

*NR-1*  
*Natural Resources*  
*Analytical Approach*

## ***APPENDIX NR-1 ANALYTICAL APPROACH***

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### ***I. Resource Definition***

Natural resources are defined as all native and non-native plants and animals, the habitats where they are found, the communities they form, and the soil and water features necessary for these resources to function. The physical and biological features required to sustain these plant and animal species comprise their habitat. When linked together by ecological processes (e.g., predation), these species assemblages are referred to as communities. In general, natural resources can be organized within the five resource groups below.

#### **A. Soils and Water**

This resource group provides discussion on soil type, erosion potential, drainage basins, floodplains, and surface water runoff in relation to areas where construction would occur.

#### **B. Terrestrial Communities**

Terrestrial communities include the plants and wildlife on the Air Force bases and under the MOAs that would potentially be disturbed by construction or exposed to noise, chaff, or flares from the F-22.

#### **C. Wetland and Freshwater Aquatic Communities**

Wetlands are transitional zones between terrestrial (land-based) and aquatic (water) habitats that exhibit hydric soils and a hydrologic regime sufficient to support hydrophytic vegetation. Freshwater aquatic communities include streams, rivers, lakes, ponds, and reservoirs and aquatic wildlife. Disturbance of wetlands and freshwater aquatic communities typically require a Clean Water Act Section 404 permit from the United States Army Corps of Engineers (USACE). In general, the USACE issues permits for project alternatives that represent the least environmentally damaging practicable alternative.

#### **D. Marine Communities**

Marine communities are defined in this document as plants, animals and habitats residing beneath the Air Force over-water airspace in the Gulf of Mexico or Atlantic Ocean.

#### **E. Threatened, Endangered, and Special-Status Species/Communities**

Threatened and endangered species are those plants or animals that are so low in number that federal or state agencies have identified them as facing the possibility of extinction throughout all or part of their geographic range.

### ***II. REGULATORY SETTING***

Legislation mandating consideration of the five resource groups is provided below.

## A. Soils and Water

***Federal Water Pollution Control Act of 1948 (Clean Water Act: 33 United States Code [USC] 1251-1387).*** This act established procedures and programs for the restoration and maintenance of the chemical, physical, and biological integrity of the nation's waters, thus protecting habitat conditions in aquatic and wetland ecosystems.

## B. Terrestrial Communities

***Lacey Act of 1900 (16 USC 3371-3378).*** This statute brought the unlawful taking of fish, wildlife, and plants under federal jurisdiction by prohibiting specimens taken illegally from being shipped across state boundaries.

***Migratory Bird Treaty Act of 1918 (16 USC 701-715s).*** This act establishes protection for migratory birds and their parts (including eggs, nests, and feathers) from hunting, capture, or sale.

***Fish and Wildlife Coordination Act of 1958 (16 USC 661-666c as amended).*** This act provides for conservation and management of fish and wildlife by encouraging cooperation between the United States Fish and Wildlife Service and other federal, state, public, and private agencies.

***Wilderness Act of 1964 (16 USC 1131).*** This act directed the Secretary of the Interior to review every roadless area of 5,000 or more acres and every roadless island (regardless of size) within National Wildlife Refuge and National Park Systems and to recommend to the President the suitability of each such area or island for inclusion in the National Wilderness Preservation System. The act provides criteria for determining suitability and establishes restrictions on activities that can be undertaken on designated areas.

***Fish and Wildlife Conservation Act of 1980 (16 USC 2901-2911 as amended).*** This act authorizes funding for grants aimed at developing and implementing comprehensive state non-game fish and wildlife management plans.

## C. Wetland and Freshwater Aquatic Communities

***Federal Water Pollution Control Act of 1948 (Clean Water Act: 33 USC 1251-1387).*** This act established procedures and programs for the restoration and maintenance of the chemical, physical, and biological integrity of the nation's waters, thus protecting habitat conditions in aquatic and wetland ecosystems.

***Executive Order 19988 of 1977, Floodplain Management.*** This Executive Order was established to avoid, to the extent possible, the adverse impacts associated with floodplain development.

***Executive Order 11990 of 1977, Protection of Wetlands.*** This Executive Order establishes a policy of no net loss of wetland for any federal action that may affect wetlands.

***Executive Order 12962 of 1995, Recreational Fisheries.*** This Executive Order requires federal agencies to evaluate the effects of actions on aquatic systems and recreational fisheries and document these effects relative to the purposes of the Order. Sec. 1 (h). while promoting compatibility between the Endangered Species Act and recreational fisheries.

