adverse effects. • 36 CFR 800.5(d)(1) Results of Assessment. No Adverse Effect The agency official shall maintain a record of the finding of no adverse effect and provide information on the finding to the public on request consistent with the confidentiality provisions of 36 CFR 800.11(c).
Finding of Adverse Effect
• 36 CFR 800.5(a)(1) - Criteria of Adverse Effect An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, setting, design, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or cumulative.
Examples of Adverse Effect
• 36 CFR 800.5(a)(2) – Examples of Adverse Effects Adverse effects on historic properties include but are not limited to: o physical destruction of or damage to all or part of the property o alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access that is not consistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR Part 68) and applicable guidelines o removal of the property from its historic location o change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance o introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features o neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian Tribe or Native Hawaiian organization o transfer, lease, or sale of property out of federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.

Source: Protection of Historic Properties, 36 CFR Part 800

Key:

CFR = Code of Federal Regulations

SHPO = State Historic Preservation Office

THPO = Tribal Historic Preservation Office

Analysis of potential impacts to historic properties (i.e., a cultural resource that is listed on or eligible for listing on the National Register of Historic Places [NRHP]) considers both direct and indirect effects. Direct effects may be the result of physically altering, damaging, or destroying all or part of a resource, or neglecting the property to the extent that it deteriorates or is destroyed. Indirect impacts are those that may occur as a result of the completed project altering characteristics of the surrounding environment through the introduction of visual or audible elements that are out of character for the period the property represents. An example of an indirect effect is increased vehicular or pedestrian traffic in the vicinity of the property.

The Navy has initiated consultation with the Washington SHPO, the ACHP, eight federally recognized American Indian tribes and nations, and several consulting parties to identify the APE for the Proposed Action, to determine the NRHP eligibility of cultural resources within the APE, to determine the effects of the alternatives for future development on historic properties, and to develop measures as necessary to mitigate any adverse effects of future development on historic properties. Figure 3.6-1 shows the APE for the NAS Whidbey Island complex.

As noted in Section 3.6.2.4, consultation was initiated in October 2014 with the SHPO and the following organizations:

- ACHP
- Town of Coupeville
- Citizens of Ebey's Reserve
- Trust Board of Ebey's Landing National Historical Reserve
- Island County Commissioners
- Island County Historical Society
- National Park Service
- City of Oak Harbor
- PBY Naval Air Museum
- Seattle Pacific University (Camp Casey)
- Washington State Parks Northwest Region Office.

The Navy sent a second letter to the SHPO and consulting parties on June 30, 2016. The letter provided information on the APE, as well as enclosures identifying the NAS Whidbey Island site locations, Ault Field, the Seaplane Base, and the 2005 and 2013 Navy Noise Study DNL contours. The SHPO acknowledged receipt of the second letter in a response dated July 6, 2016 (please note in Appendix C, the letter shows a date of July 7, 2016. The letter, however, was transmitted to the Navy via email on July 6, 2016).

Letters also were sent to the Mayor of Port Townsend, the Island County Commissioner for District 3, and the Jefferson County Historical Society on July 12, 2016. These parties are additions to the original mailing list for which letters were sent in October 2014. The letters requested comments on the proposed definition of the APE and included information on the proposed definition of the APE, as well as enclosures identifying the NAS Whidbey Island site locations, Ault Field, the Seaplane Base, and the 2005 and 2013 Navy Noise Study DNL contours.

In response to the request for comments on the proposed definition of the APE, letters and emails were received from the following parties:

- ACHP – The ACHP responded on August 10, 2016, indicating its comments regarding the proposed definition of the APE.
- City of Port Townsend – Between July 5, 2016, and August 6, 2016, the City of Port Townsend provided correspondence via email regarding the proposed definition of the APE and the noise study. The City of Port Townsend also provided a letter to the Navy on August 16, 2016, indicating its comments on the proposed definition of the APE and the use of the noise data.
- Citizens of Ebey's Reserve – In a letter dated July 22, 2016, the Citizens of Ebey's Reserve requested information regarding the comment deadline, an explanation of expanded operations at Ault Field and OLF Coupeville, and additional input on the noise modeling study and files from the 2005 environmental assessment.
- Town of Coupeville – In a letter dated August 25, 2016, the Town of Coupeville provided comments on the use of particular noise data and the potential to impact historic resources, agriculture, and businesses.

The Navy sent a third letter to the consulting parties on August 31, 2016. This letter was intended to provide clarification of the Section 106 process. It included three enclosures, consisting of information on the process and strategy for the 106 process for the continuation and increase of Growler operations, a flow chart, and a copy of the implementing regulations for Section 106 codified at 36 CFR 800.

Responses were received on September 1, 2016, from the Citizens of Ebey's Reserve concerning the noise data; on September 28, 2016, from the Trust Board of Ebey's Landing National Historical Reserve, indicating their comments on the proposed definition of the APE and the use of noise data; and on September 30, 2016, from the Washington SHPO regarding the Section 106 process, the proposed definition of the APE, the development of a public involvement plan, tribal consultation, the distinction of NEPA and the NHPA, the determination of effect, and the potential for drafting resolution documentation.

Documentation of the correspondence with the SHPO and other consulting parties is provided in Appendix C.

Consultation is being conducted with these organizations because they have demonstrated interests in the effects of the undertaking on historic properties. Consultation also is being conducted with individuals interested in this undertaking.

As mentioned previously, the Navy also has initiated Section 106 consultation with the eight federally recognized American Indian tribes and nations regarding the Proposed Action and its effects on historic properties at NAS Whidbey Island.

The following American Indian tribes and nations were contacted on October 10, 2014:

- Jamestown S'Klallam Tribe
- Lummi Tribe of the Lummi Reservation
- Samish Indian Nation
- Stillaguamish Tribe of Indians

- Suquamish Indian Tribe of the Port Madison Reservation
- Swinomish Indian Tribal Community
- Tulalip Tribes of Washington
- Upper Skagit Indian Tribe

The Samish Indian Nation responded on October 28, 2014, indicating that the Samish Indian Nation was not interested in consulting for cultural resources at this time.

The Navy sent a second letter to the American Indian tribes and nations on June 30, 2016. The letter provided information on the proposed definition of the APE, as well as enclosures identifying the NAS Whidbey Island site locations, Ault Field, the Seaplane Base, and the 2005 and 2013 Navy Noise Study DNL contours.

The Jamestown S'Klallam Tribe responded on August 1, 2016, indicating that with respect to cultural resources, the tribe has no comments regarding the EA-18G flight operations. They requested future consultation on projects regarding renovation, demolition, and construction of facilities at NAS Whidbey Island.

The Navy sent a third letter to the American Indian tribes and nations on August 31, 2016. This letter was intended to provide clarification of the Section 106 process. It included three enclosures, consisting of information on the process and strategy for the 106 process for the continuation and increase of Growler operations, a flow chart, and a copy of the implementing regulations for Section 106 codified at 36 CFR 800.

No other responses have been received to date from the other American Indian tribes and nations.

Documentation of the correspondence with the American Indian tribes and nations is provided in Appendix C.

4.6.1 Cultural Resources, No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur, and there would be no potential impacts to cultural resources. No additional Growler aircraft would be in operation, and no associated facilities would be constructed. Therefore, no new ground disturbance within the APE would occur, and no new sources of noise, vibration, or visual change would be introduced. Therefore, no new significant or adverse effects to cultural resources would occur with implementation of the No Action Alternative.

4.6.2 Cultural Resources, Alternatives 1 through 3

4.6.2.1 Cultural Resources, Potential Impacts

New construction would occur to support additional Growler aircraft and personnel, including expansion of hangar space, new armament storage, separate mobile maintenance facility storage, and expanded parking areas. As part of the planned construction activities, no existing structures would be demolished (see Figure 3.6-2, Facilities Map).

Archaeological Resources

The Navy is evaluating potential impacts of the Proposed Action to archaeological resources under NEPA and under Section 106 of the NHPA.

As part of the Proposed Action, some ground disturbance would occur within the north end of the flight line at Ault Field (i.e., that portion of the APE being evaluated for direct effects), which is within a previously disturbed area at NAS Whidbey Island that is not considered sensitive for archaeological resources. The area was historically used as farmland and was heavily tilled and disturbed prior to the arrival of the Navy in Clover Valley. Although proximate to the north end of the flight line, another potential location of ground disturbance includes the area along Taxiway Juliet. As it also is located within Ault Field, this taxiway is within an area not considered sensitive for archaeological resources. As discussed in Section 3.6.2.1, Ault Field was filled with gravel to allow for the stabilization of the airfield during construction of the current runways in 1957. The potential for intact archaeological resources, therefore, would be low.

Construction of armament storage, hangar facilities, storage areas, and expanded parking areas would include 6.6 acres for Alternatives 1 and 3 and 7.4 acres for Alternative 2. Upon completion of construction, each of the three alternatives would have a total of 2.1 acres of impervious surfaces. Some ground disturbance may occur in areas in which new impervious surfaces would be constructed either for temporary or permanent use; however, since construction is limited to areas within Ault Field, such ground disturbance would be in areas considered to have low sensitivity for archaeological resources. Additional details regarding the facility and infrastructure requirements are included in Section 2.3.3.3. The amount of acreage needed for each of the three alternatives does not vary between scenarios.

No ground disturbance is anticipated to occur in other locations of the APE during construction (i.e., off station), so no impacts would be anticipated to occur to archaeological resources. No ground disturbance that would have the potential to impact archaeological resources would occur during operation.

Therefore, the Navy anticipates minimal to no impact to known or intact archaeological sites within Ault Field during the construction and operation of the Proposed Action; the Navy also anticipates that no historic properties that are archaeological resources would be affected. The Navy is consulting with the Washington SHPO, the ACHP, American Indian tribes and nations, and consulting parties regarding archaeological resources and historic properties.

In case of an inadvertent discovery of Native American human remains and/or archaeological resources during construction, the Navy would follow the current Inadvertent Discovery Plan and would 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.

Architectural Resources

The Navy is evaluating the potential impacts of the Proposed Action to historic architectural resources under NEPA and under Section 106 of the NHPA.

Construction Impacts

With regard to historic architectural resources, the Proposed Action under each of the three alternatives would require the expansion of Building 2737 (Hangar 12) and repairs to inactive taxiways for aircraft parking also would be needed. For Alternative 2, a two-squadron hangar would be constructed on the flight line adjacent to Building 386 (Hangar 5) (see Section 2.4.2.3, Facility and Infrastructure Requirements, for additional details). As mentioned previously, during the construction of armament storage, hangar facilities, storage areas, and expanded parking areas, 6.6 acres would be needed for

Alternatives 1 and 3 and 7.4 acres for Alternative 2. Once constructed, facilities and parking would add up to approximately 2.1 acres of new impervious surface at the installation for all alternatives. This amount would not vary between scenarios within each of the three alternatives.

Building 2737 (Hangar 12) would be expanded as part of each alternative to accommodate additional training squadron aircraft. This building was originally built in August 1989 in order to accommodate the EA-6B Prowler squadron (Thursby, Bryant, and Ross et al. 2013; Thursby, Bryant, and Meiser, et al. 2013). Building 2737 (Hangar 12) is not associated with a significant event in the Cold War era. It was used for maintaining tactical bomber and electronic warfare aircraft while they were off of aircraft carrier rotation (Hampton and Burkett, 2010). While this resource is important to the operations at Ault Field, due to its date of construction and lack of significance for the Cold War, it is not considered historically significant and has been determined not eligible for listing in the NRHP. The Washington SHPO has concurred with this finding. As such, under NEPA, the potential impact to this building would not be significant and would be determined no historic properties affected for Section 106 purposes.

Building 386 (Hangar 5), which is eligible for the NRHP, is proximate to the planned location of the construction activities and would be adjacent to the two-squadron hangar under Alternative 2. This building is eligible for the NRHP due to its unique architectural qualities (i.e., Criterion C). The physical structure of the building would not be altered during construction; however, increased dust, personnel, and machinery may temporarily impact the setting. Under NEPA, the potential impacts to Building 386 (Hangar 5) would be minimal; no adverse effect would be anticipated to occur under Section 106.

Other changes to architectural resources during construction include repairs to inactive taxiways, located to the south of Runway 7-25 (Facility 201247), which was built in the early 1950s. Similar to Building 2737 (Hangar 12), while the taxiways are important to the operations at NAS Whidbey Island, they too are not considered historically significant. While the taxiways (in conjunction with the runway) represent the post-World War II conversion of Ault Field to a Master Jet Station, the Navy has determined the taxiways to be not eligible for the NRHP and has received concurrence from the SHPO (Hampton and Burkett, 2010). Therefore, the potential impacts to these taxiways would not be considered significant under NEPA; furthermore, since the taxiways are not historic properties, no effect would be anticipated to occur per Section 106 of the NHPA.

Indirect impacts, including visual and auditory impacts, also may be experienced within other areas of Ault Field or within immediate proximity to it during construction. As noted in Section 3.6.2.2, Architectural Resources, 17 buildings that are eligible for the NRHP are located within Ault Field. However, 10 of these buildings are anticipated for demolition; the Navy has worked with the SHPO to coordinate these efforts. Due to their final disposition, these 10 buildings are not considered in this analysis. Among these structures anticipated for demolition is Building 112 (Hangar 1); this structure currently is positioned within an area of Ault Field in which construction would occur. As noted in Section 3.6.2.2, while Building 112 (Hangar 1) is eligible for the NRHP, it is planned for demolition for which the SHPO has been consulted. The demolition is scheduled prior to the initiation of the Proposed Action. For this reason, no impacts (either direct or indirect) are anticipated to occur during construction (or operation) to Building 112 (Hangar 1). Therefore, under NEPA, no impact would occur to Building 112 (Hangar 1); since it would no longer be extant, no effect would be anticipated to occur under Section 106.

Indirect effects associated with construction activities and equipment may create temporary, minor impacts due to the presence of increased dust, personnel, and machinery. The impacts for each of the

alternatives would be anticipated to be similar in nature. These impacts would lessen as the distance between the construction areas and the resource would increase. As these impacts are temporary in nature, they are not anticipated to impact the NRHP eligibility of properties within Ault Field or within proximate areas. Therefore, under NEPA, no impacts or minor, temporary impacts would be anticipated to occur to architectural resources within and proximate to Ault Field; under Section 106, no adverse effect would be anticipated to occur. The Navy is consulting with the Washington SHPO, the ACHP, American Indian tribes and nations, and consulting parties regarding architectural resources and historic properties.

Operational Impacts

After construction is complete, indirect impacts within the APE may occur. These types of impacts would be associated with changes to the visual and auditory setting of historic architectural resources.

Visual Impacts Associated with Operational Impacts

Limited visual changes would occur as a result of the changes resulting from the construction associated with each alternative to Building 2737 (Hangar 12), new armament storage, separate maintenance facilities, and expanded parking areas within Ault Field. These changes would be consistent with the operational mission of NAS Whidbey Island, in which activities associated with flight operations and maintenance would occur on a daily basis. As physical changes to the existing buildings and facilities resulting from construction under all of the alternatives would be limited to Ault Field, no impacts are anticipated to occur at OLF Coupeville or to other areas within the APE. Within Ault Field, the resulting facilities would be consistent with the airfield operations and would not be anticipated to alter the overall feel of the setting.

Visual impacts, however, would be anticipated to occur due to the increased flight operations at Ault Field and OLF Coupeville. As noted in Section 2.4.2.2, annual airfield operations would increase from approximately 12 percent to 38 percent, and an additional 35 or 36 Growler aircraft would be included in the community at Ault Field. Aircraft would be visible in views both to and from historic resources during take-off and landing and while in flight and would be most noticeable for those resources located in proximity to the airfields; the aircraft would be less visible as the distance from the airfields increases.

For those resources immediately adjacent to the Ault Field and OLF Coupeville airfields, minimal impacts would be anticipated to occur because the existing visual setting in part is designed to accommodate aircraft operations. The visual presence of aircraft during take-off and landing associated with the Proposed Action generally would be consistent with the visual setting of historic resources located within Ault Field and OLF Coupeville.

During take-off and landing, the aircraft also would be within the viewshed of historic resources outside of Ault Field and OLF Coupeville, including Ebey's Landing National Historical Reserve, a part of which is used to interpret the history of Fort Casey and Fort Ebey, which protected the entrance to Puget Sound. In this manner, the military is part of the cultural landscape of Ebey's Landing National Reserve, as the military presence began in the late nineteenth century and helped shape the subsequent settlement patterns. Two of the major themes of its original comprehensive plan were Major American Wars and Political and Military Affairs (NPS, 1980). As part of these themes, Fort Ebey, Fort Casey, and OLF Coupeville were listed as historic resources representative of the themes (NPS, 1980).

The presence of the aircraft would create a temporary change in the visual setting, during the ascent and descent of the aircraft, when captured within the viewshed of a historic architectural resource. As

indicated in Section 1.4, the total number of flight operations within Ault Field and OLF Coupeville would increase by approximately 46 to 47 percent (depending on the alternative and scenario selected) over the No Action Alternative. For each alternative and scenario, the total airfield operations, and therefore the opportunity for a visual presence of aircraft, would be similar to historic operations between the late 1970s and the 1990s.

While the types of impacts under each of the alternatives would be similar, the difference between the three scenarios may influence the frequency of visual impacts resulting from takeoff and landing. Under Scenario C of each alternative, approximately 80 percent of the FCLPs would be conducted at Ault Field. As compared to the other scenarios, visual impacts may be experienced with greater frequency under this scenario to those resources in proximity to Ault Field. Likewise, under Scenario A of each alternative, approximately 80 percent of the FCLPs would be conducted at OLF Coupeville. As compared to the other scenarios, impacts may be experienced with greater frequency under this scenario to those resources in proximity to OLF Coupeville. During a high-tempo FCLP year in which pre-deployment training for multiple units may overlap, FCLP activity would be expected to increase over average conditions, and thus the frequency of aircraft also may increase over the course of the year.

In addition to the frequency of aircraft takeoffs and landings, distance also may influence the extent to which a visual impact is experienced. For instance, Crockett Prairie and Smith Prairie are adjacent to OLF Coupeville. Views of the ascent and descent of aircraft may be apparent from historic architectural resources within these locations to a greater extent than from those located further from the airfield. Existing vegetation may provide a slight buffer for those resources located within Crockett Prairie, which largely is characterized as woodlands. Due to the temporary nature of the activities, the frequency of operations, the variable distance of historic architectural resources from the airfields, and the consistent military presence within the reserve, minimal to moderate impacts would be anticipated to occur to the visual setting of these resources.

Aircraft also would be in view of historic architectural resources while in flight. Unlike take-off and landing procedures, the vertical distance to the ground surface is greater, and the duration is longer. As part of the Proposed Action, FCLPs would occur at Ault Field, as well as at OLF Coupeville. As noted in Section 1.4, a typical FCLP evolution lasts approximately 45 minutes, with three to five aircraft participating in the training. While each of the three scenarios generally would include the same total number of FCLPs, impacts occurring as a result of in-flight aircraft may be experienced more frequently under Scenario C of each alternative within proximity to Ault Field and under Scenario A of each alternative within proximity to OLF Coupeville. During a high-tempo FCLP year, which may occur under all of the action alternatives, the frequency of aircraft in flight also may increase.

In some situations, aircraft are noticed after being heard rather than from visual cues. Aircraft would be most visible temporarily in open areas. In addition, due to the vertical distance between the aircraft and the ground surface, the aircraft would appear as small objects within the sky; some also may leave contrails (i.e., condensation trails), which readily evaporate, albeit marking their previous presence. The in-flight time would be limited to a specific range and would not create a permanent effect on the visual setting of these resources. For these reasons, only minimal to moderate impacts would be anticipated to occur to the visual setting of historic resources located within the APE.

Lighting associated with the aircraft and operations at NAS Whidbey Island facilities also may be visible to and from historic resources located in proximity to the airfield. In general, the lighting would be similar to that already present and thereby would create a minimal change in the visual setting to

resources located within the APE. Lighting within the airfields generally consists of runway, carrier deck, landing system, arrest gear, wave-off, taxiway, and obstruction lighting. A rotating beacon also is present; when the airfield is open, the beacon is operated continuously from sunset to sunrise, and during daylight hours when the airfield is in instrument flight rules (Navy, 2005a). As noted in Section 2.2, lighting for FCLPs often is low and is described as ambient in order to simulate air carrier landings. Some additional lighting may be needed for the expansion of Building 2737 (Hangar 12), the parking facilities, and the armament storage under all alternatives and the two-squadron hangar under Alternative 2.

Considered together, under NEPA, only minor to moderate visual impacts would be anticipated to occur; under Section 106, no adverse effect would be anticipated to occur to historic properties located within the APE. The Navy is consulting with the Washington SHPO, the ACHP, American Indian tribes and nations, and consulting parties regarding architectural resources and historic properties.

Noise and Vibration Associated with Operational Impacts

In addition to those structures within the immediate vicinity of construction areas, architectural resources within NAS Whidbey Island (i.e., Ault Field and OLF Coupeville) and within its immediate surroundings that may be impacted by noise and vibration from the operation of the additional Growler aircraft were considered under both NEPA and Section 106 of the NHPA.

A review of existing literature indicates that buildings may be impacted by noise and vibration, noting that some may be more impacted due to their individual ages, conditions, and location. In 1977, the National Research Council developed guidelines for evaluating potential impacts from noise in the context of Proposed Actions. These guidelines are often cited in subsequent studies as the basis for evaluating impacts even today. Per the guidelines, sounds lasting more than 1 second with a peak unweighted sound level greater than or equal to 130 dB (in the 1 hertz (Hz) to 1,000 Hz frequency range) are considered potentially damaging to structural components (NRC/NAS, 1977). This is a conservative standard for assessing all sound (NRC/NAS, 1977).

According to Hubbard (1982), a person inside a structure can sense noise through vibration of the primary components of a building, such as the floors, walls, and windows; by the rattling of objects; or by damage to secondary structures, such as plaster and tiles and/or furnishings. For these types of impacts, a structural vibration velocity of 2 inches per second (inches/sec)[18] (50 millimeters per second) has commonly been used as the safe limit, such that vibrations above this value would have an adverse environmental impact (NRC/NAS, 1977). Other scholars suggest that limits between 0.006 and 0.08 inches/sec for continuous vibration would not be expected to cause damage; however, when continuous vibrations exceed 0.4 or 0.6 inches/sec, architectural and structural damages may occur (Nam et al., 2013). While standards are used to determine acceptable levels of noise and vibration, Konan and Schuring (1983) also note that the individual condition of the building/structure must be accounted for when determining potential impacts, as historic buildings may be in varying states of deterioration. For example, older structures may have previous settlement, and movements within the structure may have redistributed the loads and stresses into unknown patterns. If this occurs, damage

[18] Velocity of vibration is measured in peak units, such as inches per second or millimeters per second. The structural vibration velocity measurement refers to the velocity with which a measured point moves about from a rest position.

from new vibration would be difficult to discern from previous or existing damage (Konan and Schuring, 1983).

With respect to the potential for aircraft noise and vibration effects on the structural components of historic structures, a number of studies have been conducted. Hershey, Kevala, and Burns (1975), for instance, examined the potential for breakage at five historic sites within the Concorde flightpath. They evaluated the impact on structural features, including windows, brick chimneys, stone bridge, and plaster ceilings. They determined that the potential for breakage was generally less than 0.001 for a year of overflights. The noise appendix (Appendix A, Section A.3.11), citing this study, relays that no damage was found to a 1795 plantation house from routine departures of the Concorde aircraft 1,500 feet from the runway centerline of a major airport; the Concorde study concluded that noise exposure levels for compatible land use also should be protective of conventional historic and archaeological sites (Wyle, 2016).

As shown by these studies, recommended noise/vibration limits tend to vary within the published literature. "At one end of the range is a conservative limit of 0.10 inches/sec except in the case of ancient ruins where 0.08 inches/sec is considered appropriate by some. At the other end of the range, some would consider 0.50 inches/sec or even 2.0 inches/sec to be appropriate" (Wilson, Ihrig & Associates, Inc., ICF International, and Simpson, Gumpertz & Heger, Inc., 2012). Within the U.S., no established standard is present for determining a precise threshold for historic buildings due to the individual characteristics of buildings and the types of vibration that may occur. Therefore, research indicates a need to evaluate potential vibration impacts on a case-by-case basis or to, at minimum, account for the particular existing conditions. An analysis was performed for NAS Whidbey Island in 2012; the standards used for this analysis, therefore, are used for the assessment of noise/vibration for the three alternatives.

The 2012 study at NAS Whidbey Island suggested that sounds lasting more than 1 second above a sound level of 130 C-weighted sound level (dBC) are potentially damaging to structural components (Kester and Czech, 2012). The study evaluated Prowlers and Growlers at NAS Whidbey Island and noted that none of the conditions evaluated for the study caused C-weighted[19] sound levels to exceed 130 dBC (i.e., the stated threshold) and that structural damage would not be expected. The authors, however, did note that takeoff conditions had C-weighted sound levels greater than 110 dBC for both types of aircraft, creating an environment conducive to noise-induced vibration (Kester and Czech, 2012).

In order to reach these conclusions, the authors of the 2012 study included a brief examination of low-frequency noise associated with Growler overflights at 1,000 feet AGL in takeoff, cruise, and approach configuration/power conditions (Kester and Czech, 2012). The study found that takeoff condition has the highest potential for damage, with unweighted sound levels of approximately 105 dB and an overall C-weighted sound level of 115 dBC. The Growler would exhibit C-weighted sound levels up to 101 dBC when cruising and 109 dBC (gear down) at approach. As these levels are much less than the 130 dB criterion, damage would not be expected for typical residential structures in the vicinity of NAS Whidbey

[19] The C-weighting scale was originally designed to be the best predictor of the ear's sensitivity to tones at high noise levels. The C-weighting scale is quite flat, and it therefore includes much more of the low-frequency range of sounds than the A and B scales (Witt 2013). C-weighting is often used to assess the potential for structural vibration, rattle, or damage (Kester and Czech 2012).

Island. The authors further concluded that additional analysis would be needed to more accurately determine the potential for building rattle/vibration (Kester and Czech, 2012).

No historical data is present for facilities at NAS Whidbey Island to suggest the presence of noise and vibration-related effects on historic architectural resources. Due to the continuous operation of aircraft for more than 70 years, including periods of significantly higher levels of operation, and a history of little or no damage at this location, minimal to no impacts are anticipated to occur either with the operation of the additional Growler aircraft or with the results of the new construction and expansion of facilities associated with the alternatives.

Within the APE, historic architectural resources also are located within Ebey's Landing National Historical Reserve, a NPS-managed unit and a historic property. The NPS, in studies at other units, has accounted for the potential disruption to visitor experiences caused by overflights (Bell et. al., 2010). In a 2010 study, the authors noted that by the time most aircraft are noted, they are high enough that they yield less noise than those that are used to specifically tour NPS units. However, the authors also noted that this may result in more noise when the unit is located either near a commercial airport or a military airfield (Bell et al., 2010).

Noise and vibration across Ebey's Landing National Historical Reserve would likely vary due to the location of specific historic architectural resources in relation to the airfields. No significant physical damage as a result of aircraft operations has been reported to these structures as a result of continuous operation of aircraft for over 70 years. The potential noise and vibration would temporarily impact the setting of historic architectural resources by causing a distraction to the setting and potential annoyance to visitors or within the reserve. However, due to the temporary nature of the impacts and the location outside the airfield, minimal to moderate auditory and/or vibratory impacts would be anticipated. These impacts would not significantly detract from the historic nature or character of the individual historic architectural resources or the overall Ebey's Landing National Historical Reserve due to the consistent military presence since its founding as a reserve and the importance of the military as one of its interpretative themes. Under Scenario A of each alternative, approximately 80 percent of the FCLPs would be conducted at OLF Coupeville. As compared to the other scenarios, impacts may be experienced with greater frequency under this scenario to Ebey's Landing National Historical Reserve due to its proximity to OLF Coupeville. In addition, during a high-tempo FCLP year in which pre-deployment training for multiple units may overlap, FCLP activity would be expected to increase over average conditions. As the frequency of aircraft would increase during a high-tempo FCLP year, the potential for noise and vibration impacts also may increase.

Therefore, under NEPA, only minor to moderate, temporary impacts would be anticipated to occur; under Section 106, no adverse effect would occur. The Navy is consulting with the Washington SHPO, the ACHP, American Indian tribes and nations, and consulting parties regarding architectural resources and historic properties.

Native American Resources

The Navy is evaluating the potential impacts of the Proposed Action on Native American resources. In addition, the Navy is consulting with federally recognized American Indian tribes and nations.

Cultural Resources Conclusion

As considered under NEPA, implementation of Alternatives 1 through 3 would result in no significant impacts, direct or indirect, to archaeological, architectural, and American Indian traditional resources.

The Navy anticipates that minimal to no direct impacts would result to known or intact archaeological sites within Ault Field during the construction and operation of the Proposed Action, and no ground disturbance is anticipated to occur at the Seaplane Base and OLF Coupeville. The Navy would follow procedures in its Integrated Cultural Resources Management Plan should any inadvertent discoveries be made during construction activities. There would be no difference in impacts to archaeological resources between scenarios or between average year and high-tempo FCLP year conditions under the action alternatives.

The Navy anticipates that minimal to no direct impacts would result to architectural resources during construction of the Proposed Action. On-station resources, such as Building 2737 (Hangar 12) and the taxiways, may be directly impacted as a result of the expansion of facilities and new structures; because these are not historically significant, the impacts are anticipated to be minor.

Indirect impacts to other historic architectural resources, including visual, auditory, and/or vibratory changes to the setting, also may result from the Proposed Action. These types of impacts may occur in areas proximate to Building 386 (Hangar 5), which is eligible for the NRHP. These impacts are not anticipated to be significant. Minimal to no off-station direct impacts to architectural resources are anticipated during construction because ground disturbance is limited to Ault Field.

During operation, the Navy anticipates that minor to moderate visual, auditory, and/or vibratory impacts would occur to architectural resources. Within NAS Whidbey Island, these impacts are anticipated to be minimal, as the presence of new and/or expanded facilities and operations would be consistent with the airfield setting.

Off-station impacts would be minimal to moderate. The level of impact for off-station resources would largely be dependent upon the distance of the resource from the operations and the frequency of them. Those resources in proximity to Ault Field and OLF Coupeville would experience visual impacts to a greater extent than those that are either screened or are located further from the airfields. Under Scenario C of each alternative, approximately 80 percent of the FCLPs would be conducted at Ault Field. As compared to the other scenarios, impacts may be experienced with greater frequency under this scenario to those resources in proximity to Ault Field. Under Scenario A of each alternative, approximately 80 percent of the FCLPs would be conducted at OLF Coupeville. As compared to the other scenarios, impacts may be experienced with greater frequency under this scenario to those resources in proximity to OLF Coupeville. During a high-tempo FCLP year, training activity would be expected to increase over average conditions, and therefore, the frequency of aircraft and the potential for its associated impacts also may increase.

Under Section 106, no effect to historic properties that are archaeological resources and no adverse effect to historic properties that are architectural resources are anticipated to occur. The Navy is consulting with the Washington SHPO, the ACHP, American Indian tribes and nations, and consulting parties regarding archaeological and architectural resources and historic properties.

4.7 American Indian Traditional Resources

This section evaluates how and to what degree the Proposed Action (described in Chapter 2) could impact traditional resources within the study area as defined in Section 3.7.

As established in Section 3.7, traditional resources are "those natural resources and properties of traditional or customary religious or cultural importance, either on or off Indian lands, retained by or reserved by or for Indian tribes through treaties, statutes, judicial decisions, or EOs, including tribal trust resources." The term "traditional resources" will be used to encompass protected tribal resources.

Potential impacts to American Indian traditional cultural and religious properties, including traditional cultural properties (i.e., historic properties eligible for listing in the NRHP under the NHPA and other tribal resources are evaluated in Section 4.6 (Cultural Resources).

American Indian Traditional Resources

Implementation of any of the action alternatives would not result in significant impacts to American Indian traditional resources.

The Navy has invited government-to-government consultation with potentially affected American Indian tribes and nations to solicit any concerns they may have so that the Navy can more fully consider the extent of any potentially significant impacts to traditional resources. To date, no tribes have requested government-to-government consultation on the Proposed Action.

4.7.1 Approach to Analyses

The evaluation of impacts on traditional resources considers whether: 1) the traditional resource itself is significantly affected (such as significant impacts to fish species or to supporting habitats), or 2) there is a significant change in access to federally secured off-reservation usual and accustomed (U&A) fishing grounds and stations, or access for hunting and gathering on open and unclaimed lands. Impacts may be clearly identified, as when a known traditional resource is directly and significantly affected or access is significantly changed.

4.7.2 No Action Alternative

Under the No Action Alternative, the project would not be constructed, and overall operations would not change from current levels. NAS Whidbey Island, Ault Field, the Seaplane Base, and OLF Coupeville are restricted to authorized personnel, and the Navy would continue to accommodate access by American Indians on a case-by-case basis. The Navy would continue coordination with the Suquamish Tribe for access to the Surface Danger Zone (SDZ) in waters northwest of Ault Field for fishing activities in accordance with the 2013 memorandum of agreement. There would be no change to the Suquamish Tribe's ability to safely access the SDZ. Federally secured off-reservation hunting and gathering rights are not affected because there are no changes to current Navy access requirements to Navy property at Ault Field, the Seaplane Base, and OLF Coupeville for these activities. No Indian lands (reservations) are located within the 65 dBA DNL noise contour areas.

Therefore, under the No Action Alternative, there is no potential to significantly affect American Indian traditional resources because there would be no change to current tribal access and no additional potential to impact traditional resources in the study area.

4.7.3 Alternatives 1, 2, and 3

Under each of the three action alternatives, construction and operational activities are similar. Therefore, the potential impacts to traditional resources would largely be the same. For the purposes of this discussion, no differentiation between alternatives is made.

NAS Whidbey Island, Ault Field, the Seaplane Base, and OLF Coupeville are restricted to authorized personnel, and the Navy would continue to accommodate access by American Indians on a case-by-case basis. The Navy would continue coordination with the Suquamish Tribe to access to the SDZ in waters northwest of Ault Field for fishing activities in accordance with the 2013 memorandum of agreement. There would be no change to the Suquamish Tribe's ability to safely access the SDZ. Federally secured off-reservation hunting and gathering rights are not affected because there are no changes to current Navy access requirements to Navy property at Ault Field, the Seaplane Base, and OLF Coupeville for these activities. No Indian lands (reservations) are located within the 65 dBA DNL noise contour areas.

Terrestrial and Marine Wildlife

Under each of the three action alternatives, no direct impacts are anticipated to occur to terrestrial or marine wildlife during construction or operation. Impacts to specific wildlife species from habitat loss, sensory disturbance, and aircraft operations are discussed in Section 4.8.2.1 for terrestrial wildlife.

Under each of the three alternatives, the Proposed Action would not directly impact marine wildlife (fish and marine mammals) during construction or operation. Impacts to specific marine wildlife from habitat loss, sensory disturbance, and aircraft operations are discussed in Section 4.8.2.2 for marine wildlife.

Water Resources

Under each of the three action alternatives, implementation of the Proposed Action at NAS Whidbey Island would not result in significant impacts to water resources. The Proposed Action would result in up to approximately 2.0 acres of new impervious surface, but impacts to surface waters and marine waters and sediment would be minimized and avoided through implementation of BMPs, low-impact development (LID), and green infrastructure and therefore would not be significant. See Section 4.9 for the discussion of impacts anticipated to occur to water resources.

Climate Change and Greenhouse Gases

Under each of the three action alternatives and scenarios, potential changes in GHG emissions from implementation of the Proposed Action would be similar but greatest under Alternative 2, Scenario A (see Table 4.16-2, NAS Whidbey Island Complex Annual GHG Emissions, Alternative 2). See Section 4.16 for the discussion of climate change and GHG emissions.

Therefore, under Alternatives 1, 2, and 3, there is no potential to significantly affect American Indian traditional resources because there would be no change to current access and no significant impact to traditional resources in the study area.

4.7.4 American Indian Traditional Resources Conclusion

The implementation of the three action alternatives at NAS Whidbey Island would not result in significant impacts to American Indian traditional resources. Construction and operational activities are similar under the three action alternatives, and, therefore, the potential impacts to traditional resources would largely be the same.

The Navy has invited government-to-government consultation with potentially affected American Indian tribes and nations to solicit any concerns they may have so that the Navy can more fully consider the extent of any potentially significant impacts to traditional resources. To date, no tribes have requested or initiated government-to-government consultation on the Proposed Action.

4.8 Biological Resources

This section evaluates effects of the Proposed Action that are reasonably likely to occur on the terrestrial and marine wildlife discussed in Section 3.8, Affected Environment, Biological Resources. The analysis focuses on wildlife or vegetation types that are important to the function of the ecosystem or are protected under federal or state law or statue. The impacts discussed in this section may occur during construction for the Proposed Action and/or during the proposed aircraft operations. The potential impacts on biological resources consist of three general types: habitat loss, sensory (i.e., noise and visual) disturbance, and direct impact to individuals (i.e., wildlife-aircraft collisions [NAS Whidbey Island BASH plan (NAS Whidbey Island, 2012)]).

4.8.1 Biological Resources, No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur and there would be no change to biological resources and therefore no significant impacts to biological resources would occur through implementation of the No Action Alternative.

4.8.2 Biological Resources Potential Impacts, Alternatives 1 through 3

In light of the similarities between Alternatives 1 through 3, they are discussed collectively. Differences in the potential severity of an impact across scenarios are noted where necessary. Under Alternative 1, carrier capabilities would be expanded resulting in a net increase of 35 aircraft. Under Alternative 2, expeditionary and carrier capabilities would be expanded resulting in a net increase of 36 aircraft. Under Alternative 3, expeditionary and carrier capabilities would be expanded resulting in a net increase of 36 aircraft. New construction under Alternatives 1 through 3 would include expanded hangar space and/or new hangars, armament storage, maintenance facilities, and expanded personnel parking areas. Each alternative would result in up to approximately 2 acres of new impervious surface at NAS Whidbey Island. Impacts to biological resources would be similar under all three alternatives.

The biological resources (i.e., habitat and species) present in and around Ault Field and OLF Coupeville are similar. Species at or near Ault Field and OLF Coupeville would be impacted to greater or lesser extents depending on which scenario is selected within a given alternative.

Biological Resources

Minimal habitat loss from construction activities, would not significantly impact terrestrial wildlife and would not impact marine habitat.

Animals in the study area would be not significantly impacted by noise; there would be an increase in noise in the study area but wildlife are already exposed to a high level of long-term aircraft operations and other human-made disturbances and have presumably habituated. Only minor behavioral disturbances are anticipated for marine species.

Large numbers of wildlife inhabiting the study area throughout the year increase the risk of a strike, but with the continued implementation of a BASH plan, the Proposed Action would not significantly impact local wildlife populations.

Species:
No significant impacts from sensory disturbances. Only minor behavioral disturbances are anticipated for marine species, including fish and mammals.

ESA-listed Species:

The Proposed Action may affect, but is not likely to adversely affect, the bull trout, green sturgeon, eulachon, Chinook salmon, Hood Canal summer-run chum, steelhead, bocaccio rockfish, canary rockfish, yelloweye rockfish, Southern Resident killer whale, and humpback whale. The Proposed Action may affect the marbled murrelet, but a final determination of adverse effects is pending consultation with the USFWS.

Under the Proposed Action, the greatest potential for impacts on biological resources would occur during aircraft operations, when noise and collision impacts could occur. Research shows that some animals begin to respond to aircraft noise at as little as 60 dB (Black et al., 1984). Dolbeer et al. (2014) found that most wildlife-aircraft collisions (hereafter referred to as "strikes") occur below an altitude of 3,500 feet. Based on these findings, the Navy defined the study area as all areas where modeled average noise levels under the Proposed Action would be equal to or greater than 60 dB at ground/surface level and all areas where aircraft operations would occur at or below and altitude of 3,500 feet (Figure 3.8-1). Potential noise and wildlife-aircraft impacts are discussed in more detail below.

The biological resources that could be impacted under the Proposed Action are divided into two general categories, terrestrial wildlife and marine wildlife. Impacts on terrestrial wildlife (i.e., general birds, mammals, and reptiles and amphibians) include details on the type of potential impact related to habitat loss effects, sensory disturbance effects, and aircraft-wildlife strike effects. Species protected under the Endangered Species Act (ESA), Migratory Bird Treaty Act (MBTA), Bald and Golden Eagle Protection Act (BGEPA), and Marine Mammal Protection Act (MMPA) are discussed separately.

4.8.2.1 Effects on Terrestrial Wildlife

As a result of the Proposed Action, there are three main effect categories on terrestrial wildlife: habitat loss, sensory disturbance, and wildlife strikes. Each effect is discussed below, along with impacts specific to species groups, including separate discussions of special status species (i.e., those protected under the ESA, MBTA, and BGEPA).

Habitat Loss

Habitat loss will be limited to the construction of proposed facilities under each of the three action alternatives and would occur in developed or previously disturbed areas of Ault Field. No construction is proposed for OLF Coupeville. Under each alternative, proposed construction activities would result in the permanent loss of up to approximately 2 acres of non-native grassland and landscaped vegetation. No loss of any unique or regionally significant vegetation communities would occur. The vegetation that would be cleared has been previously disturbed and occurs in areas with high levels of human activity. Therefore, the previously disturbed areas likely provide only marginal, temporary habitat for species that are adapted to human-modified environments (e.g., raccoons). Wildlife that could occur in these areas are likely common within the study area.

