EGLIN AIR FORCE BASE JOINT LAND USE STUDY APPENDICES

TETRA TECH

JUNE 2009

APPENDICES

Appendix A - New Construction Acoustical Design Guide

The City's building construction standards or requirements for development order approval through ordinance adoption or revisions should incorporate construction techniques improving noise insulation for residential and certain non-residential structures within the high noise level areas (>65dB). New construction for residential properties, public or quasi-public service buildings, or public assembly facilities proposed within the MIA-II should be required to include sound insulation to reduce noise levels by at least 25 dB between 65 – 70 dB DNL contours and by at least 30 dB between 70 – 75 dB DNL contours. Appendix A – New Construction Acoustical Design Guide includes two examples of adopted guidelines for new construction to follow in an effort to insulate residences and other uses from aircraft noise. No residential development should be allowed (even with noise reduction) in areas with noise contours exceeding 75 dB DNL. Noise insulation construction standards can be reduced or waived when residential development is clustered or located away from airfield perimeters or placed outside of high level noise areas (>65 dB).

Wyle Report

WR 04-28

(J/N 51503)

October 2004

FINAL

NEW CONSTRUCTION ACOUSTICAL DESIGN GUIDE

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MCAS Cherry Point

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1.0 Introduction

1.1 Background

Residences located near military airfields experience many economic and transportation benefits of the facility, but are unfortunately exposed to significant amounts of aircraft noise. However, using proper construction techniques and materials minimizes the impact of aircraft noise and reduces interference with regular indoor activities. This New Construction Acoustical Design Guide can assist builders, planning officials, building inspectors, and homeowners in incorporating specific noise level reduction features into the designs of new homes in the Marine Corps Air Station (MCAS) Cherry Point area. These features will help to ensure that new homes in the area provide an adequate noise level reduction to protect occupants from undesirable noise impacts.

For homes located in areas with high noise levels, standard building methods, even those that are designed for thermal efficiency, are normally inadequate to protect inhabitants from external noise. For this reason, building design and construction methods may have to be modified for noise-sensitive rooms such as bedrooms, kitchens, living rooms, and family rooms. These spaces are referred to as the habitable rooms in a house. Standard design and construction methods can typically be used for non-habitable rooms, such as garages, mudrooms, and breezeways unless they open directly to habitable rooms without interior doors in between the rooms.

This Design Guide provides recommendations for the design of dwellings in the vicinity of the airfield that may be constructed in the future. It is meant to be used in conjunction with noise overlay zones developed by the surrounding communities through the joint land use study process. This Guide was developed for new homes; different materials and techniques would be appropriate when renovating houses to achieve the noise level reduction goals. Construction guidelines are presented for the noise level reductions (NLRs) of 20, 25, 30, and 35 decibels.

The recommendations contained in this Guide were developed considering the unique characteristics of the aircraft that currently use MCAS Cherry Point. As a result, the recommendations would not be the same as those developed for communities near civilian airfields.

1.2 How to Use this Guide

This guide has been developed to be used by a variety of different professionals, as well as by interested homeowners. This guide is recommended for the following people:

- Planning Officials

- Plan Reviewers
- Building Inspectors
- Builders
- Homebuyers/Homeowners

Sections 2.0 Through 3.0

The main design guide sections include a brief overview of sound transmission paths into a home, a discussion of basic design principles, and subsections for each building element including walls, windows, doors, ceilings, attics, floors, basements, crawlspaces, and ventilation systems. The building element subsections include text, tables, and design detail drawings to illustrate various options for noise control.

Section 4.0

Specific design requirements are presented in a selection chart. Designs that achieve noise level reductions (NLR) of 20, 25, 30 and 35 dB are listed. The table in Section 4.0 tells the sound ratings of building materials that are needed to achieve the NLR design goals. Additional details are provided in Appendix A.

