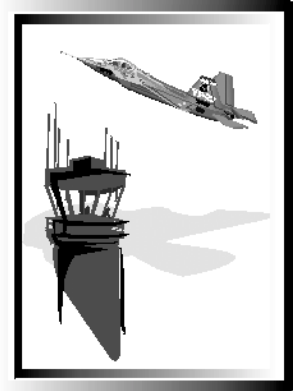


## ***TY3 TYNDALL AFB AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES***

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### **Aircraft Operations**

As an active, combat-ready unit, the Initial F-22 Operational Wing would conduct training both at the base's airfield and in the associated training airspace. Within these areas aircraft performing training activities generate noise and emit exhaust, so they can affect the noise environment and air quality. Maintenance activities, construction, and ground vehicles also produce emissions that can affect air quality. All training and other activities must be performed safely and with regard for all other users both in the air and on the ground. These training activities that affect noise and emissions also have the potential to affect safety and airspace management. Aircraft operations addresses these interconnected resources of airspace management and use, noise, air quality, and safety for the base, airspace surrounding the airfield, and associated airspace for Tyndall AFB. Appendix AO-1 provides definition of these resources and details the methods used for analysis. For this Draft EIS, the best available data were used for this new generation of advanced fighter aircraft. However, there are limitations to the extent of the data since this aircraft is new and there are only four prototype aircraft flying. Noise, air quality, and safety data have been collected to the greatest extent possible for F-22 specific aircraft.



Noise data have been collected on the F-22s; however, none of them have flown the full range of maneuvers and engine power settings needed to develop the complete noise database required for noise analysis. Although the Air Force used the current F-22 aircraft for data collection, it is still possible these developmental test engines may be further modified as a result of ongoing testing. Therefore, a composite approach was used to model noise for the F-22. Current data on the prototype aircraft were used as well as information on comparable turbofan engines and other similar fighter aircraft power settings, speed, and maneuvering.

As a new, developing aircraft, the F-22 and its systems (e.g., engines, avionics) have evolved since the first flight in 1997 and will continue to evolve in the future. Acquisition of detailed knowledge of the outputs (such as noise levels and emissions) resulting from F-22 operations has followed a similar evolutionary pattern. Basically, this information will improve in precision the more the F-22 flies and undergoes evaluation.

This evolution in knowledge of F-22 outputs (especially noise) has clearly evolved over the past few years. In the environmental analysis performed on the F-22, *F-22 Force Development Evaluation and Weapons School Beddown, Nellis AFB* (Air Force 1999a), the best available information was used (at the time only one F-22 prototype had been flown). This information indicated that the F-18 noise profile formed the most appropriate surrogate for the F-22 at that time.

By 2000, when the *F-22 Conversion of Two F-15 Fighter Squadrons to F-22 Fighter Squadrons at Tyndall AFB, Florida* (Air Force 2000) environmental analysis was completed, the Air Force Research Laboratory had collected additional F-22 noise data. Correlating these data to the known noise

signatures for other aircraft led the Air Force to continue to use the F-18 as the best available surrogate for the F-22.

As noted above, further actual noise data on the F-22 has been collected. Although these data do not provide a complete noise database, they demonstrate the evolution of information on the aircraft. These data further establish that a composite of comparable engines and fighter aircraft best characterize the noise profile for the F-22.

For air quality, the best available data were also used. The F-22 uses a new propulsion system – the F119-PW-100 – a low-bypass ratio turbofan built by Pratt & Whitney. This engine is still under test and evaluation and may require changes depending on the test program. Many operational parameters of this new engine are classified or competitively sensitive. In an effort to approximate the fuel emissions that would be expected for this F119 engine, the F100 series of engines were evaluated. These series of engines were chosen because they most closely emulate the function of the F119 engine and the power settings anticipated to be used by the F-22.

Safety data are unavailable for the F-22 because there are only four test and evaluation prototype aircraft flying. There have not been enough flight hours to accurately depict the safety record for this new aircraft. Therefore, similar fighter aircraft safety records have been used and conclusions drawn based on their flight history.

Although some F-22 data for noise, air quality, and safety are currently incomplete or unavailable, this Draft EIS provides a thorough analysis of known parameters. The Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA) recognizes that such a situation may occur. This situation is managed in accordance with 40 Code of Federal Regulations (CFR) § 1502.22, *Incomplete or Unavailable Information*, which provides the following guidance.

When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an Environmental Impact Statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking.

(a) If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the Environmental Impact Statement.

(b) If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the Environmental Impact Statement the following:

1. A statement that such information is incomplete or unavailable;
2. A statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment;

3. A summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and
4. The agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this Section, "reasonably foreseeable" includes impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.

As indicated above, data for the F-22 aircraft that are necessary to model the aircraft's noise, air quality, and safety are incomplete. While the costs to obtain complete data are not exorbitant, those data cannot be obtained at this time due to limitations on aircraft performance during its developmental stage, the need for further testing of operational aircraft, analyses during normal (versus developmental) flying conditions, and time to develop a flight safety record (40 CFR §§ 1502.22[b]; 1502.22[b]1). The data and factors used in this analysis are presented in the body of this Draft EIS and further detailed in Appendix AO-1 through AO-3.

### ***No-Action Alternative***

Under the no-action alternative, ongoing Air Force and interagency programs and activities at Tyndall AFB would continue operating at planned levels as reflected in current Air Force management plans. These plans include recent activities that have been approved by Air Force and have existing NEPA documentation.

Under the no-action alternative, Tyndall AFB would continue to operate as an AETC base and would be home to the 325<sup>th</sup> FW. Aircraft operations, including advanced fighter pilot training for both the F-15C and the F-22 and airspace management and use, would continue at baseline levels. There would be no change in the use of any baseline airspace. Under the no-action alternative baseline noise levels would not change, either in the vicinity of the base, or under the affected airspace. Impacts to air quality would reflect baseline and ongoing activities in the region; pollutant emissions would stay the same. Tyndall AFB would continue to operate under conditions in its current air permit and comply with all applicable state and federal laws and regulations. There would be no change in baseline aircraft operations, therefore, there would be no different safety issues. Operation and maintenance activities conducted at Tyndall AFB would continue in accordance with all applicable safety directives.

## ***TY3.1 Airspace Management and Use***

### **TY3.1.1 Base**

#### ***Affected Environment***

The affected environment for aircraft operations at Tyndall AFB includes the base and the airspace surrounding the airfield. Baseline conditions for the affected environment reflect sorties by two

squadrons of F-22s (54 PAI aircraft), a squadron of F-15Cs (24 PAI aircraft), all of which conduct advanced fighter pilot training, and 104 other aircraft.

Airspace currently supporting aircraft operations at Tyndall AFB includes airspace surrounding the base for airfield sorties and the Tyndall Terminal Area that has been delegated to the Tyndall Radar Approach Control Facility to provide Air Traffic Control services for arriving, departing, and en route aircraft. The Tyndall Terminal Area airspace extends from the surface to approximately 23,000 feet MSL and includes Restricted Areas, Warning Areas, and MOAs.

A total of 26,248 baseline sorties are conducted at Tyndall AFB. While no other aviation facilities exist within Tyndall's controlled airspace, a private seaplane base is located southwest of Panama City-Bay County International Airport within its airspace.

### ***Environmental Consequences***

Beddown of the Initial F-22 Operational Wing at Tyndall AFB would not adversely affect airspace use and management within the local air traffic environment. The 11,187 additional annual operational F-22 sorties would result in a 43 percent net increase in sorties over baseline conditions. While such an increase is substantial, it would not require airspace modifications or changes to the base arrival or departure procedures. This increase would not be expected to exceed the Tyndall Approach Control or control tower capabilities for handling air traffic in their respective airspaces. The effects on airspace use in the local air traffic environment would not be significant.

*People at scoping were concerned about what impact the F-22 beddown would have on municipal and private airports.*

### ***Comparative Summary of the Five Potential Basing Locations***

Management of the airspace in the vicinity of Tyndall, as well as all other bases, is adequate to support the additional sorties associated with the proposed beddown. Increases in annual sorties at Tyndall (+43 percent) or at Mountain Home (+58 percent), Langley (+7 percent), Eglin (+16 percent), and Elmendorf (+26 percent) would negligibly affect airspace management procedures. Mountain Home, however, with construction of an additional runway and associated minor adjustments to local air traffic patterns, would affect airspace management procedures slightly more than at other bases.

#### **TY3.1.2 Airspace**

##### ***Affected Environment***

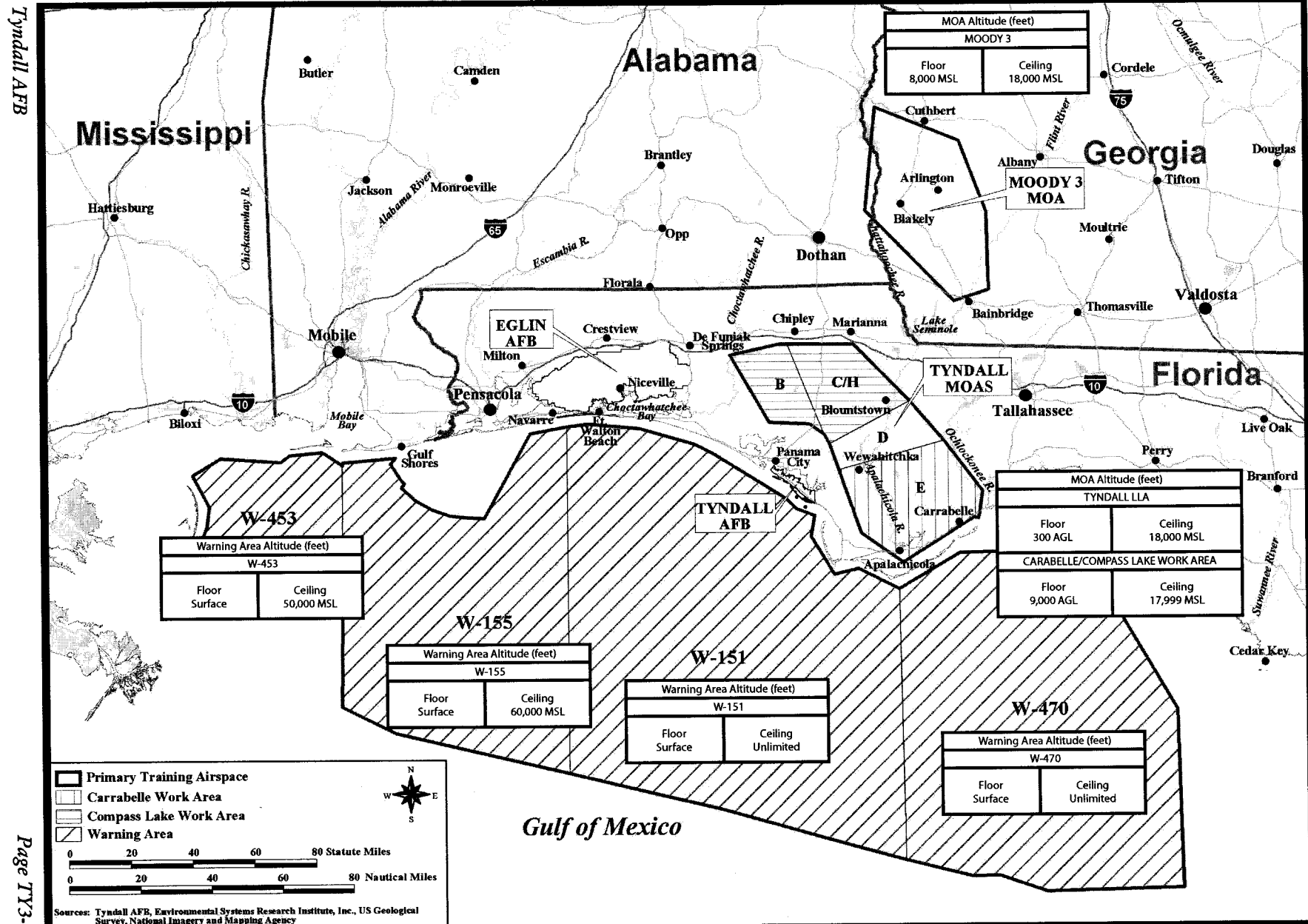
The affected airspace units for the Tyndall AFB alternative consist of eight primary airspace units (Figure TY3.1-1): four over-water Warning Areas (designated with a "W"), two overland MOAs, and two work areas (refer to Table TY2.2-2). Used on a consistent basis for training, this airspace receives 95 percent or more of baseline operational F-15C use from Eglin AFB plus F-15C and F-22 advanced fighter pilot training use from Tyndall AFB. Airspace designated as operational F-22 occasional use consists of Camden

##### ***Primary Use Airspace***

Moody 3 MOA  
Tyndall LLA MOA  
Carabelle Work Area  
Compass Lake Work Area  
W-151  
W-155  
W-470  
W-453

##### ***Occasional Use Airspace***

Camden Ridge/Pine Hill MOAs  
Rose Hill MOA  
W-168



**Figure TY3.1-1**  
**Tyndall AFB Affected Airspace Environment**

Ridge/Pine Hill MOAs, Rose Hill MOA, and W-168. Section TY2 describes the baseline use of the primary and occasional use airspace and its general parameters. Warning Areas W-151 and W-470 receive the most use by Tyndall. Other aircraft from Tyndall AFB, as well as operational aircraft from Eglin AFB, share the same airspace units. Tyndall LLA and Moody 3 MOAs, as well as W-155 and W-453, are used by both Eglin and Tyndall AFBs on a regular basis.

A number of Military Training Routes (MTRs) overlap the four MOAs and one Warning Area (W-470). Camden Ridge/Pine Hill and Moody 3 MOAs each have 11 MTRs that coincide with the MOAs. W-470 has only one MTR that overlaps with this airspace unit. Close coordination of scheduling and use of these MOAs, MTRs, and Warning Areas by respective scheduling agencies ensures safe aircraft transit throughout this region. Air traffic traveling in this area are affected by conflicts with military flight activities. See Appendix AO-1 for further description of the MTR coincidence with MOAs and Warning Areas.

### ***Environmental Consequences***

Selection of Tyndall for the Initial F-22 Operational Wing beddown would have effects on airspace use and management within this coastal region. This alternative would not itself require changes to the current configuration of primary and occasional use MOAs, ATCAAs, or Warning Areas considered for operational F-22 use; however, it might alter use of this airspace. The additional sortie-operations by the operational F-22 would result in increases in overall use of the MOAs and Warning Areas. Sortie-operations in W-151 and W-470 would increase by 18 and 32 percent, respectively, and represent an increase of 11 and 22 daily (260 flying days/year) sortie-operations. For the other airspace units, the increase would typically range from less than 1 to 3 sortie-operations daily.

*A Tyndall F-22 beddown decision means that Eglin operational F-15Cs and Tyndall operational F-22s would use the same airspace.*

The relatively low use of the affected overland MOAs would continue to minimize the potential intrusion of military flight operations on public/private airports underlying the MOAs and any visual flight rules operating through or beneath these areas. The general greater use of the over-water airspace distances military test and training activities from most commercial air traffic operating throughout the Gulf Coast region. While this alternative produces a substantial increase in sortie-operations, continued close airspace management and coordination among the airspace users should result in no adverse impacts to airspace use and management.

### ***Comparative Summary of the Five Potential Basing Locations***

Although the increase in daily sortie-operations is greater at Tyndall (22 additional sortie-operations per day in the airspace units), than other installations, no substantive impact to management of training airspace is anticipated. All of the airspace units that the F-22 would use, irrespective of the location, operate under the same basic Federal Aviation Administration (FAA) regulations and procedures.

### ***TY3.2 Noise***

Within this Draft EIS, noise is described by the sound level. Sound level is the amplitude (level) of the sound that occurs at any given time. When an aircraft flies by, the level changes continuously,

starting at the ambient (background) level, increasing to a maximum as the aircraft passes closest to the receptor, and then decreasing to ambient as the aircraft flies into the distance. Sound levels are on a logarithmic decibel scale; a sound level that is 10 decibels (dB) higher than another will be perceived as twice as loud. More specific noise metrics include Maximum Sound Level ( $L_{\max}$ ), the Sound Exposure Level (SEL), Day-Night Average Sound Level (DNL), and Onset-Rate Adjusted Monthly Day-Night Average Sound Level ( $L_{\text{dnmr}}$ ). A-weighted levels are used for subsonic aircraft noise, and C-weighted levels are used for sonic booms and other impulsive noises. A “C” is included in the symbol to denote when C-weighting is used. Each of these metrics is summarized below and discussed in detail in Appendix AO-1.

- Maximum Sound Level ( $L_{\max}$ ) is used to define maximum noise levels.  $L_{\max}$  is the highest sound level measured during a single aircraft overflight. For an observer, the noise level starts at the ambient noise level, rises up to the maximum level as the aircraft flies closest to the observer, and returns to the ambient level as the aircraft recedes into the distance.
- Sound Exposure Level (SEL) accounts for both the maximum sound level and the length of time a sound lasts. SEL does not directly represent the sound level heard at any given time. Rather, it provides a measure of the total sound exposure for an entire event averaged over 1 second.
- Day-Night Average Sound Level (DNL) is a noise metric combining the levels and durations of noise events and the number of events over an extended time period. It is a cumulative average computed over a 24-hour period to represent total noise exposure. DNL also accounts for more intrusive night time noise, adding a 10 dB penalty for sounds after 10:00 pm and before 7:00 am. DNL is the appropriate measure to account for total noise exposure around airfields such as Tyndall AFB.
- Onset-Rate Adjusted Monthly Day-Night Average Sound Level ( $L_{\text{dnmr}}$ ) is the measure used for subsonic aircraft noise in military airspace (MOAs or Warning Areas). This metric accounts for the fact that when military aircraft fly low and fast, the sound can rise from ambient to its maximum very quickly. Known as an onset-rate, this effect can make noise seem louder due to added “startle” effects. Penalties of up to 11 dB are added to account for this onset-rate.
- C-Weighted Day-Night Sound Level (CDNL) is day-night sound levels computed for areas subject to sonic booms. These areas are also subjected to subsonic noise assessed according to  $L_{\text{dnmr}}$ .