MBTA-protected species may occur within the construction area of Ault Field, and construction activities are not exempt from "take" under the military readiness rule. The construction site provides marginal habitat for MBTA-protected species, and species occurring in construction areas would likely be adapted to human-modified environments. Still, the Navy would conduct surveys for active bird nests within the construction footprint to avoid harming nesting birds or their young during vegetation clearing, grading, or excavation. No changes to feeding, sheltering, or reproduction are anticipated, and the abundance and frequency of migratory birds occurring near the construction site are expected to return to prior levels after construction is completed. Pursuant to the MBTA, no harm to or incidental takes of migratory birds are anticipated.

Therefore, vegetation removal under each of the three action alternatives would have negligible impacts on terrestrial wildlife, including MBTA-protected species, and would not negatively affect habitat use by any wildlife species. These impacts would not be significant.

As described in Section 4.9, there would be no significant impacts on surface water, wetlands, or marine sediments. Therefore, there would be no significant impact on terrestrial wildlife related to water quality.

Sensory Disturbances

Although impacts on wildlife habitat under each of the three action alternatives are limited, an increase in human activity and noise and vibrations associated with equipment use during construction and operation of the proposed facilities could disturb wildlife. Wildlife responses may include displacement or avoidance of affected areas and increased stress.

Wildlife may be directly displaced or avoid areas during construction activities. Terrestrial wildlife that live at or near the proposed construction site are presumed to be habituated to high levels of noise associated with current Ault Field activities and aircraft operations because they continue to be present despite the history of anthropogenic noise in the area. However, construction activities associated with the Proposed Action will introduce new levels of disturbance that may cause wildlife to avoid the area and/or be temporarily displaced.

While difficult to measure in the field, all behavioral responses are accompanied by some form of physiological response, such as increased heart rate or a startle response. A startle is a rapid, primitive reflex characterized by rapid increase in heart rate, shutdown of nonessential functions, and mobilization of glucose reserves. Animals can learn to control the behavioral reactions associated with a startle response and often become habituated to noise (NPS [National Park Service], 1994; Bowles, 1995; Larkin, Pater, and Tazik, 1996). Habituation keeps animals from expending energy and attention on harmless stimuli, but the physiological component might not habituate completely (Bowles, 1995).

The increase in noise during construction would be temporary and negligible compared to the No Action Alternative due to existing noise generated by airfield operations. Therefore, each of the three action alternatives would have minimal, short-term impacts on terrestrial wildlife from sensory disturbances associated with construction of the proposed facilities. These impacts would not be significant.

MBTA-protected species occurring in construction areas would likely be adapted to human-modified environments. The Navy would conduct surveys for active bird nests within the construction footprint to avoid disturbing nesting birds or their young. Temporary behavioral disturbance of non-nesting birds may result from noise, vibrations, or human presence, but these minor changes are not expected to differ appreciably from existing high levels of disturbance near the construction site. As such, no changes to feeding, sheltering, or reproduction are anticipated, and the abundance and frequency of migratory birds occurring near the construction site are expected to return to prior levels after construction is completed. Pursuant to the MBTA, no harm to or incidental takes of migratory birds are anticipated.

Aircraft operations under each of the three action alternatives would produce potential noise and visual disturbances to terrestrial wildlife. Wildlife may respond to both seeing and hearing the aircraft. Similar to construction discussed above, aircraft operations could create stress and result in displacement/avoidance of wildlife from the affected area; however, potential disturbance from aircraft operations would occur over a much larger area than that affected by construction. Aircraft operations may disturb wildlife within the study area.

The following sections focus on potential aircraft disturbances on vertebrate wildlife (i.e., birds, mammals, and reptiles and amphibians) in the study area, including separate discussions of special status species (i.e., those protected under the ESA, MBTA, and BGEPA).

Birds

Bird responses to aircraft disturbances vary by species and may vary by situation (Grubb and Bowerman, 1997; Goudie, 2006). For example, nesting birds or those caring for eggs or young would presumably be more sensitive to disturbances than birds that are not caring for eggs or young. In general, aircraft disturbances are not likely to disrupt major behavior patterns, and impacts are not expected to have an adverse impact at the population level.

This section addresses these impacts in detail for bird groups that potentially occur in the study area.

Waterfowl

Several studies have examined aircraft disturbances on breeding waterfowl. Harlequin ducks (*Histrionicus histrionicus*) had more intense alert responses when noise from military jet overflights exceeded 80 dBA (Goudie and Jones, 2004). The responses included lifting the head up, agitation, flushing, and panic diving. The direct behavioral responses typically lasted less than one minute, but additional behavioral responses such as decreased courtship behavior lasted up to 2 hours after overflights. However, the authors suggested that the responses were unlikely to affect critical behaviors of breeding pairs, such as resting, foraging, and courtship.

In a study of American black ducks (*Anas rubripes*), 25 percent to 30 percent of individuals initially responded to aircraft noise and visual disturbances, but they habituated to the disturbances with repeated exposure (Conomy et al., 1998). Wood ducks (*Aix sponsa*) also responded to initial exposure to aircraft noise and visual disturbances but did not exhibit the same pattern of habituation as American black ducks, demonstrating that responses vary between species.

Breeding waterfowl in the study area would likely respond to aircraft operations under the Proposed Action by exhibiting alert postures, flushing, diving, or disrupting normal activities but would be expected to resume normal activities within a short period after overflights (Goudie and Jones, 2004). The individuals breeding in the area of potential aircraft disturbance are already exposed to a high level of long-term operations activity as well as other human-made disturbances. Thus, most breeding waterfowl have presumably habituated to high levels of aircraft disturbances, and, based on the studies cited above, disturbances of those that may not have habituated would not likely affect critical behaviors. Additionally, there is no evidence to suggest waterfowl would suffer physical injury or hearing loss due to aircraft noise.

The Navy examined Crockett Lake Important Bird Area (IBA) as an indicator of potential aircraft disturbance impacts on breeding waterfowl between the various alternatives and scenarios. Crockett Lake IBA is known to support breeding waterfowl, including Canada geese (*Branta canadensis*), mallards, and gadwalls (*Anas strepera*) (eBird, 2015a). Assuming the Crockett Lake IBA supports higher concentrations of breeding waterfowl than other areas near Ault Field and OLF Coupeville, there would be a greater potential for aircraft disturbance impacts at this location. While potential impacts on breeding waterfowl at Crockett Lake IBA would be similar under Alternatives 1 through 3, the potential for impacts at the IBA would increase with increased aircraft operations at OLF Coupeville, with Scenario A having the highest potential (refer to Table 4.1-5). However, under all scenarios, the Proposed Action is not expected to have significant impacts on breeding waterfowl.

Studies of non-breeding bird responses to aircraft overflights have focused primarily on waterbirds, including waterfowl. On lakes in Switzerland, the number of wintering waterbirds showing stressed behaviors was higher during airplane overflights less than 1,000 feet AGL and helicopter overflights less than 1,500 feet AGL than when these aircraft flew at higher altitudes. The same study showed that birds returned to a relaxed behavior within 5 minutes after overflights (Komenda-Zehnder, Cevallos, and Bruderer, 2003). Seventy-five percent of brant (*Branta bernicla*) and 9 percent of Canada goose flocks, both of which occur in the study area, flew in response to aircraft overflights in Alaska. The greatest response of geese occurred when aircraft flew between 1,000 feet AGL and 2,500 feet AGL (Ward et al., 1999).

Migrating and wintering waterfowl may be disturbed by aircraft flying below 2,500 feet AGL. However, the affected birds would likely return to relaxed states shortly after the disturbance and also may habituate with repeated exposures. Skagit Bay IBA, Deception Pass IBA, Crescent Harbors Marsh IBA, and Penn Cove IBA support large numbers of migrating and wintering waterfowl. Potential impacts on migrating and wintering waterfowl at the IBAs would be similar under Alternatives 1 through 3; however, impacts would vary by scenario. The potential for impacts on Skagit Bay IBA and Deception Pass IBA would increase with increased aircraft operations at Ault Field, with Scenario C having the highest potential for impact (refer to Table 4.1-5). The potential for impact on Penn Cove IBA would increase with increased aircraft operations at OLF Coupeville, with Scenario A having the highest potential for impact (refer to Table 4.1-5). Crescent Harbors IBA is centrally located between Ault Field and OLF Coupeville; therefore, all scenarios may have similar impacts.

Migrating and wintering waterfowl are already exposed to an annual average of 89,000 aircraft operations (year 2021 flight operations; see Table 3.1-1). The IBAs and other parts of the study area provide important wintering and migration habitat in the biological resources study area (refer to Section 3.8). Therefore, migrating and wintering waterfowl in the study area have presumably habituated to high levels of aircraft operations and other human-made disturbances. It is not expected that the Proposed Action would have significant impacts on waterfowl using the study area outside of the breeding season.

Wading Birds

Breeding wading birds within mixed breeding colonies in Florida that were exposed to military jet overflights at 500 feet AGL responded significantly more than those that were not exposed (Black et al., 1984). However, the responses of wading birds were not severe and typically consisted of alert postures (e.g., looking up or changing position), and no birds were observed flushing from their nests. The birds began to look up at 60 dBA to 65 dBA and began to change position at 70 dBA to 75 dBA, but they returned to their original positions within 1 to 2 minutes after the overflight. Chicks responded significantly more often than adults. Overflights did not impact nest attendance, feeding of young, nest success, chick survival, nestling mortality, or nesting chronology (Black et al., 1984).

The Black et al. (1984) research suggests that the wading birds in the study area would react to the aircraft operations but would not respond strongly. Furthermore, the breeding wading birds in the study area are already exposed to a high level of long-term aircraft operations as well as other human-made noises and visual disturbances, and they are presumably habituated to the high levels of disturbances.

Penn Cove IBA and Skagit Bay IBA support known concentrations of breeding wading birds, and there would be a greater potential for aircraft disturbance impacts at this location versus some other areas in the study area. For this reason, the Navy examined Penn Cove IBA and Skagit Bay IBA as an indicator of

potential aircraft disturbance impacts on breeding wading birds between the various alternatives and scenarios. Potential impacts on breeding wading birds at the IBAs would be similar under Alternatives 1 through 3; however, impacts would vary by scenario. The potential for impacts on breeding wading birds at Skagit Bay IBA would increase with increased aircraft operations at Ault Field, with Scenario C having the highest potential for impacts (refer to Table 4.1-5). The potential for impacts on breeding wading birds at Penn Cove IBA would increase with increased aircraft operations at OLF Coupeville, with Scenario A having the highest potential for impacts (refer to Table 4.1-5).

Similar to waterfowl, migrating and wintering wading birds may be disturbed by aircraft but are already exposed to aircraft operations (see previous section). Migrating and wintering wading birds in the study area have presumably habituated to high levels of aircraft operations and other human-made disturbances. Potential impacts on migrating and wintering wading birds at the IBAs would be similar under Alternatives 1 through 3; however, impacts would vary by scenarios, as is detailed in the previous waterfowl section. It is not expected that the Proposed Action would have significant impacts on wading birds using the study area outside of the breeding season.

Seabirds

Studies of aircraft disturbances on nesting colonial seabirds are limited. One study showed that most aircraft disturbances on common murres (*Uria aalge*) breeding in central California occurred during overflights of 1,000 feet above MSL or less (Rojek et al., 2007). Flushing of nesting birds can result in eggs breaking or chicks and/or eggs being exposed to predation or the elements. Noise levels at which disturbances occurred were not documented in the Rojek et al. (2007) study. Burger (1981) found no effects on nesting herring gulls (*Larus argentatus*) during subsonic aircraft overflights with noise levels ranging from 88 to 101 dBA (supersonic overflights are not permitted in the study area).

The Navy used the common murre (Rojek et al., 2007) and herring gull (Burger, 1981) studies as proxies for potential breeding seabird responses to the Proposed Action's operations. The study area includes portions of Deception Pass IBA, which is known to support breeding seabirds, including pigeon guillemots. While Rojek et al. (2007) documented seabird behavioral responses from flyovers at altitudes lower than 1,000 feet AGL, these flights were considered infrequent, and birds were assumed to not be habituated to the flights. Breeding seabirds in the study area are already exposed to a high level of long-term aircraft operations and other human-made disturbances, which suggests they are habituated to the high levels of disturbances.

As Deception Pass is the only IBA in the study area known to support breeding seabirds, there would be a greater potential for aircraft disturbance impacts at this location. For this reason, the Navy examined the Deception Pass IBA as an indicator of potential aircraft disturbance impacts on breeding seabirds between the various alternatives and scenarios. While potential impacts on breeding seabirds at Deception Pass IBA would be similar under Alternatives 1 through 3, the potential for impacts at the IBA would increase with increased aircraft operations at Ault Field, with Scenario C having the highest potential (refer to Table 4.1-5). However, under all scenarios, the Proposed Action is not expected to have significant impacts on breeding seabirds.

Similar to waterfowl, migrating and wintering seabirds may be disturbed by aircraft but are already exposed to aircraft operations (see previous section). Migrating and wintering seabirds in the study area have presumably habituated to high levels of aircraft operations and other human-made disturbances. Potential impacts on migrating and wintering seabirds at the IBAs would be similar under Alternatives 1 through 3; however, impacts would vary by scenarios, as is detailed in the previous section. It is not

expected that the Proposed Action would have significant impacts on seabirds using the study area outside of the breeding season.

Shorebirds

Shorebird responses to aircraft disturbances are limited to one known study on red knots, which is a BCC in the study area. Koolhaas, Dekinga, and Piersma (1993) found that large numbers of red knots were rarely observed on days with aircraft activity during fall migration in Holland. In addition, they reported that a limited amount of habituation to aircraft activity by the species. There is no available research that specifically estimates shorebird response distances to aircraft disturbances. The Skagit Bay, Deception Pass, Crescent Harbors Marsh, and Penn Cove IBAs are key wintering locations for shorebirds (e.g., black oystercatchers). The Skagit Bay IBA is also an important migration stopover spot (refer to "Important Bird Areas" in Section 3.8.2.2 for more information).

Assuming the above-mentioned IBAs support higher concentrations of shorebirds than other parts of the study area, there would be a greater potential for aircraft disturbance impacts at these locations. For this reason, the Navy examined these IBAs as an indicator of potential aircraft disturbance impacts on shorebirds between the various alternatives and scenarios. Potential impacts on shorebirds would be similar under Alternatives 1 through 3; however, impacts would vary by scenario. The potential for aircraft disturbance impacts on Skagit Bay IBA and Deception Pass IBA would increase with increased aircraft operations at Ault Field, with Scenario C having the highest potential for impacts. The potential for impacts on Penn Cove IBA would increase with increased aircraft operations at OLF Coupeville, with Scenario A having the highest potential (refer to Table 4.1-5). Crescent Harbors IBA is centrally located between Ault Field and OLF Coupeville; therefore, all scenarios may have similar impacts. Shorebirds in the study area are already exposed to a high level of long-term aircraft operations and other human-made disturbances, and they are presumably habituated to the high levels of disturbances. Disturbances associated with aircraft operations would not significantly impact breeding raptors in the study area.

Raptors

Responses of raptors to military aircraft overflights have been studied for several species and research indicates that raptors in the study area are not expected to be significantly impacted by and/or may habituate to military aircraft overflights, i.e., the Proposed Action. Nesting behavior of ospreys, an Island County Species of Local Importance, was not significantly affected by military jet overflights with noise levels ranging from 52 dBA to 101 dBA (Trimper and Thomas, 2001). No agitation or startle responses were observed, but young did crouch in the nest. Ospreys appeared to have habituated to frequent jet overflights. Nesting peregrine falcons, which are both state-listed and a BCC, responded infrequently to military jet overflights and rarely exhibited intense reactions (i.e., standing, crouching, flying) in Alaska (Nordemeyer, 1999). Bald eagle responses to military aircraft disturbance have been studied and are discussed below in the "Bald and Golden Eagles" subsection.

Assuming IBAs support higher concentrations of breeding raptors than other areas in the study area, there would be a greater potential for aircraft disturbance impacts at these locations. For this reason, the Navy examined IBAs as an indicator of potential aircraft disturbance impacts on breeding raptors between the various alternatives and scenarios. Potential impacts on breeding raptors would be similar under Alternatives 1 through 3; however, impacts would vary by scenarios. The potential for aircraft disturbance impacts on Skagit Bay IBA and Deception Pass IBA would increase with increased aircraft operations at Ault Field, with Scenario C having the highest potential for impacts. The potential for

impacts on Penn Cove IBA and Crockett Lake IBA would increase with increased aircraft operations at OLF Coupeville, with Scenario A having the highest potential (refer to Table 4.1-5). Crescent Harbors IBA is centrally located between Ault Field and OLF Coupeville; therefore, all scenarios may have similar impacts. Breeding raptors in the study area, including ospreys and peregrine falcons, are already exposed to a high level of long-term aircraft operations and other human-made disturbances, and they are presumably habituated to the high levels of disturbances. Disturbances associated with aircraft operations would not significantly impact breeding raptors in the study area.

Research indicates that wintering and migrating birds could be disturbed by aircraft (Ward et al., 1999; Komenda-Zehnder, Cevallos, and Bruderer, 2003). The Penn Cove and Skagit Bay IBAs are important for wintering and migratory raptors (refer to "Important Bird Areas" in Section 3.8.2.2 for more information). Assuming Penn Cove IBA and Skagit Bay IBA support higher concentrations of wintering and migratory raptors than other locations in the study area, there would be a greater potential for aircraft disturbance impacts at these locations. For this reason, the Navy examined these two IBAs as indicators of potential aircraft disturbance impacts on raptors during non-breeding seasons between the various alternatives and scenarios.

The potential for impacts on wintering and migrating raptors at Skagit Bay IBA would increase with increased aircraft operations at Ault Field, with Scenario C having the highest potential for impacts (refer to Table 4.1-5). Conversely, the potential for impacts on wintering and migrating raptors at Penn Cove IBA would increase with increased aircraft operations at OLF Coupeville, with Scenario A having the highest potential (refer to Table 4.1-5). However, like breeding raptors, migrating and wintering raptors in the study area have presumably habituated to the already high levels of aircraft operations and other human-made disturbances. The Proposed Action is not expected to have significant impacts on raptors using the study area during the migratory and wintering seasons.

Passerines

Research of aircraft disturbance impacts on passerines during any time of year is limited. One study documented a weak correlation between aircraft noise and reduced reproductive success (Hunsaker, 2001). Skagit Bay was designated as an IBA, in part, due to its importance for both breeding and migratory passerines (refer to "Important Bird Areas" in Section 3.8.2.2 for more information). Assuming the Skagit Bay IBA supports higher concentrations of breeding and migratory passerines than other parts of the study area, there would be a greater potential for aircraft disturbance impacts at this location. For this reason, the Navy examined Skagit Bay IBA as an indicator of potential aircraft disturbance impacts on passerines between the various alternatives and scenarios.

Potential impacts on passerines at Skagit Bay IBA would be similar under Alternatives 1 through 3; however impacts would vary by scenario. Impacts at Skagit Bay IBA would increase with increased aircraft operations at Ault Field, with Scenario C having the highest potential for impacts (refer to Table 4.1-5). However, passerines in the study area are already exposed to a high level of long-term military operations and other human-made disturbances, and they are presumably habituated to the high levels of disturbance. The Proposed Action is not expected to have significant impacts on passerines using the study area.

Mammals

Few published studies have examined aircraft disturbances on terrestrial large mammals. Of those available, most focus on ungulates (e.g., deer). Ungulates often move when disturbed, which results in

increased energy expenditure that can affect the individual's health and production (Efroymson et al., 2000). Efroymson et al. (2000) reviewed existing studies of aircraft disturbance on ungulates and estimated the distance thresholds at which adverse effects have been observed. The distance threshold was conservatively estimated at about 1,380 feet AGL. At this altitude, approximately 10 percent of ungulate herds would be expected to exhibit a response to aircraft. Thresholds for responses to sound ranged from 75 dBA to 113 dBA. Efroymson et al. (2000) noted that several species of ungulates have exhibited habituation to aircraft overflights with repeated exposure, including mule deer[20].

Studies of the effects of aircraft noise on small mammals are limited (Efroymson et al., 2000). Sound pressure levels at which adverse effects occurred typically exceeded 100 dBA in small mammals. Small mammal responses included changes in reproduction and physiology as well as decreased survival rates.

Potential impacts on mammals are similar for Alternatives 1 through 3. Potential impacts on mammals would be similar across the scenarios, but the intensity of the impacts would shift between sites. Potential impacts on mammals at OLF Coupeville would increase as aircraft operations increase at OLF Coupeville, with the greatest potential for impacts at OLF Coupeville occurring under Scenario A. Potential impacts on mammals at Ault Field would increase as aircraft operations increase at Ault Field, with the greatest potential for impacts occurring under Scenario C.

Terrestrial mammals inhabiting the study area are already exposed to a high level of long-term aircraft operations (annual average of 89,000 [Table 3.1-1]) and other human-made disturbances, and have presumably habituated to the very high level of noise and visual disturbances, as has been reported for some mammals (i.e., ungulates) in other areas of repeated exposure (Efroymson et al., 2000). Thus, the implementation of the Proposed Action would not significantly affect terrestrial mammals by disturbances from aircraft operations.

Reptiles and Amphibians

Studies regarding reptile and amphibian responses to noise, aircraft noise in particular, are extremely limited. Therefore, the following studies are presented as the best available information even though they may not be directly applicable to Whidbey Island or the Pacific Northwest. Desert tortoises (*Gopherus agassizii*) are the only reptiles for which aircraft disturbance effects have been studied (Bowles et al., 1999; Efroymson et al., 2000). Desert tortoises became motionless in response to being startled but habituated to aircraft noises quickly (Bowles et al., 1999). No significant physiological changes in response to noise were documented. Studies on the effects of land-based vehicle noise on desert reptiles found that sound pressure levels of 95 dBA and 115 dBA could affect hearing (Bondello 1976; Brattstrom and Bondello, 1983; Efroymson et al., 2000). Amphibian responses to aircraft noise have not been studied. However, Brattstrom and Bondello (1983) found that Couch's spadefoot toads (*Scaphiopus couchii*) aroused from dormancy during hot, dry periods and prematurely emerged from burrows in response to motorcycle noise at 95 dBA and higher.

Potential impacts on reptiles and amphibians are similar for Alternatives 1 through 3. Potential impacts on reptiles and amphibians would be similar across the scenarios, but the intensity of impacts would shift between sites. Potential impacts on reptiles and amphibians at OLF Coupeville would increase as aircraft operations increase at OLF Coupeville, with the greatest potential for impacts at OLF Coupeville

[20] Columbian black-tailed deer, which occur in the study area, are a subspecies of mule deer.

occurring under Scenario A. Potential impacts on reptiles and amphibians at Ault Field would increase as aircraft operations increase at Ault Field, with the greatest potential for impacts under Scenario C.

Given that reptiles and amphibians occurring in the study area are already exposed to high levels of noise, they would presumably be habituated to these noise levels, as were desert tortoises in the Bowles et al. (1999) study. Therefore, the aircraft noise impacts on reptiles and amphibians under each of the three alternatives would not differ significantly from those under the No Action Alternative.

Federal Threatened and Endangered Terrestrial Species

With the exception of the marbled murrelet, the Proposed Action would have no effect on ESA-listed terrestrial wildlife species discussed in Chapter 3. As such, the following section focuses on the marbled murrelet. Effects to bull trout, covered under terrestrial species in Chapter 3, are discussed with marine fisheries in Section 4.8.2.2, below.

Marbled Murrelet

In general, impacts on marbled murrelet would be similar to those are described under the Seabirds section, above. Behavioral responses of marbled murrelets to noise and visual disturbances could be as minor as alert postures, mild startling, or a brief disruption of activities. More severe responses could include individuals attempting to move away from the disturbance by flying, diving, or swimming. If behavioral responses were to occur, they could result in energy expenditure and disruption or loss of feeding, resting, sheltering, and/or social opportunities. Energy expenditures, opportunity costs, and habitat loss could have indirect, negative effects on the health and reproduction of individuals.

Energy lost by behavioral responses to sensory disturbances, should they occur, must be replaced, or the health of the individual exhibiting those behavioral responses may decline. Replenishing energy requires more time spent feeding and resting than the individual might have otherwise budgeted. If the affected individual is caring for an egg or chick, then the energy expenditures or altered activity budget may also negatively affect the young's health. The disturbances could also keep marbled murrelets away from more productive feeding habitats. This could also negatively affect the impacted individuals because they may be forced to forage in areas with smaller or inferior prey resources. The severity of sensory disturbance effects on marbled murrelets may vary widely and would be dependent on the individuals' sensitivity as well as the intensity, duration, and frequency of the disturbances. The following discussion summarizes existing research on marbled murrelet behavior responses to disturbance.

The Proposed Action's aircraft operations have the potential to cause noise and/or visual disturbances of marbled murrelets. While nesting marbled murrelets have not been documented in the study area (Milner, 2016), recent occupancy surveys have not been conducted where suitable habitat is present (Hamer, 2016). Research into the effects of aircraft disturbances on marbled murrelets is extremely limited. Kuletz (1996) found that marbled murrelet counts in marine waters decreased in response to increasing numbers of both boats and low-flying planes. This appears to be the only study noting the effects of aircraft on marbled murrelets in marine waters, although evaluating aircraft impacts was not a primary objective. In the absence of information regarding aircraft disturbances on marbled murrelets in marine waters, boat-related studies provide some insight into how marbled murrelets respond to human disturbances. The following discussion of existing research on boat-related disturbances on marbled murrelets and aircraft-related disturbances of similar bird species allows for inference of how marbled murrelets might respond to aircraft overflights and the distances at which behavioral responses

are more likely to occur. Due to the lack of studies regarding aircraft disturbances on at-sea marbled murrelets, the following serves as the best available information.

At two sites near Juneau, Alaska, marbled murrelets appeared to habituate to boat traffic (Speckman, Piatt, and Springer, 2004). Very few individuals reacted to approaching boats by flying away. The majority of individuals either paddled away or dived briefly and then paddled away. Fish-holding individuals, a sign that the bird is about to deliver food to its young, were often threatened by approaching boats (within about 15 to 130 feet) and typically responded by swallowing the fish. This, the authors suggested, may lead to substantial energetic costs to the adults that have to continue foraging to feed their chicks and an even greater cost to the chick if the adult is not able to catch another fish to feed it (Speckman, Piatt, and Springer, 2004).

In another study, approximately 60 percent of marbled murrelets showed no reaction to boat encounters off Vancouver Island, British Columbia (Hentze, 2006). Approximately 31 percent of individuals dove and 9 percent flushed (flew away) in response to approaching boats. Marbled murrelets did not dive or flush in response to boats at least 295 feet or 330 feet away, respectively. The reactions to approaching boats also depended on a combination of environmental variables (e.g., sea state), boat speed and distance, and other factors. In addition, birds observed flushing did not fly far and typically resumed foraging relatively quickly (Hentze, 2006).

In a second study off Vancouver Island, British Columbia, 58.1 percent of individuals did not respond to moving boats, while about 30.8 percent dove and 11.7 percent flew (Bellefleur, Lee, and Ronconi, 2009)[21]. The majority of marbled murrelets reacted within 130 feet of the boats. Bird age, boat speed, and boat density were significant predictors of flushing response. Faster boats caused more birds to fly or dive and at greater distances, and birds were more likely to fly completely out of feeding areas when approached by boats at high speeds. Juveniles were also more likely to fly or dive than were adults. Individuals that responded by flying left the feeding area completely (Bellefleur, Lee, and Ronconi 2009).

While focused studies of aircraft disturbances on marbled murrelets have not been conducted, studies of other waterbird species may provide some indication as to how marbled murrelets may respond to overflights. In a study of breeding common murres[22] in California, most aircraft disturbances occurred during overflights of 1,000 feet above MSL or less (Rojek et al., 2007). Most boat disturbances occurred within 165 feet of nesting areas, which is within the range of disturbance distances for at-sea marbled murrelets reported by Speckman, Piatt, and Springer (2004), Hentze (2006), and Bellefleur, Lee, and Ronconi (2009). Because nesting common murres and at-sea marbled murrelets respond to boat traffic at similar distances, marbled murrelets might also respond to aircraft at distances similar to those of common murres.

The behaviors and relative sensitivities to aircraft disturbances between common murres at nesting sites (Rojek et al., 2007) and at-sea marbled murrelets (Speckman, Piatt, and Springer, 2004; Hentze, 2006; Bellefleur, Lee, and Ronconi, 2009) may be quite different, despite similarities in their responses to boats. Groups of colonial birds, such as common murres, at active nest sites may be more sensitive to disturbance than a bird foraging or loafing at sea (i.e., marbled murrelets). However, Komenda-Zehnder,

[21] The percentages are reported as published in Bellefleur et al. (2009). The Navy is aware that the reported numbers exceed 100 percent when summed (100.6 percent).

[22] Common murres belong to the same family (Alcidae) as marbled murrelets.

Cevallos, and Bruderer (2003) found that the proportion of wintering waterbirds on Swiss lakes exhibiting stressed behaviors was significantly higher during airplane overflights of less than 1,000 feet AGL. While this study did not include marbled murrelets, common murres, or birds at sea, it did evaluate the responses of several species of waterbirds on open water and produced a similar disturbance-altitude threshold to the Rojek et al. (2007) study (i.e., 1,000 feet AGL).

For a detailed discussion of risk of marbled murrelet aircraft strikes, please refer to the Aircraft-Wildlife Strike Effects section.

Marbled murrelets may occur in all marine waters in the study area and have been documented at a number of locations, and they would be susceptible to disturbances from aircraft operations. However, marbled murrelets in the study area are already exposed to an annual average of 89,000 aircraft operations on the NAS Whidbey Island complex (refer to Table 3.1-1), which suggests they are habituated to the existing high levels of aircraft activity as well as other human-made disturbances (e.g., boat traffic). Existing research indicates that most individuals would not respond to aircraft overflights, and those that do may return to normal foraging and loafing activities relatively soon after the disturbances end (Speckman, Piatt, and Springer, 2004; Hentze, 2006; Bellefleur, Lee, and Ronconi, 2009). For these reasons, the Proposed Action under each of the three action alternatives would not result in significant aircraft-related, sensory disturbance impacts on marbled murrelets based on the best available information[23].

Migratory Birds

As described in Section 3.8.2.1, nearly all bird species that occur in the study area are protected under the MBTA. For military readiness activities, including aircraft operations, DoD installations are exempt from "take" of migratory birds, unless the activities may result in a signification adverse effect at the population level. Impacts on migratory birds are detailed in full in the Birds section, above.

Bald and Golden Eagles

Breeding bald eagles may occur in the study area and eagle responses to military aircraft overflights have been studied. Of bald eagles studied in Arizona and Michigan, the median distance from eagles to aircraft at which there was no response to military jets was approximately 2,000 feet (Grubb and Bowerman, 1997). Thirty-one percent of bald eagles responded to military jets when they were at a median distance of 1,300 feet from the birds. Bald eagles also responded more frequently as the breeding season progressed.

Skagit Bay and Penn Cove were designated as IBAs, in part, because of their importance to breeding bald eagles. Assuming the abovementioned IBAs support higher concentrations of breeding bald eagles than other areas in the study, there would be a greater potential for aircraft disturbance impacts at these locations. For this reason, the Navy examined these IBAs as indicators of potential aircraft disturbance impacts on breeding bald eagles between the various alternatives and scenarios.

Potential impacts on breeding bald eagles would be similar under Alternatives 1 through 3; however, impacts would vary across scenarios. The potential for impacts on Skagit Bay IBA would increase with increased aircraft operations at Ault Field, with Scenario C having the highest potential for impacts. It is

[23] The ESA effects determination for the marbled murrelet is presented at the end of the Marbled Murrelet" subsection of the "Wildlife Strike Effects" section below.

also important to note that breeding bald eagles have been documented at Ault Field (NAS Whidbey Island, 2012) and increased aircraft operations would increase potential for impact on nesting eagles. The potential for impact to Penn Cove IBA would increase with increased aircraft operations at OLF Coupeville, with Scenario A having the highest potential for impacts. No eagles have been documented breeding at OLF Coupeville. Similar to other breeding raptors in the study area, bald eagles are already exposed to a high level of long-term aircraft operations and other human-made disturbances, and they are presumably habituated to the high levels of disturbances. Disturbances associated with aircraft operations would not significantly impact breeding bald eagles in the study area.

During the non-breeding season both bald eagles and golden eagles may occur. There is no known research examining aircraft disturbances on eagles, or any other raptor species, during non-breeding season. Skagit Bay is a migration stopover spot for raptors, including eagles, and, similar to other birds, migrating and wintering raptors may be disturbed by aircraft. Potential impacts on eagles in non-breeding seasons would be similar under Alternatives 1 through 3; however, impacts would vary across scenarios. The potential for impacts on Skagit Bay IBA would increase with increased aircraft operations at Ault Field, with Scenario C having the highest potential for impacts. Migrating and wintering raptors in the study area have presumably habituated to high levels of aircraft operations and other human-made disturbances. The Proposed Action is not expected to have significant impacts on bald and golden eagles using the study area outside of the breeding season.

During any season, aircraft could strike eagles, and these impacts are detailed in the Wildlife Strike Effects section, below.

Wildlife Strike Effects

During construction, wildlife may be directly harmed or killed by equipment and vehicles. Terrestrial wildlife that live at or near the proposed Ault Field construction site are generally highly mobile and would avoid construction equipment and vehicles. MBTA-protected birds, particularly those that are nesting, are susceptible to being harmed or killed by construction equipment and vehicles. Pre-construction and construction avoidance and minimization measures will be taken in order to avoid "take" of MBTA-protected species. As a result, impacts on wildlife and MBTA-protected species would not be significant.

During operations, birds and animals are susceptible to strikes with aircraft. The Air Force and Navy/Marine Corps report at least 3,000 bird strikes at their installations each year (DoD and Partners in Flight, 2010). However, the actual number of bird strikes is likely higher because only an estimated 20 to 47 percent are reported, and collisions with small birds (i.e., passerines) may go unnoticed (DoD and Partners in Flight, 2010; Dolbeer, 2015). The NAS Whidbey Island complex reported 279 wildlife strikes between November 2005 and November 2015 (Naval Safety Center, 2015a, 2015b). Strike data for the NAS Whidbey Island complex from November 2005 through November 2015 were reviewed to determine aircraft-wildlife strike trends specific to the study area.

The NAS Whidbey Island complex reported only 279 aircraft-wildlife strikes over a 10-year period, or an average of 27.9 reports per year (Naval Safety Center, 2015a, 2015b). Assuming that an estimated 20 to 47 percent of strikes were reported (DoD and Partners in Flight, 2010; Dolbeer, 2015), the NAS Whidbey Island complex would have averaged between 58.7 and 139.5 aircraft-wildlife strikes annually during that period, most of which were birds. The estimated numbers of strikes (and actual number of reported strikes) are minimal relative to the 89,000 aircraft operations flown at the NAS Whidbey Island

complex under the No Action Alternative(refer to Table 3.1-1) and the high numbers of wildlife inhabiting the study area throughout the year. The NAS Whidbey Island BASH plan (NAS Whidbey Island, 2012) is, in large part, responsible for minimizing the numbers of strikes at the complex through the implementation of a series of land management, wildlife dispersal, and warning system measures.

The following sections focus on potential aircraft-wildlife strikes by species groups (i.e., birds, mammals, and reptiles and amphibians) and include separate discussions of special status species (i.e., those protected under the ESA, MBTA, and BGEPA).

Birds

At the NAS Whidbey Island complex, birds comprised 275 of the 279 reported strikes (98.6 percent) from 2005 through 2015 (Naval Safety Center, 2015a, 2015b). Songbirds, raptors, and shorebirds comprised 89 percent[24] of all bird strikes identified to species group at the NAS Whidbey Island complex from 2005 through 2015 (Naval Safety Center, 2015a, 2015b).

At the NAS Whidbey Island complex, more than 56 percent of reported bird strikes occurred between July and October (Naval Safety Center, 2015a, 2015b). Relatively few bird strikes—8 percent of total reports—were reported in winter (November through February). Fall migration occurs between July and October, and bird populations are at their highest point of the year because the breeding season has just ended. Under each of the action alternatives, the number of operations would not vary by season, but based on the trends described above, the risk of wildlife, particularly bird, strikes would increase from July through October.

Strikes could occur at nearly any altitude; however, most strikes are reported at lower altitudes. Strike altitude data were not available for military aircraft, so civilian aircraft strike data were analyzed as a surrogate. The majority of reported civilian aircraft bird strikes (92 percent of commercial strikes and 97 percent of general aviation strikes) occurred at or below 3,500 feet. Furthermore, about 71 percent of commercial strikes and 74 percent of general aviation strikes of birds occurred at or below 500 feet AGL. Bird strikes at ground level also are common, comprising 41 percent and 37 percent of reported commercial and general aviation strikes, respectively.

Most reported bird strikes by civil aircraft occur during the day (Dolbeer et al., 2014). Under all three alternatives, most of the operations would be conducted from 7:00 a.m. to 10:00 p.m. at both Ault Field (88 percent) and OLF Coupeville (82 percent) (refer to Section 3.1.2). This suggests that birds would be at an increased risk of strikes because they are more susceptible to strikes during daylight hours (Dolbeer et al., 2014).

Alternative 1 would increase operations at the NAS Whidbey Island complex by 47 percent, and Alternatives 2 and 3 would increase operations by 46 percent (refer to Section 4.1). The increase in operations would result in an increase in the potential for aircraft-wildlife strikes, and the potential increase would be similar under all three alternatives because the increase in air operations is similar. However, impacts would vary by scenario. Assuming the IBAs supports higher concentrations of birds than other parts of the study area, there would be a greater potential for aircraft-bird strikes at these locations. For this reason, the Navy examined the IBAs as an indicator of potential aircraft disturbance

[24] 153 of 275 (56 percent) reported bird strikes at the NAS Whidbey Island complex were identified as "Unknown Bird". Of the remaining 122 bird strikes, songbirds, raptors, and shorebirds comprised 108 (89 percent).

impacts between the various scenarios. The potential for aircraft-bird strikes over Skagit Bay IBA and Deception Pass IBA would increase with increased aircraft operations at Ault Field, with Scenario C having the highest potential for impacts. The potential for impacts on Penn Cove IBA and Crockett Lake IBA would increase with increased aircraft operations at OLF Coupeville, with Scenario A having the highest potential (refer to Table 4.1-5). Crescent Harbors IBA is centrally located between Ault Field and OLF Coupeville; therefore, all scenarios may have similar impacts.

The NAS Whidbey Island would continue to implement the measures outlined in the installation's BASH plan to minimize the risk of a strike occurring. Therefore, it is expected that the number of bird-aircraft strikes at the NAS Whidbey Island complex would remain relatively low compared to the high number of operations. In general, bird populations consist of hundreds or thousands of individuals, ranging across a large geographical area. In this context, the loss of several or even dozens of birds due to physical strikes may not constitute a population-level impact for abundant species. Aircraft strikes would not have significant impacts on local bird populations.

Marbled Murrelet

Marbled murrelets are found year-round in marine waters of the study area (eBird, 2015b; Seattle Audubon Society, 2015), and individuals make daily, year-round flights between different foraging areas and between foraging and nesting areas during the breeding season (Nelson, 1997; WDFW, 2013). Marbled murrelets have been reported to fly at altitudes ranging from ground level to more than 3,000 feet AGL (Nelson, 1997; Strumpf et al., 2011; Sanzenbacher et al., 2014). The Navy has determined the Proposed action may affect the marbled murrelet, and the Navy will consult with the USFWS.

Migratory Birds

For military readiness activities, including aircraft operations, DoD installations are exempt from "take" of migratory birds, unless the activities may result in a significant adverse effect at the population level. Impacts on migratory birds are detailed in full in the Birds section, above.

Bald and Golden Eagles

The NAS Whidbey Island complex reported three strikes of bald eagles, all at Ault Field, between 2005 and 2015 (Naval Safety Center, 2015a, 2015b). Three reported strikes is relatively low when considering the number of operations annually occurring at the NAS Whidbey Island complex from 2005 to 2015 (refer to Section 1.4), the species' being most abundant near marine shorelines in Washington (WDFW, 2013; Rodewald, 2015), and bald eagles being one of the most commonly reported bird species in Island County (eBird, 2015a). In this context, the loss of several bald eagles due to aircraft strikes under the Proposed Action may not constitute a population-level impact for this relatively abundant species. NAS Whidbey Island would continue to implement the measures outlined in the installation's BASH plan to minimize the risk of a strike occurring. Thus, aircraft strikes would not have significant impacts on local bald eagle populations.

NAS Whidbey Island did not report any strikes of golden eagles between 2005 and 2015 (Naval Safety Center, 2015a, 2015b), and the species is a rare visitor to the study area (NAS Whidbey Island, 2012; eBird, 2015a). Therefore, aircraft strikes of golden eagles as a result of the Proposed Action would be unlikely, and potential impacts would not be significant.

Mammals

At the NAS Whidbey Island complex, while birds comprised the majority of strikes, mammals are also known to strike with aircraft. There were three reports of bat strikes (two in June, one in September) (Naval Safety Center, 2015a, 2015b). Most mammal strikes occur at night and bat strikes would not be expected in winter because the species of bats occurring in the study area hibernate (Dolbeer et al., 2014). Strike altitude data were not available for military aircraft, so civilian aircraft strike data were analyzed as a surrogate. Most civilian aircraft strikes of mammals occur at ground level; however, 9 percent of mammal (excluding bats) strikes occurred immediately after take-off or before landing when, for example, deer were struck by landing gear (Dolbeer et al., 2014). As such, mammal strikes would largely be limited to Ault Field and OLF Coupeville runways.

Under all three alternatives, most of the operations would be conducted from 7:00 a.m. to 10:00 p.m. at both Ault Field (88 percent) and OLF Coupeville (82 percent) (refer to Section 3.1.2). Strike data at the NAS Whidbey Island complex indicate that the risk of mammal strikes are minimal regardless of time of day because only three strikes were reported between 2005 and 2015 despite a high level of operations (89,000 annual average) under the No Action Alternative (Naval Safety Center, 2015a, 2015b).