***North American Wetlands Conservation Act (16 USC 4401-4412).*** This act supports the management and preservation of waterfowl by funding the implementation of the North American Waterfowl Management Plan and the Tripartite Agreement on wetlands between Canada, United States, and Mexico.

***Agreement of Federal Agencies on Ecosystem Management of the Chesapeake Bay, 1994.***

***Federal Agencies' Chesapeake Ecosystem Unified Plan (FACEUP).***

***Estuaries and Clean Water Act of 2000.***

#### D. Marine Communities

***Marine Mammal Protection Act of 1972 (16 USC 1361 et seq. Public Law 92-574); 1997-Supp; (MMPA).*** This act makes it illegal for a person to take a marine mammal, which includes significantly disturbing the habitat, unless done in accordance with regulations or a permit.

***Magnuson-Stevens Fishery Conservation and Management Act (16 USC 1801).*** The act requires federal agencies to consult with the National Marine Fisheries Service when activities may have adverse impacts on designated Essential Fish Habitat.

#### E. Threatened and Endangered Species

***Bald Eagle Protection Act of 1940 (16 USC 668-668C).*** This act protects Bald and Golden eagles by prohibiting the take, possession, or transportation of these species, dead or alive. This act extends protection to eagles nests and eggs.

***Endangered Species Act of 1973 (16 USC 1531-1544, as amended).*** The Endangered Species Act established measures for the conservation of plant and animal species listed, or proposed for listing, as threatened or endangered, including the protection of critical habitat necessary for their continued existence.

### ***III. METHODOLOGY***

Generally, impact analysis was conducted at two scales: (1) base and environs, and (2) airspace. For the base and environs scale, impact analysis consisted of defining the footprint of proposed construction and assessing the area and species within the footprint using computer geographic information system (GIS) software and available literature. The analysis also considered the areas on and near the base affected by changes in the noise environment. For the airspace scale, a GIS-based overlay analysis of natural resources and Military Operations Areas (MOAs) and over-water Warning Areas was performed. For both

scales, additional analyses were performed by comparing proposed noise levels to baseline and to a summary of noise literature on the effects of noise on livestock and wildlife (see Appendix NR-4).

## **A. Soils and Water**

Areas of potential ground disturbance from construction were identified and discussed in terms of erosion that could occur and the potential effects of erosion on stormwater runoff. Impacts to the 100-year floodplain were identified by comparing construction footprints to Federal Emergency Management Agency maps.

Calculations for potential soil erosion amounts were performed using the Revised Universal Soil Loss Equation (RUSLE) for water run-off related erosion (sheet, rill, and gully) and the Natural Resource Conservation Service (NRCS) Wind Erosion Equation (WEQ) for wind-related erosion and fugitive dust. Factors used to calculate erosion rates were obtained from various USDA-NRCS soil surveys, NRCS technical guides, and NRCS soil scientists from Virginia, Florida, Alaska, and Idaho. Gully erosion takes place on steep sites and is often difficult to accurately predict. Because construction associated with the F-22 project would occur on relatively level sites and best management practices (BMPs) would be employed, gully erosion is presumed to be negligible and was not included in calculations.

Assumptions, formulae, and factors used to determine potential erosion totals in all cases are listed below.

### ***Assumptions***

1. Erosion will be negligible after construction period is completed.
2. 250 pounds/acre vegetation cover and/or coarse fragments, and no soil clods or crusts in construction areas (pulverized soil conditions). Same quantity of vegetation cover present at all construction locations.
3. Moderate to high erosion factors are used in USLE calculations ( $P$  factor equals 1,  $C$  factor adjusted for low cover with low management=0.50, slope length  $L$  maximum and gradient  $S$  low, all other factors per NRCS FOTGs).
4. Wind erosion loss as fugitive dust will be reduced by 50 percent with application of BMPs such as watering and soil stockpiling. Rate of fugitive dust loss the same for all construction locations (1.2 tons/ac/month).
5. Other wind erosion losses to saltation, suspension, and surface creep, as calculated by WEQ will be reduced by 70 percent with application of BMPs such as watering, covering with erosion fabric, and soil stockpiling.
6. Moderate to high erosion factors are used in Wind Erosion Equation ( $K$  factor set to 1,  $L$  factor at maximum length for graded site,  $V$  factor set low converted to small grain equivalents, all other factors per NRCS FOTGs).