Comments received during scoping placed special emphasis on a comprehensive presentation of noise effects. Aircraft noise effects can be described according to two categories: annoyance and human health considerations. Annoyance, which is based on perception, represents the primary effect associated with aircraft noise. Far less potential exists for effects on human health. Appendices AO-1 and AO-2 provide detail on these effects and the studies used to identify them.

Studies of community annoyance to numerous types of environmental noise show that DNL correlates well with effects, and Schultz (1978) showed a consistent relationship between noise levels and annoyance. A more recent study reaffirmed and updated this relationship (Fidell *et al.* 1991).

The updated relationship, which does not differ substantially from the original, is the current preferred form.

In general, there is a high correlation between the percentages of groups of people highly annoyed and the level of average noise exposure measured in DNL. The correlation is lower for the annoyance of individuals. This is not surprising considering the varying personal factors that influence the manner in which individuals react to noise. The inherent variability between individuals makes it impossible to predict accurately how any individual will react to a given noise event. Nevertheless, findings substantiate that community annoyance to aircraft noise is represented quite reliably using DNL.

<b>Relation Between Annoyance and DNL</b>	
<b><i>DNL</i></b>	<b><i>% Population Highly Annoyed</i></b>
65	12.3
70	22.1
75	36.5
80	53.7
85	70.2

In addition to annoyance, the effect of noise on human health was raised during the public scoping process for this Draft EIS. Other factors that can be used to evaluate a noise environment are noise-induced hearing loss, speech interference, and sleep disturbance. Effects on speech and sleep also contribute to annoyance.

A considerable amount of data on hearing loss have been collected and analyzed. It has been well established that continuous exposure to high noise levels (such as that occurring in a factory) will damage human hearing (United States Environmental Protection Agency [USEPA] 1978). Hearing loss is generally interpreted as the shifting to a higher sound level of the ear's sensitivity to perceive or hear sound (sound must be louder to be heard). This change can be either temporary or permanent. Federal workplace standards for protection from hearing loss allow an A-weighted time-average level of 90 dB over an 8-hour work period, or 85 dB averaged over a 16-hour period. As shown later in this section, noise levels associated with the activities of the F-22s would be more than 30 dB below these standards. In a MOA or Warning Area, the operations are random and widely dispersed. The random nature of operations and the wide altitude structure within the MOA make it unlikely that any one location would be repeatedly overflowed over a short duration.

Studies on community hearing loss from exposure to aircraft flyovers near commercial airports showed that there is no danger, under normal circumstances, of hearing loss due to aircraft noise (Newman and Beattie 1985). Commercial airport traffic is much more continuous and frequent than at a military airfield and also commonly lower in altitude than flights in MOAs or Warning Areas. In Warning Areas and MOAs, military aircraft fly at varied altitudes, rarely fly over the same point on the ground repeatedly during a short period, and occur sporadically over a day. These factors make it unlikely that any hearing loss would occur (Thompson 1997). Other factors, described in Appendix AO-1, demonstrate the lack of potential hearing loss from the F-22 beddown.

Another non-auditory effect of noise is disruption of conversations. Speech interference associated with aircraft noise is a primary cause of annoyance to individuals on the ground. Aircraft noise can also disrupt routine activities, such as radio listening, television watching, or telephone use. The disruption generally lasts only a few seconds, and almost always less than 10 seconds. It is difficult to predict speech intelligibility during an individual event, such as a flyover, because people automatically raise their voices as background noise increases. A study (Pearsons *et al.* 1977) suggests that people can communicate acceptably in background A-weighted noise levels of 80 dB,



but some speech interference occurs when background noise levels exceed 65 dB. Typical home insulation reduces the noise levels experienced by 20 dB or more and decreases speech interference.

Noise-related awakenings form another issue associated with aircraft noise. Sleep is not a continuous, uniform condition but a complex series of states through which the brain progresses in a cyclical pattern. Arousal from sleep is a function of a number of factors including age, gender, sleep stage, noise level, frequency of noise occurrences, noise quality, and presleep activity. Quality sleep is recognized as a factor in good health. Although considerable progress has been made in understanding and quantifying noise-induced annoyance in communities, quantitative understanding of noise-induced sleep disturbance is less advanced.

Studies (Fidell *et al.* 1994; Pearsons *et al.* 1995; Kryter 1984) of the effects of nighttime noise exposure on the in-home sleep of residents near military airbases, civil airports, and in several households with negligible nighttime aircraft noise exposure, revealed the SEL as the best noise metric predicting noise-related awakenings and a strong influence of habituation on susceptibility to noise-induced sleep disturbance.

To date, no exact quantitative dose-response relationship exists for noise-related sleep interference; yet, based on studies conducted to date and the USEPA guideline of a 45 DNL to protect sleep interference, useful ways to assess sleep interference have emerged. If homes are conservatively estimated to have a 20-dB noise insulation, an average of 65 DNL would produce an indoor level of 45 DNL and would form a reasonable guideline for evaluating sleep interference. This also corresponds well to the general guideline for assessing speech interference.

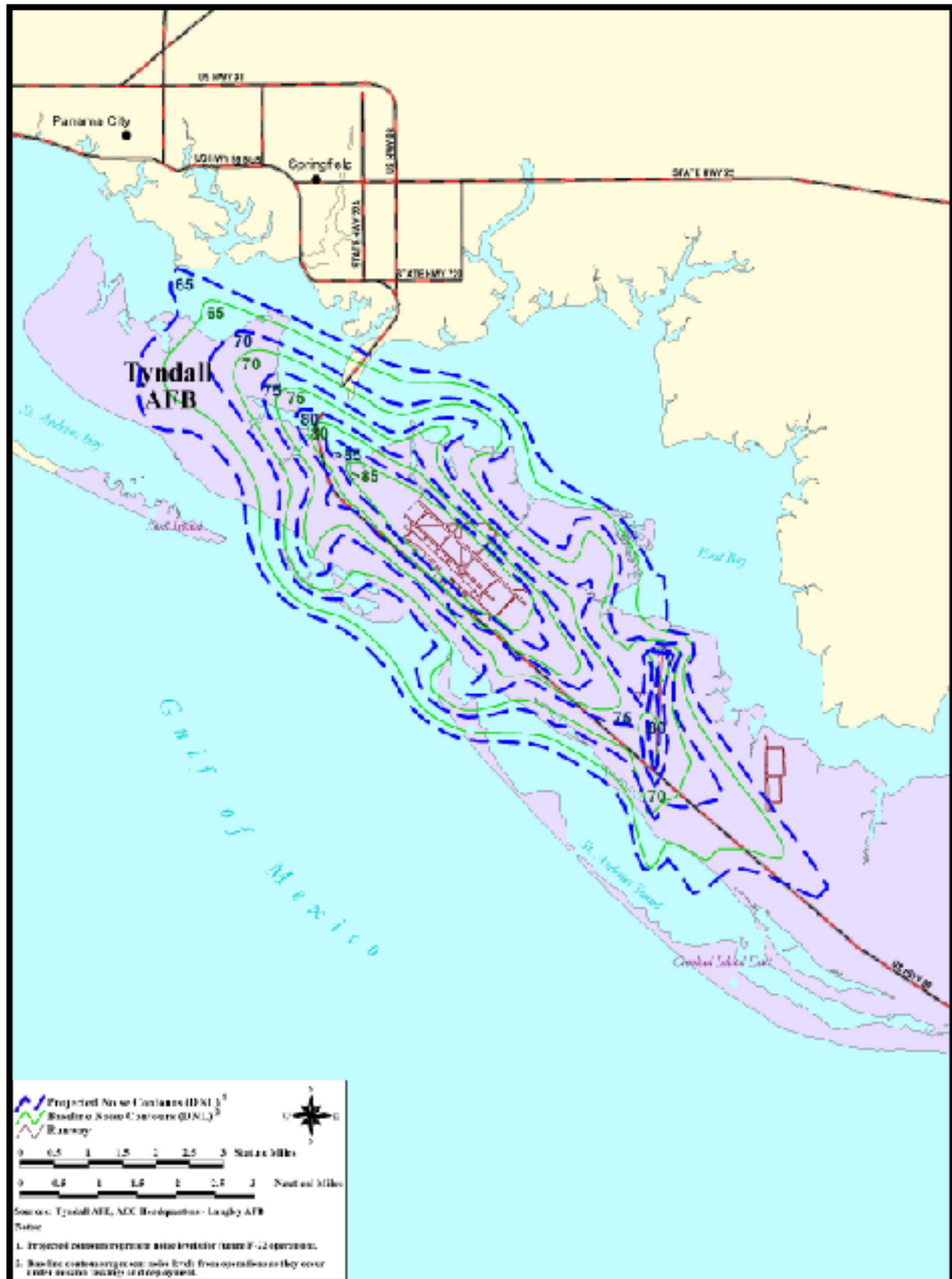
### **TY3.2.1 Base**

#### ***Affected Environment***

Tyndall AFB has supported operations by a wide variety of aircraft throughout its history. The affected environment, or no-action condition, includes 27 F-15C fighters and 60 F-22 fighters. There are also 104 other aircraft including 4 F-16 fighters, 2 E-9, 9 MU-2, and drones. In addition, Tyndall AFB regularly has many different transient (visiting) aircraft temporarily using the base to conduct testing and training associated with weapons evaluation. As the mix of based and transient aircraft using Tyndall AFB has varied over the years, the shape and extent of areas affected by aircraft noise has also varied.

In the recent past, noise conditions have been similar to those reflected by the baseline noise environment. Baseline noise levels, expressed as DNL, were modeled based on aircraft types, runway use patterns, engine power settings, altitude profiles, flight track locations, airspeed, and other factors. Appendices AO-1 and AO-2 present further information on noise metrics and methods used for defining airfield noise levels.

Noise level contours are used to identify the areas affected by noise levels ranging from 65 to 85 DNL or greater in 5 dB increments. Table TY3.2-1 and Figure TY3.2-1 present the noise conditions at Tyndall AFB.



**Figure TY3.2-1**  
**Baseline and Projected Noise Contours at Tyndall AFB**

Table TY3.2-1. Acreage Under Baseline Noise Contours in the Vicinity of Tyndall AFB			
<i>Noise Contour (DNL)</i>	<i>Acres Affected: On Base</i>	<i>Acres Affected: Off Base</i>	<i>Acres Affected: Total</i>
65-70	5,212	3,349	8,562
70-75	4,458	1,532	5,990
75-80	2,457	436	2,893
80-85	1,262	196	1,458
>85	1,452	8	1,460
Total	14,841	5,521	20,362

Noise levels of 65 DNL or greater affect both on-base and off-base lands. Most (73 percent) of the affected area lies on base. The remaining affected area (27 percent) consists predominantly of water in the Gulf of Mexico and East Bay. A portion of the area affected by 65 to 75 DNL is located on the peninsula north of the base. Section TY3.12 describes the land use implications of these noise levels.

Tyndall AFB operates under a program designed to reduce noise, particularly at night. Night operations, particularly takeoffs, landings, and engine run-ups, after 10:00 pm and before 6:00 am are avoided and infrequent, accounting for 5 percent of total activity at the airfield. In addition, whenever feasible, the base uses the runway in such a manner that directs departures and approaches to avoid developed areas in the vicinity of the base.



*Most aircraft noise occurs over water or the base. Some noise increases could affect areas in the city of Parker.*

Noise due to construction and maintenance equipment, as well as general vehicle traffic is a common, ongoing occurrence in the base environment. Existing, continuing military construction projects are currently in progress at Tyndall AFB. Trucks, as well as heavy equipment, are usually found in the base environment on a daily basis to support these existing facility and infrastructure upgrades.

### ***Environmental Consequences***

Under this alternative, the area affected by noise levels of 65 DNL or greater would increase by approximately 3,875 acres (Table TY3.2-2 and Figure TY3.2-1). This increase would result in a 14 percent expansion in the area affected by noise levels of 65 to 75 DNL combined with a 31 percent increase in the area affected by noise levels greater than 75 DNL. This increase in the affected area would result because the operational F-22s would substantially add to baseline sorties. There would be no reduction in the F-15C or F-22 advanced pilot training squadrons.

As mentioned above, areas affected by noise levels would increase under all noise contours; however, most (99 percent) of this increase would occur over water in the Gulf of Mexico or East Bay. Approximately 23 acres of light commercial, residential, and open space land uses are potentially affected by increased off-base noise levels within the 65 and 75 DNL range. Section TY3.12 describes the land use implications for the changes in areas affected by noise.

**Table TY3.2-2. Acreage Under Noise Contours in the Vicinity of Tyndall AFB Comparison of Baseline and Projected Conditions<sup>1</sup>**

	BASELINE			PROJECTED			CHANGE		
<b>Noise Contour (DNL)</b>	<b>Acres Affected: On Base</b>	<b>Acres Affected: Off Base</b>	<b>Acres Affected: Total</b>	<b>Acres Affected: On Base</b>	<b>Acres Affected: Off Base</b>	<b>Acres Affected: Total</b>	<b>Acres Affected: On Base</b>	<b>Acres Affected: Off Base</b>	<b>Acres Affected: Total</b>
65-70	5,212	3,349	8,562	5,328	4,757	10,085	+116	+1,408	+1,524
70-75	4,458	1,532	5,990	4,698	1,816	6,541	+240	+284	+524
75-80	2,457	436	2,893	3,098	763	3,861	+641	+327	+968
80-85	1,262	196	1,458	1,653	47	1,900	+391	+51	+442
>85	1,452	8	1,460	1,798	79	1,877	+346	+71	+417
<b>Total</b>	<b>14,841</b>	<b>5,521</b>	<b>20,362</b>	<b>16,575</b>	<b>7,662</b>	<b>24,237</b>	<b>+1,734</b>	<b>+2,141</b>	<b>+3,875</b>

Note: 1. Acreage includes 99 percent over water and 1 percent over land.

Noise effects resulting from the Initial F-22 Operational Wing beddown would be greater if it were not for two factors. First, the operational F-22 accelerates quickly to climb speed and uses a lower power setting than other current twin-engine fighters. This means the operational F-22 generates more noise closer to the runway and less noise further from the runway (i.e., over areas surrounding Tyndall AFB). Second, the operational F-22s (as compared to F-15Cs) would perform fewer maintenance activities where the engine is run at varying speeds along the flightline.

Short-term noise increases due to construction and renovation, as well as infrastructure (stormwater and electric lines) installment and realignment would occur. Construction occurs in stages; the earlier stage entails trucks, bulldozers, and other heavy construction equipment for the major construction projects (e.g., hangar, maintenance and operational facilities). This stage of construction would be temporary and isolated to those areas where construction would occur. Most of these projects would be undertaken adjacent to the flight line, occupy industrial areas, and be isolated from any off-base communities. In addition, construction would take place during daylight hours and would follow best management practices to minimize noise to any off-base receptors. Construction noise would be contained within base environs since most heavy construction would occur near the flight line, where noise would be compatible with ongoing activities.

### ***Comparative Summary of the Five Potential Basing Locations***

At Tyndall AFB, the 2,141 additional off-base acres affected by noise would be mostly over water, but 23 acres of residential land use would be newly subject to 65 DNL or greater. Eglin, with the highest potential for impacts, would experience an increase of 1,623 off-base acres affected by noise, including 123 acres of residential lands. Although the total off-base area affected by noise levels of

65 DNL or greater would increase more at Mountain Home (2,455 acres) than any other base, the effects would be minimal: all the affected area consists of grazing/agricultural lands. In comparison, only Langley and Elmendorf would have less potential effects. The off-base area affected by noise levels of 65 DNL or greater would decrease by 521 acres at Langley, and would increase by 607 acres at Elmendorf, but it would all be over water.

### **TY3.2.2    Airspace**

#### ***Affected Environment***

Within MOAs, overlying ATCAAs, and Warning Areas, subsonic flight often is dispersed and occurs randomly, or due to either airspace configuration or training scenarios, it may be concentrated or channeled into specific areas or corridors. The Air Force has developed the MR\_NMAP (MOA-Range NOISEMAP) computer program (Lucas and Calamia 1996) to calculate subsonic aircraft noise in these areas. MR\_NMAP can calculate noise for both random operations and operations channeled into corridors. It is supported by measurements in several military airspaces (Lucas *et al.* 1995). The affected airspace for the Tyndall AFB alternative includes MOAs and Warning Areas in which random aircraft operation is the norm.

*L<sub>dnmr</sub> is the monthly average of the Onset-Rate Adjusted Day-Night Average Sound Level (DNL). Noise levels are interpreted the same way for both DNL and L<sub>dnmr</sub>. The annual sortie-operations for an MTR or MOA are divided by 12 to define monthly average sortie-operations. For this EIS, all noise levels were calculated using L<sub>dnmr</sub>. However, to enhance readability, these noise levels will be referred to as DNL throughout the document.*

MR\_NMAP was used to compute DNL (also known as L<sub>dn</sub> or, by extension, L<sub>dnmr</sub>) for each of the potentially affected nine primary airspace units. As discussed in Appendix AO-1, this cumulative metric represents the most widely accepted method of quantifying noise impact. However, DNL does not provide an intuitive description of the noise environment. People often desire to know what the loudness of an individual aircraft will be. MR\_NMAP and its supporting programs can provide the L<sub>max</sub> (Table TY3.2-3) and SEL (Table TY3.2-4) that accounts for both the duration and intensity of a noise event for individual aircraft at various distances and altitudes. The L<sub>max</sub> indicates the noise that would be heard by an individual the instant an aircraft flies overhead. SELs reflect the noise levels of a flyover, including the maximum level, averaged over 1 second as the aircraft approaches and departs. Both measures are described in Appendix AO-2.