The Proposed Action would increase aircraft operations at the NAS Whidbey Island complex by 47 percent under Alternative 1 or by 46 percent under Alternatives 2 and 3 compared to the No Action Alternative (Refer to Section 4.1). The increase in operations would result in an increase in the potential for aircraft-mammal strikes, and the potential increase would be similar under all three alternatives because the increase in air operations is similar. The potential impacts would not affect mammals in the study area differently between scenarios, as the both Ault Field and OLF Coupeville support the same general mammal species compositions and abundances. Thus, increasing operations more heavily at Ault Field would increase the potential for mammal-aircraft strikes at that location, while reducing the potential for strikes at OLF Coupeville. The reverse is true if operations are increased more heavily at OLF Coupeville.

The NAS Whidbey Island complex would continue to implement the measures outlined in the installation's BASH plan to minimize the risk of a strike occurring. Therefore, it is expected that the number of mammal-aircraft strikes at the NAS Whidbey Island complex would remain relatively low compared to the high number of operations. Aircraft strikes would not have significant impacts on local mammal populations.

Reptiles and Amphibians

Reptile and amphibian strikes with aircraft are known to occur; however, none were reported at the NAS Whidbey Island complex between 2005 and 2015 (Naval Safety Center, 2015a, 2015b). Aircraft strikes effects on reptiles and amphibians would not be expected to increase as a result of the Proposed Action.

4.8.2.2 Effects on Marine Species

The Proposed Action would consist of both construction and operations. Construction would not result in direct impacts to marine species. Because the construction would occur on land, no marine habitat would be disturbed, and noise generated by construction would not propagate through the water. Therefore, underwater noise impacts to fish and cetaceans (whales, dolphins, and porpoises) would not occur. While hauled-out seals and sea lions could be exposed to in-air noise from construction, the

closest known haul-out sites are located on Whidbey Island and Kalamut Island (approximately 6 miles away from Ault Field), in Skagit Bay (approximately 7 miles away from Ault Field), and on Smith and Minor Island (approximately 7 miles away from Ault Field) (Washington Department of Fish and Wildlife, 2000). Due to the distance from the construction site, sound from construction would attenuate below levels that might impact pinnipeds. Consequently, the remainder of the marine species discussion will focus on potential impacts from operations.

The operations portion of the Proposed Action would not directly impact marine habitats (see Section 4.9, Water Resources). Direct injury to marine mammals and fish from aircraft noise is also not anticipated. The effects of noise appear to be somewhat attenuated by the air/water interface. The U.S. Air Force (2000) concluded that there are very few and limited cases for which there could be any risk of injury to a marine mammal from underwater noise generated by subsonic flight of Air Force aircraft. As the sound from overhead aircraft would be non-impulsive, the proposed activities would likely not result in any direct physical injury to fish species. Therefore, no direct injuries resulting from noise have been included in the following discussions of impacts on individuals of marine species under water. However, noise and visual stimuli from aircraft operations have the potential to cause minor behavioral impacts on marine mammals that surface for air or haul-out on shorelines and islands in the study area, and marine mammals and fish underwater. This section evaluates the Proposed Action's potential to disturb both fish and marine mammals during aircraft operations.

Marine species could be exposed to aircraft noise wherever aircraft overflights occur in the project area; however, sound is primarily transferred into the water from the air in a narrow cone under the aircraft. A sound wave propagating from an aircraft must enter the water at an angle of incidence of 13 degrees or less from the vertical for the wave to continue propagating under the water's surface (Richardson et al., 1995). At greater angles of incidence, the water surface acts as a reflector of the sound wave and allows very little penetration of the wave below the water (Urick, 1983). Water depth and bottom conditions also strongly influence propagation and levels of underwater noise from passing aircraft. For low-altitude flights, sound levels reaching the water surface would be higher, but the transmission area would be smaller. As an aircraft gains altitude, sound reaching the water surface diminishes, but the possible transmission area increases.

Underwater sound from aircraft overflights has been derived for some airframes. For the derived, worst-case scenario of an FA-18 at the lowest altitude (984.2 feet), the sound level at 6.6 feet below the surface peaked at 152 dB re 1 µPa, and the sound level at 164.0 feet below the surface peaked at 148 dB re 1 µPa (Eller and Cavanagh, 2000). When FA-18 flight sound was derived at 9,842.4 feet altitude, peak sound level at a depth of 6.6 feet dropped to 128 dB re 1 µPa. For sonic boom transmission for an FA-18 Hornet supersonic flight at Mach 1.2, the derived underwater peak pressure at the surface reached 176 dB re 1 µPa and at a depth of 164.0 feet reached 138 dB re 1 µPa. At Mach 2, the derived underwater peak pressure at the surface reached 178 dB re 1 µPa and at a depth of 164.0 feet reached 146 dB re 1 µPa. It must be noted that these mathematically derived values cover a very small footprint based on the altitude of the aircraft, and, due to the flight speed, these sound levels would only be present for at most tens of seconds (Eller and Cavanagh, 2000).

Fish

The inner ears of fish are sensitive to acoustic particle motion rather than acoustic pressure. Although a propagating sound wave contains pressure and particle motion components, particle motion is most significant at low frequencies (less than a few hundred Hz) and closer to the sound source. However, a

fish's gas-filled swim bladder (an organ present in many fishes that controls buoyancy) can enhance sound detection by converting acoustic pressure into localized particle motion, which may then be detected by the inner ear. Fish with swim bladders generally have greater sensitivity and better high-frequency hearing than fish without swim bladders (Popper and Fay, 2010).

Direct injury or loss of hearing are not likely due to the non-impulsive nature of the sound. Noise sources such as vessel movement and aircraft overflights lack the duration and intensity to cause hearing loss. Aircraft overflights have the potential to affect surface waters and, therefore, to expose fish occupying those upper portions of the water column to sound and general disturbance, which could potentially result in short-term behavioral or physiological responses. Consequently, the impacts of underwater sound on fish would likely include behavioral changes and auditory masking (ICF Jones and Stokes and Illingworth and Rodkin, Inc., 2012). The extent to which fish react varies among species, their life stage, and with other environmental conditions. In general, these impacts would be short-term and minimal.

Behavioral

Behavioral changes could result from overhead aircraft flights. The current guideline for establishing a behavioral impact to fish is 150 dB re 1 µPa, which would be surpassed near the surface and, in certain circumstances, at shallow depths (<164.0 feet) below the surface, as explained above. Behavioral effects to fish could include disruption or changes in natural activities, such as swimming, schooling, feeding, breeding, and migrating. Sudden changes in sound level can cause fish to dive, rise, or change swimming direction. There is a lack of studies that have investigated the behavioral reactions of unrestrained fish to man-made sound, especially in the natural environment. Studies of caged fish have identified three basic behavioral reactions to sound: startle, alarm, and avoidance (McCauley et al., 2000; Pearson et al., 1992; Scripps Institution of Oceanography and Foundation, 2008). Changes in sound intensity may be more important to a fish's behavior than the maximum sound level. Sounds that fluctuate in level tend to elicit stronger responses from fish than even stronger sounds with a continuous level (Schwartz, 1985). In addition, sound can induce generalized stress responses in fish, particularly a startle response during initial activity, which can in turn induce behavioral changes, such as site avoidance of the Project area throughout the remainder of pile-driving activities (Wysocki, Dittami, and Ladich, 2006).

The majority of fish species exposed to non-impulsive sources would likely have no reaction or mild behavioral reactions. Overall, long-term impacts for individual fish are unlikely in most cases because acoustic exposures are of short duration (tens of seconds), intermittent, and unlikely to repeat over short periods.

Auditory Masking

Auditory masking refers to the presence of a noise that interferes with a fish's ability to hear biologically relevant sounds. Fish use sounds to detect predators and prey, and for schooling, mating, and navigating, among other uses (Myrberg, 1980; Popper et al., 2003). Masking of sounds associated with these behaviors could have impacts to fish by reducing their ability to perform these biological functions.

Any noise (i.e., unwanted or irrelevant sound, often of an anthropogenic nature) detectable by a fish can prevent the fish from hearing biologically important sounds including those produced by prey or predators (Myrberg, 1980; Popper et al., 2003). Auditory masking may take place whenever the noise level heard by a fish exceeds ambient noise levels, the animal's hearing threshold, and the level of a biologically relevant sound. Masking is found among all vertebrate groups, and the auditory system in all vertebrates, including fish, is capable of limiting the effects of masking noise, especially when the

frequency range of the noise and biologically relevant signal differ (Fay, 1988; Fay and Megela-Simmons, 1999).

The frequency of the sound is an important consideration for masking for fish because many marine fish are limited to detection of the particle motion component of low frequency sounds at relatively high sound intensities (Amoser and Ladich, 2005). The frequency of the acoustic stimuli must first be compared to the animal's known or suspected hearing sensitivity to establish if the animal can potentially detect the sound.

Based on this information, the Proposed Action has the potential to affect green sturgeon, eulachon, Chinook salmon, Hood Canal summer-run chum, steelhead, bocaccio, canary rockfish, yelloweye rockfish, and bull trout, but those impacts to fish species would be "insignificant" in ESA terms in that they would not rise to the level of take. Therefore, the Proposed Action may affect, but is not likely to adversely affect, the ESA-listed fish species.

Marine Mammals

Seeing and hearing the aircraft during operations could result in stress and displacement/avoidance by marine mammals in the study area, which, in turn, could take time and effort from important daily activities such as resting or foraging. Increased stress can affect the health of adults and/or their young, as can disruptions of daily activities, which may increase energy expenditure, decrease energy (i.e., food) intake, and decrease resting opportunities. Existing research has not reported hearing loss or other bodily injury occurring as a direct result of aircraft overflights (Born et al., 1999; Efroymson et al., 2000).

Several studies have investigated marine mammal responses to aircraft disturbances. These studies and the Proposed Action's potential impacts on marine mammals, which are all protected by the MMPA, are discussed separately for pinnipeds (seals and sea lions), cetaceans (whales, dolphins, and porpoises), and federal threatened and endangered species below.

Pinnipeds

In Greenland, hauled-out ringed seals (*Pusa hispida*) escaped the ice into the water 6 percent and 49 percent of the time in response to fixed-wing airplanes and helicopters, respectively, flying at about 500 feet AGL (Born et al., 1999). For fixed-winged airplanes, ringed seals escaped the ice into the water about 21 percent of the time when the aircraft was about 330 feet away and 6 percent of the time when the aircraft was about 1,000 feet away. For helicopters, the seals escaped the ice into the water about 79 percent of the time when the helicopter was 330 feet to 1,640 feet away and about 30 percent of the time when the helicopter was more than 1,640 feet away. Born et al. (1999) suggested that the risk of scaring ringed seals could be substantially reduced if fixed-wing planes and helicopters avoided approaching them at distances closer than 1,640 feet and 5,000 feet, respectively. It should be noted that this study was conducted in an area where ambient noise levels were very low and the seals were not believed to have very much experience with human-made disturbances. Thus, the ringed seals in this study may have been less habituated to these disturbances and more susceptible to escaping the ice into the water.

Harbor seals are the primary marine mammal known to haul-out on the southeastern shores of Whidbey Island on Kalamut and the study area (NAS Whidbey Island, 2012; Jefferies et al., 2000). In addition to harbor seals, elephant seals also haul out on Smith and Minor Islands, which are located on the western edge of the study area (USFWS, 2014b; Jefferies et al., 2000). Harbor seals and elephant

seals may also be present on islands in Skagit Bay, approximately 7 miles east of Ault Field. Harbor seals and elephant seals also breed on these islands. Efroymson et al. (2000) reviewed documented altitudes at which harbor seals respond to aircraft, and the most conservative observed threshold was about 1,000 feet.

The Kalamut Island haul-out site is located near the approach path for the Ault Field landing strip, where planes will reach lower altitudes around 50 feet, resulting in greater aircraft noise and risk of potential impacts. The MMPA defines "harassment" for non-military readiness activities as "any act that disturbs or is likely to disturb a marine mammal by causing disruption of natural behavioral patterns including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering" (16 U.S.C. 1362[18][A]). In 2004, the MMPA was amended to include a separate definition of "harassment" for military readiness activities. For military readiness activities, the threshold for finding Level B harassment is higher: specifically, the act must disturb or be likely to disturb these same behavior patterns to a point that they are abandoned or significantly altered (16 U.S.C. 1362[18][B]). Currently, the same Growler aircraft that would operate under the Proposed Action use the approach route, and the seals have continued to use the haul-out site (i.e., they have not abandoned the site). Therefore, it is unlikely that the Proposed Action would result in injury or "harassment" of these animals as defined under the MMPA amendment for military readiness activities.

The number of operations at the NAS Whidbey Island complex would increase by 47 percent under Alternative 1 and by 46 percent under Alternatives 2 and 3 annually compared to the No Action Alternative (refer to Section 4.1). The increase in operations would result in an increase in the potential for aircraft disturbance on pinnipeds, and the potential increase would be similar under all three alternatives because the increase in air operations is similar. The potential impacts would not affect pinnipeds in the area of potential aircraft disturbance differently between scenarios, as they may occur in marine waters and shorelines in the flight paths for operations at both Ault Field and OLF Coupeville. Thus, increasing operations more heavily at Ault Field would increase the potential for pinniped disturbances near that location, while reducing the potential near OLF Coupeville. The reverse is true if operations are increased more heavily at OLF Coupeville.

Unlike ringed seals in Greenland (Born et al., 1999), harbor seals in the area of potential aircraft disturbance are already exposed to high levels of aircraft, vessel, and other human-made disturbances. Harbor seals are presumably habituated to the activity because they are common in the area of potential aircraft disturbance (NAS Whidbey Island, 2012) despite the existing long-term, high level of disturbances. Repeated exposures of an individual to multiple sound-producing activities over a season, year, or life stage cause some animals to habituate to, or become tolerant of, repeated exposures over time, learning to ignore a stimulus that in the past has not accompanied any overt threat. Several studies have documented marine mammal habituation to repeated exposure to human-caused noise (Stockin et al., 2008; Bejder et al,. 2006; Blackwell et al., 2004). Marine mammals that are more tolerant may stay in a disturbed area. In addition, no breeding areas would be impacted. Therefore, Alternatives 1 through 3 are not expected to have significant impacts on pinnipeds, either through behavioral disturbance or injury resulting from military readiness activities. Consequently, the Navy has determined that the Proposed Action under each of the three alternatives would not result in reasonably foreseeable "takes" of pinnipeds by harassment, injury, or mortality as defined under the MMPA.

Cetaceans

There are a number of studies on cetaceans but few on species that occur in the study area.

Patenaude et al. (2002) found that bowhead whales (*Balaena mysticetus*) and beluga whales (*Delphinapterus leucasto*) responded to aircraft through abbreviated surfacing, immediate dives or turns, changes in behavior state, vigorous swimming, and breaching during spring migration in Alaska. Bowheads responded to 2.2 percent and belugas responded to 3.2 percent of fixed-winged aircraft overflights. Bowheads and belugas responded to helicopters 14 percent and 38 percent of the time, respectively. Responses by these species most often occurred when fixed-winged aircraft were at altitudes below about 600 feet or at lateral distances of less than 820 feet. Both species responded significantly more often when helicopters were less than 820 feet away in lateral distance.

Near the Hawaiian Islands, 12 percent of all sperm whale (*Physeter microcephalus*) groups observed reacted to passing fixed-wing aircrafts by diving hastily (Smultea et al., 2008). Of the groups that reacted, all were within 1,180 feet lateral distance from the aircraft. However, only about 38 percent of all groups sighted within 1,180 feet reacted. A group also closed flanks to protect a calf when they were circled for a period of about 9 minutes (Smultea et al., 2008).

It is important to note that bowhead whales, beluga whales, and sperm whales do not occur in the study area. However, the responses described above in these more recent studies on cetaceans (Patenaude et al., 2002; Smultea et al., 2008) are similar to those reported in older studies on species that occur in the study area (i.e., gray whales and minke whales).

The Navy assumes an area of potential aircraft disturbance of 1,200 feet AGL for all cetaceans in the study area because it conservatively estimates the aircraft response threshold for all the cetacean species evaluated by Efroymson et al. (2000), Patenaude et al. (2002), and Smultea et al. (2008). Under the Proposed Action, the cetacean area of potential aircraft disturbance includes Deception Pass, Dugualla Bay, Penn Cove, Admiralty Bay, and nearshore waters west of Ault Field.

The number of operations at the NAS Whidbey Island complex would increase by 47 percent under Alternative 1 and by 46 percent under Alternatives 2 and 3 annually compared to the No Action Alternative (refer to Section 4.1). The increase in operations would result in an increase in the potential for aircraft disturbance on cetaceans, and the potential increase would be similar under all three alternatives because the increase in air operations is similar. The potential impacts would not affect cetaceans in the area of potential aircraft disturbance differently between scenarios, as they may occur in marine waters in the flight paths for operations at both Ault Field and OLF Coupeville. Thus, increasing operations more heavily at Ault Field would increase the potential for cetacean disturbances near that location, while reducing the potential near OLF Coupeville. The reverse is true if operations are increased more heavily at OLF Coupeville.

As described above, studies have shown that the majority of individual cetaceans did not respond to overflights even when the aircraft was closer than the identified thresholds (Patenaude et al., 2002; Smultea et al., 2008). Whales in Alaska (Patenaude et al., 2002) and Hawaii (Smultea et al., 2008) were likely not exposed to the long-term, high levels of aircraft operations, vessels, and other human-made disturbances that occur in the area of potential aircraft disturbance. Cetaceans in the area of potential aircraft disturbance are presumably habituated to high levels of long-term disturbances and would be even less likely to respond to aircraft than those individuals in the above-mentioned studies. Therefore, the Proposed Action is not expected to have significant impacts on cetaceans, either through behavioral disturbance or injury resulting from military readiness activities. Consequently, the Navy has determined that each of the three action alternatives would not result in reasonably foreseeable “takes” of

cetaceans (whales, dolphins, and porpoises; see Table 3.8-5) by harassment, injury, or mortality as defined under the MMPA.

Federal Threatened and Endangered Marine Species

Fish

As discussed above, the Proposed Action has the potential to affect green sturgeon, eulachon, Chinook salmon, Hood Canal summer-run chum, steelhead, bocaccio, canary rockfish, yelloweye rockfish, Dolly Varden, and bull trout, but those impacts to fish species would be "insignificant" in ESA terms in that they would not rise to the level of take. Therefore, the Proposed Action may affect, but is not likely to adversely affect, the ESA-listed fish species.

Humpback Whale and Southern Resident Killer Whale

There are no aircraft disturbance data or studies for the ESA-listed humpback whale and Southern Resident killer whale. As described, marine mammals exposed to low-altitude fixed-wing aircraft overflights could exhibit a short-term behavioral response, but not to the extent where natural behavioral patterns would be abandoned or significantly altered. Fixed-wing aircraft overflights are not expected to result in chronic stress because it is extremely unlikely that individual animals would be repeatedly exposed to low altitude overflights. Fixed-wing aircraft overflights may affect ESA-listed marine mammals. This same disturbance is not expected to result in Level A or Level B harassment as defined by the MMPA. In accordance with NEPA, fixed-wing aircraft overflights over territorial waters would have no significant impact on marine mammals. Furthermore, cetaceans, including humpback whales and Southern Resident killer whales in the project area, are presumably habituated to the existing, long-term high levels of disturbances.

Based on this information, the Proposed Action has the potential to affect humpback whales and Southern Resident killer whales, but those impacts would be "insignificant" in ESA terms in that they would not rise to the level of take. Therefore, the Proposed Action may affect, but is not likely to adversely affect, the ESA-listed humpback whale or Southern Resident killer whale.

4.8.3 Biological Resources Conclusion

Potential effects on terrestrial and marine wildlife from implementation of the Proposed Action would be similar between all three action alternatives but greater under Alternative 1 because it is the alternative that would result in the largest increase in aircraft operations. There would be negligible differences to impacts on biological resources between scenarios and between average year and high-tempo FCLP year conditions across all three action alternatives. Differences would be due to the location and frequency of operations (e.g., more FCLPs proposed under Scenario C). However, the overall significance of the Proposed Action on terrestrial and marine wildlife would be expected to be similar for each action alternative because the increase in operations under each of the three action alternatives is very similar. The Navy will consult with the appropriate regulatory agencies. The overall significance of the Proposed Action's potential impacts on various wildlife species groups is highlighted below.

- Construction of the new facilities would occur in previously disturbed areas of high-volume human activity and is not expected to result in significant impacts on terrestrial wildlife related to habitat loss. Construction under the Proposed Action would have no impact on marine habitats. Construction noise would not have any impacts on marine species.

- While the Proposed Action would result in either a 46-percent or a 47-percent increase in aircraft operations at the NAS Whidbey Island complex over the No Action Alternative, it would not produce notable increases in maximum or average annual noise levels. Furthermore, terrestrial and marine wildlife in the study area are already exposed to a high level of long-term aircraft operations and other human-made disturbances and have presumably habituated. Therefore, visual and noise disturbances from increased aircraft operations under the Proposed Action would not significantly impact terrestrial and marine wildlife.
- The NAS Whidbey Island complex reports a proportionally small number of aircraft-wildlife strikes annually (27.9 strikes/year between 2005 and 2015) relative to the high number of aircraft operations flown (89,000 annually) at the complex and the large numbers of wildlife inhabiting the study area throughout the year. With the continued implementation of the NAS Whidbey Island complex's BASH plan, the Proposed Action would not significantly impact local wildlife populations.
- For military readiness activities, including aircraft operations, DoD installations are exempt from "take" of migratory birds, unless the activities may result in a significant adverse effect at the population level. The Proposed Action's increase in aircraft operations would not have a significant impact on MBTA-protected species at the population level. During construction, impacts on MBTA-protected species would be largely avoided and minimized and, therefore, would not rise to the level of "take."
- The Navy will be consulting with USFWS on the Proposed Action's effects on marbled murrelets.
- The Proposed Action's increase in aircraft operations would not have significant noise impacts on federally listed fish species (i.e., bull trout, green sturgeon, eulachon, Chinook salmon, Hood Canal summer-run chum, steelhead, bocaccio rockfish, canary rockfish, and yelloweye rockfish). Therefore, the Proposed Action would not significantly impact the bull trout, green sturgeon, eulachon, Chinook salmon, Hood Canal summer-run chum, steelhead, bocaccio rockfish, canary rockfish, and yelloweye rockfish. In ESA terms, the Proposed Action may affect, but is not likely to adversely affect, the bull trout, green sturgeon, eulachon, Chinook salmon, Hood Canal summer-run chum, steelhead, bocaccio rockfish, canary rockfish, and yelloweye rockfish.
- The Proposed Action's increase in aircraft operations would not have significant noise and/or visual impacts on the Southern Resident killer whale and humpback whale. Marine mammals, including non-ESA species, exposed to fixed-wing aircraft overflights could exhibit a short-term behavioral response, but fixed-wing aircraft overflights over territorial waters would have no significant impact on marine mammals. Therefore, the Proposed Action would not significantly impact the Southern Resident killer whale and humpback whale. In ESA terms, the Proposed Action may affect, but is not likely to adversely affect, the Southern Resident killer whale and humpback whale. The Navy will consult with NMFS regarding the effects determination for Southern Resident killer whales and humpback whales under the ESA. Pursuant to the MMPA, including the 2004 military readiness amendment, no take of marine mammals is anticipated.

4.9 Water Resources

This assessment examines how the Proposed Action would affect groundwater, surface water, wetlands, floodplains, marine waters, and marine sediments. The analysis of groundwater focuses on the potential for impacts to the quality, quantity, and accessibility of water. The analysis of surface water considers whether any new construction would impact the quality of water. BMPs are identified to minimize soil impacts and prevent or control pollutant discharge into stormwater. The analysis of marine waters focuses on whether any new construction would impact the quality of marine waters. The analysis of wetlands considers the potential for impacts that may change the local hydrology, soils, or vegetation that support a wetland. The analysis of marine sediments focuses on whether any new construction would impact the quality of the marine sediments.

Water Resources

Impacts on surface water from construction activities, but would be minimized and avoided through implementation of BMPs and therefore would not be significant.

Potential indirect impacts from construction activities, but would be minimized and avoided through implementation of BMPs and therefore would not be significant.

4.9.1 Water Resources, No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur, and there would be no change to affected environment water resources. Therefore, no significant impacts to water resources would occur with implementation of the No Action Alternative.

4.9.2 Water Resources, Alternatives 1 through 3

New construction under Alternatives 1 through 3 would include expanded hangar space and/or new hangars, armament storage, maintenance facilities, and expanded personnel parking areas. All planned construction activities would occur in proximity to the flight line at Ault Field. No construction would occur at OLF Coupeville. While each alternative would result in up to approximately 2.1 acres of new impervious surface at NAS Whidbey Island, development associated with Alternative 1 would result in different, new impervious surface located at the hangar space, and development associated with Alternative 3 would result in slightly more impervious surface at the Armaments Storage area. Overall, the impacts to water resources would be minimal, and the differences between alternatives in regard to their impacts would only result in slight local variations in groundwater and surface water quality.

4.9.2.1 Water Resources Potential Impacts

Groundwater

New construction under each of the action alternatives would not impact the three groundwater aquifers in the vicinity of NAS Whidbey Island because none of the proposed construction would extend below the ground surface to a depth that would impact the underlying water tables. Although fuel or other chemicals could be spilled during construction, implementation of BMPs, such as immediate cleanup of these spills, would prevent any infiltration into the underlying groundwater. Although the number of personnel employed or stationed at NAS Whidbey would increase, resulting in a corresponding increase in the demand for groundwater, this is anticipated to be minimal because NAS Whidbey Island does not use groundwater as a source of drinking water.

Surface Water

The Proposed Action would result in up to 2 acres of new impervious surface created by the new armament storage, mobile maintenance facility storage area, vehicle parking, and hangar space. The increase in impervious surface would be less than 1 percent compared to the existing approximately 600 acres of impervious surface at NAS Whidbey Island.

The new impervious surfaces under each action alternative would increase the quantity and velocity of stormwater runoff, which would in turn increase the susceptibility of surface water to runoff impacts like increased turbidity and pollutants, resulting in diminished water quality. Stormwater runoff could impact surface water and waters around NAS Whidbey Island; however, as stated above, the percent increase in impervious surface from existing impervious surface is minimal and would not impact overall water quality.

Examples of BMPs for controlling non-point source pollution include, but are not limited to, the following:

- Activities such as vehicle maintenance, chemical or waste oil storage, or transferring potential contaminants would be conducted in covered areas so stormwater would not wash contaminants into storm drains or surface waters.
- Areas that cannot be covered should have their stormwater runoff retained and diverted to the sanitary sewer system.
- The storm drain system should not to be used to dump or discharge any materials or chemicals. All departments should notify the Environmental Division before conducting any operations that may discharge materials or washes into the system. This includes water from vehicle washing. All storm drains should be labeled with “no dumping” signs.

The installation’s Spill Prevention, Control, and Countermeasures (SPCC) Plan provides guidance that would be used in a spill response, such as a response procedures, notification, and communication; roles and responsibilities; and response equipment inventories. Developing stormwater and erosion-control measures, implementing standard stormwater BMPs, and educating station personnel are proactive measures to limit the exposure of stormwater to contaminants.

Because more than 1 acre would be disturbed during construction under all alternatives, a construction NPDES stormwater permit would be obtained from the USEPA through its water quality permit program. Under the permit, the Navy (NAS Whidbey Island) would develop a site-specific Stormwater Pollution Prevention Plan for new discharges that would include a site plan for managing stormwater runoff and describe the BMPs to be implemented to eliminate or reduce erosion, sedimentation, and stormwater pollution. With proper implementation of the Stormwater Pollution Prevention Plan, impacts on water quality from erosion and off-site sedimentation during construction would not be significant.

Additional mitigation might be required to account for the excess runoff from new impervious surfaces. The Navy may install underground stormwater retention infrastructure; infiltrate stormwater via wet ponds, ditches, and swales; or employ a combination of these measures to meet the standards established by the Washington State Department of Ecology in its 2012 Western Washington Stormwater Manual. These measures would be developed and incorporated into facility design based on existing site conditions.

Wetlands

Each of the three action alternatives would have no direct impacts on wetlands at NAS Whidbey Island because no wetlands occur in or adjacent to the proposed construction areas. Stormwater runoff from construction activities could have indirect impacts on nearby wetlands, such as increased turbidity and pollutant levels. However, implementation of BMPs during construction, similar to those described for surface waters, would minimize runoff into nearby wetlands.

Floodplains

No construction would occur within Federal Emergency Management Agency-mapped floodplains under any of the three action alternatives. Therefore, there would be no impacts on floodplains, and all three alternatives would be fully consistent with EO 11988.

Storm-related flooding at Ault Field and the Seaplane Base has only been an issue related to high tide and high wind events. The Final Installation Development Plan recommends use of green infrastructure outside of the airfield and runways and use of LID practices be used in construction projects (NAVFAC, 2016b). These practices would minimize potential impacts from storm-related flooding regarding the new construction associated with the Proposed Action.

Marine Waters and Sediments

The projected increase in new impervious surfaces under each action alternative would increase the quantity and velocity of stormwater runoff. This would increase the susceptibility of marine water sediments to impacts such as increased turbidity and pollutant levels. These impacts would be minimized or avoided by implementing the BMPs described above for surface waters.

Water Resources Conclusion

Overall, as discussed above, implementation of the Proposed Action at NAS Whidbey Island would not result in significant impacts to water resources. There would be no impact on groundwater because new construction under each of the action alternatives would not extend below the ground surface to a depth that would impact the underlying water tables, and implementation of BMPs, such as immediate cleanup of spills, would prevent any infiltration from spills into the underlying groundwater. The Proposed Action would result in up to approximately 2 acres of new impervious surface, but impacts to surface waters, floodplains, and marine waters and sediment would be minimized and avoided through implementation of BMPs, LIDs, and green infrastructure and therefore would not be significant. Each of the three action alternatives would have no direct impacts on wetlands at NAS Whidbey Island because no wetlands occur in or adjacent to the proposed construction areas. Indirect impacts to wetlands, as discussed above, would be minimized through use of BMPs. Construction activities are similar under the three action alternatives and therefore there would be negligible differences in impacts to water resources. The differences between alternatives in regard to their impacts would only result in slight local variations in groundwater and surface water quality.

4.10 Socioeconomics

Analysis of impacts to socioeconomics is focused on the issues of the effects of the alternatives on population, economy, employment and income, housing, local government revenues and expenditures, and community services and facilities.

This socioeconomic analysis focuses on impacts caused by changes in military and civilian personnel levels and those caused by an increase in construction expenditures. Economic impacts are defined to include direct effects, such as changes to employment, payrolls, and expenditures that affect the flow of dollars into the local economy, and indirect effects, which result from the "ripple effect" of spending and re-spending in response to the direct effects.

Socioeconomic impacts, particularly impacts such as those being evaluated in this EIS, are often mixed: beneficial in terms of gains in jobs, expenditures, and tax revenues but adverse in terms of growth-management issues, such as demands for housing and community services.

Socioeconomics

Construction impacts would result in temporary and positive impacts to the local economy. Operational impacts would result in positive impacts to the local economy.

The action alternatives would have minor to moderate impacts on the local and regional population, housing market, and local government finances.

Local school districts, particularly the Oak Harbor School District, would experience significant impacts. Minimal to no impact is expected on medical, police, and fire services.

4.10.1 Socioeconomics, No Action Alternative

Under the No Action Alternative, no additional personnel would be assigned to the NAS Whidbey Island complex, and no additional construction would occur at Ault Field or OLF Coupeville compared to the affected environment conditions. Therefore, there would be no impacts to local population, the regional economy, or housing market. In addition, there would be no fiscal impacts to local governments, and there would not be any change to the provision of local community services and facilities compared to the affected environment conditions. Therefore, no significant impacts would occur with implementation of the No Action Alternative.

4.10.2 Socioeconomics, Alternatives 1 through 3

The affected environment for the more general socioeconomic impact analyses for Alternatives 1 through 3 is defined as Island and Skagit Counties. However, as described in Section 3.10.3, more focused areas have been utilized for the analyses of specific community services and facilities. The Oak Harbor, Coupeville, and Anacortes school districts are the defined affected environment for the assessment of impacts to public education; Island and Skagit Counties are the defined affected environment for the assessment of impacts to medical facilities; and the City of Oak Harbor and the Town of Coupeville are the defined affected environment for the assessment of impacts to emergency services such as police and fire protection.

4.10.2.1 Socioeconomics Potential Impacts, Alternatives 1 through 3

Population Impacts

Implementation of Alternatives 1 through 3 would result in minor impacts on the personnel loading at the NAS Whidbey Island complex and on total population in the region. Total Growler personnel loading

at the NAS Whidbey Island complex is expected to increase under Alternatives 1 through 3 when compared to the personnel loading under the No Action Alternative. As shown on Table 4.10-1, the total number of military personnel associated with the Growler aircraft at the NAS Whidbey Island complex under the No Action Alternative would be 4,104 personnel, including 517 officers and 3,587 enlisted personnel. Once all transition activities are complete in 2021, total Growler personnel at the station would range between a low of 4,475 personnel under Alternative 1 to a high of 4,768 personnel under Alternative 2. These personnel numbers would correspond to an increase of between 371 and 664 personnel under the No Action Alternative, depending on the alternative selected. Table 4.10-1 shows both the total number of Growler personnel who would be assigned to the NAS Whidbey Island complex under each alternative and the expected change in personnel loading when compared to the No Action Alternative. Estimates of the total number of military dependents have also been included in this table (see Table 4.10-1).

The population and demographic characteristics of Island and Skagit Counties would be similarly impacted under each alternative. Table 4.10-2 provides an estimate of regional population impacts for each of the three alternatives. As additional military personnel are stationed at the NAS Whidbey Island complex, it is assumed that their dependents (e.g., spouses and children) would also move into the region. The number of military dependents affected by the proposed alternatives was calculated using 2013 data collected by the Office of the Deputy Assistant Secretary of the Defense (Military Community and Family Policy) on the average number of dependents (e.g., spouses and children) for Navy and DoD personnel (DoD, n.d.). These average percentages were applied to the expected number of personnel who would be reassigned under each of the proposed alternatives to determine the corresponding number of dependents (see Table 4.10-2).

As shown on Table 4.10-2, the resulting changes in population are expected to be minor compared to the size of the regional population under all three alternatives. Alternative 2 is expected to cause the largest demographic impact out of the three alternatives considered. Under Alternative 2, 1,574 military personnel and dependents would move into the region compared to the No Action Alternative level. The majority of these new residents (1,207 residents) would likely live in Island County. The remaining personnel and dependents are expected to live in Skagit County (200 residents) and other communities (167 residents). This increase in population would amount to an increase of approximately 1.5 percent over Island County's 2020 projected population level and an increase of 0.2 percent over Skagit County's 2020 projected population level. An estimated 786 military personnel and dependents under Alternative 1; 1,407 military personnel and dependents under Alternative 2; and 799 military personnel and dependents under Alternative 3 are expected to reside in the two counties. In total, Alternative 1 would result in an increase of 0.4 percent, Alternative 2 would result in an increase of 0.7 percent, and Alternative 3 would result in an increase of 0.4 percent of the total population in the two counties (see Table 4.10-2).

See Table 4.10-2 for the demographic impacts associated with all three alternatives.

Table 4.10-1 EA-18G Growler Personnel Loading at the NAS Whidbey Island Complex under Each Alternative in 2021

		Alternative 1		*Alternative 2*		*Alternative 3*	
	No Action Alternative	*Personnel*	*Change from No Action Alternative*	*Personnel*	*Change from No Action Alternative*	*Personnel*	*Change from No Action Alternative*
Officers	517	633	116	655	138	633	116
Enlisted	3,587	3,842	255	4,113	526	3,848	261
Military Personnel Total	4,104	4,475	371	4,768	664	4,481	377
Military Dependents[1]	5,627	6,136	509	6,537	910	6,144	517
Total Military and Dependents	9,731	10,611	880	11,305	1,574	10,625	894

Note:
[1] Military dependents include spouses and children aged 0-22 years residing with military personnel.

Table 4.10-2 Regional Population Impacts[1] Resulting from the Changes in EA-18G Growler Personnel Loading at the NAS Whidbey Island Complex Compared to the Affected Environment Levels

	Change from Affected Environment		
	Alternative 1	***Alternative 2***	***Alternative 3***
Military Personnel	371	664	377
Military Dependents	509	910	517
Total Population Change[2]	**880**	**1,574**	**894**
Island County Impacts			
Number of Military Personnel and Dependents Expected to Reside in Island County	674	1,207	685
Island County's 2020 Projected Population	82,735	82,735	82,735
Total Population Change as a Percentage of Island County's 2013 Population	**0.8%**	**1.5%**	**0.8%**
Skagit County Impacts			
Number of Military Personnel and Dependents Expected to Reside in Skagit County	112	200	114
Skagit County's 2013 Population	128,249	128,249	128,249
Total Population Change as a Percentage of Skagit County's 2013 Population	**0.1%**	**0.2%**	**0.1%**

Source: Washington State Office of Financial Management, 2012

Notes:

1 All population impacts are calculated for 2021, the time when all transition activities have been completed. The current geographical distribution of the personnel stationed at and employed by the NAS Whidbey Island complex, as listed in Table 3.10-2, was used to forecast the expected geographic distribution of the Growler personnel by county.

2 Total population change also includes those military personnel and dependents who are expected to live outside of Island and Skagit Counties.

Economy, Employment, and Income Impacts

Implementation of Alternatives 1 through 3 would have the potential to impact the regional economy in two ways. First, any additional construction activity that is required to support the mission would have a short-term positive economic effect as these funds were injected into the regional economy. Secondly, there would be a positive, long-term economic impact on the regional economy as a result of the increased employment and payroll at the NAS Whidbey Island complex that is associated with each alternative. The impacts from construction would be one-time in nature, whereas the impacts from the increased employment and employee earnings would be annual and long term.

In order to quantify the total economic impact the proposed alternatives would have on the regional economy, the Navy used the Regional Input-Output Modeling System, designed by the U.S. Bureau of Economic Analysis. The multipliers utilized in this input-output model are based on regional information derived from databases analyzing commercial, industrial, and household spending patterns and relationships. These multipliers also estimate the potential number of jobs created or lost as a result of changes in earning and spending patterns. Both one-time, short-term construction-related economic impacts and annual, long-term operational spending impacts are discussed below.

Short-term Construction-related Impacts

Implementation of the proposed alternatives would necessitate the expenditure of different levels of construction funds to support the revised mission. At present time, detailed cost estimates for each alternative are not available. However, the Navy expects that the total construction costs would range between approximately $47.8 million and $122.5 million for each action alternative, depending on the facilities constructed.

This increase in construction spending would directly impact the regional economy by increasing employment and earnings in the construction industry. In addition, these construction expenditures would also have a positive indirect impact on the local economy.

As the new construction workers spend a portion of their payroll in the local area and construction companies purchase materials from local suppliers, the overall demand for local goods and services would expand. Revenues at local retail outlets and service providers would increase. As these local merchants respond to this increase in demand, they may in turn increase employment at their operations and/or purchase more goods and services from their providers. These new workers may then spend a portion of their income in the area, thus "multiplying" the positive economic impacts of the original injection of funds. These "multiplier" effects would continue until all of the original funds have left the regional economy through either taxes, savings, or purchases from outside the local area.

Table 4.10-3 shows the direct and indirect impacts from construction under both the low-cost estimate and under the high-cost estimate.

Table 4.10-3 Total Direct and Indirect Impacts Resulting from Construction Expenditures under Each Alternative at the NAS Whidbey Island Complex

	Low Cost Estimate	*High Cost Estimate*
Total Construction Expenditures	$47,800,000	$122,500,000
Change in Regional Output	$63,300,000	$162,300,000
Change in Value Added	$33,200,000	$85,100,000
Change in Employee Earnings	$18,000,000	$46,100,000
Change in Employment (jobs)	327	839

Source: Form DD 1391; U.S. Bureau of Economic Analysis, 2015

Because these construction costs represent one-time expenditures, the resulting positive economic impacts would last only a short time. Once these funds leave the regional economy through leakages such as savings, taxes, or through the purchase of goods and services from outside the region, these positive economic impacts would cease.

Long-term Employee Earnings and Spending Impacts

As described above, direct Navy employment at NAS Whidbey Island would expand by an additional 371 to 664 personnel under the three proposed alternatives compared to the No Action Alternative level. As additional income is injected into the regional economy through changes in the NAS Whidbey Island complex's payroll, employment and earnings in the regional economy would be expanded or be multiplied. Every additional job created at the NAS Whidbey Island complex would stimulate the regional economy and create more employment and business opportunities.

As more personnel are assigned to the NAS Whidbey Island complex, these new employees would spend a portion of their additional disposable income in the regional economy, and the profits and sales of local merchants would increase. These local merchants may, in turn, increase employment or increase output as a direct result of the additional demand for their goods and services. Thus, the positive economic impacts of the original injection of funds would be cycled back into the economy, repeating or multiplying the effect.

Table 4.10-4 summarizes projected changes in employment and payroll at the NAS Whidbey Island complex under each of the alternatives. Payroll expenditures were calculated for all additional to the area under each of the alternatives. The change in direct payroll for personnel stationed or employed at the NAS Whidbey Island complex is shown in Table 4.10-4. The alternatives would result in an increase in employee earnings in the region directly related to the military, ranging from approximately $14.3 million under Alternatives 1 and 3 to $23.5 million under Alternative 2.

Table 4.10-4 NAS Whidbey Island Complex Direct Employment and Employee Earnings Impacts Associated with Each Alternative Compared to the Affected Environment

	Total Employment	*Total Employee Earnings*
Alternative 1	371	$14,300,000
Alternative 2	664	$23,500,000
Alternative 3	377	$14,300,000

Socioeconomics Summary

Implementation of Alternatives 1 through 3 would have a positive economic effect on the regional economy. Construction activities under each alternative would generate positive, short-term direct and indirect economic impacts through an increase in construction employment and construction expenditures. The additional personnel stationed at the complex would generate positive long-term direct and indirect economic impacts through their additional payroll expenditures and the resulting increase in economic activity in the region.