Section 5.0

This section discusses some of the assumptions used in developing the proposed design methods, as well as factors that would affect the accuracy of NLR predictions.

Appendices

The first appendix provides a description of design and construction methods necessary to achieve NLRs of 20, 25, 30, and 35 dB. It supplements and details the design requirements presented in Section 4.0. Once the reader is familiar with this Guide, Appendix A can be used as a stand-alone reference in implementing the designs. Appendices B and C will be useful to builders, as they provide information on many acoustical product manufacturers and certified test laboratories. Appendix D is a glossary that will be useful to all parties.

General Notes

This Guide seeks to provide clear, unambiguous direction that is practical and can be implemented with minimum additional cost. However, construction quality is especially important for maintaining the acoustical integrity of a design. For example, even a good window, if not installed properly, will allow a significant amount of noise into the building. High-quality construction standards are absolutely essential for these techniques to work effectively.

The design packages in Section 4.0 and Appendix A address typical home sizes and styles. The noise analysis used here makes assumptions about the number of exterior doors and the size of the windows with respect to the floor area. Unusual homes may require more specialized analysis to ensure compliance. For example, very small rooms with normal windows have a larger window-to-floor space ratio and may allow more noise intrusion than average sized rooms. Similarly, rooms with very large windows or a room with several windows and exterior doors may also allow more noise to enter. Unusually large windows would require better acoustical performance than is indicated in this report in order to meet the noise level reduction goals. Homes with large wrap-around porches may provide shielding from noise that the Guide will not anticipate. For these reasons, homes with unique features or with dimensions that differ significantly from the average may require the services of an acoustics consultant in order to ensure adequate noise reduction.

Individuals differ in their response to noise. In an aircraft noise-affected neighborhood, a number of residents are very annoyed by aircraft overflights, while quite a few others are not. If properly implemented, the recommendations in this Guide will reduce noise inside the home to levels that most people will find acceptable. The aircraft will still be discernible; sound insulation is not sound elimination. People will know that a plane is passing overhead but, with the techniques outlined in this Guide, the noise should not be so loud that it interferes with normal daily indoor activities. Those individuals, however, who are most sensitive to noise, may continue to be annoyed. Nevertheless, the number of people who perceive unacceptable indoor noise levels can be significantly reduced by the use of proper construction techniques.

House Types

In the MCAS Cherry Point area new homes could include:

- Single-family homes
- Modular single-family homes
- Manufactured ("HUD Code") single-family homes
- Townhouses
- Apartments (rental or condominium)

The recommendations in this guide apply to all of these types of homes, except to HUD Code homes. There are Federal requirements for the construction and safety of manufactured homes. The National Manufactured Housing Construction and Safety Standards Act of 1974 (Title VI of Pub. L. 93-383, 88 Stat. 700, 42 U.S.C. 5401, et seq.) required the U.S. Departments of Housing and Urban Development (HUD) to establish construction and safety standards for manufactured homes. The resulting Manufactured Home Construction and Safety Standards, generally referred to as the "HUD Code" (24 CFR 3280), regulate the design and construction of all manufactured homes in the U.S. A manufactured home (formerly known as a trailer or mobile

home) by definition must have "continued transportability." In contrast, a modular home is assembled from panels and is installed on a site-built permanent foundation. Therefore, modular homes do not have continued transportability and are not covered by the HUD Code (see 24 CFR 3280.7). A manufacturer may elect to construct a structure that is both a manufactured and a modular home (see CFR 3282.12).

Only the HUD Code can be used to limit the construction of manufactured homes, with certain exceptions related to wind loads and foundation design. States and localities cannot preempt Federal requirements with respect to the construction and safety of a manufactured home. A locality can require that all other types of housing be built to attain certain noise level reduction goals, but they cannot for manufactured homes. A locality can only prohibit the use of manufactured homes in certain locations such as in a specified noise zone.