**Table TY3.2-3. Representative A-Weighted Instantaneous Maximum ( $L_{max}$ ) in dB Under the Flight Track for the Aircraft at Various Altitudes in the Primary Airspace<sup>1</sup>**

			ALTITUDE IN FEET ABOVE GROUND LEVEL						
<i>Aircraft Type</i>	<i>Airspeed</i>	<i>Power Setting<sup>3</sup></i>	<i>300</i>	<i>500</i>	<i>1,000</i>	<i>2,000</i>	<i>5,000</i>	<i>10,000</i>	<i>20,000</i>
F-15C	520	81% NC	119	114	107	99	86	74	57
F-22 <sup>2</sup>	520	70% ETR	120	116	108	99	85	71	54
F-16A	450	87% NC	112	108	101	93	80	67	50
F-18A	500	92% NC	120	116	108	99	85	71	54
F-14A	530	100% NC	115	111	103	94	80	67	51
B-1B	550	101% RPM	117	112	106	98	86	75	61

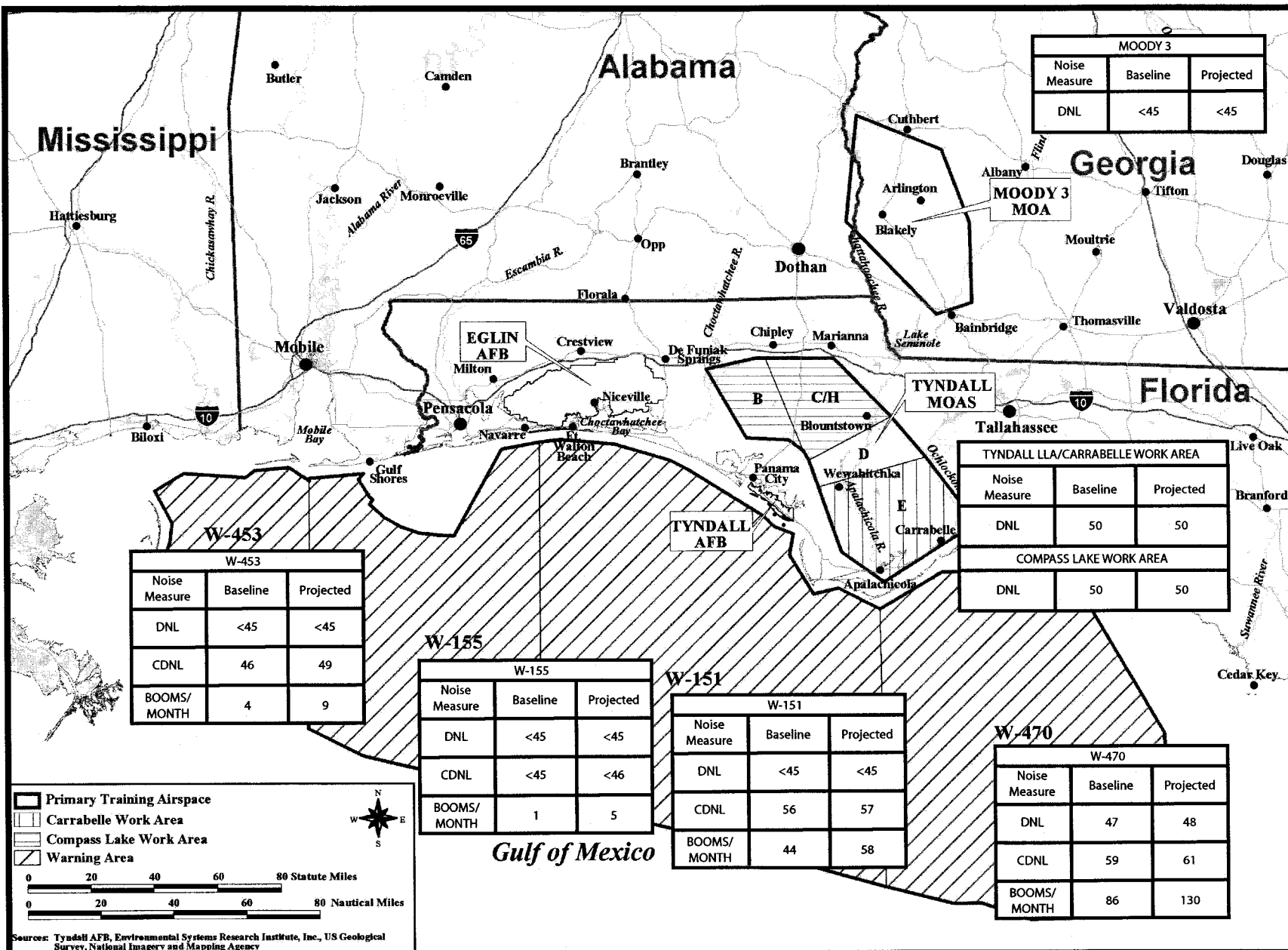
Notes: 1. Level flight, steady high-speed conditions.  
2. Projected based on F-22 composite aircraft.  
3. Engine power setting while in a MOA. The type of engine and aircraft determines the power setting: RPM = rotations per minute, NC = percent core RPM, and ETR = engine throttle ratio.

**Table TY3.2-4. Sound Exposure Levels (SEL) in dB Under the Flight Track for Aircraft at Various Altitudes in the Primary Airspace<sup>1</sup>**

		ALTITUDE IN FEET ABOVE GROUND LEVEL						
<i>Aircraft Type</i>	<i>Airspeed</i>	<i>300</i>	<i>500</i>	<i>1,000</i>	<i>2,000</i>	<i>5,000</i>	<i>10,000</i>	<i>20,000</i>
F-15C	520	116	112	107	101	91	80	65
F-22 <sup>2</sup>	520	118	114	108	101	89	77	62
F-16A	450	110	107	101	95	85	74	59
F-18A	500	118	114	108	101	89	77	62
F-14A	530	112	109	103	96	84	73	58
B-1B	550	116	112	107	101	92	82	70

Notes: 1. Level flight, steady high-speed conditions.  
2. Projected based on F-22 composite aircraft.

Figure TY3.2-2 shows the baseline noise levels in the eight primary airspace units: two MOAs, two Work Areas, and four Warning Areas. As these data show, noise levels in six of the eight airspace units are at or below 45 DNL. In the Tyndall LLA and overlying Carabelle Work Area, cumulative noise levels are 50 DNL. The noise level in the Compass Lake Work Area is 50 DNL where it overlies portions of Tyndall LLA (Tyndall C MOA) and less than 45 DNL where it overlies Tyndall B. Noise levels in the Work Areas are lessened because flight activity is at 9,000 feet MSL and higher. Noise levels of 47 DNL in W-470 are low, but the volume of sortie-operations accounts for current noise conditions.



**Figure TY3.2-2**  
**Baseline and Projected Noise Environment for Tyndall AFB Airspace**

Supersonic flight for operational fighter aircraft is primarily associated with air combat training. This occurs in the over-water Warning Areas, generally above 10,000 feet MSL. No supersonic activity is permitted in any of the overland MOAs or work areas. The amplitude of an individual sonic boom is measured by its peak overpressure, in pounds per square foot (psf), and depends on an aircraft's size, weight, geometry, Mach number, and flight altitude. Table TY3.2-5 shows comparative sonic boom peak overpressure for the F-15C and F-22 aircraft in level flight at various conditions. The biggest single factor among these conditions is altitude. Maneuvers can also affect boom amplitude, increasing or decreasing overpressures.

Table TY3.2-5. Sonic Boom Peak Overpressures (psf) for F-15C and F-22 Aircraft at Mach 1.2 Level Flight				
	ALTITUDE (FEET)			
<i>Aircraft</i>	<i>10,000</i>	<i>20,000</i>	<i>30,000</i>	<i>40,000</i>
F-15C	5.40	2.870	1.90	1.46
F-22	5.68	3.00	1.97	1.50

Aircraft exceeding Mach 1 always create a sonic boom that may or may not cause a boom at the water. As altitude increases, air temperature decreases, and the resulting layers of temperature change cause booms to be turned upward as they travel toward the water. Depending on the altitude of the aircraft and the Mach number, many sonic booms are bent upward sufficiently that they never reach the water. This same phenomenon, referred to as "cutoff," also acts to limit the area covered by sonic booms (Plotkin *et al.* 1989).

When a sonic boom reaches the ground, it impacts an area which is referred to as a "footprint" or (for sustained supersonic flight) a "carpet." The size of the footprint depends on the supersonic flight path and on atmospheric conditions. Sonic booms are loudest near the center of the footprint, with a sharp "bang-bang" sound. Near the edges, they are weak and have a rumbling sound like distant thunder.

Sonic booms from air combat training activity have an elliptical pattern. Aircraft will set up at positions up to 100 nautical miles apart, before proceeding toward each other for an engagement. Supersonic events can occur as the aircraft accelerate toward each other, during dives in the engagement itself, and during disengagement.

Long-term sonic boom measurement projects have been conducted in four airspaces: White Sands, New Mexico (Plotkin *et al.* 1989); the eastern portion of the Goldwater Range, Arizona (Plotkin *et al.* 1992); the Elgin MOA at Nellis AFB, Nevada (Frampton *et al.* 1993); and the western portion of the Goldwater Range (Page *et al.* 1994). These studies included analysis of schedule and air combat maneuvering instrumentation data support



*Supersonic flights occur only in over-water areas. About one out of every 10 sonic booms would reach the water.*



development of the 1992 BOOMAP model (Plotkin *et al.* 1992). The updated version of BOOMAP (Frampton *et al.* 1993; Plotkin 1996) incorporates results from all four studies. Because BOOMAP is directly based on long-term measurements, it implicitly accounts for maneuvers, statistical variations in operations, atmospheric effects, and other factors. The long-term average (CDNL) sonic boom patterns also tend to be elliptical. Baseline supersonic noise levels and sonic booms, CDNL, in affected airspace are also provided in Figure TY3.2-2.

A variety of aircraft perform flight activities that include supersonic events. Predominantly, these events occur during air-to-air combat, often at high altitudes. Typically, 3 to 10 percent of air combat training flight activities, depending upon aircraft type, result in supersonic events within the over-water Warning Areas where these activities are authorized. About 7.5 percent of the time during training, operational F-15Cs from Eglin AFB fly supersonic with Mach numbers usually 1.1 or less but occasionally up to 1.3. This is typical of all current-generation supersonic aircraft studied in development of BOOMAP.

For Tyndall AFB, supersonic operations are in offshore Warning Areas and, under most conditions, sonic boom footprints would fall entirely over the ocean. There is, however, variability in the distance that sonic booms will propagate (or travel) and, in some situations, booms may reach the shore. Those situations depend on specific flight parameters and atmospheric conditions. Aircrews and mission planners are aware of the effects of those conditions and follow procedures that avoid or minimize on-shore booms. By following these procedures, the occasional on-shore boom would be infrequent.

Individual sonic boom footprints would affect areas from about 10 square miles to 100 square miles, which is a small portion of the area under the airspace. The booms-per-month values account for the total number of booms and the average area affected by each.

### ***Environmental Consequences***

Projected F-22 operational flight activities would increase (by 1 dB) noise levels in only one (W-470) airspace unit. In four airspace units (Moody 3 MOA, W-453, W-151, and W-155), noise levels would remain below 45 DNL despite increases in noise. For the two work areas and Tyndall

*Projected subsonic noise levels would not change perceptibly from baseline conditions.*

LLA MOA, projected noise levels would increase by 1 dB or less and remain similar to baseline conditions. The lack of substantial increase in noise levels results from the high altitudes used by the operational F-22s. Operational F-22s would fly, on average, 80 percent of the time above 10,000 feet MSL, and 30 percent of the total time would be above 30,000 feet MSL. In general, overall noise levels in primary airspace would not change perceptibly. The number of operational F-22 sortie-operations in the occasional use airspace would be minimal and would not affect cumulative noise levels.

Refer to Table TY3.2-3 for SELs for subsonic noise of several aircraft, including the F-22. Current data indicate that F-22 subsonic noise levels (SELs) would be similar to most other fighter aircraft commonly using the airspace units. Given that most operational F-22 flight activity would occur above 10,000 feet MSL, no noticeable difference from the no-action or baseline conditions is expected. There is no substantive difference in subsonic noise among the basing locations.

The F-22 has enhanced supersonic capability relative to the current-generation of fighter aircraft. It is projected that its supersonic time would be more than three times that of aircraft such as the Eglin-based operational F-15C (25 percent, versus 7.5 percent). For example, during a typical 14-minute engagement, the operational F-22 would be supersonic 3 to 4.5 minutes, while the operational F-15C would be supersonic 1 to 2 minutes. The operational F-22 would also commonly achieve Mach numbers up to about 1.3, versus 1.1 for the operational F-15C. The combination of more supersonic time and higher Mach number would result in an operational F-22 sonic boom environment six to seven times that of a similar number of operational F-15Cs. There are, however, two mitigating factors.

First, 60 percent of operational F-22 supersonic activity would be above 30,000 feet. Booms generated at high altitude are weaker than those at low altitude. Applying the boom amplitudes shown in Table TY3.2-4 to the altitude distributions for the two aircraft types, results in an impact per boom for the F-22 of about 60 percent that of the F-15C, for an enhanced boom factor (i.e., potential to generate booms) of about four.

The second mitigating factor is that not all operational F-22s would always fly at full capability. In a typical combat training mission of 2 versus 2 or 4 versus 4, aircraft on one side would fly as operational F-22s, while aircraft on the other side would limit their performance to simulate enemy aircraft of current-generation technology. Thus, half of the operational F-22 sorties would have the enhanced boom factor, while the rest would not have an enhanced boom factor.

In the supersonic analysis, the enhanced boom factor has been applied to half of the operational F-22 sorties, while other aircraft follow the BOOMAP model as originally developed. This corresponds to an increased CDNL of 4 dB. In contrast, if the enhanced boom factor were applied to all the F-22 sorties, the increased CDNL would be 6 dB. Individual sonic boom amplitudes would be approximately the same as current fighters such as the F-15C. Applying the enhanced boom factor to one-half the operational F-22 sorties results in increased sonic boom exposure (CDNL) in W-155, W-151, W-470, and W-453. In W-453, CDNL would increase by 3 dB, W-470 by 2 dB, and W-151 by 1 dB. In W-155 CDNL would increase by almost 6 dB but would still be only 46 DNL. Overall, sonic booms per month would increase in all Warning Areas: W-470 booms would increase by 44 booms per month, W-151 by 17 booms, W-453 by 5 booms, and W-155 by 4 booms. All increases in sonic boom exposure would occur offshore, with few traveling to the land.

### ***Comparative Summary of the Five Potential Basing Locations***

Noise effects from increased flight activities in the training airspace represent the most prominent factor in assessing the differences among the basing locations. Subsonic noise would not change perceptibly as a result of the beddown at Tyndall or any of the other basing locations. While supersonic activity and accompanying sonic booms would increase substantially in some airspace units, for Tyndall, Langley, and Eglin, all of the supersonic activity and sonic booms would occur over water, and the effects of these increases would be minimal. In contrast, substantial increases in sonic booms over land would result in greater potential for impacts under the Mountain Home and Elmendorf alternatives.

### ***TY3.3 Air Quality***

Air quality in a given location is described by the atmospheric concentration of six pollutants: ozone (O<sub>3</sub>), nitrogen dioxide (NO<sub>2</sub>), carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), particulate matter equal to or less than 10 microns in diameter (PM<sub>10</sub>), and lead. As part of the Clean Air Act (CAA), the USEPA has established criteria for these pollutants. These criteria, set forth as national ambient air quality standards (NAAQS), represent maximum levels of background pollution that are considered safe, with an adequate margin of safety to protect the public health and welfare. Based on measured ambient criteria pollutant data, the USEPA designates areas of the United States as having air quality better than (attainment) or worse than (nonattainment) the NAAQS. Individual states are delegated the responsibility to regulate air quality in order to achieve or maintain air quality in attainment with these standards. States are required to develop a state implementation plan (SIP) that sets forth how the CAA provisions will be implemented within the state. The SIP is the primary means for the implementation, maintenance, and enforcement of the measures needed to attain and maintain the NAAQS in each state. Details of the NAAQS and specific regulatory requirements for sources of these emissions in attainment and nonattainment areas are included in Appendix AO-1.

The CAA also establishes a national goal of preventing degradation or impairment in federally designated Class I areas. Class I areas are defined as those areas where any appreciable degradation in air quality or associated visibility impairment is considered significant. As a part of the Prevention of Significant Deterioration (PSD) Program, Congress assigned mandatory Class I status to all national parks, national wilderness areas (excluding wilderness study areas or wild and scenic rivers), and memorial parks greater than 5,000 acres. In Class I areas, visibility impairment is defined as atmospheric discoloration (such as from an industrial smokestack) and a reduction in regional visual range. Visibility impairment or haze results from smoke, dust, moisture, and vapor suspended in the air. Very small particles either are formed from gases (sulfates, nitrates) or are emitted directly into the atmosphere from sources like electric utilities, industrial fuel burning processes and vehicle emissions. Stationary sources, such as industrial areas, are typically the issue with impairment of visibility in Class I areas so the permitting process under the PSD program requires a review of all Class I areas within a 62-mile (100-kilometer) radius of a proposed industrial facility. Mobile sources, including aircraft and their operations at Tyndall AFB, are generally exempt from review under this regulation. While the review under the PSD permit program does not apply directly to base operations at Tyndall AFB, this analysis assessed a 62-mile (100-kilometer) radius area as a screening tool for reviewing potential visibility impacts.