Housing Impacts

All types of housing around the NAS Whidbey Island complex, including military-controlled housing, would experience an increase in demand as a result of the personnel changes associated with the proposed alternatives. However, nearly all these additional households are expected to reside off base. In May 2016, of the 1,495 Public Private Venture family housing units at the NAS Whidbey Island complex, less than 2 percent were vacant. In addition, less than 10 percent of the 1,625 bachelor enlisted quarters housing units were vacant in May 2016. No additional military-controlled housing is currently planned to be built as a result of the proposed alternatives; therefore, only a limited number of the newly assigned personnel would be able to reside on station (Switalski, 2016). For the purposes of this analysis, it has been assumed that all additional personnel would be required to seek accommodations in the private sector.

The relatively small change in personnel loading at the NAS Whidbey Island complex that would occur under any of the proposed alternatives compared to the No Action Alternative would have only a minor impact on the overall housing market in the two counties under all three alternatives. Implementation

of the proposed alternatives would result in 371 personnel, 664 personnel, and 377 personnel relocating to the region under Alternative 1, 2, and 3, respectively. If it is assumed that each additional personnel at the NAS Whidbey Island complex would bring his or her entire household and that each relocating household would require a housing unit, then between 371 and 664 additional housing units would be required under the three alternatives.

In 2015, a housing study completed for the NAS Whidbey Island complex found that there was a surplus of 591 acceptable family housing units in the area. In addition, in the communities located directly around the NAS Whidbey Island complex, a total of 2,545 housing units were vacant in 2013. These communities included Oak Harbor (850 vacant units), Coupeville (76 vacant units), Anacortes (670 vacant units), and Mount Vernon (949 vacant units) and counted both owner-occupied and rental-occupied housing (USCB, n.d.[e]). Therefore, if this number of units is still available in 2021, with the possible exception of Alternative 2, the local housing market should be able to accommodate the influx of households to the region with a moderate impact on the supply of housing in the region. However, if recent real estate market trends continue and fewer housing units are offered for sale or lease, Navy personnel may find it more difficult to acquire or lease housing.

Property Values

Aircraft noise could affect the value of property under the greater than 65 DNL noise contours. Economic studies have analyzed the impacts of noise on the sale price of properties and have discovered a correlation between noise and the sale price of properties.

The relationship between the price and noise is usually presented as the Noise Depreciation Index (NDI) or Noise Sensitivity Depreciation Index, both of which estimate the percent loss of value per dB (measured by the DNL metric). An early study by Nelson (1978) at three airports found an NDI of 1.8 to 2.3 percent per dB. Nelson also noted a decline in NDI over time, which he theorized could be due to either a change in population or the increase in commercial value of the property near airports. Crowley (1973) reached a similar conclusion. A larger study by Nelson (1980) looking at 18 airports found an NDI from 0.5 to 0.6 percent per dB.

In a review of property value studies, Newman and Beattie (1985) found a range of NDI from 0.2 to 2 percent per dB. They noted that many factors other than noise affected values.

Fidell et al. (1996) studied the influence of aircraft noise on actual sale prices of residential properties in the vicinity of a military base in Virginia and one in Arizona. They found no meaningful effect on home values. Their results may have been due to non-noise factors, especially given the wide differences in homes between the two study areas.

Recent studies of noise effects on property values have recognized the need to account for non-noise factors. Nelson (2004) analyzed data from 33 airports and discussed the need to account for those factors and the need for careful statistics. His analysis showed NDI from 0.3 to 1.5 percent per dB, with an average of about 0.65 percent per dB. Nelson (2007) and Andersson et al. (Andersson, Jonsson, and Ogren, 2013) discuss statistical modeling in more detail.

Enough data are available to conclude that aircraft noise has a real effect on property values. This effect falls in the range of 0.2 to 2.0 percent per dB, with the average on the order of 0.5 percent per dB. The actual value varies from location to location and is very often small compared to that of non-noise factors. 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.

Local Government Revenues and Expenditures

The increase of personnel at the NAS Whidbey Island complex would have a positive impact on the generation of tax revenues in Island and Skagit Counties and on the State of Washington as a whole under all three alternatives. Because the majority of the additional personnel currently do not reside in Washington or in Island or Skagit Counties, any taxes these individuals pay would represent a net increase in revenues for the state and local areas. Property tax and sales tax receipts would all increase as a direct result of the expanded regional economy.

Table 4.10-5 provides estimates of the increase in tax revenues resulting from changes in personnel loading at the NAS Whidbey Island complex for all three alternatives. Alternative 2, which is expected to have the largest impact in terms of tax generation, is expected to increase tax receipts in Island County by $421,000 and Skagit County by $239,000.

Table 4.10-5 Estimated Increase in Tax Revenues Resulting from the Changes in EA-18G Growler Personnel Loading at the NAS Whidbey Island Complex Compared to the Affected Environment Levels

	Change from Affected Environment		
	Alternative 1	***Alternative 2***	***Alternative 3***
Island County Impacts			
Number of Military Personnel and Dependents Expected to Reside in Island County	674	1,207	685
Per Capita Tax Contribution	$349	$349	$349
Estimated Increase in Tax Revenues	$235,000	$421,000	$239,000
Skagit County Impacts			
Number of Military Personnel and Dependents Expected to Reside in Skagit County	112	200	114
Per Capita Tax Contribution	$525	$525	$525
Estimated Increase in Tax Revenues	$59,000	$105,000	$60,000

Note:
[1] All population impacts are calculated for 2021, the time when all transition activities have been completed.

Community Services Impacts

Education

The anticipated personnel changes at the NAS Whidbey Island complex under each of the proposed alternatives are expected to increase the number of school-aged children living in the area. Assuming that all additional military personnel and their families stationed at the NAS Whidbey Island complex relocate to the area, a net increase in the population of school-aged children would occur under all three proposed alternatives (see Table 4.10-6). Total military-connected children and total military school-aged children were calculated utilizing Navy and DoD-wide statistics on the average number of children per active duty personnel and statistics on the typical age distribution of children throughout the Navy (DoD, n.d.).

The enrollment gains attributable to military school-aged dependents are expected to be concentrated in schools with a history of high enrollment by students who are affiliated with the NAS Whidbey Island complex. If the geographical distribution of the relocating military families is similar to the geographical distribution of military families currently stationed at the NAS Whidbey Island complex, then the vast majority of these additional students would attend the schools in the Oak Harbor School District. Table 4.10-6 shows the distribution of school-aged children by district for each alternative.

Table 4.10-6 Projected Number of School-aged Children Relocating to the Region as a Result of Changes in EA-18G Growler Personnel Loading at NAS Whidbey Island Compared to the No Action Alternative Levels

	Change from No Action Alternative		
	Alternative 1	***Alternative 2***	***Alternative 3***
Military Personnel	371	664	377
Total Military-connected Children (ages 0 to 22 residing with Navy personnel)	318	568	323
Total Military School-aged Children (ages 5 to 18)	191	341	195
Oak Harbor School District	135	242	138
Coupeville School District	11	20	11
Anacortes School District	15	26	15
All Other Districts	30	53	31

Source: DoD, n.d.

Note: Totals may not sum due to rounding.

In addition, given the demographic characteristics of Navy personnel, the majority of these school-aged children would be elementary-school-aged. According Navy-wide statistics, elementary-school-aged dependents account for approximately 62.8 percent of all Navy school children. Middle-school- and high-school-aged students are less common and account each for only 18.6 percent of all Navy school children (DoD, n.d.).

The increase in "federally connected students" attending local district schools would result in a corresponding increase in federal impact aid received by the district. However, federal impact aid typically does not cover the full per-pupil costs experienced by the district and has been declining over time.

Given the relatively few additional students expected to attend the Coupeville School District or the Anacortes School District, only minor impacts are expected to occur to these districts. However, given the serious overcrowding issues already facing the Oak Harbor School District, the potential increase of between 135 and 242 additional students would further exacerbate the overcrowding problem and have a significant adverse impact on the district. Table 4.10-7 shows the expected enrollment gains at Oak Harbor School District by type of school and by alternative. Under the alternative with the maximum impact (Alternative 2), an additional 242 students could relocate to the district, including 153 elementary students (grades Kindergarten through 5); 45 middle school students (grades 6 through 8); and 44 high school students (grades 9 through 12). The majority of the additional students would be elementary-school-aged, further skewing the district's enrollment in favor of the younger grades.

Additional schools would need to be built, additional portable classrooms would have to be purchased, and/or additional reconfiguring of the district's schools would have to occur to accommodate these students. Additional staff would also be required to handle the increase in enrollment. Because state aid and federal impact aid has been at a static or declining per-pupil level, additional local funding sources would likely be required to finance the additional expenditures, if present programing is to be maintained.

Table 4.10-7 Projected Number of School-aged Children Enrolling in the Oak Harbor School District as Result of Changes in EA-18G Growler Personnel Loading at NAS Whidbey Island Compared to the No Action Alternatives Levels

	Change from No Action Alternative		
	Alternative 1	***Alternative 2***	***Alternative 3***
Total Change in Enrollment	135	242	138
Elementary School (K-5th)	85	153	87
Middle School (6th-8th)	25	45	26
High School (9th-12th)	25	44	25

Source: DoD, n.d.

Note: Totals may not sum due to rounding.

Medical Services

The proposed relocation of Growler squadrons under all three alternatives is not anticipated to negatively impact the provision of medical services at either the NAS Whidbey Island complex or in the region as a whole.

Implementation of Alternative 1, 2, or 3 is expected to have only a minimal impact on the Naval Hospital Oak Harbor. Some additional demand for services from Naval Hospital Oak Harbor would occur under each alternative as active duty personnel and their dependents would be eligible for treatment at the facility. Some additional hiring and billet changes may be required to meet the expected influx of additional patients; however, this increase is not expected to be substantial. All active duty personnel would be covered by additional squadron assets such as unit flight surgeons and would, therefore, not place an additional patient load on existing personnel at Naval Hospital Oak Harbor. In addition, a facilities modernization program is planned for FY 17 that would improve flow and access to care throughout the hospital (Rose, 2016).

Given the large coverage area served by the regional medical facilities and the relative infrequency with which these facilities are typically utilized by an individual, the minor increase in the populations served associated with the action alternatives would have only a negligible impact on the provision of these services. Existing medical facilities in the local community are anticipated to be adequate to serve the relocating military personnel and their dependents regardless of the alternative selected.

Fire and Emergency Services

No impacts are expected to occur to the Navy Region Northwest Fire and Emergency Services department at NAS Whidbey Island as a result of implementation of any of the three alternatives. With the addition of the Growlers to the NAS Whidbey Island complex, Ault Field would remain a Type 2 airfield; therefore, staff, facilities, and apparatus needs are expected to remain unchanged. No impacts

to response time are anticipated as a result of the additional growth and new construction (Merrill, 2016).

The increase in population in the City of Oak Harbor or the Town of Coupeville is expected to have only a minimal impact on the provision of fire and emergency services in the communities under any of the three alternatives. In 2014, the Oak Harbor Fire Department responded to 68 calls for assistance due to fires and 546 calls for assistance due to emergency medical service (EMS)/rescue incidents, while serving a city population of an estimated 22,178 residents (Oak Harbor Fire Department, 2015). This equates to answering approximately three fire calls for every 1,000 residents and 24 EMS/rescue calls per 1,000 residents per year.

Implementation of Alternative 2, the alternative with the maximum population impacts, is anticipated to increase total population in the City of Oak Harbor by 1,028 residents and the Town of Coupeville by 39 residents. Assuming that these ratios of incidents to population remain constant, implementation of Alternative 2 could potentially result in an additional three fire calls and 72 EMS/rescue calls per year for the Oak Harbor Fire Department and no fire calls and only one additional EMS/rescue call per year in the Town of Coupeville.

While the additional population under any of these alternatives would increase the demand for fire and emergency services, this increase is not expected to be substantial. Additional tax revenues that would be paid by the relocating households and the additional tax revenues that would be generated by the increased economic activity associated with the construction and operations on station could be used to offset any additional increased expenditures associated with the additional demand for fire and emergency services.

Police Protection

The relocation of Growler aircraft squadrons and associated personnel positions to the NAS Whidbey Island complex is not anticipated to significantly impact Oak Harbor's or Coupeville's ability to provide adequate police protection to its residents under any of the three alternatives. The City of Oak Harbor currently has approximately 1.7 police officers per 1,000 residents. Even under the alternative with the maximum population impact (Alternative 2), this ratio is not expected to change as a result of the projected influx of residents associated with the proposed relocation. The Town of Coupeville currently has approximately 2.5 police officers per 1,000 residents. Under Alternative 2 (the maximum population impact), this ratio would decline slightly to 2.4 police officers per 1,000.

However, if a portion of the additional tax revenues that would be paid by the relocating households and the additional tax revenues that would be generated by the increased economic activity associated with the construction and operations on station were used to hire more police officers and offset any additional increased expenditures needed, a similar level of police protection could continue to be provided.

Conclusion

The Proposed Action would have negligible to minor to moderate impacts on the local and regional population, housing market, and local government finances. The action alternatives would have moderate short-term positive impact and a minor positive long-term impact on the local and regional economy. Employment and earnings would increase under all three alternatives. The provision of medical services and fire and rescue services and police protection are not expected to be significantly impacted. The Oak Harbor School District would receive a significant adverse impact under the

proposed alternatives, with the majority of the school-aged military dependents expected to attend schools in that district. Elementary schools in the Oak Harbor School District would experience the greatest impact under all three alternatives. Impacts on socioeconomic resources are dependent on the number of personnel and amount of construction and not on the number and/or location of aircraft operations; therefore, there would be no difference in impacts between scenarios or between average year and high-tempo FCLP year conditions.

4.11 Environmental Justice

Environmental Justice

No disproportionately high and adverse human health or environmental effects to minority or low-income populations are expected to occur under any of the alternatives/scenarios.

This section identifies the existence of environmental justice communities (i.e., minority or low-income populations) impacted by the Proposed Action and determines whether impacts on these communities are disproportionately high and adverse. This section is organized as follows: Section 4.11, general methodology and identifying environmental justice communities in affected census block groups; Section 4.11.1, identifying environmental justice communities and identifying disproportionately and high adverse impacts under the No Action Alternative; Section 4.11.2, identifying environmental justice communities and identifying disproportionately high and adverse impacts under Alternatives 1 through 3.

Methodology

This analysis focuses on the potential for a disproportionate and adverse exposure of specific off-station population groups to the projected adverse consequences discussed in the previous sections of this chapter. As described in previous sections, noise impacts are expected to be the primary negative environmental and human health impact associated with the Proposed Action. Other adverse human health and environmental consequences of the Proposed Action include an increased safety risk associated with the additional aircraft operations and new APZs located around OLF Coupeville and the potential negative impacts to the pupils at the Oak Harbor School District caused by the projected influx of additional students to the district.

Due to the importance of the potential noise impacts, the study area for the environmental justice analysis has been defined as the census block groups that either fully or partially fall beneath the modeled dB DNL contours for each scenario under each alternative. This study area also encompasses all areas under the new and existing APZs and Ault Field and OLF Coupeville. Additionally, the majority of the Oak Harbor School District falls within the greater than 65 dB DNL noise contours.

Identifying Environmental Justice Communities

In order to assess the impacts to minority and low-income communities, the Navy must first identify whether there are any areas of minority and low-income populations that may experience disproportionately high and adverse impacts from the Proposed Action. These environmental justice communities are determined by analyzing the demographic and economic characteristics of the affected area and comparing those to the characteristics of the larger community as a whole. This larger community is known as the community of comparison.

Environmental justice communities are identified by comparing population characteristics from all the census block groups with the community of comparison—in this case, the county within which the census block groups are located. Minority populations of concern (environmental justice communities) are identified where the minority population of the affected area exceeds 50 percent or the minority population percentage of the affected area is "meaningfully greater" than the minority population percentage in the general population or other comparison group. For the purposes of this environmental justice analysis, "meaningfully greater" has been defined as where the minority population percentage within a census block group is 15 percent or more than the community of comparison (county percentage of minorities). Low-income environmental justice communities are

defined as census block groups where the percentage of the population considered to be low income is greater than (or equal to) the percentage of the general population with low incomes in the community of comparison.

The dB DNL noise contours extend into Jefferson and San Juan Counties; however, no permanent residences are located within these dB DNL contours; therefore, these counties have been excluded from this analysis. In addition, any census block groups that exist solely over water are excluded from this analysis.

To simplify the analysis, demographic and economic statistics for Island County were used as the community of comparison for all areas within the greater than 65 dB DNL contours, including those areas that fell within Skagit County, because approximately 99.7 percent of all residents impacted by the greater than 65 dB DNL contours reside in Island County, while no more than 0.3 percent of these residents (or 38 persons) reside in Skagit County. Additionally, Island County has a smaller percentage of minority, Hispanic or Latino, and low-income residents than Skagit County, making the analysis more conservative by utilizing Island County data.

Table 4.11-1 provides demographic and economic data for all of the census block groups either wholly or partially impacted by the greater than 65 dB DNL noise contours. To further refine the analysis and to estimate the actual number of minority and low-income residents affected by each of the dB DNL contours, the dB DNL contours were overlaid onto mapped U.S. Census Bureau 2010 population and demographic data to calculate the total affected area within each census block. See Figure 3.11-1 for the location of the census tracts and census block groups. The percent area of the census block covered by the dB DNL contour range was applied to the population of that census block to estimate the population within the dB DNL contour range. A 5.4-percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period, thereby calculating the total affected population for each alternative and scenario, including the No Action Alternative (Washington State Office of Financial Management, 2012).

Demographic characteristics of the corresponding census block groups were then compared to the total affected population number to estimate the total minority, Hispanic or Latino, and low-income populations impacted by each dB DNL contour for each alternative and scenario. These calculations assume an even distribution of the population across the census block and census block groups, and they exclude populations on military properties within the dB DNL contours.

Cells in Table 4.11-1 (and in subsequent tables throughout this section) that are shaded identify census blocks where an environmental justice community exists based on thresholds defined in Section 3.11. Appendix F provides data on potential environmental justice issues under the high-tempo FCLP year conditions.

Tables 4.11-2 through 4.11-11 (see Section 4.11.2) present estimates of the affected minority, Hispanic or Latino, and low-income populations under each dB DNL contour for each alternative and scenario, for the average year.

Demographic data from the U.S. Census Bureau's 2010 Census of Population and Housing were used throughout this analysis. This data source is the most current available that provides demographic detail to the block level. Some changes in the geographical distribution of environmental justice communities may occur between 2010 and the 2021; however, at this point, it is impossible to forecast these changes. Therefore, this analysis assumes that there would be no change in the geographical distribution of environmental justice communities between 2010 and 2021.

4.11.1 Environmental Justice, No Action Alternative

Under the No Action Alternative, no change in the aircraft or personnel loadings at the NAS Whidbey Island complex would occur compared to current conditions. Therefore, no additional environmental or human health impacts would be associated with the implementation of the No Action Alternative. Table 4.11-2 shows the demographic and economic characteristics of the population that currently resides under the greater than 65 dB DNL contours for Ault Field and OLF Coupeville. Total population estimates have been revised to reflect an expected 5.4-percent increase in total population in Island County between 2010 and 2020.

4.11.2 Environmental Justice, Alternatives 1 through 3

4.11.2.1 Environmental Justice Potential Impacts

As indicated above, Tables 4.11-3 through 4.11-11 present estimates of the affected minority, Hispanic or Latino, and low-income populations within each dB DNL contour under each alternative and scenario, for the average year. The shaded cells indicate the alternatives/scenarios that contain percentages of minority or Hispanic/Latino populations that are "meaningfully greater" than those in the community of comparison, which is the percentage of minority populations in Island County, and where the low-income population is equal to or greater than the percentage of residents with low incomes in the community of comparison. These calculations allow the Navy to determine the minority and/or low-income populations impacted by each alternative and scenario.

Under all alternatives/scenarios, there are minority populations and low-income populations living within the affected environment. Likewise, under the high-tempo FCLP year, there are minority populations and low-income populations under all alternatives/scenarios (see Appendix F).

Table 4.11-1 Minority, Hispanic or Latino, and Low-Income Populations in Census Block Groups Underlying Ault Field and OLF Coupevile dB DNL Contours* for All Alternatives and Scenarios, Average Year

Census Block Group	*Total Population*[1]	*Percent Population Total Minority*[2]	*Percent Population Hispanic or Latino*[3]	*Percent Population Below Poverty Level*[4]
Island County	***78,506***	***13.9%***	***5.5%***	***8.0%***
Block Group 1, Census Tract 9701	1,102	16.5%**	4.3%	14.1%
Block Group 2, Census Tract 9701	1,502	11.3%	3.5%	14.1%
Block Group 1, Census Tract 9702	1,633	27.9%	12.8%	23.4%
Block Group 1, Census Tract 9703	791	20.7%	9.4%	4.4%
Block Group 2, Census Tract 9703	1,203	10.4%	8.5%	4.4%
Block Group 3, Census Tract 9703	1,044	11.0%	4.4%	4.4%
Block Group 1, Census Tract 9704	951	30.5%	14.2%	8.6%
Block Group 2, Census Tract 9704	2,256	27.2%	8.5%	8.6%
Block Group 1, Census Tract 9706.01	1,299	36.1%	9.9%	11.2%
Block Group 2, Census Tract 9706.01	981	27.8%	6.6%	11.2%
Block Group 3, Census Tract 9706.01	906	30.7%	11.9%	11.2%
Block Group 1, Census Tract 9707	1,111	23.5%	9.3%	9.5%
Block Group 1, Census Tract 9708	1,484	22.0%	6.7%	8.7%
Block Group 1, Census Tract 9710	1,470	10.1%	4.7%	6.3%
Block Group 1, Census Tract 9711	2,019	11.2%	7.3%	2.9%
Block Group 2, Census Tract 9711	1,270	6.1%	2.4%	2.9%
Block Group 3, Census Tract 9713	1,762	4.3%	3.5%	6.8%
Skagit County	***116,901***	***16.6%***	***16.9%***	***11.7%***
Block Group 1, Census Tract 9403	1,174	4.4%	3.4%	6.2%
Block Group 1, Census Tract 9408	2,278	31.0%	2.2%	18.2%
Block Group 2, Census Tract 9521	658	10.3%	10.0%	9.1%
Block Group 3, Census Tract 9527	906	10.6%	12.9%	7.3%

Table 4.11-1 Minority, Hispanic or Latino, and Low-Income Populations in Census Block Groups Underlying Ault Field and OLF Coupevile dB DNL Contours* for All Alternatives and Scenarios, Average Year

Census Block Group	*Total Population*[1]	*Percent Population Total Minority*[2]	*Percent Population Hispanic or Latino*[3]	*Percent Population Below Poverty Level*[4]

Sources: USCB 2012a, 2012b, 2012c, 2012d, n.d.[a], n.d.[b], n.d.[c]

Notes:

[1] Total population for each affected census block group is the total 2010 population for the entire census block group as reported by the U.S. Census Bureau. These numbers may be greater than the total number of residents affected by the dB DNL contours because in many instances only a portion of the census block group falls under the dB DNL contours.

[2] Minority is defined as individuals who are members of the following population groups: American Indian or Alaska Native; Asian; Native Hawaiian or Pacific Islander; or Black or African American.

[3] Hispanic or Latino population is defined as individuals who self-identify as belonging to this ethnic group in U.S. Census surveys. This population definition is based on ethnicity and not race.

[4] The analysis relied on poverty data from the 2006-2010 American Community Survey 5-Year Estimates because the U.S. Census Bureau no longer reports poverty data in the decennial census. The American Community Survey does not estimate data at the census block group level; therefore, the percent of the population below the poverty level is displayed in this table at the census tract level, and block groups within the same census tract will report the same value.

* dB DNL contours extend into Jefferson and San Juan Counties; however, because no permanent residences are located within these dB DNL contours, these counties have been excluded from the analysis. Populations on military properties within the dB DNL contours (NAS Whidbey Island [Ault Field], the Seaplane Base, and OLF Coupeville) have also been excluded from the analysis.

** Shaded cells identify census block groups with a "meaningfully greater" percentage of a minority population than the community of comparison (i.e., the county within which the census block group is located) or the percentage of the population considered to be low income in the census block is greater than (or equal to) the percentage considered low income in the community of comparison. For this analysis, "meaningfully greater" is defined as demographic or economic statistics that differ by more than 15 percent from those of the community of comparison.

Table 4.11-2 Environmental Justice Populations at NAS Whidbey Island Complex under the No Action Alternative, Average Year

*dB DNL Contours**	*Total Affected Population*	*Total Minority Population[1]*	*Percent Minority*	*Total Hispanic or Latino Origin[2]*	*Percent Hispanic or Latino Origin*	*Total Low Income Population[3]*	*Percent Low-Income*
65-70 dB DNL	3,875	786	20.3%	285	7.4%	292	7.5%
70-75 dB DNL	3,165	612	19.3%	254	8.0%	222	7.0%
75+ dB DNL	3,993	604	15.1%	270	6.8%	340	8.5%
Total Affected Population[4]* **	**11,033**	**2,002**	**18.1%**	**809**	**7.3%**	**854**	**7.7%**

Sources: USCB 2012a, 2012b, 2012c, 2012d, n.d.[a], n.d.[b], n.d.[c]

Notes:

[1] Minority is defined as individuals who are members of the following population groups: American Indian or Alaska Native; Asian; Native Hawaiian or Pacific Islander; or Black or African American.

[2] Hispanic or Latino population is defined as individuals who self-identify as belonging to this ethnic group in U.S. Census surveys. This population definition is based on ethnicity and not race.

[3] The analysis relied on poverty data from the 2006-2010 American Community Survey 5-Year Estimates because the U.S. Census Bureau no longer reports poverty data in the decennial census. The American Community Survey does not estimate data at the census block group level; therefore, the percentage of the population below the poverty level is displayed in this table at the census tract level. Consequently, block groups within the same census tract will report the same value.

[4] Due to rounding, some totals may not sum.

* dB DNL contours extend into Jefferson and San Juan Counties; however, because no permanent residences are located within these dB DNL contours, these counties have been excluded from the analysis. Populations on military properties within the dB DNL contours (NAS Whidbey Island [Ault Field], the Seaplane Base, and OLF Coupeville) have also been excluded from the analysis.

** The shaded cells indicate the alternatives/scenarios that contain percentages of minority or Hispanic/Latino populations that are "meaningfully greater" than those in Island County as a whole or that contain percentages of low-income populations that are greater than (or equal to) those in Island County. These shaded cells indicate where environmental justice communities have been identified based upon the indicated thresholds.

*** All population estimates for areas under the dB DNL contours utilized 2010 U.S. Census Bureau data. A 5.4-percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period (Washington State Office of Financial Management, 2012).

Key:
dB DNL = day-night average sound level in decibels

Table 4.11-3 Environmental Justice Populations at NAS Whidbey Island Complex under Alternative 1, Scenario A, Average Year

*dB DNL Contours**	*Total Affected Population*	*Total Minority Population*[1]	*Percent Minority*	*Total Hispanic or Latino Origin*[2]	*Percent Hispanic or Latino Origin*	*Total Low Income Population*[3]	*Percent Low-Income*
No Action Alternative							
65-70 dB DNL	3,875	786	20.3%	285	7.4%	292	7.5%
70-75 dB DNL	3,165	612	19.3%	254	8.0%	222	7.0%
75+ dB DNL	3,993	604	15.1%	270	6.8%	340	8.5%
Total Affected Population	**11,033**	**2,002**	**18.1%**	**809**	**7.3%**	**854**	**7.7%**
Alternative 1A							
65-70 dB DNL	4,250	898	21.1%**	325	7.6%	346	8.1%
70-75 dB DNL	2,967	549	18.5%	218	7.3%	208	7.0%
75+ dB DNL	5,574	730	13.1%	346	6.2%	386	6.9%
Total Affected Population	**12,791**	**2,177**	**17.0%**	**889**	**7.0%**	**940**	**7.3%**
Population Change from No Action Alternative							
65-70 dB DNL	375	112	-	40	-	54	-
70-75 dB DNL	-198	-63	-	-36	-	-14	-
75+ dB DNL	1,581	126	-	76	-	46	-
Population Change from No Action Alternative[4***]	**1,758**	**175**	**10.0%**	**80**	**4.6%**	**86**	**4.9%**

Sources: USCB 2012a, 2012b, 2012c, 2012d, n.d.[a], n.d.[b], n.d.[c]

Notes:

1 Minority is defined as individuals who are members of the following population groups: American Indian or Alaska Native; Asian; Native Hawaiian or Pacific Islander; or Black or African American.

2 Hispanic or Latino population is defined as individuals who self-identify as belonging to this ethnic group in U.S. Census surveys. This population definition is based on ethnicity and not race.

3 The analysis relied on poverty data from the 2006-2010 American Community Survey 5-Year Estimates because the U.S. Census Bureau no longer reports poverty data in the decennial census. The American Community Survey does not estimate data at the census block group level; therefore, the percentage of the population below the poverty level is displayed in this table at the census tract level. Consequently, block groups within the same census tract will report the same value.

4 Due to rounding, some totals may not sum.

* dB DNL contours extend into Jefferson and San Juan Counties; however, because no permanent residences are located within these dB DNL contours, these counties have been excluded from the analysis. Populations on military properties within the dB DNL contours (NAS Whidbey Island [Ault Field], the Seaplane Base, and OLF Coupeville) have also been excluded from the analysis.

** The shaded cells indicate the alternatives/scenarios that contain percentages of minority or Hispanic/Latino populations that are "meaningfully greater" than those in Island County as a whole or that contain percentages of low-income populations that are greater than (or equal to) those in in Island County. These shaded cells indicate where environmental justice communities have been identified based upon the indicated thresholds.

*** All population estimates for areas under the dB DNL contours utilized 2010 U.S. Census Bureau data. A 5.4-percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period (Washington State Office of Financial Management, 2012).

Key:
dB DNL = day-night average sound level in decibels

Table 4.11-4 Environmental Justice Populations at NAS Whidbey Island Complex under Alternative 1, Scenario B, Average Year

*dB DNL Contours**	*Total Affected Population*	*Total Minority Population*[1]	*Percent Minority*	*Total Hispanic or Latino Origin*[2]	*Percent Hispanic or Latino Origin*	*Total Low Income Population*[3]	*Percent Low-Income*
No Action Alternative							
65-70 dB DNL	3,875	786	20.3%	285	7.4%	292	7.5%
70-75 dB DNL	3,165	612	19.3%	254	8.0%	222	7.0%
75+ dB DNL	3,993	604	15.1%	270	6.8%	340	8.5%
Total Affected Population	**11,033**	**2,002**	**18.1%**	**809**	**7.3%**	**854**	**7.7%**
Alternative 1B							
65-70 dB DNL	4,289	958	22.3%**	330	7.7%	359	8.4%
70-75 dB DNL	3,515	656	18.7%	261	7.4%	239	6.8%
75+ dB DNL	5,495	777	14.1%	358	6.5%	407	7.4%
Total Affected Population	**13,299**	**2,391**	**18.0%**	**949**	**7.1%**	**1,005**	**7.6%**
Population Change from No Action Alternative							
65-70 dB DNL	414	172	-	45	-	67	-
70-75 dB DNL	350	44	-	7	-	17	-
75+ dB DNL	1,502	173	-	88	-	67	-
Population Change from No Action Alternative[4]***	**2,266**	**389**	**17.2%**	**140**	**6.2%**	**151**	**6.7%**

Sources: USCB, 2012a, 2012b, 2012c, 2012d, n.d.[a], n.d.[b], n.d.[c]

Notes:

[1] Minority is defined as individuals who are members of the following population groups: American Indian or Alaska Native; Asian; Native Hawaiian or Pacific Islander; or Black or African American.

[2] Hispanic or Latino population is defined as individuals who self-identify as belonging to this ethnic group in U.S. Census surveys. This population definition is based on ethnicity and not race.

[3] The analysis relied on poverty data from the 2006-2010 American Community Survey 5-Year Estimates because the U.S. Census Bureau no longer reports poverty data in the decennial census. The American Community Survey does not estimate data at the census block group level; therefore, the percent of the population below the poverty level is displayed in this table at the census tract level, and block groups within the same census tract will report the same value.

[4] Due to rounding, some totals may not sum.

* dB DNL contours extend into Jefferson and San Juan Counties; however, because no permanent residences are located within these dB DNL contours, these counties have been excluded from the analysis. Populations on military properties within the dB DNL contours (NAS Whidbey Island [Ault Field], the Seaplane Base, and OLF Coupeville) have also been excluded from the analysis.

** The shaded cells indicate the alternatives/scenarios that contain percentages of minority or Hispanic/Latino populations that are "meaningfully greater" than those in Island County as a whole or that contain percentages of low-income populations that are greater than (or equal to) those in Island County. These shaded cells indicate where environmental justice communities have been identified based upon the indicated thresholds.

*** All population estimates for areas under the dB DNL contours utilized 2010 U.S. Census Bureau data. A 5.4-percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period (Washington State Office of Financial Management, 2012).

Key:
dB DNL = day-night average sound level in decibels

Table 4.11-5 Environmental Justice Populations at NAS Whidbey Island Complex under Alternative 1, Scenario C, Average Year

*dB DNL Contours**	*Total Affected Population*	*Total Minority Population[1]*	*Percent Minority*	*Total Hispanic or Latino Origin[2]*	*Percent Hispanic or Latino Origin*	*Total Low Income Population[3]*	*Percent Low-Income*
No Action Alternative							
65-70 dB DNL	3,875	786	20.3%	285	7.4%	292	7.5%
70-75 dB DNL	3,165	612	19.3%	254	8.0%	222	7.0%
75+ dB DNL	3,993	604	15.1%	270	6.8%	340	8.5%
Total Affected Population	**11,033**	**2,002**	**18.1%**	**809**	**7.3%**	**854**	**7.7%**
Alternative 1C							
65-70 dB DNL	5,095	1,093	21.5%**	382	7.5%	399	7.8%
70-75 dB DNL	3,424	645	18.8%	259	7.6%	232	6.8%
75+ dB DNL	5,028	781	15.5%	343	6.8%	417	8.3%
Total Affected Population	**13,547**	**2,519**	**18.6%**	**984**	**7.3%**	**1,048**	**7.7%**
Population Change from No Action Alternative							
65-70 dB DNL	1,220	307	-	97	-	107	-
70-75 dB DNL	259	33	-	5	-	10	-
75+ dB DNL	1,035	177	-	73	-	77	-
Population Change from No Action Alternative[4]* **	**2,514**	**517**	**20.6%**	**175**	**7.0%**	**194**	**7.7%**

Sources: USCB 2012a, 2012b, 2012c, 2012d, n.d.[a], n.d.[b], n.d.[c]

Notes:

[1] Minority is defined as individuals who are members of the following population groups: American Indian or Alaska Native; Asian; Native Hawaiian or Pacific Islander; or Black or African American.

[2] Hispanic or Latino population is defined as individuals who self-identify as belonging to this ethnic group in U.S. Census surveys. This population definition is based on ethnicity and not race.

[3] The analysis relied on poverty data from the 2006-2010 American Community Survey 5-Year Estimates because the U.S. Census Bureau no longer reports poverty data in the decennial census. The American Community Survey does not estimate data at the census block group level; therefore, the percent of the population below the poverty level is displayed in this table at the census tract level, and block groups within the same census tract will report the same value.

[4] Due to rounding, some totals may not sum.

* dB DNL contours extend into Jefferson and San Juan Counties; however, because no permanent residences are located within these dB DNL contours, these counties have been excluded from the analysis. Populations on military properties within the dB DNL contours (NAS Whidbey Island [Ault Field], the Seaplane Base, and OLF Coupeville) have also been excluded from the analysis.

** The shaded cells indicate the alternatives/scenarios that contain percentages of minority or Hispanic/Latino populations that are "meaningfully greater" than those in Island County as a whole or that contain percentages of low-income populations that are greater than (or equal to) those in Island County. These shaded cells indicate where environmental justice communities have been identified based upon the indicated thresholds.

*** All population estimates for areas under the dB DNL contours utilized 2010 U.S. Census Bureau data. A 5.4-percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period (Washington State Office of Financial Management, 2012).

Key:
dB DNL = day-night average sound level in decibels

Table 4.11-6 Environmental Justice Populations at NAS Whidbey Island Complex under the Alternative 2, Scenario A, Average Year

*dB DNL Contours**	*Total Affected Population*	*Total Minority Population*[1]	*Percent Minority*	*Total Hispanic or Latino Origin*[2]	*Percent Hispanic or Latino Origin*	*Total Low Income Population*[3]	*Percent Low-Income*
No Action Alternative							
65-70 dB DNL	3,875	786	20.3%	285	7.4%	292	7.5%
70-75 dB DNL	3,165	612	19.3%	254	8.0%	222	7.0%
75+ dB DNL	3,993	604	15.1%	270	6.8%	340	8.5%
Total Affected Population	**11,033**	**2,002**	**18.1%**	**809**	**7.3%**	**854**	**7.7%**
Alternative 2A							
65-70 dB DNL	4,209	892	21.2%**	323	7.7%	342	8.1%
70-75 dB DNL	3,003	547	18.2%	219	7.3%	208	6.9%
75+ dB DNL	5,472	720	13.2%	340	6.2%	382	7.0%
Total Affected Population	**12,684**	**2,159**	**17.0%**	**882**	**7.0%**	**932**	**7.3%**
Population Change from No Action Alternative							
65-70 dB DNL	334	106	-	38	-	50	-
70-75 dB DNL	-162	-65	-	-35	-	-14	-
75+ dB DNL	1,479	116	-	70	-	42	-
Population Change from No Action Alternative[4]***	**1,651**	**157**	**9.5%**	**73**	**4.4%**	**78**	**4.7%**

Sources: USCB 2012a, 2012b, 2012c, 2012d, n.d.[a], n.d.[b], n.d.[c]

Notes:

1 Minority is defined as individuals who are members of the following population groups: American Indian or Alaska Native; Asian; Native Hawaiian or Pacific Islander; or Black or African American.

2 Hispanic or Latino population is defined as individuals who self-identify as belonging to this ethnic group in U.S. Census surveys. This population definition is based on ethnicity and not race.

3 The analysis relied on poverty data from the 2006-2010 American Community Survey 5-Year Estimates because the U.S. Census Bureau no longer reports poverty data in the decennial census. The American Community Survey does not estimate data at the census block group level; therefore, the percentage of the population below the poverty level is displayed in this table at the census tract level, and block groups within the same census tract will report the same value.

4 Due to rounding, some totals may not sum.

* dB DNL contours extend into Jefferson and San Juan Counties; however, because no permanent residences are located within these dB DNL contours, these counties have been excluded from the analysis. Populations on military properties within the dB DNL contours (NAS Whidbey Island [Ault Field], the Seaplane Base, and OLF Coupeville) have also been excluded from the analysis.

** The shaded cells indicate the alternatives/scenarios that contain percentages of minority or Hispanic/Latino populations that are "meaningfully greater" than those in Island County as a whole or that contain percentages of low-income populations that are greater than (or equal to) those in Island County. These shaded cells indicate where environmental justice communities have been identified based upon the indicated thresholds.

*** All population estimates for areas under the dB DNL contours utilized 2010 U.S. Census Bureau data. A 5.4-percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period (Washington State Office of Financial Management, 2012).

Key:
dB DNL = day-night average sound level in decibels

Table 4.11-7 Environmental Justice Populations at NAS Whidbey Island under the Alternative 2, Scenario B, Average Year

*dB DNL Contours**	*Total Affected Population*	*Total Minority Population*[1]	*Percent Minority*	*Total Hispanic or Latino Origin*[2]	*Percent Hispanic or Latino Origin*	*Total Low Income Population*[3]	*Percent Low-Income*
No Action Alternative							
65-70 dB DNL	3,875	786	20.3%	285	7.4%	292	7.5%
70-75 dB DNL	3,165	612	19.3%	254	8.0%	222	7.0%
75+ dB DNL	3,993	604	15.1%	270	6.8%	340	8.5%
Total Affected Population	**11,033**	**2,002**	**18.1%**	**809**	**7.3%**	**854**	**7.7%**
Alternative 2B							
65-70 dB DNL	4,255	948	22.3%**	327	7.7%	355	8.3%
70-75 dB DNL	3,545	657	18.5%	263	7.4%	239	6.7%
75+ dB DNL	5,378	764	14.2%	352	6.5%	402	7.5%
Total Affected Population	**13,178**	**2,369**	**18.0%**	**942**	**7.1%**	**996**	**7.6%**
Population Change from No Action Alternative							
65-70 dB DNL	380	162	-	42	-	63	-
70-75 dB DNL	380	45	-	9	-	17	-
75+ dB DNL	1,385	160	-	82	-	62	-
Population Change from No Action Alternative[4]***	**2,145**	**367**	**17.1%**	**133**	**6.2%**	**142**	**6.6%**

Sources: USCB, 2012a, 2012b, 2012c, 2012d, n.d.[a], n.d.[b], n.d.[c]

Notes:

[1] Minority is defined as individuals who are members of the following population groups: American Indian or Alaska Native; Asian; Native Hawaiian or Pacific Islander; or Black or African American.

[2] Hispanic or Latino population is defined as individuals who self-identify as belonging to this ethnic group in U.S. Census surveys. This population definition is based on ethnicity and not race.

[3] The analysis relied on poverty data from the 2006-2010 American Community Survey 5-Year Estimates because the U.S. Census Bureau no longer reports poverty data in the decennial census. The American Community Survey does not estimate data at the census block group level; therefore, the percent of the population below the poverty level is displayed in this table at the census tract level, and block groups within the same census tract will report the same value.