7. Wind erosion calculated on 12-month basis and reduced to 10-day period. Because wind erosion periods vary on monthly basis, actual erosion rates will depend on weather conditions during construction periods.
8. Total predicted soil lost for given site = (acres x USLE factors) + (acres x Wind Erosion factors) + fugitive dust.

### ***Factors and Calculations***

(Note: Factors used in the USLE are not the same as in the Wind Erosion Equation)

*USLE:  $R \times K \times LS \times C \times P = A$  in tons/ac/year*

*Wind Erosion Equation:  $f(I K C L V) = E \times BMP \text{ reduction factor} = E_{Tot}$  in tons/ac/year.*

*Fugitive Dust:  $1.2 \text{ tons/ac/month} \times BMP \text{ reduction factor} = D$  in tons/ac/month*

Table NR-1-1 summarizes factor values and erosion totals for the proposed action and each alternative base.

### **B. Terrestrial Communities**

Areas of construction were outlined and overlaid upon maps of terrestrial habitats and land cover types to calculate the habitat impacted. Species known to utilize impacted habitats were then identified and a determination of effect was made. Effects of aircraft operation noise on base and under airspace were identified by evaluating proposed noise levels against the literature summarized in Appendix NR-4.

### **C. Wetland and Freshwater Aquatic Communities**

Areas of construction were outlined and overlaid upon maps of wetlands and freshwater aquatic communities that would potentially be disturbed from construction.

### **D. Marine Communities**

Marine communities and species that would potentially be affected by aircraft noise were identified. Analysis is presented in Appendix NR-4.

### **E. Threatened and Endangered Species**

The locations and habitats of special-status species that would potentially be affected by construction or aircraft noise were identified for the base, MOAs, and over-water airspace. Analysis of potential noise impacts is presented in Appendix NR-4.

### **F. Avoidance**

Following initial review of potential direct and indirect impacts, sites for facilities were identified to avoid or minimize unavoidable impacts.

Table NR-1-1. Soil Erosion Calculations for Initial F-22 Operational Wing Beddown PDEIS						
		<b>Langley AFB</b>	<b>Eglin AFB</b>	<b>Elmendorf AFB</b>	<b>Mountain Home AFB</b>	<b>Tyndall AFB</b>
	<b>Soil Type</b>	Fill (Silt Loam)	Fine sand and sand	Silt Loam	Silt Loam	Fine sand and sand
	<b>Slope (%)</b>	0 - 4	0 - 4	0 - 8	0 - 4	0 - 4
Sheet and Rill Erosion	<b>R</b>	250	420	20	12	420
	<b>K</b>	0.08	0.08	0.10	0.08	0.08
	<b>LS</b>	0.25	0.25	0.53	0.25	0.25
	<b>C</b>	1.00	1.00	1.00	1.00	1.00
	<b>P</b>	1.0	1.0	1.0	1.0	1.0
	<b>BMP % Reduc. Factor</b>	0.5	0.5	0.5	0.5	0.5
	<b>A tons/ac/year</b>	2.50	4.20	0.53	0.12	4.20
Wind Erosion	<b>I</b>	86	134	134	86	134
	<b>K</b>	1.00	1.00	1.00	1.00	1.00
	<b>C</b>	10	4	2	30	4
	<b>L</b>	4000	2000	2000	2000	2000
	<b>V</b>	0.0	0.0	0.0	0.0	0.0
	<b>E tons/ac/year</b>	8.6	5.4	2.7	40.2	5.4
	<b>E<sub>Tot</sub> (w/70% BMP Reduc.)</b>	2.6	1.6	0.8	12.1	1.6
Fugitive Dust	<b>D* tons/ac/month</b>	0.17	0.17	0.17	0.17	0.17
	<b>Total Acres Disturbed</b>	16	10	46	440	73
	<b>Sheet &amp; Rill Erosion (tons)</b>	40	42	24.38	52.8	306.6
	<b>Wind Erosion (tons)</b>	41.28	16.2	37.26	5306.4	118.26
	<b>Fugitive Dust (tons)</b>	0.68	0.425	1.955	18.7	3.1025
TOTAL	<b>Tons Erosion per Site</b>	82.0	64.5	63.6	5377.9	428.0

\*The Construction Emission Factor for Fugitive Dust includes a 50 percent BMP reduction factor.