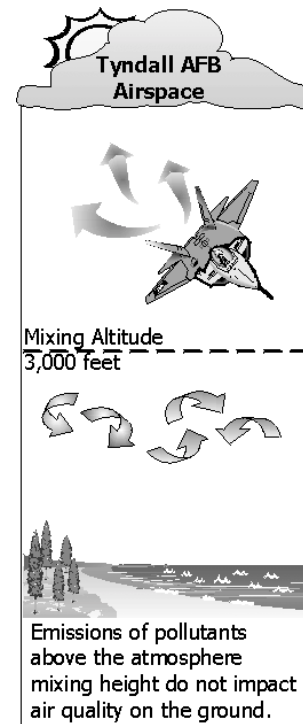
Pollutants considered in this Draft EIS include volatile organic compounds (VOCs), which are precursors to (indicators of) O<sub>3</sub>, nitrogen oxides (NO<sub>x</sub>), which are also precursors to O<sub>3</sub> as well as CO, SO<sub>2</sub>, and PM<sub>10</sub>. Airborne emissions of lead are not addressed because the affected areas contain no significant sources of this criteria pollutant.

### TY3.3.1 Base

#### ***Affected Environment***

The affected environment varies according to pollutant. For pollutants that do not undergo a chemical reaction after being emitted from a source (PM<sub>10</sub>, CO, and SO<sub>2</sub>), the affected area is generally restricted to a region in the immediate vicinity of the base. However, the region of concern for O<sub>3</sub> and its precursors (NO<sub>x</sub> and VOCs) is a larger regional area because they undergo a chemical reaction and change as they disperse from the source. This change can take hours, so depending upon weather conditions, the pollutants could be some distance from the source.

Another factor used in defining the affected environment is mixing height. Mixing height is the upper vertical limit of the volume of air in which emissions may affect air quality. Emissions released above the mixing height become so widely dispersed before reaching ground level that any potential ground-level effects would not be measurable. Emissions of pollutants released below the mixing height may affect ground-level concentrations. The portion of the atmosphere that is completely mixed begins at the earth's surface and may extend up to altitudes of a few thousand feet. Mixing height varies from region to region based on daily temperature changes, amount of sunlight, and other climatic factors. An average mixing height of 3,000 feet conservatively characterizes the conditions at Tyndall AFB. This mixing height was derived from a review of historical data (USEPA 1972) and a detailed analysis of morning and afternoon mixing heights at a nearby upper air monitoring station in Apalachicola, Florida (USEPA 2000a). Impacts of the proposed action can be evaluated in the context of the existing local air quality, the baseline emissions for the base and region, and the relative contribution of the proposed action to regional emissions.



#### **Base Environment**

The FDEP, Division of Air Resources Management has primary jurisdiction over air quality and sources of stationary source emissions at Tyndall AFB. Stationary source emissions at Tyndall AFB include jet engine testing (off the aircraft), external combustion sources, degreasing operations, storage tanks, fueling operations, heating, solvent usage, surface coating, asphalt production, and miscellaneous general process operations.

Tyndall AFB operates under a FDEP-issued Federally Enforceable State Operating Permit (FESOP) as a synthetic non-Title V source or “synthetic minor.” While potential emissions at Tyndall AFB exceed the major source thresholds, actual emissions are less than 100 tons per year for all pollutants. Under the FESOP, Tyndall has agreed to limit emissions to levels that would no longer make them a major stationary source and subject to a Title V operating permit.

Mobile source emissions include aircraft operations (takeoffs and landings), aerospace ground equipment (AGE), ground support equipment (GSE), and maintenance aircraft operations

performed with the engines still mounted on the aircraft (engine run-ups and trim checks). Emissions from aircraft takeoffs and landings, as well as other flight operations at the base, considered all based and transient aircraft. Aircraft emissions were calculated for all flight activities below the mixing height (3,000 feet). These emissions, combined with those from the other mobile sources, account for the majority of the emissions from the base. Mobile and stationary emissions are provided in Table TY3.3-1.

Table TY3.3-1. Baseline Emissions for Tyndall AFB Affected Environment					
<i>Base Emissions Source Category</i>	POLLUTANTS (TONS PER YEAR)				
	<i>CO</i>	<i>VOCs</i>	<i>NO<sub>x</sub></i>	<i>SO<sub>2</sub></i>	<i>PM<sub>10</sub></i>
Stationary Sources	44.4	65.0	50.4	2.1	37.6
Mobile Sources	1,007.5	130.2	260.8	9.4	18.2
Total Base Emissions	1,051.9	195.2	311.2	11.5	55.8

Source: Air Force 2000a.

## Regional Environment

Tyndall AFB is located within the Mobile (Alabama)-Pensacola-Panama City (Florida)-Southern Mississippi Interstate Air Quality Control Region, designated as AQCR #5. The AQCR, which was developed for planning purposes, includes Southern Mississippi, a three-county area in the southern coastal portion of Alabama, and ten counties in the Florida panhandle. Due to the extremely large extent of the AQCR, Tyndall AFB emissions are compared to local emissions characterized by Bay County. Table TY3.3-2 summarizes the regional emissions (stationary and mobile) of criteria pollutant and precursor emissions for this county. Tyndall AFB contributes less than 1 percent of regional SO<sub>2</sub> and PM<sub>10</sub> emissions. The base generates less than 2 percent of regional CO, VOCs, and NO<sub>x</sub> emissions.

Table TY3.3-2. Regional Emissions for Tyndall AFB Affected Environment					
<i>Regional Emissions</i>	POLLUTANTS (TONS PER YEAR)				
	<i>CO</i>	<i>VOCs</i>	<i>NO<sub>x</sub></i>	<i>SO<sub>2</sub></i>	<i>PM<sub>10</sub></i>
Bay County Stationary Point Sources	4,592	1,448	10,076	60,802	935
Bay County Area Sources	67,205	12,259	8,382	1,109	8,042
Total Bay County	71,797	13,707	18,458	61,911	8,977

Source: USEPA 2000b.

Air quality in the Mobile (Alabama)-Pensacola-Panama City (Florida)-Southern Mississippi Interstate AQCR has been designated as either in "attainment" or "unclassifiable/ attainment" with the NAAQS for all pollutants. The region is also expected to be in attainment with the proposed 8-hour O<sub>3</sub> standard. FDEP, in its submittal for designation of attainment/nonattainment status for the 8-hour O<sub>3</sub> standard, recommended to the USEPA that this region should be designated

unclassifiable/attainment status (FDEP 2000). Currently, the new 8-hour O<sub>3</sub> standard is pending a decision from the United States Supreme Court; the decision is expected sometime in 2001.

County-wide emissions include stationary, mobile, and area sources. The majority of Bay County emissions from permitted stationary sources is from power plants and pulp and paper mills. Emissions from area sources include on-road (highway) vehicles and off-road gasoline and diesel vehicles. The on-road category includes the contribution of off-base use of private and government vehicles associated with the baseline military and civilian personnel at Tyndall AFB. Off-road mobile sources include aviation, locomotive, and marine vessel emissions. Aviation and marine vessels include both commercial and military sources. Area source emissions also include sources of emissions from solvent/coating usage, vehicle refueling, as well as combustion emissions from heating of industrial commercial and residential facilities.

### ***Environmental Consequences***

The air quality analysis for the Initial F-22 Operational Wing beddown at Tyndall AFB quantifies the changes (increases and decreases) due to the beddown. Since Tyndall AFB is located in an “attainment” area for all pollutants, the action would not interfere with any SIP measures or budgets established in order to achieve or maintain the NAAQS. Thus, there are no federal conformity requirements under 40 CFR Subpart W for the action (See Appendix AO-1).

Information on projected aircraft operations incorporated F-22-specific data on maintenance run-up procedures, uninstalled engine cell testing, and typical ground run-up times (taxi, idle-in and idle-out times) for each landing-takeoff cycle (personal communication, McGettrick and Myers 2000, 2001). Time-in-modes for take-off, climb-out, and approach were based on default time-in-modes developed for comparable jet aircraft. Modal-specific emission factors and fuel flow rates are not currently available for the F-22 engines. The advanced design of the F-22 includes the development of a new propulsion system, the F119-PW-100, a low bypass turbofan engine. The engine is still under test and evaluation and many operational parameters are classified and sensitive. Therefore, according to NEPA guidance, *Incomplete and Unavailable Information*, 40 CFR §1502.22, the analysis used the best available data.

*The F-22 would require fewer maintenance activities where the engine is run at varying speeds along the flightline, thereby reducing emissions.*

A composite set of emission factors and fuel flow rates for each pollutant at each power setting was developed based on recently published modal emission factors for the F100 series of engines (Air Force 1999b) using JP-8 as a fuel. The F100 series engines are the power plants of both the F-15 and F-16 aircraft. Details of the emission factors and time-in-modes used for the analyses are included in Appendix AO-3.

Direct emissions generated by both stationary and mobile sources at Tyndall AFB are detailed in Table TY3.3-3 below. Stationary sources include external and internal combustion sources, engine cell testing, and other aircraft maintenance operations. Mobile sources include aircraft operations (takeoffs and landings), aircraft maintenance run-ups, and exhaust emissions from aircraft ground

support equipment. This analysis reflects the changes associated with the overall increase of aircraft and sorties associated with the beddown of operational F-22s.

Table TY3.3-3. Projected Direct Emissions for Tyndall AFB Affected Environment					
Source Category	POLLUTANTS (TONS PER YEAR)				
	CO	VOCs	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>
Projected with beddown					
Stationary Sources	45.9	65.3	54.2	2.1	37.6
Mobile Sources	1,514.7	192.5	413.3	15.2	31.6
Baseline without beddown					
Stationary Sources	44.4	65.0	50.4	2.1	37.6
Mobile Sources	1,007.5	130.2	260.8	9.4	18.0
Change attributed to beddown					
Stationary Sources	1.5	0.3	3.8	0.0	0.0
Mobile Sources	507.1	62.3	152.5	5.7	13.5
TOTAL Change in Base Emissions	508.6	62.6	156.6	5.7	13.5

All criteria pollutant direct emissions would increase as a result of the beddown. Increases in emissions and addition of new stationary sources would be subject to air quality regulations and permitting review by FDEP. Since the base is already classified as a major stationary source, increased emissions from stationary sources, such as engine test cells would not impact the base's status. There would be no new categories of stationary source emissions from the base and increases in stationary source emissions would not be significant.

Emissions of criteria pollutants from mobile sources result from increased aircraft operations at the base due to additional based aircraft and additional annual sorties. Emissions would increase due to added takeoff and landing operations at the base, as well as AGE and GSE operations associated with each takeoff and landing operation. Minimal emissions would result from maintenance run-ups since the operational F-22 would not need to run these checks. No regulatory thresholds would be exceeded for either mobile or stationary sources. This is comparable to what would occur at all other basing locations.

Indirect emissions are those not generated from sources at the base but which contribute to the regional inventory such as emissions from vehicles from commuting personnel and construction workers. Table TY3.3-4 shows the total regional (direct and indirect) contribution from the beddown at Tyndall AFB.

**Table TY3.3-4. Regional Emissions for Tyndall AFB Affected Environment**

<i><b>Source Category</b></i>	<b>POLLUTANTS (TONS PER YEAR)</b>				
	<i><b>CO</b></i>	<i><b>VOCs</b></i>	<i><b>NO<sub>x</sub></b></i>	<i><b>SO<sub>2</sub></b></i>	<i><b>PM<sub>10</sub></b></i>
Base Emissions (Direct)	508.6	62.6	156.6	5.7	13.5
F-22 Commuting Contribution (Indirect)	123.5	22.2	23.2	1.3	1.0
TOTAL F-22 Projected Contribution	632.1	84.8	179.8	7.0	13.5
Regional Emissions (Bay County)	71,797	13,707	18,458	61,911	8,977
TOTAL F-22 Projected Regional Emissions Contribution	1%	1%	1%	0.01%	0.1%

Emissions from the proposed action, including indirect commuting emissions, are also evaluated in the context of regional emissions. Emissions from the beddown would be insignificant in relation to regional emissions and would contribute less than 1 percent to the Bay County area.

While construction activities are of temporary nature and short duration, emissions during the construction period were quantified in order to determine their impacts on regional air quality. The construction phase would span a 3-year period from 2002 to 2004. Construction emissions were calculated for all 3 years, with the maximum annual emissions compared to existing baseline emissions. Sources of emissions considered during the construction phase include exhaust from internal combustion engines, exhaust from diesel-powered construction equipment, fugitive dust from the construction site, as well as indirect emissions from construction worker commuting. Construction emissions would be negligible compared to base and regional emissions and represent 1 percent or less of the county-wide emissions.

<b>Temporary Construction Emissions</b>		
	<i><b>Tons per Year</b></i>	<i><b>% Regional Contribution</b></i>
CO	341	<1
VOCs	89	1
NO <sub>x</sub>	158	1
SO <sub>2</sub>	13	<1
PM <sub>10</sub>	30	<1

Visibility impairment due to base emissions from the Tyndall alternative is not of concern since there are no PSD Class I areas within a 62-mile (standard review distance) radius of the main test and training areas at Tyndall AFB.

### ***Comparative Summary of the Five Potential Basing Locations***

There would be negligible differences in air quality impacts at any of the five installations. No base would exceed regulatory thresholds. The contribution to annual regional emissions of criteria pollutants would be between .01 percent and 1 percent at Tyndall; less than .01 percent at Langley, Eglin, and Elmendorf; and between 0.1 percent and 10 percent at Mountain Home.



### TY3.3.2 Airspace

#### ***Affected Environment***

The likelihood for air quality impacts was evaluated based on the floor height of the MOAs and Warning Areas. The affected environment for airspace used by aircraft from Tyndall AFB includes both overland and over-water airspace. Air quality in the over-water airspace is good due to the meteorological conditions and the limited number and size of pollution sources. The primary source of emissions within the over-water area due to Tyndall AFB activities is aircraft operations. Other sources include the flight of drones and ordnance test and training activities at Eglin AFB.

The affected airspace does not overlie any nonattainment or PSD Class I areas. Of the eight airspace units listed, the Tyndall LLA MOA is the closest (within 20 miles) to a Class I area (St. Marks Wilderness).

Table TY3.3-5 summarizes baseline emissions for aircraft operating in the affected primary airspace. Appendix AO-3 provides details of the calculations used to estimate aircraft emissions in these airspace units.

Table TY3.3-5. Baseline Emissions for Tyndall AFB Affected Primary Airspace					
	POLLUTANTS (TONS/YEAR)				
<i>Affected Airspace<sup>1</sup></i>	<i>CO</i>	<i>VOCs</i>	<i>NO<sub>x</sub></i>	<i>SO<sub>2</sub></i>	<i>PM<sub>10</sub></i>
Tyndall LLA MOA	6.76	2.43	273.88	0.39	0.65
W-151	17.40	4.67	367.60	0.63	4.56
W-155	0.22	0.07	8.83	0.01	0.01
W-453	5.33	2.39	52.45	0.14	1.93
W-470	10.35	3.14	378.56	0.52	1.44

Note: 1. Airspace units with a floor below 3,000 feet AGL (mixing height).

Emission concentrations associated with aircraft operations are minimal due to the large size of the airspace units. Because the baseline emissions are dispersed over millions of acres, much of it over water, they do not measurably affect air quality.

#### ***Environmental Consequences***

Table TY3.3-6 presents projected emissions associated with the additional operational F-22 sortie-operations in the airspace units associated with the Tyndall AFB alternative. Appreciable emission increases in primary airspace units would occur for CO and NO<sub>x</sub> for the Tyndall LLA MOA as well as for offshore Warning Areas, W-151, W-155, W-453, and W-470. These emission increases would be the result of the additional operational F-22 sortie-operations. NO<sub>x</sub> emission increases would be less than 100 tons per year for each airspace unit except W-470, where projected emission increases are approximately 130 tons per year. CO emission increases are less than 5 tons per year in all airspace units. Since these increases in emissions are both generated and dispersed over millions of

acres of over-water areas (e.g., W-470 covers over 4.4 million acres), the impact on air quality would be minimal.

Table TY3.3-6. Projected Emissions for Tyndall AFB Affected Primary Airspace					
	POLLUTANTS (TONS PER YEAR)				
<i>Affected Airspace</i>	<i>CO</i>	<i>VOCs</i>	<i>NO<sub>x</sub></i>	<i>SO<sub>2</sub></i>	<i>PM<sub>10</sub></i>
Tyndall LLA MOA	8.00	2.90	324.14	0.47	0.82
W-151	18.90	5.20	424.17	0.72	4.76
W-155	0.47	0.17	18.88	0.03	0.05
W-453	5.70	2.53	67.51	0.16	1.98
W-470	13.47	4.36	505.51	0.73	1.74

### ***Comparative Summary of the Five Potential Basing Locations***

Emissions from aircraft operations would be transitory and dispersed over extensive areas. Overall emissions in the airspace are minimal and no substantive difference exists among the basing alternatives relative to air quality impacts.