[4] Due to rounding, some totals may not sum.

* dB DNL contours extend into Jefferson and San Juan Counties; however, because no permanent residences are located within these dB DNL contours, these counties have been excluded from the analysis. Populations on military properties within the dB DNL contours (NAS Whidbey Island [Ault Field], the Seaplane Base, and OLF Coupeville) have also been excluded from the analysis.

** The shaded cells indicate the alternatives/scenarios that contain percentages of minority or Hispanic/Latino populations that are "meaningfully greater" than those in Island County as a whole or that contain percentages of low-income populations that are greater than (or equal to) those in Island County. These shaded cells indicate where environmental justice communities have been identified based upon the indicated thresholds.

*** All population estimates for areas under the dB DNL contours utilized 2010 U.S. Census Bureau data. A 5.4-percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period (Washington State Office of Financial Management, 2012).

Key:
dB DNL = day-night average sound level in decibels

Table 4.11-8 Environmental Justice Populations at NAS Whibdey Island Complex under Alternative 2, Scenario C, Average Year

*dB DNL Contours**	*Total Affected Population*	*Total Minority Population*[1]	*Percent Minority*	*Total Hispanic or Latino Origin*[2]	*Percent Hispanic or Latino Origin*	*Total Low Income Population*[3]	*Percent Low-Income*
No Action Alternative							
65-70 dB DNL	3,875	786	20.3%	285	7.4%	292	7.5%
70-75 dB DNL	3,165	612	19.3%	254	8.0%	222	7.0%
75+ dB DNL	3,993	604	15.1%	270	6.8%	340	8.5%
Total Affected Population	**11,033**	**2,002**	**18.1%**	**809**	**7.3%**	**854**	**7.7%**
Alternative 2C							
65-70 dB DNL	5,063	1,071	21.2%**	377	7.4%	391	7.7%
70-75 dB DNL	3,414	647	19.0%	260	7.6%	232	6.8%
75+ dB DNL	4,853	746	15.4%	329	6.8%	405	8.3%
Total Affected Population	**13,330**	**2,464**	**18.5%**	**966**	**7.2%**	**1,028**	**7.7%**
Population Change from No Action Alternative							
65-70 dB DNL	1,188	285	-	92	-	99	-
70-75 dB DNL	249	35	-	6	-	10	-
75+ dB DNL	860	142	-	59	-	65	-
Population Change from No Action Alternative[4]***	**2,297**	**462**	**20.1%**	**157**	**6.8%**	**174**	**7.6%**

Sources: USCB 2012a, 2012b, 2012c, 2012d, n.d.[a], n.d.[b], n.d.[c]

Notes:

[1] Minority is defined as individuals who are members of the following population groups: American Indian or Alaska Native; Asian; Native Hawaiian or Pacific Islander; or Black or African American.

[2] Hispanic or Latino population is defined as individuals who self-identify as belonging to this ethnic group in U.S. Census surveys. This population definition is based on ethnicity and not race.

[3] The analysis relied on poverty data from the 2006-2010 American Community Survey 5-Year Estimates because the U.S. Census Bureau no longer reports poverty data in the decennial census. Because the American Community Survey does not estimate data at the census block group level, the percentage of the population below the poverty level is displayed in this table at the census tract level, and block groups within the same census tract will report the same value.

[4] Due to rounding, some totals may not sum.

* dB DNL contours extend into Jefferson and San Juan Counties; however, because no permanent residences are located within these dB DNL contours, these counties have been excluded from the analysis. Populations on military properties within the dB DNL contours (NAS Whidbey Island [Ault Field], the Seaplane Base, and OLF Coupeville) have also been excluded from the analysis.

** The shaded cells indicate the alternatives/scenarios that contain percentages of minority or Hispanic/Latino populations that are "meaningfully greater" than those in Island County as a whole or that contain percentages of low-income populations that are greater than (or equal to) those in Island County. These shaded cells indicate where environmental justice communities have been identified based upon the indicated thresholds.

*** All population estimates for areas under the dB DNL contours utilized 2010 U.S. Census Bureau data. A 5.4-percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period (Washington State Office of Financial Management, 2012).

Key:
dB DNL = day-night average sound level in decibels

Table 4.11-9 Environmental Justice Populations at NAS Whidbey Island Complex under the Alternative 3, Scenario A, Average Year

*dB DNL Contours**	*Total Affected Population*	*Total Minority Population*[1]	*Percent Minority*	*Total Hispanic or Latino Origin*[2]	*Percent Hispanic or Latino Origin*	*Total Low Income Population*[3]	*Percent Low-Income*
No Action Alternative							
65-70 dB DNL	3,875	786	20.3%	285	7.4%	292	7.5%
70-75 dB DNL	3,165	612	19.3%	254	8.0%	222	7.0%
75+ dB DNL	3,993	604	15.1%	270	6.8%	340	8.5%
Total Affected Population	**11,033**	**2,002**	**18.1%**	**809**	**7.3%**	**854**	**7.7%**
Alternative 3A							
65-70 dB DNL	4,231	895	21.2%**	324	7.7%	345	8.2%
70-75 dB DNL	2,983	546	18.3%	218	7.3%	207	6.9%
75+ dB DNL	5,502	722	13.1%	342	6.2%	383	7.0%
Total Affected Population	**12,716**	**2,163**	**17.0%**	**884**	**7.0%**	**935**	**7.4%**
Population Change from No Action Alternative							
65-70 dB DNL	356	109	-	39	-	53	-
70-75 dB DNL	-182	-66	-	-36	-	-15	-
75+ dB DNL	1,509	118	-	72	-	43	-
Population Change from No Action Alternative[4]***	**1,683**	**161**	**9.6%**	**75**	**4.5%**	**81**	**4.8%**

Sources: USCB 2012a, 2012b, 2012c, 2012d, n.d.[a], n.d.[b], n.d.[c]

Notes:

[1] Minority is defined as individuals who are members of the following population groups: American Indian or Alaska Native; Asian; Native Hawaiian or Pacific Islander; or Black or African American.

[2] Hispanic or Latino population is defined as individuals who self-identify as belonging to this ethnic group in U.S. Census surveys. This population definition is based on ethnicity and not race.

[3] The analysis relied on poverty data from the 2006-2010 American Community Survey 5-Year Estimates because the U.S. Census Bureau no longer reports poverty data in the decennial census. The American Community Survey does not estimate data at the census block group level; therefore, the percentage of the population below the poverty level is displayed in this table at the census tract level, and block groups within the same census tract will report the same value.

[4] Due to rounding, some totals may not sum.

* dB DNL contours extend into Jefferson and San Juan Counties; however, because no permanent residences are located within these dB DNL contours, these counties have been excluded from the analysis. Populations on military properties within the dB DNL contours (NAS Whidbey Island [Ault Field], the Seaplane Base, and OLF Coupeville) have also been excluded from the analysis.

** The shaded cells indicate the alternatives/scenarios that contain percentages of minority or Hispanic/Latino populations that are "meaningfully greater" than those in Island County as a whole or that contain percentages of low-income populations that are greater than (or equal to) those in Island County. These shaded cells indicate where environmental justice communities have been identified based upon the indicated thresholds.

*** All population estimates for areas under the dB DNL contours utilized 2010 U.S. Census Bureau data. A 5.4-percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period (Washington State Office of Financial Management, 2012).

Key:
dB DNL = day-night average sound level in decibels

Table 4.11-10 Environmental Justice Populations at NAS Whidbey Island Complex under Alternative 3, Scenario B, Average Year

*dB DNL Contours**	*Total Affected Population*	*Total Minority Population[1]*	*Percent Minority*	*Total Hispanic or Latino Origin[2]*	*Percent Hispanic or Latino Origin*	*Total Low Income Population[3]*	*Percent Low-Income*
No Action Alternative							
65-70 dB DNL	3,875	786	20.3%	285	7.4%	292	7.5%
70-75 dB DNL	3,165	612	19.3%	254	8.0%	222	7.0%
75+ dB DNL	3,993	604	15.1%	270	6.8%	340	8.5%
Total Affected Population	**11,033**	**2,002**	**18.1%**	**809**	**7.3%**	**854**	**7.7%**
Alternative 3B							
65-70 dB DNL	4,273	950	22.2%**	328	7.7%	357	8.4%
70-75 dB DNL	3,526	656	18.6%	262	7.4%	239	6.8%
75+ dB DNL	5,427	766	14.1%	354	6.5%	403	7.4%
Total Affected Population	**13,226**	**2,372**	**17.9%**	**944**	**7.1%**	**999**	**7.6%**
Population Change from No Action Alternative							
65-70 dB DNL	398	164	-	43	-	65	-
70-75 dB DNL	361	44	-	8	-	17	-
75+ dB DNL	1,434	162	-	84	-	63	-
Population Change from No Action Alternative[4]* **	**2,193**	**370**	**16.9%**	**135**	**6.2%**	**145**	**6.6%**

Sources: USCB, 2012a, 2012b, 2012c, 2012d, n.d.[a], n.d.[b], n.d.[c]

Notes:

[1] Minority is defined as individuals who are members of the following population groups: American Indian or Alaska Native; Asian; Native Hawaiian or Pacific Islander; or Black or African American.

[2] Hispanic or Latino population is defined as individuals who self-identify as belonging to this ethnic group in U.S. Census surveys. This population definition is based on ethnicity and not race.

[3] The analysis relied on poverty data from the 2006-2010 American Community Survey 5-Year Estimates because the U.S. Census Bureau no longer reports poverty data in the decennial census. The American Community Survey does not estimate data at the census block group level; therefore, the percentage of the population below the poverty level is displayed in this table at the census tract level, and block groups within the same census tract will report the same value.

[4] Due to rounding, some totals may not sum.

* dB DNL contours extend into Jefferson and San Juan Counties; however, because no permanent residences are located within these dB DNL contours, these counties have been excluded from the analysis. Populations on military properties within the dB DNL contours (NAS Whidbey Island [Ault Field], the Seaplane Base, and OLF Coupeville) have also been excluded from the analysis.

** The shaded cells indicate the alternatives/scenarios that contain percentages of minority or Hispanic/Latino populations that are "meaningfully greater" than those in Island County as a whole or that contain percentages of low-income populations that are greater than (or equal to) those in Island County. These shaded cells indicate where environmental justice communities have been identified based upon the indicated thresholds.

*** All population estimates for areas under the dB DNL contours utilized 2010 U.S. Census Bureau data. A 5.4-percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period (Washington State Office of Financial Management, 2012).

Key:
dB DNL = day-night average sound level in decibels

Table 4.11-11 Environmental Justice Populations at NAS Whidbey Island Complex under Alternative 3, Scenario C, Average Year

*dB DNL Contours**	*Total Affected Population*	*Total Minority Population[1]*	*Percent Minority*	*Total Hispanic or Latino Origin[2]*	*Percent Hispanic or Latino Origin*	*Total Low Income Population[3]*	*Percent Low-Income*
No Action Alternative							
65-70 dB DNL	3,875	786	20.3%	285	7.4%	292	7.5%
70-75 dB DNL	3,165	612	19.3%	254	8.0%	222	7.0%
75+ dB DNL	3,993	604	15.1%	270	6.8%	340	8.5%
Total Affected Population	**11,033**	**2,002**	**18.1%**	**809**	**7.3%**	**854**	**7.7%**
Alternative 3C							
65-70 dB DNL	5,033	1,066	21.2%**	375	7.5%	389	7.7%
70-75 dB DNL	3,431	649	18.9%	260	7.6%	233	6.8%
75+ dB DNL	4,861	744	15.3%	329	6.8%	404	8.3%
Total Affected Population	**13,325**	**2,459**	**18.5%**	**964**	**7.2%**	**1,026**	**7.7%**
Population Change from No Action Alternative							
65-70 dB DNL	1,158	280	-	90	-	97	-
70-75 dB DNL	266	37	-	6	-	11	-
75+ dB DNL	868	140	-	59	-	64	-
Population Change from No Action Alternative[4]* **	**2,292**	**457**	**19.9%**	**155**	**6.8%**	**172**	**7.5%**

Sources: USCB, 2012a, 2012b, 2012c, 2012d, n.d.[a], n.d.[b], n.d.[c]

Notes:

[1] Minority is defined as individuals who are members of the following population groups: American Indian or Alaska Native; Asian; Native Hawaiian or Pacific Islander; or Black or African American.

[2] Hispanic or Latino population is defined as individuals who self-identify as belonging to this ethnic group in U.S. Census surveys. This population definition is based on ethnicity and not race.

[3] The analysis relied on poverty data from the 2006-2010 American Community Survey 5-Year Estimates because the U.S. Census Bureau no longer reports poverty data in the decennial census. The American Community Survey does not estimate data at the census block group level; therefore, the percentage of the population below the poverty level is displayed in this table at the census tract level, and block groups within the same census tract will report the same value.

[4] Due to rounding, some totals may not sum.

* dB DNL contours extend into Jefferson and San Juan Counties; however, because no permanent residences are located within these dB DNL contours, these counties have been excluded from the analysis. Populations on military properties within the dB DNL contours (NAS Whidbey Island [Ault Field], the Seaplane Base, and OLF Coupeville) have also been excluded from the analysis.

** The shaded cells indicate the alternatives/scenarios that contain percentages of minority or Hispanic/Latino populations that are "meaningfully greater" than those in Island County as a whole or that contain percentages of low-income populations that are greater than (or equal to) those in Island County. These shaded cells indicate where environmental justice communities have been identified based upon the indicated thresholds.

*** All population estimates for areas under the dB DNL contours utilized 2010 U.S. Census Bureau data. A 5.4-percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period (Washington State Office of Financial Management, 2012).

Key:
dB DNL = day-night average sound level in decibels

Identifying Disproportionately High and Adverse Impacts

Methodology

Once the presence or absence of environmental justice communities is determined, the Navy then must assess the impacts from the Proposed Action and determine whether these impacts would have a disproportionately high and adverse effect on these populations. This analysis involves comparing the impacts on the identified environmental justice communities to the general population within the affected environment (e.g., noise contours). In determining whether potential disproportionately high and adverse impacts exist, the Navy also considers the significance of the impacts under NEPA.

The Council on Environmental Quality (CEQ) guidance on environmental justice analysis requires that any disproportionately high and adverse human health or environmental effects on minority and low-income populations be identified and analyzed. A disproportionate effect is defined as an adverse effect that either is predominately borne by a minority population and/or low-income population or is an effect that will be suffered by the minority and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or low-income population.

As informed by CEQ's *Environmental Justice Guidance Under the National Environmental Policy Act* (December 1997) and the Report of the Federal Interagency Working Group on Environmental Justice and NEPA Committee, *Promising Practices for EJ Methodologies in NEPA Reviews* (March 2016), disproportionately high and adverse impacts are typically determined based on the impacts in one or more resource topics analyzed in NEPA documents. Any identified impact to human health or the environment (e.g., impacts on noise, biota, air quality, traffic/congestion, or land use) that potentially affects minority populations and low-income populations in the affected environment might result in disproportionately high and adverse impacts.

According to the CEQ guidance mentioned above (December 1997), when determining whether environmental effects are disproportionately high and adverse, agencies are to consider the following three factors to the extent practicable:

1. Whether there is, or will be, an impact on the natural or physical environment that significantly and adversely affects a minority or low-income population.
2. Whether environmental effects are significant (as defined by NEPA) and are, or may be, having an adverse impact on minority or low-income populations that appreciably exceeds or is likely to exceed those on the general population or other appropriate comparison group.
3. Whether the environmental effects occur, or would occur, in a minority or low-income population affected by cumulative or multiple adverse exposures from environmental hazards.

Similar factors are considered in determining whether there are disproportionately high and adverse human health effects, including significance of measured health effects, in risk and rates, of hazard exposure and whether this hazard exposure exceeds the risk or rate to the general population or appropriate comparison groups.

The Report from the Federal Interagency Working Group on Environmental Justice and NEPA (March 2016) also provides guidance for determining whether the impacts to minority or low-income populations may be disproportionately high and adverse. Agencies should consider the following factors:

1. The significance of any direct, indirect, or cumulative impacts to minority and low-income populations in the affected environment for each alternative carried forward for detailed analysis in the NEPA document (as employed by NEPA). Agencies' approaches should not determine that a proposed action or alternative would not have a disproportionately high and adverse impact on minority and low-income populations solely because the potential impacts of the proposed action or alternative on the general population would be less than significant (as defined by NEPA).
2. The distribution of beneficial and adverse impacts between minority and low-income populations and the general population in the affected environment, as well as how adverse impacts are mitigated.

   After considering all appropriate mitigation measures, balance any remaining adverse impacts with beneficial impacts of the project to the community, as appropriate. If an adverse impact to minority and low-income populations remains after accounting for all appropriate mitigation measures and related project benefits, continue to consider whether the remaining adverse impact(s) is/are disproportionately high and adverse. In determining the balance between beneficial and adverse impacts, the beneficial impacts and mitigation should be related to the type and location of the adverse impact. Agencies should not balance adverse impacts that directly affect human health at levels of concern, especially those that exceed health criteria, with project benefits.

   Situations in which minority and low-income populations receive an uneven distribution of benefits in the presence of adverse impacts (e.g., a smaller proportion of beneficial impacts accrue to minority and low income populations than to the general population) could indicate a potential disproportionately high and adverse impact.
3. Comparing direct, indirect, and cumulative adverse impacts to minority and low-income populations in the affected environment within the geographic unit of analysis to an appropriate comparison group.

   Identify a relevant and appropriate comparison group when evaluating the impact of the proposed federal action on minority and low-income populations. The comparison group provides context for the analysis of human health effects, environmental effects, and the risk or rate of hazard exposure to minority and low-income populations in the affected environment. This comparison group is distinct from the reference community, which was used to identify the existence of minority and low-income populations.

   In the disproportionately high and adverse impact analysis, agencies compare impacts to minority and low-income populations *in the affected environment* with an appropriate comparison group *within the affected environment*. Relevant and appropriate comparison groups are selected based on the nature and scope of the proposed project.

4. The degree to which any of the following seven factors could amplify identified impacts. Factors that can potentially amplify an impact to minority and low-income populations in the affected environment include, but are not limited to, the following:
    a. Proximity and exposure to chemical and other adverse stressors, e.g., impacts commonly experienced by fenceline communities;
    b. Vulnerable populations, e.g., minority and low-income children, pregnant women, elderly, or groups with high asthma rates;
    c. Unique exposure pathways, e.g., subsistence fishing, hunting, or gathering in minority and low-income populations;
    d. Multiple or cumulative impacts, e.g., exposure to several sources of pollution or pollutants from single or multiple sources;
    e. Ability to participate in the decision-making process, e.g., lack of education or language barriers in minority and low-income populations;
    f. Physical infrastructure, e.g., inadequate housing, roads, or water supplies in communities;
    g. Non-chemical stressors, e.g., chronic stress related to environmental or socioeconomic impacts.

The identification of a disproportionately high and adverse impact on minority and low-income populations does not preclude a proposed agency action from going forward and does not necessarily compel a conclusion that a proposed action is environmentally unsatisfactory. If an agency determines there is a disproportionately high and adverse impact to minority and low-income populations, an agency may wish to consider heightening its focus on meaningful public engagement regarding community preferences, considering an appropriate range of alternatives (including alternative sites), and mitigation and monitoring measures.

In certain instances where an impact from the proposed action initially appears to be identical to both the affected general population and the affected minority and low-income populations, there may be inter-related ecological, aesthetic, historic, cultural, economic, social, or health factors that amplify the impact (e.g., unique exposure pathways, social determinants of health, or community cohesion). After consideration of factors that can amplify an impact to minority and low-income populations in the affected environment, an agency may determine the impact to be disproportionately high and adverse.

Analysis for Identifying Disproportionately High and Adverse Impacts

As described throughout this EIS, aircraft noise impacts are expected to be the primary adverse environmental impact associated with the Proposed Action. Other impacts described in this EIS that have the potential to disproportionately impact environmental justice communities include potential safety risks from a concentration of environmental justice populations within APZs and concentration of overcrowding in schools within the Oak Harbor School District. As discussed under Methodology above, this section compares the potential impacts on the environmental justice populations within the affected area to the general population within the affected area and makes a determination of whether or not these impacts disproportionately impact the previously identified environmental justice communities.

The Navy considered whether there may be other education-related impacts that had the potential to disproportionately impact environmental justice communities and concluded that overcrowding and

noise impacts would be equally felt across the affected area. The Navy identified that environmental justice communities are not expected to be subjected to disproportionately high and adverse impacts on education because overcrowding and noise impacts would be equally felt across the school district in the affected area.

Aircraft Noise

This EIS determines there is a significant impact to the populations living under the noise contours from implementation of all alternatives/scenarios (see Section 4.2). In order to assess whether the significant impacts on the population under the noise contours disproportionately affect identified environmental justice communities, the Navy compared the potential impacts on the affected general population (the total population under the different dB DNL noise contours for each alternative/scenario) to the identified environmental justice populations in the affected area (under the dB DNL noise contours for each alternative/scenario).

Based on the data shown in Tables 4.11-2 through 4.11-11, the comparison of the impacts to the identified environmental justice communities (shaded cells in the tables) within the affected environment to the impacts on the general population (the non-environmental justice communities) within the affected environment indicates that the identified environmental justice communities are not disproportionately affected. Even though the noise impacts to the entire community may be significant under NEPA, it does not appear that these adverse impacts appreciably exceed or are likely to exceed those experienced by the total affected population. The tables indicate that for each noise contour (greater than 65 dB DNL), the identified environmental justice communities are not concentrated in higher noise zones. The environmental justice communities represent a range of approximately 17 percent to 23 percent for identified minority populations and approximately 7 percent to 8 percent for identified Hispanic or Latino and low-income populations within each noise contour. Consequently, these identified communities do not appear to be subjected to an uneven distribution of adverse impacts.

The significance of the impacts under NEPA is also a factor in determining whether impacts to environmental justice communities may be disproportionately high and adverse. As part of this determination, the net change between each action alternative and the No Action Alternative of each environmental justice community was analyzed. For this analysis, the estimates of the affected minority, Hispanic or Latino, and low-income populations for each alternative/scenario were compared to the results of the analysis for the No Action Alternative. The net change in the total population and the net change in the environmental justice populations between the various alternatives/scenarios and the No Action Alternative were then calculated. The results of these analyses can be found on Tables 4.11-2 through 4.11-11 and are summarized on Table 4.11-12. See Appendix F for detailed tables showing the effects of the high-tempo FCLP year conditions; summary conclusions are included on Table 4.11-12. This calculation allows the Navy to determine the minority and/or low-income populations impacted by each alternative and scenario.

Table 4.11-12 Demographic and Economic Characterstics of the Population Change from the No Action Alternative for Each Alternative and Scenario under the Average Year and High-Tempo FCLP Year

	Population Change from No Action Alternative			
*Geographical Area***	*Total Affected Population****	*Percent Minorities*	*Percent Hispanic or Latino*	*Percent Low Income*
Island County	78,506	13.9%	5.5%	8.0%
Alternative 1A				
Average Year	1,758	10.0%	4.6%	4.9%
High-tempo FCLP Year	1,443	4.8%	3.3%	3.7%
Alternative 1B				
Average Year	2,266	17.2%	6.2%	6.7%
High-tempo FCLP Year	1,906	14.8%	5.6%	6.1%
Alternative 1C				
Average Year	13,547	20.6%	7.0%	7.7%
High-tempo FCLP Year	2,202	19.5%	6.6%	7.5%
Alternative 2A				
Average Year	1,651	9.5%	4.4%	4.7%
High-tempo FCLP Year*	1,199	1.9%	2.6%	2.9%
Alternative 2B				
Average Year	2,145	17.1%	6.2%	6.6%
High-tempo FCLP Year	1,843	15.0%	5.6%	6.2%
Alternative 2C				
Average Year	2,297	20.1%	6.8%	7.6%
High-tempo FCLP Year	1,961	18.3%	6.3%	7.2%
Alternative 3A				
Average Year	1,683	9.6%	4.5%	4.8%
High-tempo FCLP Year	1,389	4.2%	3.2%	3.6%
Alternative 3B				
Average Year	2,193	16.9%	6.2%	6.6%
High-tempo FCLP Year	1,897	14.4%	5.5%	6.0%
Alternative 3C				
Average Year	2,292	19.9%	6.8%	7.5%
High-tempo FCLP Year	1,873	18.0%	6.2%	7.1%

Table 4.11-12 Demographic and Economic Characterstics of the Population Change from the No Action Alternative for Each Alternative and Scenario under the Average Year and High-Tempo FCLP Year

	Population Change from No Action Alternative			
*Geographical Area***	*Total Affected Population****	*Percent Minorities*	*Percent Hispanic or Latino*	*Percent Low Income*

Sources: USCB,2012a, 2012b, 2012c, 2012d, n.d.[a], n.d.[b], n.d.[c]

Notes:

* In total, the Alternative 2, Scenario A, high-tempo FCLP year is expected to affect 146 fewer minority residents, 24 fewer Hispanic/Latino residents, and 21 fewer low-income residents than are currently impacted by the No Action Alternative.

** dB DNL contours extend into Jefferson and San Juan Counties; however, because no permanent residences are located within these dB DNL contours, these counties have been excluded from the analysis. Populations on military properties within the dB DNL contours (NAS Whidbey Island [Ault Field], the Seaplane Base, and OLF Coupeville) have also been excluded from the analysis.

*** All population estimates for areas under the dB DNL contours utilized 2010 U.S. Census Bureau data. A 5.4-percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period (Washington State Office of Financial Management, 2012).

Key:
FCLP = field carrier landing practice

The tables show that the net change in environmental justice communities within the dB DNL noise contours under the nine alternatives/scenarios ranges from 9.5 percent to 20.6 percent. This means that 9.5 percent to 20.6 percent of the residents within the greater than 65 dB DNL noise contour are calculated to be a minority (and 74.9 percent to 90.5 percent are calculated to be a non-minority). In a similar calculation, 4.7 percent to 7.7 percent of the population residing within the 65 dB DNL noise contours for the alternatives are calculated to be part of the low-income population (and 92.3 percent to 95.3 percent are calculated to be not in the low-income population), and 4.6 percent to 7.0 percent are calculated to be Hispanic/Latino (and 93 percent to 95.4 percent are calculated to be not Hispanic/Latino).

Under the high-tempo FCLP year, 1.9 percent to 19.5 percent of the population residing under the dB DNL contours are calculated to be minority (79.5 percent to 98.2 percent are calculated to be non-minority), 2.9 percent to 7.5 percent to be part of the low-income population (92.5 percent to 97.1 percent are calculated to be not in the low-income population), and 2.6 percent to 6.6 percent to be Hispanic/Latino (93.4 percent to 97.4 percent are calculated to be not Hispanic/Latino) (see Appendix F).

When analyzing data provided on Tables 4.11-2 through 4.11-11, it is shown that within the affected area, minority and low-income residents are more likely to reside within quieter dB DNL contours (i.e., 65 to 70 dB DNL contours) than in the louder dB DNL contours (i.e., 75 dB DNL or greater contours) when compared to the total affected population. For instance, in the alternative that records the largest percentage of minorities impacted when compared to the No Action Alternative under the average year (Alternative 1, Scenario C), approximately 20.6 percent of this population change are minority residents. At the same time, 25.2 percent of all residents living in the 65 to 70 dB DNL contours are minorities,

while only 17.1 percent of all residents living in the 75 dB DNL or greater contours are minorities. This relationship holds true for all alternatives and scenarios in both the average and the high-tempo FCLP year. Similarly, low-income residents are more likely to reside in the quieter dB DNL contours (i.e., 65 to 70 dB DNL contours) than in the louder dB DNL contours (i.e., 75 dB DNL or greater contours) when compared to the total affected population. On average, non-minority populations and populations that are not low-income are more likely to be affected by the louder dB DNL contours than the communities of concern. Therefore, while minority and low-income residents are potentially significantly and adversely affected by aircraft noise under each of the alternatives/scenarios, these populations are not disproportionately impacted when compared to the total affected population.

Additionally, there are no known cumulative or multiple adverse exposures from environmental hazards on minority or low-income environmental justice communities identified in the tables above. Finally, there do not appear to be any of the seven factors identified above under Methodology that could amplify identified impacts on minority or low-income communities. Therefore, the Navy determines that although there are significant impacts to noise levels on populations living within the dB DNL noise contours from the alternatives/scenarios, these impacts do not disproportionately impact environmental justice communities.

Potential Increased Risk of Aircraft Mishaps in Accident Potential Zones

This EIS identifies that because under all alternatives/scenarios the Proposed Action would add 35 or 36 Growler aircraft and increase overall airfield flight operations at the NAS Whidbey Island complex, there would be an increase in the risk of a mishap (see Section 4.3.1.1). Accident Potential Zones (APZs) are created based on projected operations for approach, departure, and flight tracks for a runway. APZs are based on historical accident and operations data throughout the military and the specific areas that would be impacted (which have been determined to be potential impact areas) if an accident were to occur.

It is not expected that the APZs at Ault Field would change regardless of alternative selected under this Proposed Action; however, this would be confirmed through the Navy's subsequent AICUZ update process (see Figure 3.3-2 for 2005 AICUZ Clear Zones and APZs at Ault Field).

A potential environmental justice issue could be raised if environmental justice communities were concentrated in higher-risk areas, such as APZs. Using the same methodology employed for identifying environmental justice communities under the noise contours, the Navy estimated the number of minority and low-income residents located within the APZs at Ault Field and OLF Coupeville. All APZs identified in Section 4.3 (2005 AICUZ APZs at Ault Field, 2005 AICUZ Clear Zones at OLF Coupeville, and Conceptual APZs Option 1 and 2 at OLF Coupeville) were overlaid onto mapped U.S. Census Bureau 2010 population and demographic data to calculate the total affected area within each census block. The percent area of the census block covered by the APZs was applied to the population of that census block to estimate the population within the APZ boundary. A 5.4-percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period, thereby calculating the total affected population for each alternative and scenario, including the No Action Alternative (Washington State Office of Financial Management, 2012).

Demographic characteristics of the corresponding census block groups were then applied to this total affected population number to estimate the total minority, Hispanic or Latino, and low-income populations impacted by each APZ. These calculations assume an even distribution of the population

across the census block groups, and they exclude populations on military properties within the APZs. Table 4.11-13 presents estimates of the affected minority, Hispanic or Latino, and low-income populations under each APZ.

Table 4.11-13 Environmental Justice Populations at NAS Whidbey Island Complex under APZs for Ault Field and OLF Coupeville

APZ	*Total Affected Population**	*Total Minority Population[1]*	*Percent Minority*	*Total Hispanic or Latino Origin[2]*	*Percent Hispanic or Latino Origin*	*Total Low Income Population[3]*	*Percent Low-Income*
Ault Field Existing APZs	1,830	406	22.2%**	190	10.4%	226	12.4%
OLF Coupeville Existing APZs[4]	95	7	7.5%	4	3.8%	3	2.9%
OLF Coupeville Conceptual APZs – Option 1[5]	666	70	10.5%	43	6.5%	21	3.1%
OLF Coupeville Conceptual APZs – Option 2[6]	1,324	121	9.2%	66	5.0%	49	3.7%

Sources: USCB 2012a, 2012b, 2012c, 2012d, n.d.[a], n.d.[b], n.d.[c]

Notes:

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.

2 Hispanic or Latino population is defined as individual(s) who self-identify as belonging to this ethnic group in U.S. Census surveys. This population definition is based on ethnicity and not race.

3 The analysis relied on poverty data from the 2006-2010 American Community Survey 5-Year Estimates as the US Census Bureau no longer reports poverty data in the decennial census. The American Community Survey does not estimate data at the census block group level, therefore the percent of the population below the poverty level is displayed in this table at the Census Tract level; therefore, Block Groups within the same Census Tract will report the same value.

4 Under Alternative 1, Scenario C; Alternative 2, Scenario C; and Alternative 3, Scenario C no new APZs would be required at OLF Coupeville. There would be no change in the APZs at Ault Field compared to existing conditions.

5 Under Alternative 1, Scenario B; Alternative 2, Scenario C; and Alternative 3, Scenario C OLF Coupeville Conceptual APZs – Option 1 would be required. There would be no change in APZs at Ault Field compared to existing conditions.

6 Under Alternative 1, Scenario A; Alternative 2, Scenario A; and Alternative 3, Scenario A OLF Coupeville Conceptual APZs – Option 2 would be required. There would be no change in APZs at Ault Field compared to existing conditions..

* All population estimates for areas under the dB DNL contours utilized 2010 U.S. Census Bureau data. A 5.4 percent growth factor was applied to the 2010 census statistics to account for population changes between 2010 and 2020 based on medium forecasted population projections during that period (Washington State Office of Financial Management, 2012).

** The shaded cells indicate the alternatives/scenarios that contain percentages of minority or Hispanic/Latino populations that are "meaningfully greater" than in Island County as a whole or that contain percentages of low-income populations that are greater than (or equal to) those in Island County. These shaded cells indicate where environmental justice communities have been identified based upon the indicated thresholds.

As mentioned above, the potential development of APZs does not directly correlate to an increased risk of incident for the population living under the APZs. Official APZs are established through the AICUZ study process and would depend on the alternative selected. If APZs are created, they could influence

future land use decisions by the community and may have a minor impact on the land under the APZs (see Section 4.5).

The Navy has determined there are environmental justice communities living within the 2005 AICUZ APZs at Ault Field (see Table 4.11-13). Additionally, as shown in Table 4.11-13 and described in detail in Section 4.3.1, the increase in airfield operations at Ault Field under all of the action alternatives/ scenarios would not result in a change to the existing APZs surrounding the installation. Consequently, there would be an increase in the number of operations at Ault Field from the Proposed Action and, therefore, an increase in risk for mishap, but there would be no impact on the land use of any population living within the boundaries of the APZs.

The Navy has determined there are no environmental justice communities living within the 2005 AICUZ APZs at OLF Coupeville or within the Conceptual APZ Option 2 at OLF Coupeville. There is a Hispanic/Latino population within the Conceptual APZ Option 1 at OLF Coupeville.

Under Scenario C for all action alternatives, the number of airfield operations would not warrant additional APZs at OLF Coupeville; therefore, only the Clear Zones would be required. Consequently, there would be an increase in the number of operations at OLF Coupeville under Scenario C for all action alternatives and, therefore, an increase in risk for mishap, but there would be no impact on the land use of any population living within the boundaries of the APZs.

Under Scenarios A and B for all action alternatives, this EIS determined there is a potential for APZs to be warranted due to the number and type of flight operations at OLF Coupeville. Under Scenario B, Conceptual APZ Option 1 may be warranted, and under Scenario A, Conceptual APZ Options 1 and 2 may be warranted. Official APZs are established through the AICUZ study process and would depend on the alternative selected. There would be an increase in the number of operations at OLF Coupeville under Scenarios A and B for all action alternatives and, therefore, an increase in risk for mishap, and there would be a minor impact on the land use under the conceptual APZs for these two scenarios.

This EIS has determined that there is not a significant increase in risk associated with the increase in aircraft operations under the action alternatives/scenarios because current airspace safety procedures, maintenance, training, and inspections would continue to be implemented, and airfield flight operations would adhere to established safety procedures. While it is generally difficult to project future safety/mishap rates for any aircraft, the Growler has a well-documented and established safety record as a reliable aircraft.

Potential aircraft mishaps are the primary safety concern with regard to military training flights. NAS Whidbey Island maintains detailed emergency and mishap response plans to react to an aircraft accident, should one occur. These plans assign agency responsibilities and prescribe functional activities necessary to react to mishaps, whether on or off the installation. 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, which involves an array of organizations whose participation would be governed by the circumstances associated with the mishap and actions required to be performed (DoD Instruction 6055.07, Mishap Notification, Investigation, Reporting, and Record Keeping) (DoD, 2011).

In addition, there are no identified POIs such as schools or churches where communities congregate within the APZs surrounding Ault Field (see Figure 3.3-2) or OLF Coupeville (see Figures 4.3-1 and 4.3-2).

Therefore, the Navy has determined that although there are environmental justice communities within the APZs and risk associated with aircraft mishaps is expected to increase within the areas surrounding both Ault Field and OLF Coupeville, implementation of the Proposed action is not expected to disproportionately impact environmental justice communities.

Environmental Justice Conclusion

The Navy has concluded that although there are environmental justice communities within the affected area and there are significant impacts outlined within the EIS to populations living within the affected area (noise impacts to those living within the 65 dB DNL noise contours and overcrowding at Oak Harbor School District schools), these impacts do not disproportionately impact environmental justice communities.

Although the Navy has determined there to be no disproportionately high or adverse impacts on environmental justice communities, the Navy has embarked on a robust community outreach program as part of this EIS process. As detailed in Section 1.9, Public and Agency Participation and Intergovernmental Coordination, the Navy has held eight public scoping meetings and has kept residents informed throughout the process with mailings (both letters and postcards), newspaper advertisements, press releases, a project website, and digital advertisements. Project documents have been made available at local public libraries as well as online at the project's website. Public outreach efforts will continue throughout the public comment period to ensure that impacted environmental justice populations are kept informed and involved in the decision-making process.

4.12 Transportation

Transportation

Construction results in increased traffic on and off the installation, but roadways would be able to handle increase.

Increase in personnel and dependents results in an increase in traffic on local roads. Traffic would be spread throughout roads in Island and Skagit Counties and is not expected to result in LOS falling below established LOS standards.

Increase in gate traffic may result in queuing of vehicles, but would be limited to peak hours during the day.

No significant increase in use of transit, pedestrian, and bicycle facilities since majority of new traffic will be car-based.

This section summarizes the potential transportation impacts that could result from renovation of facilities and an increase in Growler operations at NAS Whidbey Island under the No Action Alternative and Alternative 1 through Alternative 3. As discussed in Section 3.12.2, the study area consists of:

- State Route (SR) 20 between Burlington and SR 525
- SR 525 between SR 20 and Clinton
- Interstate (I)-5 at the interchange with SR 20 in Burlington
- roadways serving NAS Whidbey Island or immediately adjacent to NAS Whidbey Island

Potential transportation impacts were estimated by evaluating how the proposed increase in personnel and dependents under each alternative could affect traffic volumes and levels of service (LOS) on major roadways within the project study area. Traffic volumes were estimated and assessed based on the following:

- Full transition of P-8A squadrons to NAS Whidbey Island would occur by 2020.
- Background growth factors of 3.0 percent in Island County and 5.4 percent in Skagit County would apply based on medium county population projections (Washington State Office of Financial Management, 2012), which account for regional growth in traffic volumes through 2020.
- Trip generation was based on the assumption that each new Navy personnel would result in one new household with dependents, as described in Section 4.10. The Institute of Traffic Engineers Trip Generation Manual 9th Edition (ITE (Institute of Traffic Engineers), 2012) was used to determine weekday trip generation rates for households based on the housing unit types in the region (American Fact Finder, 2014). Trips were assigned to study area road segments (I-5, SR 20, and SR 525) based on the percentage of personnel stationed and employed at NAS Whidbey Island by place of residence (Navy, 2005b).
    - It was assumed that no new Navy personnel under the action alternatives would be living on base; therefore, the percentage of NAS Whidbey Island personnel living on-base (37 percent) was distributed proportionally across the study area for future trip generation.
    - It was assumed two of the weekday trips generated by each household would be attributed to Navy personnel traveling between a place of residence and Ault Field. It was assumed remaining trips generated by each household would occur within a place of residence (see Appendix D).

- A general LOS analysis under No Action Alternative and action alternative conditions was performed using the 2010 Highway Capacity Manual generalized daily service volumes for urban freeway facilities, rural multilane highways, urban multilane highways, and urban street facilities (see Appendix D). LOS under the action alternatives was compared to LOS standards under the No Action Alternative.
- For a conservative analysis, no transit, bicycle, or pedestrian trips were assumed for Navy personnel and dependents.
- Personnel would commute to Ault Field under each operational scenario; therefore, traffic impacts under a given alternative would be the same under each operational scenario.

4.12.1 Transportation, No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur, and there would be no change to transportation. SR 20, SR 525, and I-5 and local roads would experience an increase in traffic over affected environment conditions that would be attributed to background community growth. Therefore, no significant impacts would occur with implementation of the No Action Alternative.

4.12.2 Transportation, Alternatives 1 through 3

Construction activities associated with the Proposed Action under each alternative would result in short-term but negligible increases in traffic, and they would not result in a worsening of LOS on major roadways under No Action conditions. Operations associated with the Proposed Action under each alternative would result in a long-term and moderate increase in traffic, but they would not result in a worsening of LOS on major roadways beyond LOS standards. Some local roadways and intersections near Ault Field may see increases in traffic delay from personnel accessing gates to Ault Field, however impacts would be limited to peak hours during the day and are expected to be less than significant. Therefore, implementation of the Proposed Action under any action alternative would not result in significant impacts to transportation.

4.12.2.1 Transportation Potential Impacts

Renovation of Existing Facilities at NAS Whidbey Island

Construction-related traffic from the renovation of facilities at NAS Whidbey Island would consist of delivery trucks, dump trucks, heavy equipment, and vehicles driven by construction crews. This could result in short-term impacts on traffic from additional truck trips and slower-moving vehicles. Trips are assumed to access Ault Field via SR 20, Ault Field Road, and Charles Porter Avenue. The number of construction trips on these roadways would be negligible and temporary. No construction trips are expected to access the Seaplane Base as a result of the Proposed Action. Oversize vehicles would need to obtain permits from the appropriate jurisdiction. Pilot/escort vehicles or flaggers may be requirements of an oversize or overweight permit to facilitate the movement of these vehicles through traffic.

Off-base Operations, Trip Generation

The Proposed Action would generate between 171 and 2,321 new trips per weekday under Alternative 1, 306 to 4,154 new trips per weekday under Alternative 2, and 174 to 2,359 new trips per weekday under Alternative 3 within the study area. Table 4.12-1 shows the daily traffic volumes generated on segments of SR 20, SR 525, and I-5 under each alternative. Under each alternative, traffic volumes at

each of the existing road segments would be expected to increase compared to the No Action Alternative. Trip projections take into account an annual background growth based on population projections from the Washington State Office of Financial Management. Trips do not take into account deployment schedules, and actual traffic during deployment may be lower. Table 4.12-2 compares traffic volumes for each alternative and demonstrates that much of the increase in traffic volumes in Skagit County can be attributed to background growth. Whereas, increases in Island County traffic near NAS Whidbey Island can largely be attributed to trips generated under the alternatives. The largest trip percentage increase over the No Action Alternative would occur on SR 20 south of Swantown Road in Oak Harbor and would range from 16 percent under Alternative 1 to 29 percent under Alternative 3.

Table 4.12-1 NAS Whidbey Island Trip Distribution

		Alternative			
Road	***Location***	***1***	***2***	***3***	***No Action***
I-5	***North and South of SR 20***	193	346	197	0
SR 20	Under I-5	193	346	197	0
SR 20	East of Pulver Road to West of March Point Road	205	367	209	0
SR 20	East of SR 20 Spur to South of SR 20 Spur	286	512	291	0
SR 20	North of Rosario Drive to South of Rosario Drive	224	400	227	0
SR 20	North of Banta Road to South of Frostad Road	227	407	231	0
SR 20	North of Regatta Drive to South of Swantown Road	2,321	4,154	2,359	0
SR 20	North of Sidney Street to South of Libbey Road	215	384	218	0
SR 20	West of Main Street to East of Main Street	213	381	216	0
SR 20/ SR 525	West of Bayview Road to Clinton Ferry Doc	171	306	174	0

Note: Based on percentage of personnel stationed and employed at NAS Whidbey Island by place of residence (Navy, 2005b), ITE Trip Generation Manual 9th Edition (ITE, 2012), and Housing Unit Type (American Fact Finder, 2014); assumes 2 trips per household from ITE trip generation rate were Navy personnel traveling to and from Ault Field; assumes remaining trips on major roadways occur within place of residence. Number of dependents is based on discussion in Section 4.10.

Additional trips from Navy personnel and dependents would be expected on other local roads and would vary depending on housing decisions. The largest increase in traffic volumes on local roads would be expected to occur on roads near Ault Field and the Seaplane Base from Navy personnel commuting to and from the installation.

Off-base Operations, Level of Service

The majority of road segments studied would not experience a change in LOS under the action alternatives compared to the affected environment or the No Action Alternative. SR 20 south of Swantown Road would experience degradation in LOS compared to both the affected environment and the No Action Alternative. SR 20 South of Swantown Road currently operates at LOS C and would operate at LOS C under the No Action Alternative. Under Alternatives 1, 2, and 3, this road segment would drop to LOS D; however, the road segment would still operate at a level higher than the LOS standard of LOS E. SR 20 north of Goldie Street currently operates at LOS C but would degrade to LOS D under Alternatives 1, 2, 3, and the No Action Alterative. However, SR 20 north of Goldie Street would still operate above the LOS standard of E. No road segments along SR 20, SR 525, and I-5 under the Proposed Action (any of the action alternatives) would fail to operate at or better than LOS standards.

Table 4.12-2 NAS Whidbey Island Projected Average Daily Traffic and Level of Service

				Alternative							
		Affected Environment		1		2		3		No Action	
Location	LOS Standard	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS
Road: Interstate 5 (I-5)											
Municipality: Burlington											
South of SR 20	D	69,000	C	72,900	C	73,100	C	72,900	C	72,700	C
North of SR 20	D	54,000	B	57,100	B	57,300	B	57,100	B	56,900	B
Road: State Route 20 (SR 20)											
Municipality: Burlington											
Under I-5	D	23,000	B	24,400	B	24,600	B	24,400	B	24,200	B
Municipality: Skagit County											
East of Pulver Rd	D	23,000	B	24,400	B	24,600	B	24,500	B	24,200	B
East of Avon Allen Rd	D	24,000	B	25,500	B	25,700	B	25,500	B	25,300	B
West of Avon Allen Rd	D	22,000	B	23,400	B	23,600	B	23,400	B	23,200	B
East of SR 536	D	21,000	B	22,300	B	22,500	B	22,300	B	22,100	B
West of SR 536	D	31,000	B	32,900	B	33,000	B	32,900	B	32,700	B
East of LaConner Whitney Rd	D	31,000	B	32,900	B	33,000	B	32,900	B	32,700	B
West of LaConner Whitney Rd	D	31,000	B	32,900	B	33,000	B	32,900	B	32,700	B
East of March Point Rd	D	31,000	B	32,900	B	33,000	B	32,900	B	32,700	B
West of March Point Rd	D	31,000	B	32,900	B	33,000	B	32,900	B	32,700	B
Road enters Anacortes											
North of Rosario Dr	D	14,000	D	15,000	D	15,200	D	15,000	D	14,800	D
South of Rosario Dr	D	16,000	D	17,100	D	17,300	D	17,100	D	16,900	D
Road enters Island County											
Municipality: Anacortes											
East of SR 20 Spur	D	31,000	B	33,000	B	33,200	B	33,000	B	32,700	B
South of SR 20 Spur	D	16,000	D	17,200	D	17,400	D	17,200	D	16,900	D
Municipality: Island County											
North of Banta Rd	D	17,000	D	17,700	D	17,900	D	17,700	D	17,500	D
North of Frostad Rd	D	17,000	D	17,700	D	17,900	D	17,700	D	17,500	D
South of Frostad Rd	D	18,000	D	18,800	D	18,900	D	18,800	D	18,500	D
Road enters Oak Harbor											
North of Sidney St	D	11,000	C	11,500	C	11,700	C	11,500	C	11,300	C

Table 4.12-2 NAS Whidbey Island Projected Average Daily Traffic and Level of Service

				Alternative							
		Affected Environment		1		2		3		No Action	
Location	LOS Standard	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS
South of Libbey Rd	D	11,000	C	11,500	C	11,700	C	11,500	C	11,300	C
Road enters Coupeville											
East of Quail Trail Lane	D	8,000	B	8,400	B	8,500	B	8,400	B	8,200	B
North of SR 525 and Race Rd	D	6,600	B	7,000	B	7,100	B	7,000	B	6,800	B
West of SR 525 and Race Rd	D	1,100	B	1,300	B	1,400	B	1,300	B	1,100	B
Municipality: Oak Harbor											
North of Regatta Dr	E	17,000	D	19,800	D	21,700	D	19,900	D	17,500	D
North of Case Rd	E	17,000	D	19,800	D	21,700	D	19,900	D	17,500	D
North of Goldie St	E	15,000	C	17,800	D	19,600	D	17,800	D	15,500	D
South of SE Midway Blvd	E	17,000	C	19,800	C	21,700	C	19,900	C	17,500	C
North of SE Sixth Ave	E	21,000	C	24,000	C	25,800	C	24,000	C	21,600	C
South of SE Sixth Ave	E	21,000	C	24,000	C	25,800	C	24,000	C	21,600	C
North of SE Barrington Ave	E	20,000	C	22,900	C	24,800	C	23,000	C	20,600	C
North of SE Pioneer Way	E	16,000	C	18,800	C	20,600	C	18,800	C	16,500	C
West of Beeksma Dr	E	18,000	C	20,900	C	22,700	C	20,900	C	18,500	C
North of Swantown Rd	E	21,000	C	24,000	C	25,800	C	24,000	C	21,600	C
South of Swantown Rd	E	14,000	C	16,700	D	18,600	D	16,800	D	14,400	C
Municipality: Coupeville											
West of Main St	D	9,900	C	10,400	C	10,600	C	10,400	C	10,200	C
East of Main St	D	7,900	B	8,300	B	8,500	B	8,400	B	8,100	B
State Route 525 (SR 525)											
Municipality: Island County											
South of SR 20	D	7,000	B	7,400	B	7,500	B	7,400	B	7,200	B
North of Ellwood Dr	D	6,600	B	7,000	B	7,100	B	7,000	B	6,800	B
Road enters Freeland											
West of Bayview Rd	D	12,000	C	12,500	C	12,700	C	12,500	C	12,400	C
West of Maxwelton Rd	D	11,000	C	11,500	C	11,600	C	11,500	C	11,300	C
East of Maxwelton Rd	D	9,700	C	10,200	C	10,300	C	10,200	C	10,000	C
West of Campbell Rd	D	9,000	C	9,400	C	9,600	C	9,400	C	9,300	C
East of Cedar Vista Dr	D	9,000	C	9,400	C	9,600	C	9,400	C	9,300	C

Table 4.12-2 NAS Whidbey Island Projected Average Daily Traffic and Level of Service

		Affected Environment		Alternative 1		Alternative 2		Alternative 3		No Action	
Location	**LOS Standard**	**ADT**	**LOS**	**ADT**	**LOS**	**ADT**	**LOS**	**ADT**	**LOS**	**ADT**	**LOS**
West of Humphrey Rd	D	8,400	C	8,800	C	9,000	C	8,800	C	8,700	C
East of Humphrey Rd	D	7,000	C	7,400	C	7,500	C	7,400	C	7,200	C
At Clinton Ferry Dock	D	5,900	C	6,200	C	6,400	C	6,300	C	6,100	C
Municipality: Freeland											
West of Honeymoon Bay Rd	D	6,500	B	6,900	B	7,000	B	6,900	B	6,700	B
East of Honeymoon Bay Rd	D	11,000	C	11,500	C	11,600	C	11,500	C	11,300	C
West of Fish Rd	D	13,000	C	13,600	C	13,700	C	13,600	C	13,400	C

Sources: ADT (WSDOT, 2014); LOS Standards (Island County, 2015c; City of Oak Harbor, 2014a; Skagit County, 2007a) Trip Generation (ITE, 2012)

Note: Trip generation is based on Trip Generation Manual 9th Edition (ITE, 2012) and LOS is based on 2010 Highway Capacity Manual (Transportation Research Board [TRB], 2010), Appendix D; ADT is rounded to nearest 100. In addition, a 3.0-percent (Island County) and 5.4-percent (Skagit County) growth factor was applied to the 2014 Washington State Department of Transportation traffic counts to account for population changes between 2014 and 2020 based on median forecasted population projections during that period (Washington State Office of Financial Management, 2012)

Key:
ADT = average daily traffic
LOS = level of service
SR = State Route

County and local roads would be expected to see some increase in traffic volumes. LOS was not determined for these roads due to a lack of recent traffic counts on local roads and the regional nature of traffic patterns that is difficult to predict for local roadways (e.g., exact location of residences for Navy personnel and work and school destinations for dependents). The increase in trips on local roads is expected to be greatest near Oak Harbor based on the percentage of Navy personnel currently residing in Oak Harbor and at NAS Whidbey Island. However, these trips would be spread throughout the community and would not be expected to cause significant impacts to traffic.

Local roads providing access to Ault Field gates (i.e., Ault Field Road, Langley Boulevard, Clover Valley Road, North Saratoga Street, and West Banta Road) would be expected to see the greatest increase in traffic from additional Navy personnel under the Proposed Action. The Navy has identified the intersection of SR 20 and Banta Road, to the north of Ault Field, as an area of concern. SR 20 currently operates at LOS D, and it is expected to continue to operate at LOS D under all Alternatives. The number of trips using this intersection is expected to increase by 227 vehicles (Alternative 1) to 407 trips (Alternative 2) compared to the No Action Alternative. The intersection is currently controlled by a stop sign on Banta Road and North Gate Drive to SR 20; however, the Island County 6-year Transportation Improvement Program indicates a traffic signal will be installed at this intersection by 2021 (Island County, 2016b). This increase in trips at this intersection may result in vehicles queuing in the right and left-turn only lanes on SR 20 and Banta Road from vehicles entering and exiting Ault Field from Saratoga Gate. Vehicle queuing would be limited to peak traffic hours and alleviated by the addition of a traffic signal and general LOS on this segment of SR 20 would not be expected to worsen under the Proposed Action under any of the alternatives.

The City of Oak Harbor Comprehensive Plan indicates that currently all intersections meet the city's adopted LOS standards (City of Oak Harbor, 2014a). The plan identified four intersections that may fail to meet LOS standards with additional development:

- SR 20 and Beeksma Drive (LOS F)
- SR 20 and Scenic Heights Road (LOS F)
- Heller Street and SW Swantown Avenue (LOS E)
- Midway Avenue and NE 7th Avenue (LOS F)

Traffic under any of the alternatives may contribute to the degradation of LOS at these intersections; however, the comprehensive plan includes a number of priority projects that would improve LOS at these intersections (City of Oak Harbor, 2014a). Oak Harbor and Washington State Department of Transportation also recently completed a traffic study for a corridor of SR 20 that includes the Beeksma Drive intersection and identified the addition of turning lanes or roundabouts as possible roadway improvements to improve LOS along SR 20 (WSDOT, 2012).

An increase in traffic on the Deception Pass Bridges would occur similar to what would be experienced on the segments of SR 20 North of Banta Road and South of Rosario Road. Similar to these segments, the Deception Pass Bridges are not expected to experience a drop in LOS under any of alternatives. Recent improvements to the bridges should ensure they remain structurally sound and would not be significantly impacted under any of the alternatives (WSDOT, 2015c; Island County Sub-Regional RTPO, 2012).

Therefore, implementation of the Proposed Action under any of the alternatives would not result in significant impacts to transportation.

On-base Operations

The four gates providing access to NAS Whidbey Island process approximately 19,400 vehicles daily. Assuming one round trip for each navy personnel under the action alternatives, gates at Ault field could see an increase of between 700 and 1,300 daily trips (approximately 3 percent to 8 percent over No Action Alternative traffic volumes entering and exiting the installation). It is assumed the increase in traffic would worsen existing backups identified in the NAS Whidbey Island Transportation Plan at the intersections of Midway Street and Langley Boulevard; the intersection of Midway Street and Charles Porter Avenue; and on Lexington Street near Building 113. The NAS Whidbey Island Transportation Plan has identified installation of a roundabout at the intersection of Midway Street and Langley Boulevard, and Rerouting Lexington Street to create a 90-degree connection with Princeton Street as potential roadway improvements to improve traffic flow. It is assumed that there would be no housing available on station at the Seaplane Base; however, some additional trips may result from Navy personnel and dependents accessing services located at the Seaplane base.

Therefore, implementation of the Proposed Action under any of the alternatives would not result in significant impacts to transportation.

Transit, Pedestrian, and Bicycle Facilities

Use of transit, pedestrian, and bicycle facilities would be expected to increase under any of the action alternatives. The increase in use of these facilities by Navy personnel and dependents is not expected to be significant because it is expected that the automobile would be used as the primary means of transportation. Transit, pedestrian, and bicycle facilities are not expected to significantly reduce actual vehicle trip generation on road segments in the study area.

Therefore, implementation of the Proposed Action under any of alternatives would not result in significant impacts to transportation.

Conclusion

Implementation of the Proposed Action would not result in significant impacts to transportation resources. Construction under each alternative would result in an increase in construction vehicles on roadways in and outside of the installation. Roadways are expected to be able to handle the temporary increase in construction vehicles. The increase in personnel and dependents during operations would result in an increase in traffic on local roads. Traffic would be spread throughout roads in Island and Skagit Counties and is not expected to result in LOS falling below established LOS standards. An increase in traffic at gates providing access to NAS Whidbey Island would result under each alternative; however any increase in traffic delays would be limited to peak traffic hours. The automobile is expected to be the primary mode of transportation for Navy personnel and therefore, there would be no significant increase in use of transit, pedestrian, and bicycle facilities. Impacts on traffic and transportation resources are dependent on number of personnel and not number and/or location of aircraft operations; therefore there would be no difference in impacts between scenarios or between average year and high-tempo FCLP year conditions.

If identified by the County or local municipality, measures could be implemented that would reduce congestion during peak traffic hours, such as restricting access at specific gates, changes to gate hours of operations, utilizing flaggers to direct traffic during peak traffic hours, or other traffic control devices. Roadway improvements at Ault field and in Oak Harbor already identified in the NAS Whidbey Island Transportation Plan, the City of Oak Harbor's comprehensive plan, and by the Washington State Department of Transportation would further reduce congestion on SR 20 and local roadways.

4.13 Infrastructure

Infrastructure

Increased consumption or demand for water, wastewater, stormwater, solid waste management, energy, and communications systems from the increase in population that would be spread throughout Island and Skagit Counties.

New facilities under each alternative would also result in increased demand for infrastructure resources.

Existing and future capacity is expected to handle the increases in demand.

This section analyzes the magnitude of anticipated increases or decreases in public works infrastructure demands, considering historic levels, existing management practices, and storage capacity, and evaluates potential impacts to public works infrastructure associated with implementation of the alternatives. Impacts are evaluated by whether they would result in the use of a substantial proportion of the remaining system capacity, reach or exceed the current capacity of the system, or require development of facilities and sources beyond those existing or currently planned.

The assessment of impacts is based on comparing existing use and conditions to anticipated changes in capacity associated with the utilities. Existing utility use and capacity were considered to be the best representation for year 2021 conditions. The analysis compares current use with anticipated future demands as a result of each alternative to determine potential impacts. In circumstances where personnel numbers are expected to increase, multipliers were used for each utility to assess how the increase in personnel would potentially impact the surrounding community. The multipliers are published by the U.S. Geological Survey and the U.S. Department of Energy and represent the average per capita use or per household use. The analysis focuses on the change in demand in relation to the ability of providers to meet additional demands while maintaining the current level of service for existing customers.

Infrastructure that relies on regional sources (i.e., electricity, natural gas) was analyzed at the regional level. Other utilities that could have a direct impact on municipal systems are discussed for specific jurisdictions. The majority of households would be located in Oak Harbor, NAS Whidbey Island, and Anacortes based on the percentage of personnel stationed and employed at NAS Whidbey Island who are residing in each municipality (Navy, 2005b). The analysis assumed each new Navy personnel would result in a new household with dependents. The number of dependents under each alternative is discussed in Section 4.10 and would range from 509 (Alternative 1) to 910 (Alternative 2). As discussed in Section 4.10, sufficient housing stock exists in the study area, and new households are expected to occupy currently vacant housing within the study area. For the purposes of this analysis, it is not expected there would be any vacant housing units at the Seaplane Base.

4.13.1 Infrastructure, No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur, and there would be no change to the existing infrastructure at Ault Field. Minor increases in demand for utilities would be expected under the No Action Alternative due to an increase in background community growth.

Therefore, no significant impacts to infrastructure would occur with implementation of the No Action Alternative.

4.13.2 Infrastructure, Alternatives 1 through 3

4.13.2.1 Infrastructure Potential Impacts

Potable Water Impacts

The increase in military personnel and dependents in the study area would result in an increased demand for potable water. However, as shown in Table 4.13-1, NAS Whidbey Island, Oak Harbor, and Anacortes currently have additional water capacity. Therefore, each alternative is expected to have a negligible impact on potable water sources.

Table 4.13-1 NAS Whidbey Island Water Supply Capacity by District

Water District	*Daily Consumption (gpd)*	*Daily Supply Capacity (gpd)*	*Additional Supply Capacity (gpd)*
NAS Whidbey Island	630,000	4,500,000 [1]	3,870,000
Oak Harbor	2,218,000 [2]	2,740,000	522,000
Anacortes	15,700,000 [2]	42,000,000	26,300,000
Skagit PUD	12,000,000	24,000,000	12,000,000

Sources: City of Oak Harbor, 2014b; City of Anacortes, 2015a; NAVFAC, 2015a; Skagit PUD, 2014

Notes:
[1] Capacity does not include emergency wells or wells located at OLF Coupeville
[2] Oak Harbor consumption includes NAS Whidbey Island; Anacortes consumption includes NAS Whidbey Island and Oak Harbor

Key:
gpd = gallons per day
PUD = Public Utility District

Table 4.13-2 identifies the projected water demand per alternative. Approximately 104,000 (Alternative 1) to 186,000 (Alternative 2) gallons per day would be needed to support 371 to 664 additional households in the region, depending on the alternative selected. Additional water consumption at Ault Field for new and renovated facilities under each alternative is presented in Table 4.13-3. Facility projections include consumption projects for uses in existing space that would be renovated. Facility consumption would be within the installation's current water supply capacity and would represent less than 1 percent of Ault Field's additional supply capacity.

Table 4.13-2 NAS Whidbey Island Area Projected Water Consumption per Alternative

Water District	*Number of Households*	*Projected Water Usage (gpd)*	*Percent of Additional Supply Capacity*
Alternative 1			
NAS Whidbey Island	0	n/a	n/a
Oak Harbor	263	73,600	14.1%
Anacortes	291	81,500	0.3%
Skagit PUD	19	5,300	0.0%
Unincorporated[1]	61	17,100	n/a
Study Area	371	103,900	n/a
Alternative 2			
NAS Whidbey Island	0	n/a	n/a
Oak Harbor	470	131,600	25.2%
Anacortes	521	145,900	0.6%
Skagit PUD	34	9,500	0.1%
Unincorporated	110	30,800	n/a
Study Area	664	185,900	n/a
Alternative 3			
NAS Whidbey Island	0	n/a	n/a
Oak Harbor	267	74,800	14.3%
Anacortes	296	82,900	0.3%
Skagit PUD	19	5,300	0.0%
Unincorporated	62	17,400	n/a
Study Area	377	105,600	n/a

Source: Nelson, 2004

[1] Unincorporated includes Coupeville, Washington

Note: Totals do not sum because Oak Harbor consumption includes NAS Whidbey Island; Anacortes consumption includes NAS Whidbey Island and Oak Harbor. Totals also do not sum due to rounding. Residential household consumption was assumed to be 280 gpd; additional supply capacity is based on the data shown in Table 4.13-1.

Key:
gpd = gallons per day
n/a = not applicable
PUD = Public Utility District

Table 4.13-3 Projected Annual Water Consumption for New Facilities at Ault Field (gpd)

Alternative	*Armament Storage*	*Mobile Maintenance Facility*	*Hangar Space*	*Total*
No Action Alternative	-	-	-	-
Alternative 1	40	390	560	990
Alternative 2	40	390	1,650	2,080
Alternative 3	40	390	560	990

Source: Navy, 2015b

Note: Projected totals are based on projected water consumption for similar future facilities at NAS Whidbey Island and include new construction and renovated existing structures

Key:
gpd = gallons per day

The percent of existing additional supply capacity in Oak Harbor ranges from 14 percent (Alternative 1) to 25 percent (Alternative 2). Oak Harbor anticipates having sufficient supply capacity until 2035 under current production and until 2060 with increased groundwater production (City of Oak Harbor, 2014b). NAS Whidbey and Oak Harbor both rely on Anacortes as their primary source of water. Total projected water demand represents less than 1 percent of Anacortes' current water capacity of 42 mgd, andAnacortes has water rights for, and the ability to expand, to 55 mgd (City of Anacortes, 2011, 2015a). Therefore, implementation of the Proposed Action under any of the action alternatives would not result in significant impacts to public water supplies.

New households in unincorporated areas of Island or Skagit Counties would rely on individual wells or small water districts using groundwater. Due to the small number of new households and the likelihood they would be spread out over a large geographic area, impacts to these water resources are expected to be minimal. Existing houses in unincorporated areas are expected to retain their existing access to water via a well or connection to a water district, and no new wells or connections would be needed. Therefore, implementation of the Proposed Action under any of the alternatives would not result in significant impacts to the water district.

Implementation of the Proposed Action under any of the alternatives would not result in significant impacts to potable water.

Wastewater Impacts

The increase in military personnel and dependents in the study area would result in an increased production of wastewater. However, as shown in Table 4.13-4, NAS Whidbey Island, Oak Harbor, and Anacortes all currently have additional wastewater treatment capacity. Therefore, the Proposed Action, regardless of alternative selected, is expected to have an impact, but not significant, on wastewater treatment.

Table 4.13-4 NAS Whidbey Island Area Wastewater Treatment Capacity

Water District	*Daily Processing (gallons/day)*	*Daily Capacity (gallons/day)*	*Additional Capacity (gallons/day)*
NAS Whidbey Island	360,000	850,000	490,000
Oak Harbor	2,900,000	5,200,000	2,300,000
Anacortes	1,920,000	4,500,000	2,580,000
Mount Vernon	4,000,000	16,500,000	12,500,000

Sources: USEPA, 2008; Carollo Engineers, 2013; City of Oak Harbor, 2015b, 2015c; City of Anacortes, 2015b; Mount Vernon, n.d.

Note: Oak Harbor consumption includes the Seaplane Base. Oak Harbor capacity assumes the Oak Harbor Clean Water Facility is operational by 2018

Table 4.13-5 identifies projected wastewater production under each alternative. Approximately 94,000 to 168,000 gallons per day would be produced by 371 to 664 additional households in the region. Additional wastewater production at Ault Field for new and renovated facilities under each alternative is presented in Table 4.13-6. Facility projections include production for existing space that would be renovated. Facility production would be within the installation's current wastewater treatment capacity of 0.85 mgd, representing less than 1 percent of the additional capacity (USEPA, 2008).

Additional households in Oak Harbor and Anacortes would produce significantly less wastewater than their respective wastewater treatment capacities. Therefore, implementation of the Proposed Action would not result in significant impacts to wastewater treatment.

New households in unincorporated areas of Island and Skagit Counties would rely on on-site wastewater treatment systems. Existing houses are assumed to already have on-site wastewater systems. Property owners would be responsible for ensuring on-site wastewater systems meet state and local regulations.

Implementation of the Proposed Action under any of the alternatives would not result in significant impacts to wastewater.

Table 4.13-5 NAS Whidbey Island Area Projected Wastewater Production

Wastewater District	*Number of Households*	*Projected Wastewater Production (gpd)*	*Percent of Additional Capacity*
Alternative 1			
NAS Whidbey Island	0	n/a	n/a
Oak Harbor	263	66,200	2.9%
Anacortes	28	7,100	0.3%
Mount Vernon	19	4,800	0.0%
Unincorporated	61	15,400	n/a
Study Area	371	93,500	n/a
Alternative 2			
NAS Whidbey Island	0	n/a	n/a
Oak Harbor	470	118,500	5.2%
Anacortes	50	12,700	0.5%
Mount Vernon	34	8,500	0.1%
Unincorporated	110	27,700	n/a
Study Area	664	167,300	n/a
Alternative 3			
NAS Whidbey Island	0	n/a	n/a
Oak Harbor	267	67,300	2.9%
Anacortes	29	7,200	0.3%
Mount Vernon	19	4,900	0.0%
Unincorporated	62	15,600	n/a
Study Area	377	95,000	n/a

Source: Nelson, 2004

Note: Assumed residential household production of 252 gpd; additional capacity based on the totals listed in Table 4.13-4.

Key:
gpd = gallons per day
n/a = not applicable

Table 4.13-6 Projected Annual Wastewater Production for New Facilities at Ault Field (gpd)

Alternative	*Armament Storage*	*Mobile Maintenance Facility*	*Hangar Space*	*Total*
No Action	0	0	0	0
Alternative 1	40	150	560	750
Alternative 2	40	150	1,650	1,840
Alternative 3	40	150	560	750

Source: Navy, 2015b

Note: Totals are based on projected wastewater consumption for similar future facilities at NAS Whidbey Island and include new construction and renovated existing structures

Key:
gpd = gallons per day

Stormwater Impacts

The Proposed Action would result in an increase in total impervious surface area at Ault Field. Specifically, approximately 2.1 acres of new impervious surface area would be created on Ault Field as a result of new armament storage, the mobile maintenance facility storage area, vehicle parking, and hangar space. The projected approximately 2.1 acres of impervious surface area would be an increase of less than 1 percent over the existing approximately 600 acres of existing impervious surface at Ault Field. Because more than 1 acre would be disturbed during construction under all alternatives, a construction NPDES stormwater permit would be obtained from the USEPA through its water quality permit program (see Section 4.9.2). The installation would need to implement BMPs to ensure that any new stormwater runoff would not further degrade the quality of water discharged into Dugualla Bay beyond current NPDES permit limits. NAS Whidbey Island currently complies with the State Stormwater Management Manual for Western Washington (NAVFAC, 2016b). BMPs in the manual include proper use and handling of de/anti-icing chemicals for aircraft and requirements and performance standards for LID. No new facilities or housing are expected to be constructed at the Seaplane Base under the Proposed Action; therefore, no impacts to stormwater would result there.

The stormwater system in areas of Oak Harbor is at or over capacity. However, the Proposed Action is not expected to impact stormwater in Oak Harbor or other areas of Island and Skagit Counties. As discussed in Section 4.10.2, sufficient existing housing is expected to be available to accommodate the new households under the Proposed Action. Therefore, no new housing is expected to be built that would increase impervious surface area and impact existing stormwater systems. Within the City of Oak Harbor and other areas of Island and Skagit Counties, mitigation is required by property developers under local regulations to reduce stormwater impacts.

If any new housing units were built as a result of the Proposed Action, stormwater impacts would be reduced through the implementation of stormwater management practices required by local and state regulations. Oak Harbor requires developers to be responsible for drainage in and through subdivisions, and it may require storm drain detention or infiltration systems (Code Publishing, 2016).

Therefore, implementation of the Proposed Action under any of the alternatives would not result in significant impacts to stormwater management systems.

Solid Waste Management Impacts

An increase in total solid waste generation is expected at NAS Whidbey Island and within the City of Oak Harbor and other areas of Island and Skagit Counties under the Proposed Action. However, regional landfill facilities have sufficient capacity. Therefore, no significant impact on solid waste management is expected.

Table 4.13-7 shows the projected solid waste production under each alternative. Additional households would generate between approximately 3,900 and 6,900 pounds of solid waste daily. Approximately 1,300 to 2,400 pounds of total solid waste generated would be recycled or composted. New facilities under each alternative would be expected to increase solid waste and hazardous waste generation by approximately 2 percent, based on the increase in square footage of facilities at Ault Field under each alternative. Hazardous waste collection and disposal is discussed in more detail in section 4.15. All municipal solid waste in the study area is sent to the Roosevelt Regional Landfill. Waste generated under any of the action alternatives would represent a negligible amount of the facility's permitted capacity of 120 million tons.

Therefore, implementation of the Proposed Action under any of the alternatives would not result in significant impacts to solid waste management.

Table 4.13-7 NAS Whidbey Island Projected Solid Waste Production (pounds per day)

Alternative	*Total Solid Waste*	*Waste Recycled/Composted*
Alternative 1	3,900	1,300
Alternative 2	6,900	2,400
Alternative 3	3,900	1,300
No Action	0	0

Source: USEPA, 2015d

Notes: Assumes population increase described in Section 4.10.
Assumes solid waste generation rate of 4.4 pounds per person.
Assumes recycling/composting rate of 1.51 pounds per person.

Energy Impacts

An increase in total energy consumption at NAS Whidbey Island and within the City of Oak Harbor and other areas of Island and Skagit Counties would be expected under each action alternative. However, projections anticipate sufficient energy supply for the foreseeable future. Therefore, no significant impact to energy supply is expected under any of the alternatives.

Approximately 1.5 million kWh to 2.8 million kWh of electricity per year (see Table 4.13-8) is expected to support new households under the Proposed Action. New households would require new connections to the existing distribution system, and some areas may require new infrastructure to accommodate increased capacity, depending on the location and quantity of housing.

The data in Table 4.13-8 show that 27,800 million British thermal units to 50,000 million British thermal units of additional natural gas would be needed within the region to support new homes under the alternatives. Property owners would be responsible for contacting Cascade Natural Gas Corporation (CNG) to obtain a connection to the existing gas distribution system. New properties too far from existing gas mains may be required to find other fuel sources, such as propane; however, the number of these homes would be minimal and would not impact alternative fuel types.

Table 4.13-8 NAS Whidbey Island Projected Annual Energy Consumption

	Households	*Electricity Consumption (kWh)*	*Natural Gas (MMBTU)*
Alternative 1	371	1,539,600	27,750
Alternative 2	664	2,755,400	49,670
Alternative 3	377	1,564,500	28,200
No Action	0	0	0

Source: EIA, 2013

Note: Assumed daily household consumption of 12.57 MWh for electricity and 74.8 MMBTU for natural gas (EIA, 2013).

Key:
kWh = kilowatt hours
MMBTU = million British thermal units

The data in Tables 4.13-9 and 4.13-10 show projected annual electricity and natural gas consumption for new facilities that would be needed at Ault Field under each alternative. New energy use was estimated using projected building square footage and was based on Energy Information Administration commercial building energy-use intensities (EIA, 2008). New federal buildings are required to use 30 percent less energy than those built using traditional construction techniques, and this requirement was incorporated into the energy-use estimates. No areas of concern have been identified at Ault Field, and upgrades or expansion to the existing electric power distribution system on the installation are expected under the alternatives. The Navy would need to perform an economic analysis to determine if the addition of the new facilities at Ault Field to the installation's existing steam system is feasible (NAVFAC, 2016a).

Table 4.13-9 Projected Annual Electricity Consumption for New Facilities at Ault Field (kWh)

Alternative	*Armament Storage*	*Mobile Maintenance Facility*	*Hangar Space*	*Total*
Alternative 1	21,324	160,030	302,570	483,930
Alternative 2	21,324	160,030	891,610	1,072,970
Alternative 3	21,324	160,030	302,570	483,930
No Action	0	0	0	0

Source: NAS Whidbey Island, 2016

Note: Totals are based on projected electricity consumption from new buildings and on EIA's commercial building survey (EIA, 2008), assuming a reduction of 30 percent as required by federal energy efficiency requirements for new federal buildings.

Key:
kWh = kilowatt hours

Table 4.13-10 Projected Annual Natural Gas Consumption for New Facilities at Ault Field (MMBTU)

Alternative	*Armament Storage*	*Mobile Maintenance Facility*	*Hangar Space*	*Total*
Alternative 1	70	540	940	1,550
Alternative 2	70	540	2,760	3,770
Alternative 3	70	540	940	1,710
No Action	0	0	0	0

Source: Navy, 2015b

Note: Totals are based on projected natural gas consumption from new buildings and on EIA's commercial building survey (EIA, 2008), assuming a reduction of 30 percent as required by federal energy efficiency requirements for new federal buildings.

Key:
MMBTU = million British thermal units

As discussed in Section 3.13, NAS Whidbey Island has improved its electricity-use efficiency through implementation of several building renovation projects, thereby reducing its overall energy usage 40 percent between 2003 and 2015 (NAS Whidbey Island, 2016). The projected increase in building energy use from this action under any alternative would be less than 2 percent of total building energy use in

2015. New building energy efficiency standards would be implemented at the new buildings as NAS Whidbey Island continues to reduce site-wide energy use to meet EO 13693 requirements.

The State of Washington is home to abundant and cheap supplies of hydroelectric power. The state is a net exporter of electricity and provides power to the Canadian power grid as well as California and the Southwest (EIA, 2015). Washington State has produced over 114 million MWh, with retail sales of only 92 MWh (EIA, 2015). Electricity demand under any of the alternatives would account for less than 1 percent of surplus production.

CNG projects natural gas production of over 4.2 million therms (1 therm equals 100,000 BTUs) and demand of just over 4 million therms in 2021 (CNG, 2011). Projected natural gas consumption under any of the action alternatives represents a small fraction of projected surplus. CNG has acknowledged it will need to identify additional capacity resources or supply arrangements to meet peak demands within its service area. However, the company's integrated resource plan indicates that, thanks to new technologies, the gas supply is adequate to meet growing demands in the Pacific Northwest and North America (CNG, 2011).

Therefore, implementation of the Proposed Action under any of the alternatives would not result in significant impacts to energy utilities.

Communications Impacts

It is expected that existing housing is already connected to telephone networks. Cell phone service is provided by multiple carriers throughout the study area. Capacity is largely driven by consumer demand, and it is expected carriers would install new cell towers or upgrade existing cell towers as needed to meet demand.

The Proposed Action is expected to result in an increased use of the bandwidth of existing communication systems at NAS Whidbey Island resulting from the increased number of personnel and operations. Existing capacity does not currently keep up with peak demand. Renovation or construction of new facilities under the action alternatives would include new or upgraded communication networks to facilities, such as fiber optic and copper cables to support alarms, telephones, video teleconferencing, processing, perimeter security, enterprise land mobile radio, legacy applications, environmental controls, and information assurance and cyber security. Upgrades during renovation and construction would ensure existing communications at Ault Field are not significantly impacted.

Therefore, implementation of the Proposed Action under any of the alternatives would not result in significant impacts to communications utilities.

Facilities Impacts

Existing facilities at Ault Field would need to be modified, and new facilities would be constructed in order to support the necessary training, maintenance, and operational requirements under each alternative. Approximately 55,500 square feet (Alternatives 1 and 3) to 93,000 square feet (Alternative 2) of new facilities would be constructed (see Section 2.3.2.4 for a description of these facilities). All planned construction activities would occur on the north end of the flight line at Ault Field, and sufficient space at the installation exists to accommodate all planned facilities. Renovation and construction of new facilities would have a beneficial impact to facilities under each alternative. No new facilities would be constructed off station.

Therefore, implementation of the Proposed Action under any of the alternatives would not result in significant impacts to facilities.

Infrastructure Conclusion

Overall, as discussed above, implementation of Alternatives 1 through 3 at NAS Whidbey Island would not result in significant impacts to infrastructure resources. Each alternative would result in increased consumption or demand for water, wastewater, stormwater, solid waste management, energy, and communications systems. Increased demand under each alternative would result from an increase in population that would be spread throughout Island and Skagit Counties. New facilities under each alternative would also result in increased demand for infrastructure resources. Based on existing and future capacity and projected demand, Navy and local infrastructure systems are expected to have sufficient capacity to accommodate the increase in population and facility requirements. Therefore, the impact under each alternative would be less than significant. Difference in impacts between action alternatives would only occur due to slight differences in construction and personal needs and would be negligible. Impacts on infrastructure needs are dependent on number of personnel and not number and/or location of aircraft operations; therefore there would be no difference in impacts between scenarios or between average year and high-tempo FCLP year conditions for all resources.

4.14 Geological Resources

This section assesses potential impacts of the Proposed Action on geological resources, including topography, geology, seismic events, and soils. The analysis of geological resources focuses on the area of proposed construction where soils would be disturbed and where there would be potential for soil erosion. BMPs are identified to minimize soil impacts and prevent or control pollutant discharge into stormwater.

Geological Resources

Construction would not include clearing or blasting of earth or rock, and only include minor grading; therefore, no significant impacts on geologic resources would occur.

There would be no impact on resistance to seismic events because all buildings constructed under the Proposed Action would be designed to conform to the seismic provisions of the Washington State Building Code, and a SPCC plan would be in place during construction.

Impacts to soils during construction could include grading, compaction, and rutting from vehicle traffic and an increase in erosion, but impacts minimized due to the use of BMPs. No significant impacts. BMPs will be implemented to further reduce or eliminate any potential impacts.

4.14.1 Geological Resources, No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur, and there would be no change to geological resources. Therefore, no significant impacts to geological resources would occur with implementation of the No Action Alternative.

4.14.2 Geological Resources, Alternatives 1 through 3

New construction under Alternatives 1 through 3 would include expanded hangar space and/or new hangars, armament storage, maintenance facilities, and expanded personnel parking areas. All planned construction would occur in proximity to the flight line at Ault Field. No construction would occur at OLF Coupeville. Each alternative would result in up to approximately 2 acres of new impervious surface at NAS Whidbey Island.

4.14.2.1 Geological Resources Potential Impacts

Topography Impacts

Alternatives 1 through 3 would have no impact on topography as topography at the construction sites would not be affected by minor grading because the sites are generally level.

Geology Impacts

Under each of the three action alternatives, construction would not include clearing or blasting of earth or rock. There would only be minor grading, around 18 to 24 inches deep, which would not affect bedrock or geology. Therefore, no significant impacts on geology would occur.

Seismic Activity Impacts

In the event of an earthquake, seismic hazards including liquefaction may result in damage to buildings or other structures. Potential for damage from ground shaking is highest in local areas that contain artificial fill, areas underlain by peat, existing landslides, and valley floors underlain by unconsolidated alluvial sediments. Much of the runway and airfield areas at Ault Field were constructed on artificial fill. However, all buildings constructed under the Proposed Action would be designed to conform to the seismic provisions of the Washington State Building Code. In the event of an earthquake, there is also

the potential for spills to occur. However, an SPCC plan would be developed and implemented in order to help prevent spills and to control and clean up spills in the event that they did occur. Therefore, if a seismic event were to occur, human health and safety would be protected to the maximum extent practicable.

Soils Impacts

Under each of the three action alternatives, impacts to soils during construction could include compaction and rutting from vehicle traffic and an increase in erosion. Up to approximately 2 acres of new impervious surfaces would increase the quantity and velocity of stormwater runoff, which would increase the susceptibility of surrounding soils to erosion. These impacts would be minimized or avoided by using standard soil erosion- and sedimentation-control techniques at the construction site such as a silt barrier (filter fabric) and appropriate revegetation techniques upon completion. Areas that cannot be covered would have their stormwater runoff retained and diverted to the sanitary sewer system.

Minor grading, around 18 to 24 inches deep, would occur and the soils removed. To the extent possible, soils from grading would be reused on site for the project. Any remaining soils would be taken off station to a designated soil disposal site. In addition, construction practices would meet the policies and objectives contained within OPNAVINST 5090.1D, which are to protect, conserve, and manage the vital elements of the natural resource program, including soils, as well as basing land use practices on scientifically sound conservation procedures and techniques. Construction practices would also be consistent with the goals of the Integrated Natural Resources Management Plan, which directs identification of and appropriate use of soil in accordance with, and within the limits of, its physical characteristics while protecting it from uncontrolled stormwater runoff to prevent and control soil erosion (NAS Whidbey Island, 2012). Revegetation techniques would include replanting disturbed areas with native plants.