## ***TY3.4 Safety***

### **TY3.4.1 Base**

#### ***Affected Environment***

Aircraft safety concerns typical for Tyndall AFB include aircraft mishaps and bird-aircraft strikes. Aircraft mishaps and their prevention represent a paramount concern for the Air Force. Class A mishaps, associated with a loss of life, loss of an aircraft, or costs in excess of \$1 million, provide an indicator of aircraft safety. There is no safety information yet available on operational F-22s. This analysis relies on experience with the current F-15C advanced fighter pilot training aircraft based at Tyndall AFB. Through 30 September 1999, the F-15C has a lifetime historical Class A mishap rate of 2.65 per 100,000 flying hours or one mishap every 37,736 flying hours (Air Force 2000a). Using this mishap rate and comparing it to the number of annual flying hours logged by the 325 FW in the past five years, a Class A mishap at Tyndall AFB would be predicted to occur once about every 2.8 years. There have not been any Class A accidents in the last five years involving F-15C aircraft from Tyndall AFB (personal communication, Roller 2000).

Clear, safety, and accident potential zones have been established around the airfield. Data on mishaps within 10 nautical miles of an airfield reveal that 75 percent of aircraft accidents occur on or adjacent to the runway and in a corridor extending out from the end of a runway for 15,000 feet. Three zones within this corridor are established based on aircraft mishap patterns: the Clear Zone (CZ), Accident Potential Zone (APZ) I, and APZ II. Within the CZ, which covers a 3,000-by-

3,000-foot area at the end of each runway, the overall accident risk is highest. APZ I, which extends for 5,000 feet beyond the CZ, is an area of reduced accident potential. In APZ II, which is 7,000 feet long, accident potential is the lowest among the three zones. At Tyndall AFB, the Air Force has acquired most of the property within the CZ and the APZs. Because all the zones associated with Tyndall are either on-base or over open water, there is no existing incompatible development outside Air Force owned property.

Bird-aircraft strikes and the hazards they present form another safety concern for aircraft operations. The Air Force Bird Aircraft Strike Hazard (BASH) Reduction Program was established to reduce bird strikes through awareness, bird control, bird avoidance, and aircraft design. Air Force Pamphlet 91-212, 1 April 1997, provides guidance for implementing an effective BASH reduction program. Appendix AO-1 of this Draft EIS contains additional information on the Air Force BASH Program.

Tyndall AFB maintains an aggressive program to minimize BASH potential in the airfield environment. The base is located in a bird migratory corridor (flyaway). The Tyndall AFB BASH Plan establishes procedures to minimize this hazard, including the removal or control of bird attractants. Historically, Tyndall AFB F-15C training aircraft have experienced approximately 13 bird-aircraft strikes per year. Most of the incidents resulted in little or no damage to the aircraft, and none resulted in a Class A mishap (personal communication, Roller 2000).

### ***Environmental Consequences***

Aircraft safety conditions of the F-22 Operational Wing would change, although it is impossible to predict the potential mishap level. Historical trends do show that when new military aircraft first enter the inventory, the accident rate is higher and that mishaps of all types decrease the more an aircraft is flown.

By the time the operational F-22 aircraft were based at Tyndall AFB, the testing and pilot training phases of the aircraft's integration into the operational force would have progressed substantially. Significant knowledge would have been gained about the aircraft's safest flight regime during flight testing at Edwards AFB, California, and Operational Test and Evaluation at Nellis AFB, Nevada. Only highly experienced fighter pilots graduate to operational units. As the overall F-22 program proceeds from 2002 onward, the potential for mishaps would likely decrease to levels comparable to other twin-engined fighter aircraft. The F-22 has the potential to achieve a better than average safety record because the design incorporates the most modern technology, knowledge is constantly being gained about the safe operating envelope of the aircraft, and the aircraft will be flown by the most experienced pilots. No new CZs or APZs would need to be established.

Since the operational F-22 would operate in the same airfield environment as the other Tyndall-based aircraft, the overall potential for bird-aircraft strikes would increase because of the increase in the number of operational F-22 aircraft assigned. The potential increase in bird-aircraft strikes would be mitigated to some degree because the operational F-22 would more rapidly reach altitudes above where the majority of the strikes occur.

### ***Comparative Summary of the Five Potential Basing Locations***

The potential for impacts to safety is low at all bases because of pre-existing BASH and other safety programs. No substantive difference exists among the bases relative to safety.

#### **TY3.4.2    Airspace**

##### ***Affected Environment***

No historical Class A mishap rate data exist for the F-22. The most comparable aircraft in the Air Force inventory is the F-15C. For comparative purposes, the F-15C has a lifetime historical Class A mishap rate of 2.65 or one mishap every 37,736 flying hours (Air Force 2000a). Using this rate, a Class A mishap could be predicted to occur in the airspace about once every 2.5 years. There have been no Class A mishaps in the last five years involving F-15C advanced pilot training aircraft from Tyndall AFB.

Bird-aircraft strikes in the airspace are far fewer than in the airfield environment since aircraft normally operate at altitudes above the zone where such events commonly occur.

##### ***Environmental Consequences***

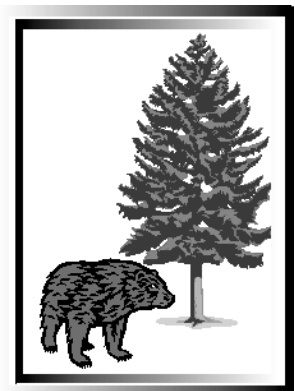
Under this alternative, most (88 percent) operational F-22 sorties would be scheduled in the over-water areas of the military training airspace where there would be very little risk to persons or property from aircraft overflight. Concern was expressed during scoping regarding offshore platforms. While the possibility of objects separating from an aircraft in flight cannot be totally discounted, that risk, too, is extremely low. No significant safety impacts in airspace are anticipated as a result of the Tyndall AFB basing alternative.

### ***Comparative Summary of the Five Potential Basing Locations***

No substantive difference exists among the bases or training airspace units relative to potential safety impacts. The only difference would be for Elmendorf and Mountain Home, where a minor increase in flare use would occur in overland airspace units. Both would continue to implement restrictions on flare use designed to minimize flare risks.

## **Natural Resources**

Tyndall AFB natural resources include native and exotic vegetation and wildlife, their habitats, and the physical medium necessary for these resources to function. Groups of plant and animal species in a given area, linked by ecological processes, are referred to as communities. A special community designation is Threatened, Endangered, and Special Status Species/Communities, which are plant and animal species or areas that are afforded special regulatory status under the Endangered Species Act (ESA). The term *habitat* is also used to describe natural resources and refers to the necessary physical and biological features to sustain plant and animal species. Physical medium, as discussed in this section, include the soil and



water that provide the foundation for all biota. Description of the components used to define the affected environment and the methods used to evaluate baseline conditions are presented in Appendix NR-1.

Designations of special status species protection are generally in accordance with specific acts (i.e., ESA, Marine Mammal Protection Act [MMPA]) as established by specific agencies (i.e., United States Fish and Wildlife Service, National Marine Fisheries Service). Due to the overlapping jurisdiction of some agencies and acts, individual species often exhibit multiple state and federal status designations. For example, species identified as federal threatened or endangered in accordance with the ESA are often, but not always, also designated as threatened or endangered in accordance with state statutes. To avoid confusion and ensure clarity in the Draft EIS, please refer to Appendix NR-2 when counting special status species or determining the special status designations of species potentially occurring on base and under the affected airspace.

### ***No-Action Alternative***

Tyndall AFB would continue to manage its natural resources in accordance with state and federal regulations and in accordance with the Tyndall AFB Integrated Natural Resources Management Plan under either an action or a no-action decision. No-action would not pose additional affects to soils, water, and wetlands. Biological resources will continue to be affected by normal operations associated with an active Air Force base. Under the no-action alternative, training F-22 aircraft would overfly threatened, endangered, and special status species/communities, and marine communities.

## ***TY3.5 Soil and Water***

### ***TY3.5.1 Base***

#### ***Affected Environment***

Tyndall AFB is located on a peninsula, with the East Bay of St. Andrews Bay to the north and the Gulf of Mexico to the south. Deed Point Lake is a Surface Water Improvement and Management Program priority water body within the St. Andrews watershed and the primary drinking water source for Bay County (Air Force 2000b). Sections of the peninsula, including Tyndall AFB, are characterized as contributing direct runoff of poor water quality to the bay (Air Force 2000b).

Soils at Tyndall AFB are grouped into five soil orders: entisols, inceptisols, histosols, spodosols, and ultisols. Entisols dominate in the extreme western portion of Tyndall AFB, while spodosols dominate the remainder of the base.

Entisols on base formed in the deep sands of upland and alluvial terraces and silty clays of coastal marine terraces. Spodosols are poorly drained soils in which materials, such as organic matter, aluminum, and/or iron, have leached through the soil profile and accumulated in a lower layer in the soil.

### ***Environmental Consequences***

Construction would impact 73 acres with a history of ground disturbance, 26 acres of which could qualify as wetlands. Appropriate delineation in conjunction with final facility siting would be completed. The construction site is within the 100-year floodplain. Approximately 428 tons of soil could erode due to construction activities related to the beddown of the Initial F-22 Operational Wing. Since more than 5 acres would be disturbed by construction, a NPDES stormwater permit would be required. Under the permit, the base must develop a Storm Water Pollution Prevention Plan (SWPPP) that describes best management practices to be implemented to eliminate or reduce sediment and non-stormwater discharges. Proper design and implementation of the SWPPP will result in negligible impacts from erosion and offsite sedimentation.

### ***Comparative Summary of the Five Potential Basing Locations***

At Tyndall AFB, 73 acres would be disturbed including lands within the 100-year floodplain. The potential impacts to soils and water at Tyndall is second only to Mountain Home, where the largest land area (440 acres) would be affected by construction. Langley (16 acres) would have a negligible potential for consequences and be comparable to Eglin (10 acres) and Elmendorf (46 acres).

## ***TY3.6 Terrestrial Communities (Wildlife and Vegetation)***

### **TY3.6.1 Base**

#### ***Affected Environment***

In presettlement times, land that now encompasses Tyndall AFB was covered mostly with longleaf pine forests. By the 1950s, the base had been cut over at least twice and, in the 1960s, plantations of slash and sand pine were established by reforestation activities. The few undeveloped areas on the main Tyndall AFB peninsula are degraded due to long-term fire suppression. Undeveloped upland land on the main Tyndall AFB peninsula that has not been converted to pine plantations includes natural longleaf pine, sand pine scrub, maritime hardwood hummocks, and xeric hardwood hummocks (Air Force 2000a). The salt marshes and barrier islands on Tyndall are generally undeveloped and reflect natural conditions (FNAI 1994).

Low-lying habitat such as flatwoods and upland communities are inhabited by reptiles, water birds, neotropical migrants, and game and furbearing mammals. The maritime hummocks contain less low-lying wet habitat than the flatwoods but do contain many of the same wildlife species. Common plant and animal species and habitats characteristic of the base are summarized in Appendix NR-3.



*Of the 19,000 acres on Tyndall that do not have human developments, 12,500 acres are pine plantations,*

### ***Environmental Consequences***

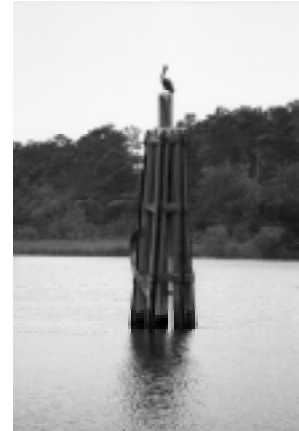
Construction of the operational F-22 support facilities would directly disturb a 73-acre area on the north side of the existing runway. This does not include construction of new off-base housing that would likely be required to house the estimated 1,846 additional personnel, secondary workers, and

families. The 73-acre area is mostly old runway and mowed fields. Construction would likely encroach on mesic/wet slash pine flatwoods (up to 16 acres) and slash pine plantations (up to 8 acres) that border the mowed runway area. These wooded communities may be wetlands and are discussed below in section TY3.7.1. The old runways and some of the mowed fields provide some marginal upland habitat for wildlife. Construction would displace disturbance-tolerant wildlife species occupying marginal upland habitat; however, the size of the disturbance zone and proximity to adjacent higher quality habitat would likely displace wildlife species in the immediate area.

An increase in on-base land area (about 1,700 acres) would occur under the projected noise contours (i.e., above 65 DNL) with the Tyndall AFB alternative. Wildlife species inhabiting area under noise contours associated with the base have likely habituated to aircraft noise and the proposed changes in noise levels are not expected to represent biologically significant changes for these species (see Appendix NR-4 for a discussion of the effects of noise on wildlife).

### ***Comparative Summary of the Five Potential Basing Locations***

Impacts to the terrestrial community on base were determined from an analysis of the quantity and diversity of habitat and species in the proposed construction zone and under the noise contours for the F-22. Construction at Tyndall would affect 73 acres of habitat supporting a diversity of species; areas adjacent to the construction area and under the base noise contours support the highest diversity of habitat and species relative to any of the base alternatives. Construction at Langley would affect 16 acres of previously developed area; much of the remaining base is similarly developed and exhibits marginal habitat and relatively low species diversity. The amount (10 acres) and quality of habitat in the construction area at Eglin is similar to Langley. Construction at Elmendorf would affect a larger (46 acres), more naturally diverse area than either Langley or Eglin. Construction at Mountain Home would affect disturbed habitat dominated by exotic species; however, the sheer size (440 acres) of the construction area would have an effect greater than Langley or Eglin and similar to Elmendorf.



*Waterbirds and birds of prey using barrier islands and other sensitive areas on Tyndall AFB typically habituate to existing overflights and are not expected to be adversely affected by changes in the noise levels from F-22 operations.*

## **TY3.6.2 Airspace**

### ***Affected Environment***

The overland airspace under the Tyndall AFB alternative would be the same as for the Eglin AFB alternative. Refer to section EG 3.6.2 for a description of terrestrial communities.

### ***Environmental Consequences***

Based on projected aircraft operations and review of noise effects on wildlife literature (see Appendix NR-4), impacts to wildlife under airspace from the Tyndall AFB alternative will not be significantly different from baseline conditions and are not expected to adversely affect populations.

### ***Comparative Summary of the Five Potential Basing Locations***

Because proposed differences in subsonic noise levels under airspace are not expected to be biologically significant, impacts to the terrestrial community were primarily determined from an analysis of the number and altitude of sonic booms relative to the size, type, and diversity of habitat underneath airspace. Supersonic activity would occur only over-water Warning Areas for Tyndall, Langley, and Eglin, and only above 10,000 feet MSL. Because Tyndall and Eglin airspace covers a larger, more biologically diverse area, impacts to the terrestrial community are expected to be relatively greater at these bases than at Langley. Because Elmendorf overland airspace includes a diversity of species and special habitat areas that would be subject to sonic booms, impacts would be similar to Tyndall and Eglin. Increases in sonic booms in the airspace associated with Mountain Home would be substantial. This factor, in combination with the number and nature of wildlife species underlying the Mountain Home airspace, suggests that potential consequences would be greater than those associated with any of the other locations.

### ***TY3.7 Wetland and Freshwater Aquatic Communities***

#### **TY3.7.1 Base**

##### ***Affected Environment***

More than 40 percent of Tyndall AFB is wetlands and the National Wetland Inventory identified about 100 wetland types on base (Cowardin *et al.* 1979, Air Force 1998a). On Tyndall's main peninsula, general wetland types include wet prairies, basin swamps, floodplain swamps, backwater, streams, and mesic/wet flatwoods. On the barrier islands, coastal interdunal swales and coastal dune lakes occur as shallow freshwater bodies in depressions where water is supplied by groundwater. Salt marsh occurs along the edges of bayous at Goose and Cedar points and at low energy areas along the bay side shoreline of Shell Island. Every creek draining from Tyndall AFB into the bay or gulf has salt marsh at its mouth and extending inland. These highly productive areas are important to many species of invertebrates, fish, migratory waterfowl, wading birds, shorebirds, marsh birds, and osprey.

##### ***Environmental Consequences***

Building locations sited in TY2.1.3 have taken operational criteria and environmentally sensitive resources into consideration. Wetlands in the 73-acre construction zone have not been delineated yet in accordance with the United States Army Corps of Engineers 1987 Wetlands Delineation Manual. Based on information provided by Tyndall AFB biologists, the mesic/wet flatwoods and other wooded habitat, including pine plantations, in the construction area are assumed to be wetlands (personal communication, Mobley 2000). In addition, standing water occurs for extended periods in some of the low-lying areas in mowed fields, indicating that hydrology may be sufficient for these areas to be determined wetlands (personal communication, Mobley 2000). Based on a site visit and information provided by Tyndall AFB biologists, 26 acres (15 acres of wooded habitat and 11 acres of mowed fields) are assumed to be wetlands and could be affected by construction. Prior to any ground disturbing activities, a delineation of potential wetlands in the construction area would be performed. As may be required by Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands), the appropriate designee of the Secretary of the Air Force will publish a



“finding of no practicable alternative” for any activities impacting floodplains and wetlands, respectively. Given currently proposed building footprints, a Section 404 of the Clean Water Act permit for discharges to waters of the United States is anticipated for this alternative.

### ***Comparative Summary of the Five Potential Basing Locations***

Impacts to wetlands and freshwater aquatic communities were determined from the extent of filling, draining, and sedimentation anticipated during construction. Potential impacts to wetlands (26 acres) and the need for a Section 404 permit are greatest at Tyndall although a jurisdictional wetland delineation would be required to determine the precise acreage of wetland impact. Construction at Mountain Home could impact aquatic communities (including wetlands) although a jurisdictional wetland delineation would be required to make a final determination. Direct impacts to wetlands would not occur at Langley, Eglin, or Elmendorf.