Therefore, implementation of each of the three action alternatives would not result in significant impacts on soils.

Geological Resources Conclusion

Overall, as discussed above, implementation of Alternatives 1, 2, or 3 at NAS Whidbey Island would not result in significant impacts to geological resources. Topography would not be impacted because new construction would be conducted in generally level areas. Construction would not include clearing or blasting of earth or rock, and only minor grading, and, therefore, no significant impacts on geologic resources would occur. There would be no impact on resistance to seismic events because all buildings constructed under the Proposed Action would be designed to conform to the seismic provisions of the Washington State Building Code, and an SPCC plan would be in place during construction. Up to approximately 2 acres of new impervious surfaces would result from construction activities; however, implementation of each of the three action alternatives would not result in significant impacts on soils due to the use of BMPs to reduce or eliminate any potential impacts. Construction activities are similar under the three action alternatives and therefore there would be negligible differences in impacts to geological resources.

4.15 Hazardous Materials and Wastes

The hazardous materials and wastes analysis contained in the respective sections addresses issues related to the use and management of hazardous materials and wastes as well as the presence and management of specific cleanup sites at NAS Whidbey Island.

Hazardous Materials and waste Potential Impacts

Hazardous materials and wastes would increase in quantity but would be managed under existing law and U.S. Navy regulation and management practices. The existing practices and strategies would successfully manage the use and disposal of these materials.

No proposed construction activities would occur within or in proximity to any DERP sites; therefore, ongoing remedial programs would not be impacted.

4.15.1 Hazardous Materials and Wastes, No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur; this means the Navy would not operate additional Growler aircraft and would not add additional personnel at NAS Whidbey Island. Annual Growler airfield operations would be maintained at levels consistent with those identified in the 2005 and 2012 transition EAs. Consequently, there would not be any improvements to the Navy's electronic attack capability and no construction to support additional Growler aircraft or personnel. The No Action Alternative would not meet the purpose of or need for the Proposed Action; however, as required by NEPA, the No Action Alternative is carried forward for analysis in this EIS and provides a benchmark for measuring the environmental consequences of the action alternatives.

Under the No Action Alternative, the Proposed Action would not occur, and there would be no change associated with hazardous materials and wastes. Therefore, no significant impacts associated with hazardous materials and wastes would occur with implementation of the No Action Alternative.

4.15.2 Hazardous Materials and Wastes, Alternatives 1 through 3

The analysis of hazardous materials, hazardous waste, and contaminated sites focuses on the potential for these substances to be introduced into the environment during construction activities or from aircraft operations and maintenance. Potentially affected areas consist of proposed construction areas, the airfields, and aircraft support and maintenance facilities.

4.15.2.1 Hazardous Materials and Wastes Potential Impacts

Factors considered in the analysis include the potential for increased human health risk or environmental exposure, as well as changes in the quantity and types of hazardous substances transported, stored, used, and disposed. Operation and maintenance of additional Growler aircraft would not introduce any new hazardous materials and/or waste streams at the NAS Whidbey Island complex. While the addition of 35 or 36 Growler aircraft would increase the amount of hazardous materials handled and generate increased amounts of hazardous wastes, this increase would be managed by existing hazardous material and waste management functions and facilities at NAS Whidbey Island and would not result in significant impacts with regard to the handling, use, storage, or disposal of fuel, oils, and lubricants at the station. Increases in hazardous wastes would be negligibly higher under Alternatives 2 and 3 (36 aircraft) than under Alternative 1 (35 aircraft). There would be no difference in hazardous waste generation between scenarios or between average year and high-tempo

FCLP year conditions. All hazardous wastes would continue to be collected and managed on site in accordance with the installation's hazardous waste management plan. Appropriate procedures for handling of hazardous materials and BMPs for the management of hazardous substances and spill response at NAS Whidbey Island would be applied. Hazardous waste management activities would follow existing procedures for the safe handling, use, and disposal of hazardous substances and waste. Therefore, the Proposed Action under any alternative would have no impact to hazardous materials and the waste management program at NAS Whidbey Island.

The methodology for evaluating contaminated sites (Defense Environmental Remediation Program [DERP] sites) compares the proximity of proposed facility development/construction activities to contaminated sites and considers the operational uses of the facilities to determine potential impacts to or from these sites. The Proposed Action would not interfere with any ongoing remedial programs at the NAS Whidbey Island complex, and no proposed construction activities under any of the alternatives would occur within or in proximity to any DERP sites or result in the potentially hazardous exposure of on-site personnel. No proposed construction activities would require removal or disturbance of surface soil, subsurface soil, groundwater, or existing groundcover near or within any DERP sites.

In June 2016, the Navy issued a policy that it intends to remove, dispose, and replace legacy aqueous film forming foam that contains perfluorooctane sulfonate and/or perfluorooctanoic acid. Future operations at Ault Field and OLF Coupeville would not result in release of legacy aqueous film forming foam into the environment once it is removed and replaced. The Navy continues to assemble information concerning potential historical perfluorinated compounds at Ault Field and OLF Coupeville. The Navy is developing a preliminary assessment for perfluorinated compounds to identify areas where historical releases of perfluorooctane sulfonate and/or perfluorooctanoic acid may be impacting drinking water sources and ensure that no one is drinking water with levels of perfluorooctane sulfonate and/or perfluorooctanoic acid greater than the recommended level set by the USEPA in May 2016.

Therefore, implementation of any of the action alternatives would not result in significant impacts to hazardous materials and wastes.

Hazardous Materials and Wastes Conclusion

Hazardous materials and wastes would increase in quantity but would be managed under existing law and U.S. Navy regulation and management practices. The existing practices and strategies would successfully manage the use and disposal of these materials. No proposed construction activities would occur within or in proximity to any DERP sites; therefore, ongoing remedial programs would not be impacted at Ault Field.

4.16 Climate Change and Greenhouse Gases

Climate Change and Greenhouse Gases

Climate change will continue to occur, resulting in global impacts affecting Whidbey Island and Puget Sound and the Navy's priorities and mission.
Federal, state and local agencies, including the DoD, will continue to assess impacts and define adaptation and mitigation strategies to address them.

Potential changes in GHG emissions from implementation of the Proposed Action would be similar between all three action alternatives and scenarios but greatest under Alternative 2, Scenario A.

For all three alternatives, Scenario A, the option to conduct 80 percent of FCLPs at OLF Coupeville and 20 percent of FCLPs at Ault Field, would result in the greater increase in GHG emissions.

GHG emissions from the Proposed Action should not have a significant impact on Washington's GHG emission goals.

Increased GHG emissions are the primary cause of climate change, and therefore efforts to reduce GHG emissions are considered the best way to reduce the potential impacts of climate change. CEQ recommends agencies use the projected GHG emissions and also, when appropriate, potential changes in carbon sequestration and storage as the proxy for assessing a Proposed Action's potential climate change impacts. In order to provide the decision maker and public with a frame of reference, the CEQ recommends agencies incorporate by reference applicable agency emissions targets, such as GHG emissions reductions, to make it clear whether the emissions being discussed are consistent with such goals (including applicable state, regional, and local goals) (CEQ, 2016).

As discussed in Chapter 3, global climate change threatens ecosystems, water resources, coastal regions, crop and livestock production, and human health. The continuing increase in GHG concentrations in the Earth's atmosphere will likely result in a continuing increase in global annual average temperature and climate change effects. Global, federal, and state initiatives to reduce GHG emissions have been implemented to reduce the severity of climate change impacts in the future. These changes would occur under all alternatives. The Proposed Action would result in an increase in GHG emissions compared to the No Action Alternative, primarily from the increase in the use of jet fuel for military aircraft operations. The Navy and the DoD have implemented other programs and policies to reduce GHG emissions from other sources. The Navy, the DoD, and the State of Washington have implemented laws, policies, and programs to address the impacts of climate change in the future.

4.16.1 Global Climate Change Projections

Because GHGs remain in the atmosphere for long periods of time, the concentrations of GHGs in the atmosphere are likely to continue to remain elevated despite reductions in GHG emissions (IPCC, 2013), and therefore the impacts of climate change described in Chapter 3 are likely to continue to occur. Depending on society's commitment to reducing GHG emissions, the USEPA predicts that CO_2 concentrations could be stabilized at about the current levels of 400 parts per million by the end of this century, but if unchecked could reach 1,300 parts per million by then. By 2100, global average temperatures are expected to rise between 2.7 degrees and 8.6 degrees Fahrenheit. These temperature levels would result in a continuation of effects, such as the increase in sea levels, extreme weather events, and ocean acidification—all of which will increase impacts on ecological and economic systems, as well as human health. Significant reductions in GHG emissions will only reduce the severity of climate

change impacts; however, such reductions will be critical to limiting impacts on infrastructure and natural resources (USEPA, 2016f)

4.16.1.1 Projections for Impacts of Climate Change to Washington and Puget Sound

Washington State has identified several specific risks to the state and sensitive areas. The direct effects of climate change that will affect the state are warmer temperatures, rising sea levels, reduced snow pack, and extreme weather events (Washington State Department of Ecology, n.d.[g]).

Warmer temperatures will result in milder winters with more rain and hotter summers with less rain. Annual temperatures are predicted to be 2 degrees warmer in the 2020s and 3 degrees warmer in the 2040s compared to 1970 through 1999 averages. These changes will result in a decline in water supplies, more human health risks, a changing growing season, more pests, native plant and animal population decline (including salmon), and wetlands decline (Washington State Department of Ecology, n.d.[k]).

It is difficult to predict rising sea levels and their impacts on the coast of Washington and within Puget Sound because sea level is affected by many different local factors, including ocean currents, wind patterns, land loss, local glacial melt, and even the potential for earthquakes. Sea levels in Puget Sound are projected to continue rising through the 21st century, increasing by 14 to 54 inches by 2100 (relative to 2000), resulting in higher tidal/storm surge and increased coastal inundation, erosion, and flooding (Climate Impacts Group, 2015). Higher sea levels will increase wave heights, particularly during storm surges. Sea level rise effects include coastal community flooding, coastal erosion and landslides, seawater intrusion into groundwater wells, and lost wetlands and estuaries (Washington State Department of Ecology, n.d.[i]).

Reduced snow pack and earlier runoff will have a wide impact in Washington. Average spring snowpack in the Puget Sound region is projected to decline by 42 to 55 percent by the 2080s (relative to 1970 through 1999) (Climate Impacts Group, 2015). Less snow means that glaciers are not replenished. Downstream effects that will likely increase in the future include changes in the timing of peak freshwater flows, power output and hydropower facilities, winter recreation, fish migration, and water availability in the dry summer season (Washington State Department of Ecology, n.d.[j]).

Extreme weather resulting from climate change in Washington is likely to take the form of a greater intensity of wind storms, heat waves, droughts, heavy rains, snow storms, and dust storms. Storms result in flooding, landslides, hail, and wind that endanger life, damage property, and challenge state and local emergency response capabilities. Heat waves are also dangerous to temperature-sensitive individuals (e.g., infants and elderly) and natural habitats (Washington State Department of Ecology, n.d.[h]).

Many Pacific salmon populations could be harmed by warming stream temperatures, increasing winter peak flows, and decreasing summer low flows, which could affect salmon reproduction, growth, and survival. Some species may not be harmed; however, it is likely that salmon species with an in-stream rearing life stage (e.g., steelhead, some Chinook sockeye, and Coho) will be affected (Climate Impacts Group, 2015).

Ocean water is becoming more acidic because of elevated levels of carbon dioxide related to human activities. The pH of Washington's coastal waters is projected to decline by 0.14 to 0.32 by 2011 (relative to 1986 through 2005 levels) (Climate Impacts Group, 2015). This process, known as ocean acidification,

may be having negative impacts on marine animals, particularly shellfish. Scientists predict that ocean acidification will continue in the future, which could cause significant developmental problems for many species in Washington, such as oysters, clams, barnacles, geoduck, and plankton, which are important food sources for salmon, seabirds, whales and other marine wildlife in the region (Washington State Department of Ecology, n.d.[l]).

4.16.1.2 Projections for Impacts of Climate Change on Department of Defense

As discussed in Chapter 3, The 2014 DoD Climate Change Adaptation Roadmap indicates that rising global temperatures, changing precipitation patterns, increasing frequency or intensity of extreme weather events, and rising sea levels and associated storm surges are likely to affect the DoD's activities, and adaptation will require consideration of climate change in DoD plans, operations, training, infrastructure, and acquisition (DoD, 2014).

4.16.1.3 Projections for Impacts of Climate Change at NAS Whidbey Island

As NAS Whidbey Island is located within Puget Sound, it will experience the same climate change effects described above. Increased sea levels, storm surges, and extreme weather events could have an impact on NAS Whidbey Island's existing facilities and infrastructure. Station facilities are at elevations ranging from 10 feet to 75 feet above sea level. Sea level increases for the Strait of Juan de Fuca are projected to be 1 to 6 inches by 2030, 1 to 14 inches by 2050, and 6 to 55 inches by 2100 (Climate Impacts Group, 2015). While this predicted increase would not cause a permanent inundation of the station, it is likely to increase the potential for flooding events at the station during storms. Higher sea levels also increase the power of waves and the associated rate of coastal erosion around the station.

Climate change could also affect operations at NAS Whidbey Island. Extreme weather could impact aircraft training schedules, and heat waves may increase the number of "black flag" days (suspended outdoor training due to heat), fire hazards, or dust generation during activities. Increases in cooling degree days will require more energy for cooling of buildings and may require increased capability of building cooling systems. Increased frequency of intense rain events could tax the existing stormwater treatment systems, leading to localized flooding and increased pollution levels in runoff.

4.16.2 Changes in Greenhouse Gas Emissions from the Proposed Action

In accordance with Navy guidance (Navy, 2014b) and CEQ guidance (CEQ 2016), the following section quantifies the estimated GHG emissions that would be generated in executing the Proposed Action.

4.16.2.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur. No new stationary sources would be installed, and no existing stationary sources would have an increase in emissions. There would be no significant change in aircraft operations. Therefore, no significant impacts to GHG emissions would occur with implementation of the No Action Alternative.

4.16.2.2 Alternative 1

Alternative 1 would expand carrier capabilities by adding three additional aircraft to each existing carrier squadron and augmenting the FRS with eight additional aircraft (a net increase of 35 aircraft). While no new squadrons would be created, this expansion would require new buildings and the renovation of space for maintenance hangers, armament storage, and classroom space. The Navy would also construct

additional paved areas for vehicle parking and aircraft runway improvements and parking areas. The expansion of Growler operations would require an increase of 371 personnel at the NAS Whidbey Island complex. Alternative 1 represents the largest increase in aircraft operations of the three alternatives. The three different scenarios reflect different operation levels at Ault Field and OLF Coupeville. See Chapter 2 for a full description of the Proposed Action under Alternative 1.

Implementation of Alternative 1 would contribute directly to emissions of GHGs from the combustion of fossil fuels. GHG emissions have been calculated using resources and emission factors as described in Section 4.4 (Air Quality), and detailed assumptions and calculations are provided in Appendix B. As listed in Table 4.4-1, construction activities would generate approximately 1,808 metric tons (MT) of carbon dioxide equivalent (CO_2e) during construction, but these emissions would be temporary and would occur before implementation of the Proposed Action.

Once the Proposed Action has been implemented, ongoing increased stationary source operations, Growler aircraft operations, and personnel commuting would generate an increase in GHG emissions compared to No Action Alternative GHG emissions. Table 4.16-1 provides a summary of the annual GHG emissions under the three different scenarios.

Site-wide stationary source GHG emissions would increase by 1 percent, and site-wide mobile GHG emissions associated with the Proposed Action would increase by 39 percent to 57 percent. Regional GHG emissions inventories that include military aircraft emissions are not available; therefore, GHG emissions have been compared to applicable state sector totals (i.e., transportation and aircraft emissions) to provide a reference for the scale of emissions from the Proposed Action. The change in Growler GHG emissions represents less than 1 percent of aircraft emissions within the State of Washington.

Washington State has established GHG reduction targets to reduce overall emissions (RCW 70.235.020 Washington State Legislature, 2008), and increases in GHG emissions could affect the state's efforts to meet these targets. While the Washington GHG inventory has shown an increase in overall transportation GHG emissions from 37.5 to 42.5 Million MT CO_2e between 1990 and 2012 (refer to Table 3.16-1 in Section 3.16), annual aircraft GHG emissions decreased from 9.1 to 8.0 Million MT CO_2e over the same period (Washington State Department of Ecology, 2016). The change in GHG emissions from the Proposed Action would only result in a small percentage of total aircraft GHG emissions in the State of Washington. Therefore, the GHG emissions from the Proposed Action should not have a significant impact on Washington's GHG emission goals.

Table 4.16-1 NAS Whidbey Island Complex Annual GHG Emissions, Alternative 1

Emission Source	CO_2e Emissions (Metric tpy) No Action	Alt 1A	Alt 1B	Alt 1C
Stationary Sources				
Site-wide Total GHG Emissions (2014 Reported)	11,371			
New Electricity Building Use (Indirect)	0	53	53	53
New Natural Gas Building Use (Direct)	0	83	83	83
Total Change in Stationary CO_2 Emissions		136	136	136
% increase in Stationary CO_2 Emissions		1%	1%	1%
Mobile Sources				
Aircraft Operations	90,431	146,302	137,145	128,473
Personnel Commute Emissions	9,091	9,912	9,912	9,912
Total Action-related Mobile CO_2 Emissions	99,521	156,214	147,057	138,385
Change in Mobile CO_2 Emissions		56,693	47,536	38,864
% increase in Mobile CO_2 Emissions		57%	49%	39%
Total Change in Emissions (Stationary and Mobile)		56,829	47,672	39,000
2012 Total CO_2 from Transportation in Washington State[1]		42,500,000		
Change in Mobile Emissions as % of Total 2012 Transportation CO_2e Emissions in Washington State		0.13%	0.11%	0.09%
2012 Total CO_2e from Aircraft in Washington State[1]		8,000,000		
Change in Aircraft Emissions as % of Total 2012 Aircraft CO_2e Emissions in Washington State		0.71%	0.59%	0.49%

Note:
[1] Washington State Department of Ecology, 2016: GHG Inventory 1990-2012 http://www.ecy.wa.gov/climatechange/docs/2012GHGtable.pdf

Key:
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
GHG = greenhouse gas
tpy = tons per year

4.16.2.3 Alternative 2

Alternative 2 would expand expeditionary and carrier capabilities by establishing two new expeditionary squadrons, adding two additional aircraft to each existing carrier squadron, and augmenting the FRS with eight additional aircraft (a net increase of 36 aircraft). This expansion would require more construction of new buildings than Alternative 1, for maintenance hangars, armament storage, and classroom space. The Navy would also construct additional paved areas for vehicle parking and aircraft runway improvements and parking areas. The expansion of Growler operations would require an increase of 664 personnel at the NAS Whidbey Island complex. The three different scenarios reflect different operation levels at Ault Field and OLF Coupeville. See Chapter 2 for a full description of the Proposed Action under Alternative 2.

Implementation of Alternative 2 would contribute directly to emissions of GHGs from the combustion of fossil fuels. GHG emissions have been calculated using resources and emission factors as described in Section 4.4 (Air Quality), and detailed assumptions and calculations are provided in Appendix B. As listed in Table 4.4-6, construction activities would generate approximately 2,451 MT of CO_2e during

construction, but these emissions would be temporary and would occur before implementation of the Proposed Action.

Once the Proposed Action has been implemented, ongoing increased stationary source operations, Growler aircraft operations, and personnel commuting would generate an increase in GHG emissions under Alternative 2 compared to No Action Alternative GHG emissions. Table 4.16-2 provides a summary of the annual GHG emissions under the three different scenarios.

Table 4.16-2 NAS Whidbey Island Complex Annual GHG Emissions, Alternative 2

	CO_2e Emissions (Metric tpy)			
Emission Source	*No Action*	*Alt 1A*	*Alt 1B*	*Alt 1C*
Stationary Sources				
Site-wide Total GHG Emissions (2014 Reported)	11,371			
New Electricity Building Use (Indirect)	0	122	122	122
New Natural Gas Building Use (Direct)	0	188	188	188
Total Change in Stationary CO_2 Emissions		310	310	310
% increase in Stationary CO_2 Emissions		3%	3%	3%
Mobile Sources				
Aircraft Operations	90,431	146,108	137,270	128,794
Personnel Commute Emissions	9,091	10,561	10,561	10,561
Total Action Related Mobile CO_2 Emissions	99,521	156,669	147,832	139,356
Change in Mobile CO_2 Emissions		57,148	48,310	39,835
% increase in Mobile CO_2 Emissions		58%	49%	40%
Total Change in Emissions (Stationary and Mobile)		57,447	48,609	40,134
2012 Total CO_2 from Transportation in Washington State[1]		42,500,000		
Change in Mobile Emissions as % of Total 2012 Transportation CO_2e Emissions in Washington State		0.13%	0.11%	0.9%
2012 Total CO_2e from Aircraft in Washington State[1]		8,000,000		
Change in Aircraft Emissions as % of Total 2012 Aircraft CO_2e Emissions in Washington State		0.71%	0.60%	0.50%

Note:
[1] Washington State Department of Ecology, 2016: GHG Inventory 1990-2012 http://www.ecy.wa.gov/climatechange/docs/2012GHGtable.pdf.

Key:
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
GHG = greenhouse gas
tpy = tons per year

Site-wide stationary source GHG emissions would increase by 3 percent, and site-wide mobile GHG emissions associated with the Proposed Action would increase by 41 percent to 58 percent. Regional GHG emissions inventories that include military aircraft emissions are not available; therefore, GHG emissions have been compared to applicable state sector totals (i.e., transportation and aircraft emissions) to provide a reference for the scale of emissions from the Proposed Action. The change in

Growler emissions represents less than 1 percent of aircraft GHG emissions within the State of Washington.

Washington State has established GHG reduction targets to reduce overall emissions (RCW 70.235.020 Washington State Legislature, 2008), and increases in GHG emissions could affect the state's efforts to meet these targets. While the Washington GHG inventory has shown an increase in overall transportation GHG emissions from 37.5 to 42.5 Million MT CO_2e between 1990 and 2012 (refer to Table 3.16-1 in Section 3.16), annual aircraft GHG emissions decreased from 9.1 to 8.0 Million MT CO_2e over the same period (Washington State Department of Ecology, 2016). The change in GHG emissions from the Proposed Action would only result in a small percentage of total aircraft GHG emissions in the State of Washington. Therefore, the GHG emissions from this Proposed Action should not have a significant impact on Washington's GHG emission goals.

4.16.2.4 Alternative 3

Alternative 3 would expand expeditionary and carrier capabilities by adding three additional aircraft to each existing expeditionary squadron, adding two additional aircraft to each existing carrier squadron, and augmenting the FRS with nine additional aircraft (a net increase of 36 aircraft). This expansion would require less construction than Alternative 2, including new buildings and the renovation of space for maintenance hangars, armament storage, and classroom space. The Navy would also construct additional paved areas for vehicle parking and aircraft runway improvements and parking areas. The expansion of the Growler community would require an increase of 337 personnel at the NAS Whidbey Island complex. The three different scenarios reflect different operation levels at Ault Field and OLF Coupeville. See Chapter 2 for a full description of the Proposed Action under Alternative 3.

Implementation of Alternative 3 would contribute directly to emissions of GHGs from the combustion of fossil fuels. GHG emissions have been calculated using resources and emission factors as described in Section 4.4 (Air Quality), and detailed assumptions and calculations are provided in Appendix B. As listed in Table 4.4-11, construction activities would generate approximately 1,808 MT of CO_2e during construction, but these emissions would be temporary and would occur before implementation of the Proposed Action.

Once the Proposed Action has been implemented, ongoing increased stationary source operations, Growler aircraft operations, and personnel commuting under Alternative 3 would generate an increase in GHG emissions compared to existing and No Action Alternative GHG emissions. Table 4.16-3 provides a summary of the annual GHG emissions under the three different scenarios.

Site-wide stationary source GHG emissions would increase by 1 percent, and site-wide mobile GHG emissions associated with the Proposed Action would increase by 40 percent to 57 percent. Regional GHG emissions inventories that include military aircraft emissions are not available; therefore, emissions have been compared to state sector totals (i.e., transportation and aircraft emissions) to provide a reference for the scale of emissions from the Proposed Action. The change in Growler emissions represents less than 1 percent of aircraft emissions within the State of Washington.

Table 4.16-3 NAS Whidbey Island Complex Annual GHG Emissions, Alternative 3

Emission Source	CO_2e Emissions (Metric TPY)			
	No Action	Alt 1A	Alt 1B	Alt 1C
Stationary Sources				
Site-wide Total GHG Emissions (2014 Reported)	11,371			
New Electricity Building Use (Indirect)	0	58	58	58
New Natural Gas Building Use (Direct)	0	91	91	91
Total Change in Stationary CO_2 Emissions		149	149	149
% increase in Stationary CO_2 Emissions		1%	1%	1%
Mobile Sources				
Aircraft Operations	90,431	145,840	137,510	128,596
Personnel Commute Emissions	9,091	9,926	9,926	9,926
Total Action Related Mobile CO_2 Emissions	99,521	155,766	147,436	138,522
Change in Mobile CO_2 Emissions		56,245	47,915	39,001
% increase in Mobile CO_2 Emissions		57%	48%	39%
Total Change in Emissions (Stationary and Mobile)		56,381	48,051	39,137
2012 Total CO_2e from all sources in Washington State[1]		92,000,000		
Change in Emissions (Stationary and Mobile) as % of Total 2012 CO_2e Emissions in Washington State		0.06%	0.05%	0.04%
2012 Total CO_2e from Aircraft in Washington State[1]		8,000,000		
Change in Aircraft Emissions as % of Total 2012 Aircraft CO_2e Emissions in Washington State		0.70%	0.60%	0.49%

Note:
[1] Washington State Department of Ecology, 2016: GHG Inventory 1990-2012 http://www.ecy.wa.gov/climatechange/docs/2012GHGtable.pdf.

Key:
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
GHG = greenhouse gas
TPY = tons per year

Washington State has established GHG reduction targets to reduce overall emissions (RCW 70.235.020 Washington State Legislature, 2008), and increases in GHG emissions could affect the state's efforts to meet these targets. While the Washington GHG inventory has shown an increase in overall transportation GHG emissions from 37.5 to 42.5 Million MT CO_2e between 1990 and 2012, annual aircraft GHG emissions decreased from 9.1 to 8.0 Million MT CO_2e (Washington State Department of Ecology, 2016) over the same period. The change in GHG emissions from the Proposed Action would only result in a small percentage of total aircraft GHG emissions in the State of Washington. Therefore, the GHG emissions from the Proposed Action should not have a significant impact on Washington's GHG emission goals.

4.16.2.5 Greenhouse Gas Summary Conclusions, Alternatives 1 through 3

Potential changes in GHG emissions from implementation of the Proposed Action would be similar between all three action alternatives and scenarios but greatest under Alternative 2, Scenario A (see

Table 4.16-2). For air emissions, the difference in aircraft emissions between the scenarios within each alternative is more distinctive than the differences between the alternatives.

For all three alternatives, Scenario A, the option to conduct 80 percent of FCLPs at OLF Coupeville and 20 percent of FCLPs at Ault Field, would result in the greater increase in GHG emissions. Differences are less a result of the number of operations as they are due to the type of operations that change between the scenarios (e.g., more LTOs have been projected to occur at Ault Field if FCLPs are relocated to OLF Coupeville). A smaller increase is a result of the transit back and forth from the OLF.

Washington State has established GHG reductions targets to reduce overall emissions (RCW 70.235.020 Washington State Legislature, 2008), and increases in GHG emissions could affect the state's efforts to meet these targets. While the Washington GHG inventory has shown an increase in overall transportation GHG emissions from 37.5 to 42.5 Million MT CO_2e between 1990 and 2012 (Refer to Table 3.16-1 in Section 3.16), annual aircraft GHG emissions decreased from 9.1 to 8.0 Million MT CO_2e over the same period (Washington State Department of Ecology, 2016). The change in GHG emissions from the Proposed Action would only result in a small percentage of total aircraft GHG emissions in the State of Washington. Therefore, the GHG emissions from the Proposed Action should not have a significant impact on Washington's GHG emission goals.

GHG emissions would also be higher under the high-tempo FCLP year conditions across all three action alternatives (see Table 4.16-4 and Appendix B for details). High-tempo FCLP conditions would produce 6 to 7 percent more GHG emissions under Alternative 2 compared to the average conditions, and 4-6 percent more under Alternatives 1 and 3. This is a result of not only changes in the number of operations but also in the type of operations.

Table 4.16-4 Total Change in Criteria Pollutant and GHG Emissions, All Alternatives

Alternative/Scenario	Average Operations	High-Tempo Operations	Percent Difference
	MT CO_2e		
Alternative 1			
Scenario A	56,829	60,138	6%
Scenario B	47,672	50,137	5%
Scenario C	39,000	40,624	4%
Alternative 2			
Scenario A	57,447	61,434	7%
Scenario B	48,609	51,595	6%
Scenario C	40,134	42,349	6%
Alternative 3			
Scenario A	56,381	59,748	6%
Scenario B	48,051	50,380	5%
Scenario C	39,137	40,766	4%

Key:
CO_2e = carbon dioxide equivalent
MT = metric ton

As described in Chapter 3, the DoD, Navy, and NAS Whidbey Island have implemented many policies and programs to reduce GHG emissions. In the 2010 Navy Energy Vision (Navy, 2010b), the Secretary of the Navy set goals to reduce the reliance on petroleum by increasing energy efficiency and the use of

alternative energy, which will reduce GHG emissions. NAS Whidbey Island has implemented strategies and programs to reduce GHG emissions from the NAS Whidbey Island complex. Improved energy efficiency through implementation of several building renovation projects has reduced overall facility energy usage by 40 percent between 2003 and 2015. Recent improvements have resulted in a site-wide reduction of reported GHG emissions. Reported site-wide stationary GHG emissions from NAS Whidbey Island peaked at 15,947 MT CO_2e and were down to 11,371 MT CO_2e in 2014 (see Table 3.16-2). NAS Whidbey Island will continue to work toward the achievement of DoD's GHG reduction goals (NAS Whidbey Island, 2016).

4.16.3 Adaptation and Mitigation

4.16.3.1 Washington State

As discussed in Chapter 3, the State of Washington has implemented laws, regulations, and policies to continue to research and address climate change. Washington State's *Preparing for a Changing Climate: Washington State's Integrated Climate Response Strategy* (Washington State Department of Ecology, 2012) was published to describe the risks of climate change to the state and identify the state's priorities in addressing these risks. The report identifies the following strategies:

1. Protect people and communities most vulnerable to climate impacts by increasing state and local public health capacity to monitor, detect, plan, and respond to emerging threats and climate-related emergencies. Also increase awareness of climate risks among the public and health-care providers.
2. Reduce risk of damage to buildings, transportation systems, and other infrastructure. Identify vulnerable areas and take proactive steps to reduce risks to infrastructure, avoid climate risks when siting new infrastructure and planning for growth, and enhance capacity to prepare for more frequent and severe flooding, rising sea levels, wildfires, and changes in energy supply and demand.
3. Reduce risks to the ocean and coastlines. Help communities prepare for rising sea levels and storm surges and protect people and property. Prevent the degradation of habitats and create opportunities for upland habitat creation. Reduce shellfish vulnerability by reducing land-based contributions of carbon and polluted runoff to the marine environment.
4. Improve water management by promoting integrated approaches that consider future water supply and address competing water demands for irrigated crops, fish, municipal and domestic water needs, and energy generation. Implement enhanced water conservation and efficiency programs and incorporate climate change realities into agency decision making.
5. Reduce forest and agriculture vulnerability by enhancing surveillance of pests and disease. Promote and transition to species that are resilient to changing climate conditions, conserve productive and adaptive forest and farmland, and reduce forest and wildland fire risk in vulnerable areas.
6. Safeguard fish, wildlife, habitat, and ecosystems and improve the ability of wildlife to migrate to more suitable habitat as the climate shifts. Protect and restore habitat and sensitive and vulnerable species. Reduce existing stresses from development, pollution, unsustainable harvest, and other factors.

7. Support the efforts of local communities and strengthen capacity to respond and engage the public. Identify existing and new funding mechanisms to support adaptation work at the local level, and ensure a coordinated and integrated approach among levels of government and society. Support research and monitoring and ensure scientific information is accessible and responds to needs of decision-makers. (Washington State Department of Ecology, 2012)

Many Puget Sound communities, government agencies, and organizations are preparing for the effects of climate change on water resources. For example, King County has begun modifying its flood infrastructure in preparation for projected flooding increases (Climate Impacts Group, 2015).

4.16.3.2 Department of Defense

The DoD has identified the potential impacts of climate change and addressed the need to plan for the worsening of natural events that will result from climate change. As described in Chapter 3, the federal government, DoD, the Department of the Navy, and NAS Whidbey Island are in the process of implementing programmatic solutions for the adaptation to and mitigation of climate change.

The DoD's progress toward achieving the federal sustainability goals is outlined in the annual Strategic Sustainability Performance Plan (DoD, 2015). Table 4.16-5 provides a summary of the DoD's objectives and specific goals.

Table 4.16-5 DoD Strategic Sustainability Performance Plan Objectives

Objective #1: The Continued Availability of Resources Critical to the DoD Mission is Ensured
GOAL #1: The Use of Fossil Fuels Reduced
1.1 - Reduction in Facility Energy Intensity
1.2 - Use of Renewable Energy [Title 10, U.S.C. §2911(e)(2)]
1.3 - Reduction in Fleet Petroleum Use (non-tactical)
GOAL #2: Water Resources Management Improved
2.1 - Reduction in Facility Potable Water Intensity
2.2 - Reduction in Facility Industrial and Irrigation Water
2.3 - Stormwater Runoff Managed to Maintain Pre-Development Hydrology
Objective #2: DoD Readiness Maintained in the Face of Climate Change
GOAL #3: Greenhouse Gas Emissions Associated with DoD Operations Reduced
3.1 - Reduction in Scope 1&2 GHG Emissions
3.2 - Reduction in Scope 3 GHG Emissions
3.3 - Increase in Teleworking by Eligible Employees
3.4 - Reduced Scope 3 GHG Emissions from Employee Air Travel
GOAL #4: DoD Climate Change Risks Assessed and Resiliency Improved
Objective #3: The Ongoing Performance of DoD Assets Ensured by Minimizing Waste and Pollution
GOAL #5: Solid Waste Minimized and Optimally Managed
5.1 - Increase in DoD Employees Covered by Policies to Reduce the Use of Printing Paper
5.2 - Increase in Non-Hazardous Solid Waste Diverted from the Waste Stream
5.3 - Increase in Construction and Demolition Debris Diverted from the Waste Stream
GOAL #6: The Use and Release of Chemicals of Environmental Concern Minimized
6.1 - Reduction in On-Site Releases and Off-Site Transfers of Toxic Chemicals
6.2 - DoD Personnel and Contractors Who Apply Pesticides Are Properly Certified
6.3 - Integrated Pest Management Plans Prepared, Reviewed, and Updated Annually
Objective #4: Continuous Improvement in the DoD Mission Achieved through Management and Practices Built on Sustainability and Community
GOAL #7: Sustainability Practices Become the Norm
7.1 - 95% of Procurement Conducted Sustainably
7.2 - Electronic Stewardship and the Efficient Use of Data Centers
7.3 - Sustainable Buildings (Conforming to the Guiding Principles)
7.4 - Environmental Management Systems Effectively Implemented and Maintained

Source: DoD, 2015

Key:
DoD = United States Department of Defense
GHG = greenhouse gas

The Department of the Navy implements these federal and DoD policies to reduce energy usage, GHG emissions, and energy vulnerability. In the 2010 Navy Energy Vision (Navy, 2010b), the Secretary of the Navy set goals to improve energy security, increase energy independence, and reduce the reliance on petroleum by increasing energy efficiency and the use of alternative energy. The strategic imperatives of this report include:

- Alternative Energy Afloat: By 2020, half of the Navy's total energy consumption afloat will come from alternative sources.

- "Great Green Fleet": The Navy will sail a carrier strike group composed of nuclear ships, hybrid electric ships running on biofuel, and aircraft flying on biofuel by 2016.
- Increase Alternative Energy Ashore: By 2020, the Navy will produce at least 50 percent of shore-based energy requirements from alternative sources; 50 percent of Navy installations will be net-zero.
- Reduce Non-Tactical Petroleum Use: By 2015, the Navy will reduce petroleum use in the commercial Fleet by 50 percent through the use of hybrid, electric, and flex-fuel vehicles (Navy, 2010b).

DoD and the Navy are actively engaging in improving their resiliency to climate change--from conducting screening surveys to assess vulnerability of DoD installations from severe weather and projected changes in climate, to developing tools to help installations assess how much water they need to satisfy mission requirements. As climate science advances, the DoD and Navy will regularly evaluate climate change risks and opportunities in order to develop policies and plans to manage its effects on the DoD operating environment, missions, and facilities.

NAS Whidbey Island has implemented many sustainability strategies and programs at the NAS Whidbey Island complex. Improved energy efficiency through implementation of several building renovation projects has reduced overall facility energy usage by 40 percent between 2003 and 2015, and water-use efficiency projects have reduced water use by 48 percent between 2007 and 2015. Both improvements in water and energy use exceed the DoD's interim sustainability goals for these resources (NAS Whidbey Island, 2016). Increased sea levels, storm surges, and risk of flooding may affect new and existing infrastructure and buildings, as well as Growler operations.

As discussed in Chapter 3, the Navy and the DoD continue to review and plan for the impacts of climate change on all Navy operations, adjusting strategies and programs as new information becomes available (DoD, 2014; Navy, 2010b).

4.17 Summary of Potential Impacts to Resources

A summary of the potential impacts associated with each of the action alternatives and the No Action Alternative is presented in Table 4.17-1. This EIS does not identify any mitigation measures for the implementation of action alternatives but does identify measures that could be taken to develop suggested mitigation techniques, including, but not limited to, stormwater retention practices. As the NEPA process continues, mitigation measures may be developed and altered based on comments received during public and regulatory agency review of the EIS. If mitigation measures were identified during this process, they would be identified in the FEIS or Record of Decision. These measures would be funded, and efforts to ensure their successful completion or implementation would be treated as compliance requirements.

Table 4.17-1 Summary of Potential Impacts to Resource Areas

	Scenario A	*Scenario B*	*Scenario C*
Airspace and Airfield Operations (No significant impact from projected increase in aircraft operations)			
Airspace (Sections 4.1.1; 4.1.2.1; 4.1.3.1; 4.1.4.1)			
No Action Alternative	The Navy would not operate additional Growler aircraft at Ault Field, and therefore there would be no impact on airspace.		
Action Alternative 1	No change in operational procedures or changes in departure/arrival route, and therefore no modification required to the current airspace. Additional Growler aircraft would be operating within the same flight parameters currently used within the controlled airspace surrounding the Naval Air Station (NAS) Whidbey Island complex, and therefore no adverse effect on civil or commercial aviation airspace.		
Action Alternative 2	Impacts are similar to those depicted under Alternative 1, Scenario A.		
Action Alternative 3	Impacts are similar to those depicted under Alternative 1, Scenario A.		
Airfield Operations (annual) (Sections 4.1.1; 4.1.2.1; 4.1.3.1; 4.1.4.1)			
No Action Alternative	The Navy would not operate additional Growler aircraft at Ault Field, and there would be no increase in annual airfield operations: 6,500 operations at Outlying Land Field (OLF) Coupeville and 81,700 operations at Ault Field.		
Action Alternative 1	The Navy would add 35 additional Growler aircraft		
	Increase in annual operations:		
	• 12,300 at Ault Field • 29,000 at OLF Coupeville Approximately 41,300 annual operations increase for the NAS Whidbey Island complex (47-percent increase over the No Action Alternative)	• 25,400 at Ault Field • 15,800at– OLF Coupeville Approximately, 41,200 annual operations increase for the NAS Whidbey Island complex (47-percent increase over the No Action Alternative)	• 38,700 at Ault Field • 2,700 at OLF Coupeville Approximately 41,400 annual operations increase for the NAS Whidbey Island complex (47-percent increase over the No Action Alternative)
Action Alternative 2	The Navy would add 36 additional Growler aircraft		
	Increase in annual operations:		
	• 13,000 at Ault Field • 27,500 at OLF Coupeville Approximately 40,500 total annual operations increase for the NAS Whidbey Island complex (46-percent increase over the No Action Alternative)	• 25,600 at Ault Field • 14,900 at OLF Coupeville Approximately 40,500 total annual operations increase for the NAS Whidbey Island complex (46-percent increase over the No Action Alternative)	• 38,200 at Ault Field • 2,300 at OLF Coupeville Approximately 40,500 total annual operations increase for the NAS Whidbey Island complex (46-percent increase over the No Action Alternative)

Table 4.17-1 Summary of Potential Impacts to Resource Areas

	Scenario A	*Scenario B*	*Scenario C*
Action Alternative 3	The Navy would add 36 additional Growler Aircraft.		
	Increase in annual operations:		
	• 12,800 at Ault Field • 27,400 at OLF Coupeville Approximately 40,200 total annual operations increase for the NAS Whidbey Island complex (46 percent increase over the No Action Alternative)	• 25,300 at Ault Field • 14,800 at OLF Coupeville Approximately 40,100 total annual operations increase for the NAS Whidbey Island complex (46 percent increase over the No Action Alternative)	• 37,900 at Ault Field • 2,200 at OLF Coupeville Approximately 40,100 total annual operations increase for the NAS Whidbey Island complex (46 percent increase over the No Action Alternative)
Noise Associated with Aircraft (Significant noise impact from proposed Growler operations at the NAS Whidbey Island complex)			
DNL Noise Contours (Sections 4.2.1, 4.2.2.1.1, 4.2.3.1.1; 4.2.4.1.1)			
No Action Alternative	No additional Growlers would be assigned to NAS Whidbey Island, and there would be no associated increase in aircraft operations; therefore, no change in DNL noise contours at the airfields. The population within the 65 dB DNL noise contour would be 8,717 people at Ault Field and 2,316 people at OLF Coupeville, for a total of 11,033.		
The increase in aircraft operations will result in a larger decibel (dB) day-night average sound level (DNL) noise contour. Therefore, there will be an increase in population within the 65dB DNL noise contour of:			
Action Alternative 1	442 people, Ault Field 1,316 people, OLF Coupeville Total increase of 1,758	1,327 people, Ault Field 939 people, OLF Coupeville Total increase of 2,266	1,979 people, Ault Field 535 people, OLF Coupeville Total increase of 2,514
Action Alternative 2	395 people, Ault Field 1,256 people, OLF Coupeville Total increase of 1,651	1,261 people, Ault Field 884 people, OLF Coupeville Total increase of 2,145	1,785 people, Ault Field 512 people, OLF Coupeville Total increase of 2,297
Action Alternative 3	399 people, Ault Field 1,284 people, OLF Coupeville Total increase of 1,683	1,272 people, Ault Field 921 people, OLF Coupeville Total increase of 2,193	1,766 people, Ault Field 526 people, OLF Coupeville Total increase of 2,292
Supplemental Metrics (Sections 4.2.1, 4.2.2.1.2, 4.2.3.1.2; 4.2.4.1.2)			
No Action Alternative	No additional Growlers would be assigned to NAS Whidbey Island, and there would be no associated increase in aircraft operations; therefore, no change in the noise environment.		
Action Alternative 1	The EIS analyzed the potential impacts of noise exposure as it relates to specific noise events at up to 30 points of interest (POIs). The following supplemental noise metrics were analyzed: single-event noise levels, indoor speech interference, classroom/learning interference, sleep disturbance; potential noise effects on recreation and potential hearing loss for populations within the 80 dB DNL contour. The results of this analysis vary depending on the scenario and the annual operations modeled. To understand the full impact of these supplemental metrics, see Sections 4.2.2.1.2 (Alternative 1), 4.2.3.1.2 (Alternative 2), or 4.2.4.1.2 (Alternative 3).		
Action Alternative 2	Impacts are similar to those depicted under Alternative 1.		
Action Alternative 3	Impacts are similar to those depicted under Alternative 1.		

Table 4.17-1 Summary of Potential Impacts to Resource Areas

	Scenario A	*Scenario B*	*Scenario C*
Public Health and Safety (No significant impact from projected increase in aircraft operations)			
Flight Safety (Sections 4.3.1, 4.3.2.1)			
No Action Alternative	No additional Growler aircraft, so no impact on public health and safety with relation to flight safety at Ault Field or OLF Coupeville.		
Action Alternative 1	Increase of aircraft flying at Ault Field and OLF Coupeville increases the risk of an incident; however, current risk management strategies in place at NAS Whidbey Island minimize these risks. Therefore there is no significant impact on flight safety.		
Action Alternative 2	Impacts are similar to those depicted under Alternative 1.		
Action Alternative 3	Impacts are similar to those depicted under Alternative 1.		
Bird-Animal Aircraft Strike Hazard (BASH) (Sections 4.3.1, 4.3.2.1)			
No Action Alternative	No additional Growler aircraft, so no impact on public health and safety with relation to BASH at Ault Field or OLF Coupeville.		
Action Alternative 1	Increase in the volume of air operations; however, this would not change the installation's ability to comply with military airfield safety procedures for aircraft arrival and departure flight tracks and for operations surrounding the airfield. Therefore, there is no significant impact on BASH.		
Action Alternative 2	Impacts are similar to those depicted under Alternative 1, Scenario A.		
Action Alternative 3	Impacts are similar to those depicted under Alternative 1, Scenario A.		
Clear Zones and Accident Potential Zones (APZs) (Sections 4.3.1, 4.3.2.1)			
No Action Alternative	No additional Growler aircraft, so no impact on public health and safety with relation to APZs or Clear Zones at Ault Field or OLF Coupeville.		
Action Alternative 1	It is not expected that the Clear Zones or APZs at Ault Field would change; however, this needs to be confirmed through the Navy's Air Installation Compatible Use Zone (AICUZ) update process. The number of annual operations at OLF Coupeville may require the development of APZs (Clear Zones already exist) through the completion of the AICUZ update process, which includes coordinating with the local community on land use recommendations.	Conclusions on development of APZs at Ault Field and OLF Coupeville are similar to those depicted under Alternative 1, Scenario A.	Conclusions on the development of APZs at Ault Field are similar to those depicted under Alternative 1, Scenario A. The number of annual operations at OLF Coupeville would not likely require the development of APZs (Clear Zones already exist); however, this needs to be confirmed through the Navy's AICUZ update process.
Action Alternative 2	Conclusions on development of APZs at Ault Field and OLF Coupeville are similar to those depicted under Alternative 1, Scenario A.	Conclusions on development of APZs at Ault Field and OLF Coupeville are similar to those depicted under Alternative 1, Scenario A.	Conclusions on development of APZs at Ault Field and OLF Coupeville are similar to those depicted under Alternative 1, Scenario C.
Action Alternative 3	Conclusions on development of APZs at Ault Field and OLF Coupeville are similar to those depicted under Alternative 1, Scenario A.	Conclusions on development of APZs at Ault Field and OLF Coupeville are similar to those depicted under Alternative 1, Scenario A.	Conclusions on development of APZs at Ault Field and OLF Coupeville are similar to those depicted under Alternative 1, Scenario C.

Table 4.17-1 Summary of Potential Impacts to Resource Areas

	Scenario A	*Scenario B*	*Scenario C*
Environmental Health Risks and Safety Risks to Children (Section 4.3.2.1)			
No Action Alternative	The number of children under the noise contour is: 2,680 – Average Year and 2,916 – High-tempo FCLP Year		
Based on the limited scientific literature available, there is no proven positive correlation between noise-related events and physiological changes in children. Additionally, the aircraft noise associated with the action alternatives is intermittent; therefore, the Navy does not anticipate any significant disproportionate health impacts to children caused by aircraft noise. There are no schools located within the APZs at Ault Field and OLF Coupeville under any of the alternatives or scenarios; therefore, there is no disproportionate environmental health and safety risk to children as a result of possible aircraft mishaps. *The number of children impacted under the noise contours will increase as compared to the No Action Alternative in the average year by:*			
Action Alternative 1	426 – Average Year 301 – High-tempo FCLP Year	473 – Average Year 376 – High-tempo FCLP Year	597 – Average Year 691 – High-tempo FCLP Year
Action Alternative 2	470 – Average Year 18 – High-tempo FCLP Year	536 – Average Year 408 – High-tempo FCLP Year	451 – Average Year 185 – High-tempo FCLP Year
Action Alternative 3	430 – Average Year 173 – High-tempo FCLP Year	471 – Average Year 350 – High-tempo FCLP Year	678 – Average Year 478 – High-tempo FCLP Year
Air Quality (No significant impacts from construction or stationary emissions. Mobile operational emissions from additional Growler operations may impact ambient air quality)			
Construction Emissions (Sections 4.4.1, 4.4.2.1.1; 4.4.3.1.1; 4.4.4.1.1)			
No Action Alternative	No existing stationary sources would have an increase in emissions, and there would be no change in aircraft operations. Therefore, no impacts to air quality or air resources would occur.		
Action Alternative 1	Emissions from construction equipment and activities would be minor and temporary and would not result in any significant impacts.		
Action Alternative 2	Construction emissions are larger in magnitude but like in type to those depicted under Alternative 1. They are also higher in magnitude over Alternative 3. These impacts would be minor and temporary and would not result in any significant impacts.		
Action Alternative 3	Construction emissions are identical to those depicted under Alternative 1.		
Operational Stationary Emissions (Sections 4.4.1, 4.4.2.1.2; 4.4.3.1.2; 4.4.4.1.2)			
No Action Alternative	No existing stationary sources would have an increase in emissions, and there would be no change in aircraft operations. Therefore, no impacts to air quality or air resources would occur.		
Action Alternative 1	Increases in direct and indirect stationary emissions from new buildings and maintenance and fueling of aircraft are minor and would be covered under the existing NAS Whidbey Island air operating permit.		
Action Alternative 2	Operational stationary emissions are larger in magnitude but like in type to those depicted under Alternative 1. They are also higher in magnitude over Alternative 3.		
Action Alternative 3	Operational stationary emissions like in type and magnitude to those depicted under Alternative 1.		

Table 4.17-1 Summary of Potential Impacts to Resource Areas

	Scenario A	*Scenario B*	*Scenario C*
Mobile Emissions (Sections 4.4.1, 4.4.2.1.3; 4.4.3.1.3; 4.4.4.1.3)			
No Action Alternative	No existing stationary sources would have an increase in emissions, and there would be no change in aircraft operations. Therefore, no impacts to air quality or air resources would occur.		
Action Alternative 1	Operational mobile emissions would be like in type (such as Ault Field Growler aircraft, OLF Coupeville Growler aircraft, in-frame maintenance operations, and personal operating vehicles) and magnitude for all Alternatives under Scenario A, and higher compared to Scenarios B and C for all Alternatives. Changes in mobile operational emissions may impact compliance with National Ambient Air Quality Standards under all Alternatives and Scenarios.	Mobile emissions are smaller in magnitude but like in type to those depicted under Alternative 1, Scenario A.	Mobile emissions are like slightly smaller in magnitude and type to those depicted under Alternative 1, Scenario A, and also smaller than Alternative 1, Scenario B.
Action Alternative 2	Mobile emissions are larger in magnitude, but like in type, to those depicted under Alternative 1, Scenario A.	Mobile emissions are larger in magnitude, but like in type, to those depicted under Alternative 1, Scenario B, but smaller than Alternative 2, Scenario A.	Mobile emissions are larger in magnitude, but like in type, to those depicted under Alternative 1, Scenario C, but smaller than Alternative 2 Scenario B.
Action Alternative 3	Mobile emissions are larger in magnitude, but like in type, to those depicted under Alternative 1, Scenario A.	Mobile emissions are larger in magnitude, but like in type, to those depicted under Alternative 1, Scenario B, but smaller than Alternative 3, Scenario A.	Mobile emissions are larger in magnitude, but like in type, to those depicted under Alternative 1, Scenario C, but smaller than Alternative 3, Scenario B.
Land Use (Increase in the land area within the projected greater than 65 dB DNL noise contours and some localized significant impacts on county and municipal parks)			
Land Use Analysis (Sections 4.5.1, 4.5.2)			
No Action Alternative	No new Growler operations, and therefore no change in land area impacted by DNL noise contours; therefore, no impact.		
Action Alternative 1	Due to larger DNL noise contours and noise exposure areas, land uses previously considered compatible may become incompatible per AICUZ recommendations.		
Action Alternative 2	Impacts on land use compatibility are similar to those under Alternative 1.		
Action Alternative 3	Impacts on land use compatibility are similar to those under Alternative 1.		

Table 4.17-1 Summary of Potential Impacts to Resource Areas

	Scenario A	*Scenario B*	*Scenario C*
Increase in residential land use within the greater than 65 dB DNL noise contour as compared to the No Action Alternative:			
Action Alternative 1	8 percent (Ault Field) 48 percent (OLF Coupeville)	12 percent (Ault Field) 42 percent (OLF Coupeville)	17 percent (Ault Field) 28 percent (OLF Coupeville)
Action Alternative 2	7 percent (Ault Field) 47 percent (OLF Coupeville)	11 percent (Ault Field) 41 percent (OLF Coupeville)	16 percent (Ault Field) 26 percent (OLF Coupeville)
Action Alternative 3	7 percent (Ault Field) 48 percent (OLF Coupeville)	12 percent (Ault Field) 42 percent (OLF Coupeville)	16 percent (Ault Field) 27 percent (OLF Coupeville)
Conceptual APZs at OLF Coupeville would impact:			
Action Alternative 1	1,301 acres of residential land use, if developed.	503 acres of residential land use, if developed.	No conceptual APZs at OLF Coupeville would be required.
Action Alternative 2	1,301 acres of residential land use, if developed.	503 acres of residential land use, if developed.	No conceptual APZs at OLF Coupeville would be required.
Action Alternative 3	1,301 acres of residential land use, if developed.	503 acres of residential land use, if developed.	No conceptual APZs at OLF Coupeville would be required.
Recreation and Wilderness (Sections 4.5.1, 4.5.2.2)			
No Action Alternative	No new Growler operations, and no changes to noise environment at recreation and wilderness areas; therefore, no impact.		
Action Alternative 1	Due to increased noise exposure from Growler operations, a range of impacts from long-term minor to long-term moderate would be expected at the federal, state, and local recreation areas and parks located within the greater than 65 dB DNL noise contour. Localized significant impacts to recreation at one county park, Driftwood Park, as a result of increased noise exposure. No Congressionally designated wilderness areas or BLM-owned lands with wilderness characteristics in the Study Area.	Impacts similar to those depicted under Alternative 1, Scenario A, except there also would be localized significant impacts on recreation at the Oak Harbor Off-leash Dog Park.	Impacts similar to those depicted under Alternative 1, Scenarios A and B, except there would be no significant impacts on recreation at Driftwood Park.
Action Alternative 2	Impacts similar to those depicted under Alternative 1, Scenario A.	Impacts similar to those depicted under Alternative 1, Scenario B.	Impacts similar to those depicted under Alternative 1, Scenario C.

Table 4.17-1 Summary of Potential Impacts to Resource Areas

	Scenario A	*Scenario B*	*Scenario C*
Action Alternative 3	Impacts similar to those depicted under Alternative 1, Scenario A.	Impacts similar to those depicted under Alternative 1, Scenario B.	Impacts similar to those depicted under Alternative 1, Scenario C.
Cultural Resources (No significant impacts from construction activities or operation of new aircraft)			
Archaeological Resources (Sections 4.6.1, 4.6.2.1)			
No Action Alternative	No new construction or operations, and therefore no impact.		
Action Alternative 1	Minimal to no impact will result to known or intact archaeological sites within Ault Field during the construction and operation. The Navy is consulting with the Washington State Historic Preservations Officer (SHPO), Advisory Council on Historic Preservation (ACHP), American Indian tribes and nations, and consulting parties regarding archaeological resources.		
Action Alternative 2	Impacts similar to those depicted under Alternative 1.		
Action Alternative 3	Impacts similar to those depicted under Alternative 1.		
Architectural Resources (Sections 4.6.1, 4.6.2.1)			
No Action Alternative	No new construction or operations, and therefore no impact.		
Action Alternative 1	Minimal to no direct and indirect impacts are anticipated to occur to on-station historic resources during construction. Minimal indirect impacts are anticipated to occur during operations. Minimal to no impacts are anticipated to occur during construction to off-station resources because activities are limited to Ault Field. Minimal to moderate indirect impacts are anticipated to occur to off-station historic resources during operation. Resources that are closer to OLF Coupeville may experience a higher level of visual, auditory, and/or vibratory impact and more frequent occurrences of aircraft appearances, noise, and vibration than those located elsewhere due to the increased FCLPs at OLF Coupeville for this scenario as compared to Scenarios B	Impacts similar to those depicted under Alternative 1, Scenario A, with the exception that resources that are proximate to both Ault Field and OLF Coupeville may experience a higher level of impact.	Impacts similar to those depicted under Alternative 1, Scenario A, with the exception that resources that are proximate to Ault Field (and not OLF Coupeville) may experience a higher level of impact and OLF Coupeville a lower level of impact

Table 4.17-1 Summary of Potential Impacts to Resource Areas

	Scenario A	*Scenario B*	*Scenario C*
	and C. Resources that are closer to Ault Field may experience a lower level of impact and less frequent occurrences than those located elsewhere due to the lower amount of FCLPs at Ault Field for this scenario as compared to Scenarios B and C. The Navy is consulting with the Washington SHPO, ACHP, American Indian tribes and nations, and consulting parties regarding architectural resources.		
Action Alternative 2	Impacts similar to those depicted under Alternative 1, Scenario A.	Impacts similar to those depicted under Alternative 1, Scenario B.	Impacts similar to those depicted under Alternative 1, Scenario C.
Action Alternative 3	Impacts similar to those depicted under Alternative 1, Scenario A.	Impacts similar to those depicted under Alternative 1, Scenario B.	Impacts similar to those depicted under Alternative 1, Scenario C.
American Indian Traditional Resources (No significant impact to tribal rights, protected tribal resources)			
American Indian Traditional Resources (Section 4.7.1, 4.7.2)			
No Action Alternative	No potential to significantly affect American Indian traditional resources since there would be no change to current tribal access and no additional potential to impact traditional resources in the study area.		
Action Alternative 1	No change to current access for American Indian tribes and nations to the installation. Terrestrial and Marine Resources: There would be no direct impacts during construction or operation on terrestrial and marine wildlife. Water Resources: Approximately 2 acres of impervious surface, but impacts to surface waters, would be minimized and avoided through implementation of best management practices (BMPs), low-impact development (LID), and green infrastructure and therefore would not be significant. Climate Change and Greenhouse Gasses: Potential impacts in GHG emissions from the implementation of the Proposed Action would be similar but greatest under Alternative 2, Scenario A, and would not be significant.		
Action Alternative 2	Impacts are similar to those depicted under Alternative 1.		
Action Alternative 3	Impacts are similar to those depicted under Alternative 1.		
Biological Resources (No significant impacts from construction activities or operation of new aircraft)			
Terrestrial Wildlife (Sections 4.8.1, 4.8.2.1)			
Habitat Loss			
No Action Alternative	No new construction and no new Growler aircraft; therefore, no habitat loss and no impact on terrestrial wildlife.		

Table 4.17-1 Summary of Potential Impacts to Resource Areas

	Scenario A	*Scenario B*	*Scenario C*
Action Alternative 1	Vegetation removal from construction activities would have negligible impacts on terrestrial wildlife at Ault Field and would not negatively affect habitat use by any special status species (e.g., MBTA-protected birds).		
Action Alternative 2	Impacts are similar to those depicted under Alternative 1.		
Action Alternative 3	Impacts are similar to those depicted under Alternative 1.		
Sensory Disturbance Effects (Terrestrial Wildlife, with the exception of Birds)			
No Action Alternative	No new construction and no new Growler aircraft; therefore, no impact on terrestrial mammals and/or reptiles, fish, and amphibians.		
Action Alternative 1	Increase in aircraft operations would occur, but since local terrestrial wildlife are already exposed to a high level of long-term air operations and other human-made disturbances, they have presumably habituated to the very high level of noise and visual disturbances at NAS Whidbey Island. Therefore, there would be no significant impacts to terrestrial mammals, fish, and/or reptiles and amphibians with respect to visual and noise disturbances from construction and operation.		
Action Alternative 2	Impacts are similar to those depicted under Alternative 1.		
Action Alternative 3	Impacts are similar to those depicted under Alternative 1.		
Sensory Disturbance Effects (Birds)			
No Action Alternative	No new construction and no new Growler aircraft; therefore, no impact on birds.		
Action Alternative 1	Increase in aircraft operations would occur, but since local bird populations are already exposed to a high level of long-term air operations and other human-made disturbances, they have presumably habituated to the very high level of noise and visual disturbances at NAS Whidbey Island. Therefore, there would be no significant impact on birds with respect to visual and noise disturbances from construction and operation. For military readiness activities, including aircraft operations, DoD installations are exempt from "take" of migratory birds, unless the activities may result in a signification adverse effect at the population level.		
	The potential for aircraft disturbance impacts on Important Bird Areas (IBAs) located in closer proximity to OLF Coupeville would increase with increased aircraft operations, with Scenario A having the highest potential for impacts.	The potential for aircraft disturbance impacts on IBAs would be similar for IBAs in proximity to OLF Coupeville and Ault Field under Scenario B.	The exception that the potential for aircraft disturbance impacts on IBAs located in closer proximity to Ault Field would increase with increased aircraft operations, with Scenario C having the highest potential for impacts.
Action Alternative 2	Impacts are similar to those depicted under Alternative 1, Scenario A.	Impacts are similar to those depicted under Alternative 1, Scenario B.	Impacts are similar to those depicted under Alternative 1, Scenario C.
Action Alternative 3	Impacts are similar to those depicted under Alternative 1, Scenario A.	Impacts are similar to those depicted under Alternative 1, Scenario B.	Impacts are similar to those depicted under Alternative 1, Scenario C.
Aircraft-wildlife Strike Effects			
No Action Alternative	No new construction and no new Growler aircraft; therefore, no risk of aircraft-wildlife strikes.		
Action Alternative 1	Increase of aircraft flying at Ault Field and OLF Coupeville increases the risk of an incident; however, no aspect of the action would create attractants with the potential to increase birds in the area, and current risk management strategies in place at NAS Whidbey Island		

Table 4.17-1 Summary of Potential Impacts to Resource Areas

	Scenario A *Scenario B* *Scenario C*
	minimize the likelihood of an incident. Therefore, aircraft-wildlife strikes would not have significant impacts on local wildlife populations, including special status species (e.g., MBTA-protected birds).
Action Alternative 2	Impacts are similar to those depicted under Alternative 1.
Action Alternative 3	Impacts are similar to those depicted under Alternative 1.
Endangered Species Act (ESA)-listed Terrestrial Species (Marbled Murrelet)	
No Action Alternative	No new construction and no new Growler aircraft flying over; therefore, no impact on protected species.
Action Alternative 1	Increase of aircraft flying at Ault Field and OLF Coupeville increases the risk of a strike and increases noise and visual disturbances to the marbled murrelet. There have been no reported strikes of the marbled murrelet at NAS Whidbey Island, and the installation follows a detailed BASH management program. In addition, the local inhabitants of the species are presumably habituated to the very high level of noise and visual disturbances. The Navy has determined that, pursuant to the ESA, the Proposed Action may affect the marbled murrelet. The Navy will consult with the USFWS.
Action Alternative 2	Impacts are similar to those depicted under Alternative 1.
Action Alternative 3	Impacts are similar to those depicted under Alternative 1.
Marine Species (Not Listed under ESA) (Sections 4.8.1, 4.8.2.2)	
No Action Alternative	No new construction and no new Growler aircraft flying over marine species; therefore, no impact.
Action Alternative 1	Increase in aircraft activity may cause sensory disturbance to marine animals. Harbor seals and other pinnipeds are presumably habituated to the activity because they are common around NAS Whidbey Island and have not abandoned haul-out sites despite the existing long-term high level of disturbances. In addition, no breeding areas would be impacted. Marine species are already exposed to a high level of long-term air operations and other human-made disturbances, so they have presumably habituated to the very high level of noise and visual disturbances at NAS Whidbey Island. Therefore, there would be no significant impacts on marine species through behavioral disturbance or injury resulting from military readiness activities.
Action Alternative 2	Impacts are similar to those depicted under Alternative 1.
Action Alternative 3	Impacts are similar to those depicted under Alternative 1.
ESA-Listed Marine Species (Humpback Whale, Southern Resident Killer Whale, Bull Trout, Dolly Varden, Green Sturgeon, Eulachon, Chinook Salmon, Hood Canal summer-run chum, Steelhead, Bocaccio Rockfish, Canary Rockfish, and Yelloweye Rockfish)	
No Action Alternative	No new construction and no new Growler aircraft flying over; therefore, no impact on protected species.
Action Alternative 1	Marine species such as dolphins and whales are shown to not respond to overflights. In addition, marine species are already exposed to a high level of long-term air operations and other human-made disturbances, so they have presumably habituated to the very high level of noise and visual disturbances at NAS Whidbey Island. There is the potential to affect humpback whales and Southern Resident killer whales, but those impacts would be "insignificant" in ESA terms in that they would not rise to the level of take. Therefore, pursuant to the ESA, the Proposed Action may affect, but is not likely to adversely affect, the humpback whale or Southern Resident killer whale. The Proposed Action has the potential to affect green sturgeon, eulachon, Chinook salmon, Hood Canal summer-run chum, steelhead, bocaccio, canary rockfish, yelloweye rockfish, and bull trout, but those impacts to fish species would be "insignificant" in ESA terms in that they would not rise to the level of take. Therefore, pursuant to the ESA, the Proposed Action may affect, but is not likely to adversely affect, the above-mentioned fish species.

Table 4.17-1 Summary of Potential Impacts to Resource Areas

	Scenario A *Scenario B* *Scenario C*
Action Alternative 2	Impacts are similar to those depicted under Alternative 1.
Action Alternative 3	Impacts are similar to those depicted under Alternative 1.
Water Resources (No significant impact from construction activities or operation of new aircraft)	
Groundwater (Sections 4.9.1, 4.9.2.1)	
No Action Alternative	No new construction or increase in demand for groundwater resources; therefore, no impact.
Action Alternative 1	No construction would extend to a depth that may impact groundwater resources, and minimal increase in demand for groundwater; therefore, no impact.
Action Alternative 2	Impacts similar to those depicted under Alternative.
Action Alternative 3	Impacts similar to those depicted under Alternative 1.
Surface Water/Wetlands/Floodplains/Marine Waters and Sediments (Sections 4.9.1, 4.9.2.1)	
No Action Alternative	No new construction; therefore, no impact.
Action Alternative 1	No direct impact, since construction would not be occurring within resource areas. Potential indirect impact due to 2 acres of new impervious surface at Ault Field (1% increase over existing), which would slightly increase stormwater flow. Any impacts would be minimized through best management practices.
Action Alternative 2	Impacts similar to those depicted under Alternative 1.
Action Alternative 3	Impacts similar to those depicted under Alternative 1.
Socioeconomics (Significant impacts to education from increase in personnel and dependents; no other significant impacts due to increased personnel and dependents living in the region)	
Population (Sections 4.10.1, 4.10.2.1)	
No Action Alternative	No new personnel or dependents; therefore, no impact.
Action Alternative 1	Net increase of 880 people to the region would result in a minor impact.
Action Alternative 2	Net increase of 1,574 people to the region would result in a minor impact.
Action Alternative 3	Net increase of 894 people to the region would result in a minor impact.
Economy, Employment, and Income (Sections 4.10.1, 4.10.2.1)	
No Action Alternative	No construction activities and no new personnel in the region; therefore, no impact.
Action Alternative 1	Up to $122.5 million in direct construction expenditures, which would be a short-term impact. Up to 839 projected short-term employment positions from construction activities. 371 personnel in the region spending money.
Action Alternative 2	Impacts similar to those depicted under Alternative 1, with the exception of 664 personnel in the region spending money.
Action Alternative 3	Impacts similar to those depicted under Alternative 1, with the exception of 377 personnel in the region spending money.
Housing (Sections 4.10.1, 4.10.2.1)	
No Action Alternative	No new personnel/households in the region; therefore, no impact.
Action Alternative 1	Up to 371 households relocating to the area. Regional housing would be able to handle the increase in demand; therefore, minor impact to housing.
Action Alternative 2	Up to 664 households relocating to the area. Regional housing may not have sufficient vacancies to handle the influx of households. Therefore, there is a moderate impact to housing.
Action Alternative 3	Up to 377 households relocating to the area. Regional housing would be able to handle the increase in demand; therefore, minor impact to housing.

Table 4.17-1 Summary of Potential Impacts to Resource Areas

Scenario A	*Scenario B* *Scenario C*
Local Government Revenue and Expenditures (Sections 4.10.1, 4.10.2.1)	
No Action Alternative	No new personnel/dependents in the region; therefore, no impact.
Action Alternative 1	Increase in annual tax receipts in Island County by $235,000 and Skagit County by $59,000.
Action Alternative 2	Increase in annual tax receipts in Island County by $421,000 and Skagit County by $105,000.
Action Alternative 3	Increase in annual tax receipts in Island County by $239,000 and Skagit County by $60,000.
Community Services (Sections 4.10.1, 4.10.2.1)	
No Action Alternative	No new personnel/dependents in the region; therefore, no impact.
Action Alternative 1	Education Projected 191 students in already overcrowded school districts would result in significant impacts on school districts in the region. Medical, Fire and Emergency, and Police Protection Services Minimal impacts from increase in personnel/dependents in the area.
Action Alternative 2	Impacts similar to those depicted under Alternative 1 with the exception of 341 students projected.
Action Alternative 3	Impacts similar to those depicted under Alternative 1 with the exception of 195 students projected.
Environmental Justice (Environmental justice communities exist, but impacts do not disproportionately impact environmental justice communities.) (Section 4.11)	
No Action Alternative	No change in the aircraft or personnel loadings at the NAS Whidbey Island complex would occur; therefore, there would be no additional environmental or human health impacts.
Action Alternative 1	The Navy has identified there are minority and low-income populations living within the affected area. Although there are environmental justice communities within the affected area and there are significant impacts outlined within the EIS to populations living within the affected area (noise impacts to those living within the 65 dB DNL noise contours and overcrowding at Oak Harbor School District schools), these impacts do not disproportionately impact environmental justice communities.
Action Alternative 2	Impacts similar to those depicted under Alternative 1.
Action Alternative 3	Impacts similar to those depicted under Alternative 1.
Transportation (No significant impacts from construction activities or additional personnel and dependents)	
Renovation of Existing Facilities at NAS Whidbey Island (Sections 4.12.1, 4.12.2.1)	
No Action Alternative	No new construction; therefore, no impact.
Action Alternative 1	Short-term impacts on traffic from additional truck traffic and slow-moving vehicles during construction.
Action Alternative 2	Impacts similar to those depicted under Alternative 1.
Action Alternative 3	Impacts similar to those depicted under Alternative 1.
Off Base Operations: Trip Generation and Level of Service (Sections 4.12.1, 4.12.2.1)	
No Action Alternative	No new construction or personnel/dependents in the region; therefore, no impact.
Action Alternative 1	Estimated 171 to 2,321 new trips per weekday on major roadways off base. Level of service on State Route (SR) 20 south of Swantown Road would degrade from a level of service C to level of service D; however, it would operate higher than the LOS standard. SR 20 north of Goldie Street currently operates at LOS C but would degrade to LOS D Area of concern at intersection of SR 20 and Banta Road would see an increase of 277 daily trips; however, a traffic signal will be installed by 2021.

Table 4.17-1 Summary of Potential Impacts to Resource Areas

Scenario A	*Scenario B* *Scenario C*
Action Alternative 2	Estimated 306 to 4,154 new trips per weekday on major roadways off base. Level of service on SR 20 south of Swantown Road would degrade from a level of service C to level of service D; however, it would operate higher than the LOS standard. Area of concern at intersection of SR 20 and Banta Road would see an increase of 407 daily trips; however, a traffic signal will be installed by 2021.
Action Alternative 3	Estimated 174 to 2,359 new trips per weekday on major roadways off base. Level of service on SR 20 south of Swantown Road would degrade from a level of service C to level of service D; however, it would operate higher than the LOS standard. Area of concern at intersection of SR 20 and Banta Road would see an increase of 231 daily trips; however, a traffic signal will be installed by 2021.
On Base Operations (Sections 4.12.1, 4.12.2.1)	
No Action Alternative	No new construction or personnel/dependents in the region; therefore, no impact.
Action Alternative 1	Gates at Ault Field could see an increase of between 700 and 1,300 daily trips (approximately 3 to 8 percent over No Action Alternative traffic volumes entering and exiting the installation. Implementation of improvements identified in the NAS Whidbey Island Transportation Plan would help to alleviate traffic concerns.
Action Alternative 2	Impacts similar to those depicted under Alternative 1.
Action Alternative 3	Impacts similar to those depicted under Alternative 1.
Transit, Pedestrian, and Bicycle Facilities (Sections 4.12.1, 4.12.2.1)	
No Action Alternative	No new personnel/dependents in the region; therefore, no impact
Action Alternative 1	The increase in use of these facilities by Navy personnel and dependents is not expected to be significant because it is expected that the automobile would be used as the primary means of transportation.
Action Alternative 2	Impacts similar to those depicted under Alternative 1, Scenario A.
Action Alternative 3	Impacts similar to those depicted under Alternative 1, Scenario A.
Infrastructure (No significant impact due to additional personnel and dependents)	
Potable Water (Sections 4.13.1, 4.13.2.1)	
No Action Alternative	No new construction or personnel/dependents in the region; therefore, no impact
Towns have additional capacity to handle increase in demand; therefore, resource is impacted but not significantly impacted.	
Action Alternative 1	Approximately 103,900 gallons per day of potable water needed to support 371 additional households in the region and 980 gallons per day to support new facilities.
Action Alternative 2	Approximately 185,900 gallons per day of potable water needed to support 664 additional households in the region and 2,080 gallons per day to support new facilities.
Action Alternative 3	Approximately 105,600 gallons per day of potable water needed to support 377 additional households in the region and 980 gallons per day to support new facilities.
Wastewater (Sections 4.13.1, 4.13.2.1)	
No Action Alternative	No new construction or personnel/dependents in the region; therefore, no impact
Towns have additional capacity to handle increase in demand; therefore, resource is impacted but not significantly impacted.	
Action Alternative 1	Approximately 93,500 gallons per day of additional wastewater to support 371 additional households in the region and 750 gallons per day to support new facilities.

Table 4.17-1 Summary of Potential Impacts to Resource Areas

Scenario A	*Scenario B* *Scenario C*
Action Alternative 2	Approximately 167,300 gallons per day of additional wastewater to support 664 additional households in the region and 1,840 gallons per day to support new facilities.
Action Alternative 3	Approximately 95,400 gallons per day of potable water needed to support 377 additional households in the region and 750 gallons per day to support new facilities.
Stormwater (Sections 4.13.1, 4.13.2.1)	
No Action Alternative	No new construction; therefore, no impact
Action Alternative 1	Increase of 2.0 acres of impervious surfaces from new facilities, and no new houses are expected to be constructed. Best management practices and compliance with stormwater permit requirements would minimize any potential impacts, and therefore the resource is impacted but not significantly impacted.
Action Alternative 2	Impacts similar to those depicted under Alternative 1.
Action Alternative 3	Impacts similar to those depicted under Alternative 1.
Solid Waste Management (Sections 4.13.1, 4.13.2.1)	
No Action Alternative	No new construction or personnel/dependents in the region; therefore, no impact
Regional landfills have additional capacity to handle increase in demand; therefore, resource is impacted but not significantly impacted.	
Action Alternative 1	Approximately 3,900 pounds of additional solid waste disposed of daily, and 1,300 pounds of additional waste recycled/composted daily.
Action Alternative 2	Approximately 6,900 pounds of additional solid waste disposed of daily, and 2,400 pounds of additional waste recycled/composted daily.
Action Alternative 3	Approximately 3,900 pounds of additional solid waste disposed of daily, and 1,300 pounds of additional waste recycled/composted daily.
Energy (Sections 4.13.1, 4.13.2.1)	
No Action Alternative	No new construction or personnel/dependents in the region; therefore, no impact
Projections anticipate sufficient energy supply for the foreseeable future; therefore, resource is impacted but not significantly impacted.	
Action Alternative 1	Increase of 1,539,600 kilowatt hour (kWh) of electricity per year and 27,750 million British Thermal Units (MMBTU) of additional natural gas needed per year to support 371 additional households throughout the region and 483,930 kWh of electricity and 1,550 MMBTU of additional natural gas per year needed to support new facilities.
Action Alternative 2	Increase of 2,755,400 kWh of electricity per year and 49,670 MMBTU of additional natural gas needed to support 664 additional households throughout the region and 1,072,970 kWh of electricity and 3,770 MMBTU of additional natural gas per year needed to support new facilities.
Action Alternative 3	Increase of 1,564,500 kWh of electricity per year and 28,200 MMBTU of additional natural gas needed to support 377 additional households throughout the region and 483,930 kWh of electricity and 1,710 MMBTU of additional natural gas per year needed to support new facilities.

Table 4.17-1 Summary of Potential Impacts to Resource Areas

Scenario A	*Scenario B* *Scenario C*
Communications (Sections 4.13.1, 4.13.2.1)	
No Action Alternative	No new construction or personnel/dependents in the region; therefore, no impact
Action Alternative 1	Existing housing is likely already connected to telephone networks and cell phone service provided by multiple carriers. Increased use of bandwidth at NAS Whidbey Island expected. New construction would include new or upgraded communication networks; therefore, the resource is impacted but not significantly impacted.
Action Alternative 2	Impacts similar to those depicted under Alternative 1.
Action Alternative 3	Impacts similar to those depicted under Alternative 1.
Facilities (Sections 4.13.1, 4.13.2.1)	
No Action Alternative	No new facilities; therefore, no impact.
Action Alternative 1	Beneficial impact from renovation of existing facilities and new facilities constructed. Sufficient space exists at Ault Field for construction. Therefore, no significant impact to resource.
Action Alternative 2	Impacts similar to those depicted under Alternative 1.
Action Alternative 3	Impacts similar to those depicted under Alternative 1.
Geological Resources (No significant impacts due to construction activities)	
Topography/Geology (Sections 4.14.1, 4.14.2.1)	
No Action Alternative	No new construction; therefore, no impact.
Action Alternative 1	Construction conducted near to the surface on generally level, pre-disturbed, areas; therefore, no impacts to topography or geography.
Action Alternative 2	Impacts similar to those depicted under Alternative 1.
Action Alternative 3	Impacts similar to those depicted under Alternative 1.
Seismic Activity (Sections 4.14.1, 4.14.2.1)	
No Action Alternative	No new construction; therefore, no impact.
Action Alternative 1	In event of earthquake, seismic hazards may damage buildings. Best management practices and emergency planning would minimize any potential impact.
Action Alternative 2	Impacts similar to those depicted under Alternative 1.
Action Alternative 3	Impacts similar to those depicted under Alternative 1.
Soils (Sections 4.14.1, 4.14.2.1)	
No Action Alternative	No new construction; therefore, no impact.
Action Alternative 1	Direct impacts to soils may include grading, compaction, and rutting. Indirect impacts from increased quantity and velocity of stormwater. All potential impacts would be avoided and minimized utilizing best management practices.
Action Alternative 2	Impacts similar to those depicted under Alternative 1.
Action Alternative 3	Impacts similar to those depicted under Alternative 1.
Hazardous Materials and Wastes (No significant impacts due to construction activities or from the addition and operation of additional Growler aircraft) **(Sections 4.15.1; 4.15.2.1)**	
No Action Alternative	No change associated with hazardous materials and wastes; therefore, no impact.
Action Alternative 1	Hazardous materials and waste would increase in quantity at NAS Whidbey Island but would be managed under existing law and U.S. Navy regulations and management practices; therefore, there would be no significant impact under Alternative 1 (35 aircraft).

Table 4.17-1 Summary of Potential Impacts to Resource Areas

	Scenario A	*Scenario B*	*Scenario C*
Action Alternative 2	Impacts similar to those depicted under Alternative 1, but would be negligibly higher (36 aircraft) than under Alternative 1 (35 aircraft).		
Action Alternative 3	Impacts similar to those depicted under Alternative 2.		
Climate Change and Greenhouse Gases (No significant impact from the increase in aircraft operations)			
Climate Change (Sections 4.16.1.1; 4.16.1.2; 4.16.1.3)			
No Action Alternative	Climate change will continue to occur, resulting in global impacts affecting Whidbey Island and Puget Sound and the Navy's priorities and mission. Federal, state and local agencies, including the DoD, will continue to assess impacts and define adaptation and mitigation strategies to address them.		
Action Alternative 1	Impacts similar to those depicted under the No Action Alternative.		
Action Alternative 2	Impacts similar to those depicted under the No Action Alternative.		
Action Alternative 3	Impacts similar to those depicted under the No Action Alternative.		
Greenhouse Gas (GHG) (Sections 4.16.2.1; 4.16.2.2; 4.16.2.3; 4.16.2.4; 4.16.2.5)			
No Action Alternative	No existing stationary sources would have an increase in emissions, and there would be no change in aircraft operations. Therefore, no impacts on greenhouse gases would occur.		
Increase in mobile and stationary CO_2 emissions as compared to the No Action Alternative (Equates to less than 1 percent of all aircraft CO_2 emissions in Washington. GHG emissions from this action should not have significant impact on Washington's GHG emission goals.)			
Action Alternative 1	Stationary – 1 percent Mobile – 57 percent	Stationary – 1 percent Mobile – 48 percent	Stationary – 1 percent Mobile – 39 percent
	While the Washington GHG inventory has shown an increase in overall transportation GHG emissions from 37.5 to 42.5 Million MT CO_2e, annual aircraft GHG emissions decreased from between 9.1 and 8.0 Million MT CO_2e (Washington State Department of Ecology, 2016).		
Action Alternative 2	Stationary – 3 percent Mobile – 58 percent	Stationary – 3 percent Mobile – 49 percent	Stationary – 3 percent Mobile – 40 percent
Action Alternative 3	Stationary – 1 percent Mobile – 57 percent	Stationary – 1 percent Mobile – 48 percent	Stationary – 1 percent Mobile – 39 percent

Table 4.17-1 Summary of Potential Impacts to Resource Areas

	Scenario A	*Scenario B*	*Scenario C*

Note: This table provides a summary of impacts of the Proposed Action under each alternative and each operational scenario. The impact conclusions in this table are based on detailed analysis provided in Chapter 4 of the EIS. Impact conclusions are based on average year conditions.

KEY

ACHP	=	Advisory Council on Historic Preservation
AICUZ	=	Air Installation Compatible Use Zone
APZ	=	Accident Potential Zone
BASH	=	Bird-Animal Aircraft Strike Hazard
dB	=	decibel
DNL	=	day-night average sound level
ESA	=	Endangered Species Act
FCLP	=	field carrier landing practice
GHG	=	greenhouse gas
IBA	=	Important Bird Area
kWh	=	kilowatt hour
LOS	=	level of service
MMBTU	=	million British thermal units
NAAQS	=	National Ambient Air Quality Standards
NAS	=	Naval Air Station
OLF	=	Outlying Landing Field
POI	=	Point of Interest
SHPO	=	State Historic Preservation Office
SR	=	State Route

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