#### **TY3.7.2 Airspace**

##### ***Affected Environment***

Wetlands and aquatic habitat cover an estimated 652,500 acres under the overland MOAs (see Appendix NR-3). Forested wetlands are much more common in all areas (see Appendix NR-3).

##### ***Environmental Consequences***

The Tyndall alternative would not fill or otherwise directly impact wetlands under airspace. Impacts to wildlife that use these habitats are discussed under sections TY3.6 and TY3.9.

### ***Comparative Summary of the Five Potential Basing Locations***

Direct impacts to wetlands and freshwater aquatic communities underlying airspace are not anticipated as a result of the proposed action and alternatives. Indirect impacts to species comprising these communities would not be appreciably different among locations and are expected to be negligible.

## ***TY3.8 Threatened, Endangered, and Special Status Species/Communities***

#### **TY3.8.1 Base**

##### ***Affected Environment***

Thirty-five special status species occur, or have the potential to occur, at Tyndall AFB including nine federally listed species, comprising one plant, one amphibian (flatwoods salamander), two reptiles, two birds, and three mammals known to or potentially occur on Tyndall AFB (see Appendix NR-2) (FNAI 1994, Air Force 1998a). See the discussion of the Atlantic loggerhead sea turtle in section LA3.8.1. Scientific names and areas of occurrence for each special status species and communities are provided in Appendix NR-2.

Eighteen state listed species, including nine plants, one reptile, five birds, and three mammals occur on Tyndall AFB (see Appendix NR-2). Fourteen federal species of concern and/or state species of special concern occur on Tyndall AFB (see Appendix NR-2).

### ***Environmental Consequences***

The plant communities in the construction zone have the potential to support at least one federally listed species (flatwoods salamander) and eight state-sensitive plant species. There is a potential for impacting a special status species. Surveys of proposed construction areas would be required prior to ground disturbance.

### ***Comparative Summary of the Five Potential Basing Locations***

Impacts to threatened, endangered, and special-status species/communities were determined by the potential of these species/communities to be impacted during construction or from aircraft operations under the base noise contours. Tyndall has the greatest potential for impacts because the threatened flatwoods salamander uses habitat similar to that found in the construction zone. Subsequent surveys for this species could reduce the potential for impacts. Langley has the lowest potential for adverse consequences because construction and aircraft operations would have no effect on special-status species/communities. Construction and aircraft operations at Eglin and Elmendorf are also unlikely to affect special-status species/communities; however, the proximity of protected species (least tern at Eglin and Beluga whale and six state species at Elmendorf) result in a slightly higher potential for impacts at these bases than at Langley. Additional surveys and species information at Eglin and Elmendorf could result in a no effect determination for these species. Mountain Home has a slightly greater potential for impacts because habitat of the burrowing owl, a special-status species, may be affected.

## **TY3.8.2 Airspace**

### ***Affected Environment***

The overland airspace used under the Tyndall alternative would be the same as for the Eglin alternative. Refer to section EG3.9.2 for a brief description of special status species under this airspace.

### ***Environmental Consequences***

Literature on the effects of noise on wildlife (including sensitive species) is summarized in Appendix NR-4. The data suggest that aircraft operations proposed for the Tyndall alternative would not adversely affect special status species and communities relative to baseline conditions.

### ***Comparative Summary of the Five Potential Basing Locations***

Training airspace associated with Tyndall, Langley, and Eglin that is used for supersonic activity consists entirely of over-water Warning Areas and therefore the potential for impacts to special-status species/communities at these bases are lowest for the five locations. The bases with only overland airspace, Mountain Home and Elmendorf, tend to have a greater potential for impacts to special-status species due to supersonic activity and associated increases in sonic booms. Because

the Mountain Home airspace is essentially one unit, the effects of sonic booms would be less dispersed, and the potential for impact greater, than at Elmendorf.

### ***TY3.9 Marine Communities***

#### **TY3.9.1 Base**

Tyndall AFB does not include marine habitat; however, the base is nearly surrounded by water and portions of noise contours associated with this alternative extend over marine habitat. Base activities associated with this alternative would not affect marine communities. Marine communities occur under airspace and are, therefore, not discussed in this section.

#### ***Comparative Summary of the Five Potential Basing Locations***

Relatively small components of Tyndall, Langley, and Eglin include marine communities; however, the lack of physical disturbance to the marine environment and the lack of biologically significant changes in noise conditions on base are expected to result in negligible affect to the marine community. Because training airspace for Mountain Home and Elmendorf do not overlie marine communities, there would be no potential for impacts.

#### **TY3.9.2 Airspace**

##### ***Affected Environment***

Marine communities for Tyndall AFB are the same as those discussed under the Eglin AFB alternative (refer to section EG3.9.2).

*There is little likelihood for consequences to marine communities on the base.*

##### ***Environmental Consequences***

The Tyndall AFB airspace over the marine environment is the same as for the Eglin AFB alternative. The only difference is the increased airspace use associated with the Tyndall AFB operational F-22 aircraft without removing any Eglin AFB operational F-15C aircraft. This results in a slightly greater potential for consequences at Tyndall AFB than for the Eglin AFB alternative. The Magnuson-Stevens Fishery Conservation and Management Act, 16 United States Code (USC) 1801 *et seq.* requires federal agencies to assess potential impacts to Essential Fish Habitat. The increased aircraft operations in the airspace under the Tyndall alternative will not impact Essential Fish Habitat. Refer to section EG3.9.2 for a description of the potential impacts to marine communities under this airspace (also refer to Figure EG3.9-1).

#### ***Comparative Summary of the Five Potential Basing Locations***

The potential for impacts to the marine community under Tyndall, Langley, and Eglin airspace is low due to current restrictions on flying below 5,000 feet MSL and the absence of supersonic flight below 10,000 feet MSL. Because training airspace for Mountain Home and Elmendorf do not overlie marine communities there would be no potential for impacts.

## Cultural and Traditional Resources

Cultural and traditional resources are any prehistoric or historic district, site, or building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious or other purposes. Cultural and traditional resources include archaeological resources (both prehistoric and historic), historic architectural resources, and traditional resources. Significant cultural resources are considered for potential adverse impacts. Significant resources are those that are eligible for inclusion in the National Register of Historic Places (NRHP) or that are identified as important to traditional groups. Significant traditional resources are identified by Native American or other traditional groups. Department of Defense (DoD) *American Indian and Alaska Native Policy* (November 21, 1999) requires an assessment, through consultation, of the effect of proposed DoD actions that may have the potential to significantly affect protected tribal resources, tribal rights, and Indian and Alaskan Native lands, before decisions are made by the services.



Visual resources are usually defined as areas with unique features that are a result of the combined characteristics of the natural and human aspects of land use. Examples of the natural aspects of land include wild and scenic rivers, topography, and geologic landforms. Examples of human aspects of land use include scenic highways and historic districts. The assessment of visual and aesthetic value involves a characterization of visual features in the study area.

### ***No-Action Alternative***

The no-action alternative would have low to negligible impacts to cultural resources because of the nature of the ongoing activities at Tyndall AFB. In the event that features are discovered during any activity, Tyndall AFB would implement the standard Air Force procedures in Air Force Instruction 32-7065 for unanticipated archaeological discoveries and maintain compliance with applicable regulations and established procedures for the protection and conservation of cultural resources.

Under the no-action alternative, visual resources would not be impacted. Tyndall AFB would continue to operate as an active air base. There would be no change in the overall scenic perspectives on base or any changes that would obscure views of the base.

### ***TY3.10 Visual***

#### **TY3.10.1 Base**

#### ***Affected Environment***

Tyndall AFB is located on the Gulf of Mexico in the East Gulf Coastal Plain physiographic region, a region generally low in elevation and characterized by coastal terraces. Tyndall AFB is located on a peninsula with the Gulf of Mexico to the south and the East Bay of St. Andrews Bay to the north.

The nearest major metropolitan area is Panama City, located approximately 13 miles northwest of the base.

The developed portions of the base are surrounded on the north, east, and south sides by a mixture of upland coniferous forests and coniferous plantations with some islands of shrub and brushland. Over 40 percent of Tyndall AFB is wetlands, many of which are overgrown with stunted trees and shrubs. Typical wildlife seen on base include aquatic birds, alligators, deer, black bear, and raccoons. The urban/built-up portions of the base are principally located on the southwestern side of the base.

From the highway, the base has the appearance of a light industrial complex with a combination of one- and two-story buildings. The airstrip itself is largely screened from the road by stands of coniferous trees that border the strip. Tyndall AFB is also visible from boats in the popular recreational boating area, East Bay. The flat topography and the presence of upland coniferous forests limit the base's visibility from the bay.



*Views of the base from land are limited to United States Highway 98 (U.S. 98), which runs through the base.*

### ***Environmental Consequences***

Determination of the significance of the impact on visual resources is based on the level of visual sensitivity in the area. Refer to Appendix CR-1 for a description of the analytical approach.

Tyndall AFB is currently exposed to military aircraft overflights. As a result of using the base daily for takeoffs and landings, military aircraft have become a common and expected aspect of the visual environment. Although the operational F-22 aircraft would increase overall aircraft sortie-operations by 43 percent, this increase would not likely affect visual resources, as visual sensitivity on base is low and aircraft overflights are common. Operational F-22s will be indistinguishable from advanced pilot training F-22s flying in the Tyndall AFB vicinity. Although the increased overflights may result in annoyance, they are not expected to impact nearby boating or other recreational activities.

*A scoping issue noted was the concern that F-22s will have an impact on recreational activities.*

Construction projects included in this alternative have the potential to increase the visibility of urban characteristics of the base from recreational boaters. In addition to the visual effects, the increased noise from F-22 operational aircraft has the potential to increase annoyance to recreational boaters. The addition of new structures to previously undeveloped areas would not alter the visual character of the base, because aircraft overflights suggest these types of buildings to be expected in an airfield environment.

### ***Comparative Summary of the Five Potential Basing Locations***

The potential for visual impacts is low at all bases because of the preexisting military character and industrial uses. Tyndall has a low potential for impacts. Langley has the greatest potential for visual impacts because of the presence of numerous historical resources. Eglin has less likelihood of impacts compared to Langley and Elmendorf and is similar to Tyndall and Mountain Home.

## ***TY3.11 Cultural***

### **TY3.11.1 Base**

#### ***Affected Environment***

##### **Archaeological Resources**

There are 95 known archaeological sites on Tyndall AFB (Air Force 2000a), and none of these lie within the area of affected environment for Tyndall AFB alternative. The base Historic Preservation Plan indicates that potential archaeological resources within the main cantonment are likely to have been impacted by dense development and recommends that no further archaeological survey is necessary (Hardlines 1996a). The Florida Department of Historic Resources (DHR) has concurred with this assessment. There are no NRHP-listed archaeological sites at Tyndall AFB.

##### **Architectural Resources**

There are no NRHP-listed architectural resources at Tyndall AFB, although 19 buildings have been evaluated as potentially eligible for the NRHP. Most buildings are of unknown eligibility (Hardlines 1996a). One building, Hangar 280, is eligible for the NRHP. Within the area of the proposed action, the TACAN Station Tower (Building 20) is a Korean War-era structure built in 1955. NRHP eligibility of this structure is unknown.

##### **Traditional Resources**

No traditional resources have been identified at Tyndall AFB (Air Force 2000a). Federally recognized Indian tribes that may have an interest in the Tyndall AFB area are identified in the base Historic Preservation Plan: the Mississippi Band of Choctaw Indians, Philadelphia, Mississippi; the Seminole Tribe, Hollywood, Florida; the Miccosukee, Miami, Florida; and the Poarch Band of Creek Indians, Atmore, Alabama (Hardlines 1996a). Contact has been initiated with potentially interested Indian tribes regarding the present action.

#### ***Environmental Consequences***

The Tyndall AFB alternative would require the construction of 33 buildings or facilities at the base, including operations and maintenance facilities with associated infrastructure, and additions or upgrades to engine shop storage, the munitions area, and the training detachment facility. Construction would take place northeast of the existing runway in an area currently used for drone parking, and in an area of existing facilities south of United States Highway 98 (U.S. 98). No buildings are proposed for demolition.

No impacts to significant archaeological resources are expected under the Tyndall alternative. The entire construction area falls within a zone of low probability for archaeological sites (Hardlines 1996b, Figure 23). Most of the project area lies within the north part



*The Tyndall alternative would not impact architectural resources. The theater has been in continual use from the 1940s (above) to the 2000s (below).*



of the main cantonment, which has been surveyed for archaeological resources (Hardlines 1996a, Figure 15). No archaeological resources were identified within the survey area, and the Florida DHR has indicated that “. . . exempt from future survey requirements are: lands immediately within the Tyndall AFB main cantonment, consisting of runways and built-up parts of the base on either side of Highway 98 . . .” (Hardlines 1996a). Unsurveyed areas beyond the flightline at the north edge of the cantonment would be addressed in compliance with Section 106 of the National Historic Preservation Act (NHPA) prior to construction.

No impacts to architectural resources are expected under the Tyndall alternative. No building demolitions are planned. The two buildings proposed for upgrading (Engine Shop Storage and Training Detachment Facility) were not included in the 1996 list of historic buildings (Hardlines 1996a). Facility upgrades or renovations would be coordinated with the base cultural resource manager to identify whether the facilities are historic properties. Alterations to significant historic properties would be conducted in compliance with Section 106 of the NHPA and the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving Rehabilitating Restoring & Reconstructing Historic Buildings* (1995). Consultation with the Florida DHR regarding project plans has been initiated.

Impacts to traditional resources are not likely. No traditional resources have been identified at Tyndall AFB. Consultation with interested Indian tribes regarding actions at the base is ongoing.

### ***Comparative Summary of the Five Potential Basing Locations***

The potential for impacts to archaeological and traditional resources is low at all bases. Tyndall also has a low likelihood of impacts to architectural resources, comparable to Mountain Home.

## **TY3.11.2 Airspace**

### ***Affected Environment***

A number of NRHP-listed properties have been identified under Tyndall AFB airspace. In addition, many more eligible or potentially eligible cultural resources associated with the history of the region are likely to underlie project airspace.

NRHP-listed resources underlying Tyndall AFB primary use airspace (Tyndall LLA, Moody 3, W-151, W-155, W-453, W-470, Carabelle Work Area, Compass Lake Work Area) are the same as those described for this airspace under the Eglin AFB alternative (refer to section EG3.11.2).

### ***Environmental Consequences***

Projected operational F-22 overland airspace use under this alternative would increase from 2 to 24 percent above baseline sortie-operations (refer to section TY3.2-2). Subsonic noise would remain under 45 DNL. No supersonic flights would occur over land.

Potential impacts to cultural resources under Tyndall AFB airspace are the same as those described for similar Eglin AFB airspace (refer to section EG3.3.2).

### ***Comparative Summary of the Five Potential Basing Locations***

There is a little likelihood of impacts to archaeological or architectural resources under airspace at any of the bases. Tyndall also has a low likelihood of impacts to traditional resources under airspace, comparable to Langley and Eglin.

## **Human Resources**

The following resource discussion for Tyndall AFB describes the potential effects of the beddown of the Initial F-22 Operational Wing to the human environment. Human Resources include land use, socioeconomics, and environmental justice. Appendix HR-1 contains the methodological approach. The proposed Initial F-22 Operational Wing beddown and related training activities would not substantially change aircraft operations, overflights, or noise levels at Tyndall AFB or in its associated airspace.



The affected environment for human resources includes areas on base and the surrounding vicinity, specifically those jurisdictions whose economies are closely associated with activities at the base. For the land use and environmental justice resources, the effects on areas underlying the airspace are also considered.

### ***No-Action Alternative***

The no-action alternative would not impact land use, socioeconomics, or environmental justice. Land use and existing land use patterns would remain as described in baseline conditions. Tyndall AFB would continue to cooperate with the local communities and would continue to operate and contribute to the economic health of the region. Under the no-action alternative there would be no negative or disproportionate consequences to children, minority, or low-income populations.

## ***TY3.12 Land Use***

### ***TY3.12.1 Base***

#### ***Affected Environment***

Tyndall AFB is located in Bay County, Florida. The installation comprises more than 20,000 acres just across the Hathaway Bridge from the city of Parker. U.S. 98 bisects the base. Approximately 85 percent of the land is set aside for environmental or operational reasons. This set-aside includes natural areas, as well as safety zones.



*Airfield, aircraft operations and maintenance, and industrial land uses, as well as military family housing are located north of U.S. 98.*



Tyndall AFB is predominantly commercial and noncommercial forestland. Of the 3,900 acres that are developed, 1,000 acres are improved grounds, 2,250 acres are semi-improved ground, and 650 acres are under buildings, roads, parking, and airfield pavements.

Agricultural areas and large water bodies surround the base. The city of Parker is the closest municipality to Tyndall AFB and is located just north of the base. Land use in Parker is predominantly single-unit residential, with mobile homes and commercial development along major thoroughfares. Some single- and multi-family housing is located on the east side of U.S. 98. Agricultural, including timberlands, or conservation land uses in the other counties in the region range between 70 and 90 percent of designated land use. The Bay County Comprehensive Plan describes criteria and standards designed to guide development in the county.



*Administrative, community, outdoor recreation land uses, and military family housing areas are located south of the highway.*

Table TY3.12-1 presents a list of land uses within the vicinity of the installation situated within the baseline 65 dB noise contour line depicted on Figure TY3.2-1.

Table TY3.12-1. Land Uses within the Tyndall AFB Baseline 65 DNL Noise Contour	
<i><b>Land Use</b></i>	<i><b>Percentage</b></i>
Residential	.1
Other Urban Uses <sup>1</sup>	.1
Undeveloped Lands <sup>2</sup>	.1
Water	26.7
Tyndall AFB	73

Notes: 1. Includes transportation, communication, commercial, and recreational uses.

2. Includes agricultural, forests, and wetlands.

Source: FDEP 1999.

Base plans and studies present factors affecting both on- and off-base land use and include recommendations to assist on-base officials and local community leaders in ensuring compatible development. In general, land use recommendations are made for areas affected by both the potential for aircraft accidents (refer to section TY3.4, Safety) and aircraft noise (refer to section TY3.2, Noise). There are safety zones defined for each end of the runway based on the analysis of historic mishap data that defines where most aircraft accidents occur. At Tyndall AFB, no incompatible land uses exist within the safety zones.

Noise contours in these plans are generated by the modeling program NOISEMAP. These noise contours are used to describe noise exposure around the base and support compatible land use recommendations. Noise is one of the major factors used in determining appropriate land uses since elevated sound levels are incompatible with certain land uses. When noise levels exceed a DNL of 65 dB, residential land uses are normally considered incompatible. Further, the percentage of persons highly annoyed by noise can be estimated based upon varying noise levels. Noise

exposure (depicted with contours) from operations occurring today at Tyndall AFB are shown in Figure TY3.2-1. These contours provide the baseline against which to measure the projected change should the F-22 Operational Wing be based at Tyndall AFB.

For the most part, lands underlying these contours are installation property as well as areas of the bay and gulf. However, a portion of the city of Parker (a peninsula jutting into the East Bay) is exposed to levels exceeding 65 DNL, which is considered inappropriate for residential use. Approximately 34 acres of this area comprises medium- and high-density residential uses, including older single-family homes, mobile homes, and multi-family townhomes (Air Force 2000a).

### ***Environmental Consequences***

The Initial F-22 Operational Wing beddown would require construction and modification of facilities on base, a large increase in personnel, and an increase in flight operations. However, this should not adversely affect on-base land uses. Proposed development should be consistent with the base General Plan, particularly since the development would occur in proximity to other similar land uses.

Figure TY3.2-1 depicts the projected NOISEMAP contours should the operational squadrons of F-22s be located at Tyndall AFB. For areas in the vicinity of Tyndall AFB, the amount of land exposed to 65 to 70 DNL would increase by about 9 acres off base. Areas exposed to 70 to 75 DNL would increase by 20 acres off base. There is no increase anticipated in the 75 DNL and higher contours. Off base there is an overall increase of approximately 29 acres exposed to 65 DNL and above; of this, 23 acres is residential land. Residential use in these areas includes medium- and high-density (15 or more dwelling units per acre) single family development, as well as some apartment and mobile home developments.

<b>Amount of Off-Base Land Area Change from Baseline to Projected at Tyndall AFB</b>		
<b><i>Noise Contours (DNL)</i></b>	<b><i>Total Land Area (acres)</i></b>	<b><i>Total Residential Area (acres)</i></b>
65-70	9.2	19.7
70-75	20.2	3.3
75-80	0.0	0.0
80-85	0.0	0.0
>85	0.0	0.0
Totals	29.4	23.0

Note: 1. All referenced acreages are located off Tyndall AFB.

A site inspection of those lands that will be newly affected by the noise contours was undertaken. The purpose of the inspection was to determine the number of houses that occur in those off-base, overland areas where an increase in area is projected. Within the 65 to 70 DNL contour, 79 dwelling units occur and in the 70 to 75 DNL contour, 9 dwelling units occur. The number of persons per housing unit for the Tyndall area is 1.9 (Air Force 2000a).

In order to better understand the effects of aircraft noise on individuals in the vicinity of airfield and underlying other aircraft use areas, numerous studies have been undertaken. Aircraft noise effects can be described according to two categories: annoyance and human health considerations. Annoyance, which is based on a perception, represents the primary effect associated with aircraft noise. Far less potential exists for effects on human health. Studies of community annoyance to numerous types of environmental noise show that DNL correlates well with effects. Schultz (1978)

showed a consistent relationship between noise levels and annoyance. A more recent study reaffirmed this relationship (Fidell *et al.* 1991).

In general, there is a high correlation between the percentages of groups of people highly annoyed and the level of average noise exposure measured in DNL. The correlation is lower for the annoyance of individuals. This is not surprising considering the varying personal factors that influence the manner in which individuals react to noise. The inherent variability between individuals makes it impossible to predict accurately how any individual will react to a given noise event. Nevertheless, findings substantiate that group or community annoyance to aircraft noise is represented quite reliably using DNL. Table 3.12-2 presents the relation between annoyance and DNL. The change in population highly annoyed as a result of the project was estimated by multiplying the number of off-base dwelling units identified in newly affected areas by the average number of persons per housing unit in the area, and then applying the percentage of population highly annoyed for each noise level. For the Tyndall AFB alternative, 22 additional people would be highly annoyed, when compared with baseline conditions.

Table TY3.12-2. Relation Between Annoyance and DNL	
<i>DNL</i>	<i>Percent of Population Highly Annoyed</i>
65	12.3
70	22.1
75	36.5
80	53.7
85	70.2

Source: Finegold *et al.* 1994.

Appendices AO-1 and AO-2 include additional information regarding aircraft noise effects. For purposes of the land use analysis, it is important to note that human effects is one of the factors used to determine appropriate land uses for areas in proximity to airfields. Assessments of land use compatibility may then be used to develop community land use plans, guidelines, and regulations.

As stated above, the change in area affected under the Tyndall alternative increases overall by 29 acres. These locations have historically been exposed to elevated noise levels associated with Tyndall AFB.

Residential property values in the vicinity of airfields, in general, are affected by a variety of non-noise factors such as national, regional, and community economic conditions, national and regional trends in employment, inflation, interest rates, local population changes and real estate development (Fidell *et al.* 1996). While property values in the vicinity of Tyndall AFB may be affected by local perceptions of environmental issues such as noise exposure, the complex interaction of multiple economic and real estate factors makes the estimation of such effects highly speculative. A study, *Effects of Military Aircraft Noise on Residential Property Values*, indicates that there is no reliable correlation between aircraft noise and residential property sale prices at Langley AFB and concludes that the number of variables and confounding factors at Davis-Monthan AFB obviate a conclusion of a direct relationship between noise and residential property sale prices (Fidell *et al.* 1996).

In summary, the proposed beddown of the Initial F-22 Operational Wing at Tyndall AFB would have a negligible impact on land use patterns, ownership, plans or property values. Should the decision be made to place the F-22 at Tyndall AFB and once flying operations have commenced, a detailed data collection effort would occur and existing noise studies and land use recommendations would be updated.

### ***Comparative Summary of the Five Potential Basing Locations***

Land use impacts stem from changes in noise levels for off-base areas. Despite an increase of about 2,500 acres affected by noise at Mountain Home, the off-base land uses consist of grazing/agricultural. Consequently, potential impacts would be less than at Eglin and Tyndall where noise would affect 123 and 23 acres of residential land use, respectively. The potential effects of noise would be the least at Elmendorf because the only off-base areas affected overlies water. Although the off-base area affected by noise would decrease with beddown of the F-22 at Langley, impacts would be greater than at Elmendorf or Mountain Home because residential lands would continue to be affected.

## **TY3.12.2 Airspace**

### ***Affected Environment***

This section summarizes land uses underlying MOAs used by Tyndall aircraft. As illustrated in Figure TY2.2-1, the MOAs overlie a multi-state area in the southeastern United States.

The general land use patterns underlying this airspace may be characterized as rural. Agricultural uses include farms, cropland, and timber. There are also a number of small towns throughout the area that occur along area roads and highways. Within these populated areas, a wide variety of land use types occur, including residential, commercial, industrial, and public land uses. Areas of cultural significance also occur under the airspace; Appendix CR identifies properties that have been placed on the NHRP. An analysis of these cultural resources is provided in section TY3.11.

Special use areas have been identified under the MOAs. Appendix HR-2 contains tables summarizing special use areas for each state under the airspace. They are considered special use areas because they provide recreational opportunities (trails and parks) and/or they provide solitude or wilderness experience (parks, forests, and wilderness areas). Recreational areas include large public land areas such as state or national parks, forests and reserves, which may include individual campgrounds, trails and visitor centers.

Land use underlying the Tyndall MOAs are described in section EG3.4.2. W-151 and W-470 airspace units lies over the Gulf of Mexico. Scoping comments expressed concern that overflights could affect offshore platforms.

### ***Environmental Consequences***

Under this alternative, noise would increase very slightly. In most cases, the increase would overlap the existing noise levels for ongoing airspace use. Most noise levels are expected to remain below 45 DNL, the level below which aircraft noise cannot generally be detected above background noise.

Where noise levels are higher than 45 DNL, they are expected to remain the same under this alternative as under existing conditions.

Supersonic flights would occur over water and not over land. Subsonic flights over water are generally over 5,000 feet MSL for aircrew safety considerations. Supersonic flights are nearly always above 10,000 feet MSL for the same reason. The offshore platforms would experience some sonic booms from F-22 aircraft operating at altitude, but the effect of these sonic booms would be no more than an annoyance. It is unlikely the land use patterns, ownership, or management practices would be affected by the use of the airspace by the F-22 aircraft.

### ***Comparative Summary of the Five Potential Basing Locations***

The potential for impacts to land use as a result of airspace use would be negligible for Tyndall, Langley, and Eglin because supersonic activity occurs mainly over water. Impacts at Elmendorf and Mountain Home would be similar, because supersonic activity occurs over land and sonic booms would increase noticeably.

## ***TY3.13 Socioeconomics***

### **TY3.13.1 Base**

#### ***Affected Environment***

#### **Employment and Earnings**

Information regarding employment and earnings is presented for Bay and Gulf counties whose economies are closely associated with activities at Tyndall AFB. Comparisons are also presented with conditions for the state of Florida.

In the region, total full- and part-time employment increased from 74,142 jobs in 1990 to 86,748 in 1997 at an average rate of 2.3 percent annually. The largest contributions to employment in 1997 were made by services (27.8 percent), retail trade (22.8 percent), and state and local government (11.2 percent). For the years 1980, 1990, and 1997, the contribution of the military decreased from 10.4 percent to 7.7 percent and 6.2 percent, respectively. The sectors of the economy exhibiting the greatest addition of jobs over the period 1990-1997 were services and retail trade (United States Department of Commerce, Economics, and Statistics Administration [USDCESA] 2000).

In the state of Florida, military employment declined from 2.6 percent of total employment in 1980, to 2.2 percent in 1990, and 1.5 percent in 1997. The sectors of the economy exhibiting the greatest addition of jobs in the state over the period 1990 to 1997 were services, retail trade, and state and local government. In 1999, the number of military personnel stationed at Tyndall AFB stood at about 2,920, with an additional 2,720 civilian workers (including 1,500 contractors).

Non-farm earnings in the two-county region totaled over \$2.2 billion in 1997. The major contributions were made by services (23.0 percent), state and local government (13.8 percent), retail trade (12.3 percent), and military (11.1 percent). In the state of Florida, non-farm earnings totaled over \$219 billion in 1995, with the major contributions made by services (33.9 percent), retail trade (11.7 percent), and state and local government (11.5 percent) (USDCESA 2000).

The value of payroll associated with government personnel at Tyndall AFB reached over \$156 million in 1999. In addition to economic effects associated with payroll expenditures by personnel associated with Tyndall AFB, the installation also purchases significant quantities of goods and services from local and regional firms. In 1999, total annual expenditures by the base totaled over \$89 million. Further, the Air Force estimates that the economic stimulus of Tyndall AFB created approximately 2,250 secondary jobs in the civilian economy (Air Force 1999d).

## **Population**

In 1999, the population of the two-county region increased by an average annual rate of 1.7 percent between 1990-1999, reaching 161,520. The population of Florida also increased at an average annual rate of 1.7 percent during the same period, reaching 15,111,244 in 1999 (U.S. Census Bureau 2000a).

Based on information provided by Tyndall AFB concerning the place of residence (by zip code) of personnel assigned to the installation, it is possible to derive an estimate of the number of personnel residing in each of a number of communities in the vicinity of the base. The largest numbers of military personnel reside in the following communities: Callaway, Panama City, Springfield, Parker, and Lynn Haven. Compared to the general population, however, military personnel have a greater than average propensity to reside especially in Callaway and also somewhat in Springfield and Parker. They have a less than average propensity to reside in Panama City, Panama City Beach, and Lynn Haven.

*Military retirees in the vicinity of Tyndall AFB comprise 3.4 percent of total regional population.*

Approximately 58 percent of the 1998 population of the two counties reside in incorporated communities. These cities and towns range in size from Panama City (with a population of 39,477) to Mexico Beach (with a population of 1,001). The largest cities include Panama City, Callaway (12,780 persons), and Lynn Haven (12,604 persons). The regional population is projected to increase from about 167,200 in 2000 to 230,700 by the year 2025, at an average annual growth rate of 1.3 percent.

## **Housing**

The 1990 United States Census of Population and Housing documented 72,338 housing units in the region with a vacancy rate of about 26.4 percent. Of the vacant units, 40.5 percent were for seasonal and recreational use. Of the total number of housing units, 17.5 percent were mobile homes (U.S. Census Bureau 1991).

From 1990 to 1999, an average of 1,235 building permits for residential units was issued annually in the two-county region. The number of units permitted on an annual basis varied from a high of 1,693 units in 1998 to a low of 810 units in 1990. The majority (83 percent) of these units was comprised of single-family homes. The proportion of units contained in structures with five or more units comprised 13 percent of the new units. The number of multiple-family units permitted varied from a high of 568 in 1997 to a low of zero in 1994 and 1996 (U.S. Census Bureau 2000b).

Of the active-duty personnel assigned to Tyndall AFB in fiscal year (FY) 1999, over 28 percent reside on base in government family and unaccompanied housing.

***Environmental Consequences***

Construction at Tyndall would peak in FY 2002 with the expenditure of over \$171 million. It is estimated that these expenditures will support 2,664 construction jobs and 2,073 secondary jobs, for a total employment effect of 4,737. This number of jobs comprises 5.5 percent of the 1997 level of regional employment. Earnings associated with both the direct and secondary jobs would total over \$134 million or about 6.1 percent of total non-farm earnings in the region in 1997. It is estimated that a total of 473 workers could temporarily relocate and take up residency in the region during the construction phase.

*Several people at scoping requested that the Air Force consider the ability of a community to handle the influx of new residents.*

The operations phase would experience an increase in base personnel of 1,846 (1,767 active-duty personnel and 79 civilian/contractor personnel) and a secondary employment of 546 jobs. Total employment in the region would increase by 2,392 jobs by FY 2007. Such increases comprise 29.6 percent of the 1999 base personnel and 2.8 percent of regional employment. The increase in earnings associated with the personnel buildup is estimated at over \$80 million or about 3.7 percent of the total regional non-farm earnings in 1997.

The arrival of active-duty personnel and their dependents (3,925 persons), civilian workers and contractors (167 persons), and those associated with secondary jobs (116 persons) would result in a net addition of 4,208 persons to the region by FY 2007. This increase represents 2.8 percent of the regional population total in 1999.

Unaccompanied active-duty military members will occupy 360 newly constructed on-base accommodations. This will offset a portion of the project-related housing demand. It is estimated that the number of on-base residents will increase by 13 percent. The relative increase in Callaway, Springfield, and Parker could result in growth pressure on housing and other services.

Of the approximately 3,850 persons expected to relocate to the region by FY 2007 and reside off base, the largest number (over 1,200 persons) are expected to reside in the unincorporated portions of Bay County. In addition, there could be about 1,100 persons in Callaway, 570 persons in Panama City, over 360 in Springfield, and almost 250 each in Parker and Lynn Haven.

F-22 construction is likely to impact the housing market as families arrive in the region. There could be a cumulative demand for 1,543 housing units (both owner-occupied and rented) located off base by those persons entering the area over the period FY 2002 through FY 2007.

*There is little likelihood for socioeconomic or environmental justice consequences under the airspace.*

Included in the construction projects associated with the F-22 beddown is a proposal to construct 360 dormitory rooms to partially meet the needs of the 521 new unaccompanied personnel. With the addition of the construction of government-funded housing for unaccompanied personnel, the demand for housing units in the surrounding communities would total 1,363 units. The maximum annual demand for housing units of 513 units during the operation phase comprises 41.5 percent of historic annual construction in the region. It is likely that the added demand for housing units could decrease the vacancy rate in the region substantially and, in the short term, place stresses on the housing market.

### ***Comparative Summary of the Five Potential Basing Locations***

Based on differences in both personnel changes and construction projects, the socioeconomic influence of the F-22 would vary among the bases. Tyndall would have the greatest increase in operations employment and earnings, creating 2,392 direct and secondary jobs and earnings by \$80 million. Langley is the only base that would experience a decrease in operations employment and earnings: operations employment would decrease by 358 direct and secondary jobs and earnings would decrease by \$12 million. It is also the only base that would create a reduction in project related population and housing demand. Eglin would create the smallest increase in operations employment and earnings and no substantive impacts. Operations employment would increase by 325 direct and secondary jobs and earnings by \$10 million. Elmendorf, with an increase of 390 direct and secondary jobs and earnings by \$13 million, has a greater increase in operations employment and earnings than Eglin. Mountain Home would increase employment by 1,560 direct and secondary jobs and earnings by \$57 million.

### ***TY3.14 Environmental Justice***

#### **TY3.14.1 Base**

##### ***Affected Environment***

Executive Order 12898 (Environmental Justice) requires an analysis of the potential for federal actions to cause disproportionate health and environmental impacts on minority and low-income populations.

Bay County comprises the region of comparison for the Tyndall AFB alternative. The region of comparison contains 126,994 persons, of whom 14.9 percent are minority, 14.4 percent are low-income (refer to Appendix HR-4), and 25.6 percent are children. The information regarding minority and low-income population groups is derived from the 1990 United States Census of Population. This is the latest source of information containing data at the required level of detail.

To satisfy the requirements of Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, locations of off-base schools exposed to aircraft noise levels of 65 DNL or above were identified. Currently, no off-base schools in the vicinity of Tyndall AFB are exposed to noise levels of 65 DNL or greater.

##### ***Environmental Consequences***

The analysis of environmental justice for the base and vicinity considers changes in noise levels created by the action alternative. The area affected by existing noise levels of 65 DNL or greater around Tyndall AFB overlays land areas in Bay County, as well as water areas in the Gulf of Mexico and bays adjacent to the base. Areas within the 65 DNL or greater noise levels were identified and the affected population under these areas was estimated. For Tyndall AFB, an additional 107 persons would potentially be affected within the 65 DNL contour. Approximately 11 (10.3 percent) of the potentially affected additional population would be minority and 9 (8.4 percent) would be low-income. This compares to a 14.9 percent minority population and a 14.4 percent low-income population in the region of comparison. There would be no disproportionate noise impacts on



minority populations or low-income populations within the area affected by aircraft noise from this alternative.

Under the proposed Tyndall AFB alternative, no off-base schools would be exposed to aircraft noise levels of 65 DNL or above and therefore, there would be no change in exposure of school children to noise impacts as a result of the project.

### ***Comparative Summary of the Five Potential Basing Locations***

The potential for disproportionate impacts to minority or low-income populations is low at all bases. No substantive difference exists among the bases relative to environmental justice. Eglin has the greatest potential for impacts from noise and therefore may have a slight, but not substantial disproportionate impact on children.

## **TY3.14.2 Airspace**

### ***Affected Environment***

Baseline data on minority and low-income populations residing in counties under the airspace are presented in Appendix HR-4. There are no federally recognized Indian lands under the airspace.

### ***Environmental Consequences***

Subsonic noise would not generate environmental justice issues for minority populations, low-income populations, or children living under the airspace. In addition, any noise impacts from supersonic noise would occur in Warning Areas that are over water.

### ***Comparative Summary of the Five Potential Basing Locations***

No substantive difference exists among the bases' airspace relative to potential environmental justice concerns. Potential impacts at Tyndall are comparable to Langley and Eglin. Concerns were raised during scoping about overflights and sonic booms over traditional use land areas at Elmendorf and Mountain Home.

## **Community and Infrastructure**

Community and infrastructure resources include public services such as potable water, wastewater treatment, electric and natural gas utilities, solid waste management, and hazardous materials and waste. It also includes public schools and transportation. These resources are typically impacted by fluctuations in population and generally occur at the base and environs. Airspace and ranges are not addressed for community and infrastructure, as they are not applicable to this resource. Pertinent regulatory and methodological information can be found in Appendix CI-1. Additional technical information can be found in Appendix CI-2.



### ***No-Action Alternative***

The no-action alternative would not affect baseline demands on public services or infrastructure. There would be no operational F-22 beddown and, therefore, no change in base population. Likewise, there would be no changes to demands on schools and other social services. Under the no-action alternative, hazardous material use and waste generation at Tyndall AFB would continue as described in baseline conditions. Environmental Restoration Programs (ERP) at the base would continue, and Tyndall AFB would continue to manage its hazardous materials and wastes in accordance with all applicable laws and regulations.

### ***TY3.15 Public Services***

#### **TY3.15.1 Base**

##### ***Affected Environment***

##### **Potable Water**

Tyndall AFB receives its potable water from Bay County Water Treatment Plant which processes and delivers treated surface water. Bay County is currently in the process of up-sizing the current 12-inch delivery pipe so that increased capacity can be provided to Tyndall AFB and other communities located east of the base (personal communication, Monty 2000). The current operating rate of the plant is 37 million gallons per day (mgd) with a permitted capacity of 50 mgd. Over the next two to three years, the treatment plant will be upgraded to provide additional capacity for Tyndall AFB and other serviced communities (personal communication, Monty 2000).

##### **Wastewater Treatment**

Tyndall AFB discharges all of its wastewater to an on-base Advanced Wastewater Treatment Plant that is owned and operated by Bay County. This plant treats wastewater from Tyndall AFB as well as other communities located in the vicinity and is operated under a leasing agreement between Bay County and Tyndall AFB. The current operating rate of this plant is 3.5 mgd with a permitted capacity of 7 mgd (personal communication, Monty 2000).

A second wastewater treatment plant, Military Point Lagoon, is also located at Tyndall AFB. As is the case with the domestic wastewater treatment plant, Military Point Lagoon is owned and operated by Bay County through a leasing agreement with Tyndall AFB. This plant treats industrial wastewater from a nearby paper mill and chemical company. Its current operating rate is 21 mgd, with a permitted capacity of 37 mgd. This plant exclusively treats waste from neighboring industries and does not accept any wastewater from Tyndall AFB (personal communication, Monty 2000).

##### **Electric Power & Natural Gas**

Natural gas is provided to Tyndall AFB through the local distribution company, TECO People's Gas. TECO's representatives indicate that there are no capacity or supply hindrances within the system (personal communication, Goodwin 2000).

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Electric power is provided to Tyndall AFB by Gulf Power. Gulf Power is aware of the proposed F-22 beddown at Tyndall AFB and is currently undertaking planning level studies to determine what upgrades will be required to accommodate the project. Gulf Power representatives have indicated that upgrading of the submarine cable and the associated substations will be necessary. Gulf Power is committed to providing Tyndall AFB with the load upgrades required by the F-22 beddown project (personal communication, Oswald 2000).

### **Solid Waste Management**

Tyndall AFB contracts out their waste management services to Arrow Waste Disposal. There are no landfills on base.

### **Schools**

Public schooling in the county is provided by the Bay District School Board, which operates 3 high schools, 6 middle schools, 19 elementary schools (one of which is located on Tyndall AFB), and a number of special and alternative school facilities.

Enrollment in the school district has grown from just over 26,000 in 1994 to about 27,000 in 1998, at an average annual rate of just under 1 percent (Air Force 2000a). Projections of the capacity of facilities in school districts in Florida are developed by the state and based on plant surveys. The plant survey conducted by the state of Florida revealed that all schools in the district were over capacity, with the exception of the two newest schools (Lucille Moore and Patronis elementary schools). In May 1998, the school district successfully lobbied county residents for approval of a one-half cent increase in the sales tax rate to fund capital improvements and remedy the overcrowding situation. Over a 5-year period, additions and renovations to all school facilities in the district will take place. These improvements will accommodate the student body projected for the year 2002. In addition, two new schools (one high school and K-8 grade school) are slated for completion by August 2008. The projected student enrollment for the year 2008 is 29,060 (Air Force 2000a).



*There would be an estimated 1,063 additional school-aged children, directly or indirectly, as a result of the F-22 Operational Wing beddown at Tyndall AFB.*

### ***Environmental Consequences***

#### **Potable Water**

As a result of the proposed F-22 Operational Wing beddown, it is estimated that a total increase of 360 in-migrating persons would reside on base with an additional 3,850 in-migrating persons residing in adjacent communities. The additional demand on Bay County's potable water system is estimated to be 0.85 mgd (assuming 200 gal/capita/day). This estimated demand accounts for sanitary use, industrial (non-domestic) use, public service use (including fire fighting, system maintenance, and landscape irrigation), and unaccounted system losses and leakage. Given that the Bay County Water Treatment Plant currently has 13 mgd of excess capacity, the proposed project would require only 6.5 percent of that excess. This modest requirement, coupled with Bay County Water Treatment Plant's planned capacity upgrades, indicates that the impact of the proposed F-22 beddown would be insignificant.

*There is little likelihood for public services consequences under the airspace.*

## **Wastewater Treatment**

The proposed F-22 beddown would result in an additional demand of 0.85 mgd on the Advanced Wastewater Treatment Plant (assuming 200 gal/capita/day). This increase in demand represents approximately 25 percent of the plant's current excess capacity. Bay County personnel have indicated that the treatment plant's current capacity of 7 mgd is more than adequate to accommodate the F-22 beddown.

## **Electric Power and Natural Gas**

At present, electric power capacity, provided by Gulf Power, is insufficient for the proposed F-22 beddown. Gulf Power is currently addressing the load additions required to accommodate the beddown and is committed to providing the required capacity necessary for continued regional growth (personal communication, Oswald 2000).

Natural gas capacity, provided by TECO People's Gas, is sufficient for the proposed F-22 beddown and no significant impact is expected as a result of the project (personal communication, Goodwin 2000).

## **Schools**

The additional 1,063 school-aged children associated with the Operational Wing beddown would absorb approximately 68 percent of the projected new capacity planned for 2008. School overcrowding is possible but it could be accommodated through planned school district growth, particularly given the fact that the growth would be spread out over a number of years.

## ***Comparative Summary of the Five Potential Basing Locations***

The potential for impacts to public services is low for all installations. Tyndall would have the largest increase in student population, estimated to be 1,063 new students. There would be no increased demand for public services at Langley. There would be a decrease in demand for utilities and a reduction in number of students by 150 in local schools. Comparatively, Eglin would increase school enrollment by 121 students; Elmendorf would increase school students by 161; Mountain Home would increase school enrollment by 686 students. Impacts associated with demand for other public services such as water would be the greatest at Mountain Home.

## ***TY3.16 Transportation***

### **TY3.16.1 Base**

#### ***Affected Environment***

U.S. 98 provides the only access to Tyndall AFB. Regional highways that do not provide direct access to Tyndall AFB include Interstate 10, which runs east to west across the Florida Panhandle and State Route (SR) 20, the major east/west corridor across Calhoun and Washington counties. SR 71 links the towns of Blountstown and Bristol to the north to Port St. Joe in Gulf County. The major north/south corridors are U.S. 77, 79, and 231 into Panama City. In particular, U.S. 231 provides access to Panama City and associated beaches.

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Under Florida state law, if the level-of-service (LOS) degrades below a prescribed level of service for a given segment of road, the road is classified as being “deficient” by the Florida Department of Transportation (FDOT). Limitations on new development may be placed on that segment until the LOS is brought into compliance. Appendix CI-2 presents the characteristics of major roads in the region.

Two road segments in the region are currently categorized as deficient by FDOT, and both are relevant to the project. These two segments have an LOS classification of “F.” These segments of U.S. 98 are located in Panama City and provide the only access to Tyndall AFB from the west, Hathaway Bridge from Thomas Drive to the bridge, and from the bridge to Beck Avenue. Carrying capacity on these segments is rated at 35,000 vehicles per day; however, average daily traffic for the Thomas Drive and Beck Avenue segments were 55,400 and 41,600, respectively. The “Hathaway Corridor,” which includes these two road segments, will be designated a Long Term Transportation Concurrency Management System Area by Bay County. This means that improvements have been programmed to reduce LOS deficiencies within the next 10 to 15 years.



*On both sides of the Hathaway Bridge, the primary access route to Tyndall AFB, U.S. 98, is classified as deficient by the FDOT.*

Tyndall AFB has approximately 98 miles of roads. U.S. 98 bisects the base, serves as the primary artery of the Tyndall circulation system, and provides access from Parker and Mexico Beach to the east. It also functions as the major roadway for all coastal areas along Bay, Gulf, and Franklin counties. There are grid patterns of roads to the north and south of U.S. 98 that serve the industrial, residential, and operational areas of the base (Air Force 2000a).

The base road system is able to adequately handle current base traffic. Additionally, planned transportation improvements and land use changes described in the Tyndall AFB General Plan will further improve Tyndall's transportation system (Air Force 1996).

### ***Environmental Consequences***

The Tyndall AFB alternative is expected to increase on-base employment by 1,846 jobs, with the potential to generate nearly 1,500 vehicle trips to and from the installation each workday during the morning and evening peak travel periods. Current employment on the installation is 6,232 jobs, with the potential for approximately 4,500 vehicle trips during the peak travel periods. The increase in employment and associated travel demand could increase base employee peak period travel demand by one-third. This is on a roadway already categorized as “deficient.” The anticipated increase in traffic volumes would be a significant impact. Base intersections and access gates have the potential to degrade service levels to near or below the FDOT “deficient” criteria. Detailed transportation management actions would likely be required.

*There is little likelihood for consequences to transportation under the airspace.*

### ***Comparative Summary of the Five Potential Basing Locations***

The potential for impacts to transportation is low for all installations. Tyndall would have the highest potential impact with an increase of 1,500 peak hour trips and one-third increase in base

worker travel. Langley would have a decrease of 243 peak hour vehicle trips and an approximate 2.7 percent decrease in travel demand. Eglin would have an increase of 218 peak hour trips but this would have little impact on congestion. Elmendorf would have an approximate 6 percent increase in traffic and Mountain Home would have an approximate 9.2 percent increase.

### ***TY3.17 Hazardous Materials and Waste***

#### **TY3.17.1 Base**

##### ***Affected Environment***

Under current policies, no hazardous material, unless specifically exempted, can be brought onto Tyndall AFB until the material is authorized for use in each specific process or application, and all other requirements for its possession and use are met. Authorization is required for each hazardous material used, stored, or in any way maintained on the base. The office of primary responsibility for coordinating the authorization process is the Hazardous Material Management Office, which utilizes

the Air Force-Environmental Management Information System to facilitate the procurement of hazardous materials.

*Baseline Tyndall AFB hazardous materials and hazardous waste management programs for the training F-22s would be retained and used to manage any hazardous materials and wastes from operational F-22s. Refer to Appendix CI-1 for more information on these materials and wastes.*

The Tyndall Hazardous Materials Management Plan, in combination with the installation's Hazardous Waste Management Plan, Disaster Preparedness Plan (Oplan 32-1), and the Facility Response Plan, provide a complete management structure for preventing and responding to releases of hazardous materials. Approximately 80 percent of the releases at Tyndall AFB between June 1998 and June 1999 were primarily automobile or jet fuel and were considered small because they covered an area of less than 50-square feet (Air Force 1998b).

Tyndall AFB is a large-quantity hazardous waste generator. Hazardous wastes are generated during operations and maintenance activities. Types of waste include antifreeze, waste paint or paint-related materials, batteries, sealants, Safety Kleen solvents, and miscellaneous halogenated and non-halogenated solvents. The total quantity of hazardous waste generated at the base from June 1998 to June 1999 was 95,379 pounds. Hazardous wastes are managed in accordance with the Tyndall AFB Hazardous Waste Management Plan. Hazardous wastes are initially stored at Waste Accumulation Points at work locations. A licensed contractor transports the waste from the Accumulation Points to the less than 90-day storage facility where they are stored until disposal is economically practicable or before 90 days have expired, whichever comes first. A licensed disposal contractor picks up the wastes and transports it off-base for disposal in a licensed disposal facility.

The DoD developed the ERP to identify, investigate, and remediate potentially hazardous material disposal sites on DoD property prior to 1984. Currently, 36 sites are included in the ERP at Tyndall AFB. Of these 36 sites, 13 have been designated as "closed," with 2 additional sites pending closure. Two more sites are expected to require interim remedial actions or final action before they can be classified as "closed." Seven sites are currently undergoing ERP investigations and remediation efforts, and an additional site will go through these efforts. Ten other sites require a site investigation before any determination on their status can be made (Air Force 2000a).

Hazardous materials, especially those associated with the F-22 aircraft, will already be handled on Tyndall AFB because of the two F-22 advanced fighter pilot training squadrons. Any hazardous waste generated for F-22 maintenance activities that could present any unique hazards would already be addressed at Tyndall. Tyndall AFB would have implemented appropriate hazardous material control procedures to minimize potential risks to personnel and the environment associated with the F-22 training squadrons.

*During scoping, people expressed concern that the low-observable coatings on the F-22 could be hazardous to people working on and around the aircraft.*

### ***Environmental Consequences***

The amount of hazardous and toxic materials used during operational F-22 operations and maintenance would have the potential to increase by 100 percent over baseline. The types of materials would include some of those described above, plus F-22 materials that are hazardous and would use any special handling procedures already developed at Tyndall for the F-22. Existing procedures for the centralized management of the procurement, handling, storage, and issuing of hazardous materials through the Hazardous Material Management Office process would be increased in scope to handle the changes. The increased volume of hazardous materials would affect management, procedures, and facilities but would not be expected to cause significant adverse impacts.

Tyndall AFB would continue to generate hazardous wastes during various operations and maintenance activities. The increase could be as much as 50,000 to 60,000 pounds annually. Hazardous waste disposal procedures, including off-base disposal procedures, would be expanded to handle the changes. The base Hazardous Waste Management Plan would be updated to reflect any changes of hazardous waste generators and waste accumulation point monitors. Additional hazardous waste accumulation sites would be required in the F-22 aircraft maintenance areas to handle the increase.

*There is little likelihood for hazardous materials and waste consequences under the airspace.*

### ***Comparative Summary of the Five Potential Basing Locations***

The potential for impacts to hazardous waste management is low for all installations. Although Tyndall would have a 100 percent increase in hazardous waste, existing facilities are capable of handling this amount. Langley would generate the smallest increase in hazardous waste. Eglin would increase hazardous waste by 30 percent over baseline; Elmendorf would increase by 40 percent over baseline; and Mountain Home would increase hazardous waste by 50 percent. No change in current operations would be required for any of the bases.