Manufactured homes and some modular homes use thinner gypsum board and particular types of mechanical systems. In addition, where it is necessary to use additional layers of gypsum board on walls or ceilings, there is a question of whether the structure can carry the extra weight. This may make it impossible or cost prohibitive to meet the noise reduction goals for manufactured homes and some modular homes.

Therefore, this Guide does not cover sound insulating manufactured homes. Modular homes should be treated no different than traditional single-family homes.

2.0 Noise Control Basics

2.1 Units Used in Acoustics

A number of different metrics (measures) have been developed to express various aspects of acoustics. It is important to understand several of them in order to make the best use of this Guide.

Aircraft noise is generally expressed in terms of its A-weighted sound level, in units called "decibels." Strictly speaking, the decibel unit should be abbreviated only by "dB"; however, for clarity "dBA" and "dB(A)" are often used to highlight the fact that the sound level measurement has been A-weighted (this weighting system is described below).

The noise exposure in areas around airfields is expressed in terms of the Day-Night Average Sound Level, which is abbreviated by "DNL" in text and "L_{dn}" in equations. DNL is a measure of the average A-weighted sound level of all aircraft flights occurring in a 24-hour period with nighttime operations being counted more heavily as described below. The unit of DNL is also the decibel.

The sound insulation properties of building construction materials are described by Sound Transmission Loss (TL) or Sound Transmission Class (STC). These measures of sound insulation are also described below.

Day-Night Average Sound Level (DNL) and Noise Contours

Aircraft noise exposure in a community is usually described in terms of noise contour maps. These indicate bands or zones around airfields where the average noise level can be expected to fall within the ranges specified by the contour lines. Most noise contour maps show contour levels of DNL 65 dB and above in 5 dB increments.

The acoustic metric used at MCAS Cherry Point is the Day-Night Average Sound Level (DNL or L_{dn}). As noted above, this is a cumulative measure of the noise exposure during a 24-hour calendar day. A 10 dB penalty is added to noise events occurring between 10:00 p.m. and 7:00 a.m. to reflect their greater intrusiveness and potential for disturbing sleep. The DNL is the result of averaging the A-weighted sound pressure level over 24 hours for aircraft activities taking place on an average busy day. The average busy day is determined by analyzing flight activity over a full year. This gives an indication of the year-round average noise exposure for the community.

Sound Transmission Loss (TL)[1]

This is the physical measure that describes the sound insulation value of a building element such as a window or wall. Values of TL are determined in acoustical laboratories under controlled testing methods prescribed by the American Society for Testing and Materials (ASTM). The TL is expressed in decibels (dB), and the greater the sound insulation, the higher the TL value and the less sound will be transmitted through the building material. TL values are determined for different frequency ranges and give an indication of how a building product or assembly responds differently to sounds at different frequencies.

Sound Transmission Class (STC)[2]

Since working with a series of TL measurements for different frequencies can be cumbersome, a single-number descriptor based on the TL values has been developed. This rating method is called the Sound Transmission Class (STC). As with the TL, the greater the STC rating for a construction method or component, the higher the sound insulation. Originally, STC ratings were developed as a single-number descriptor for the TL of interior office or apartment walls for typical office noise and speech spectra. Now, they are used for exterior building components as well. Most acoustical materials and components are commonly specified in terms of their STC ratings.

2.2 Aircraft Noise

Interference with Activities

The problem of aircraft noise has been recognized and studied in this country since the 1950s. Opinion surveys indicate that interference with telephone usage, listening to television and radio, and conversations invoke the most complaints. However, after a home has been sound insulated, residents notice improvements in their ability to carry out these normal activities as well as to fall asleep and concentrate.

Fears of permanent hearing damage from flyovers have been shown to be unfounded. A large number of studies on the physical health effects of aircraft noise exposure have led to the general conclusion that residences near airfields are not exposed to high enough sound levels to warrant concern. The principal effect of aircraft noise on airfield neighbors is annoyance, caused by interference with daily activities.

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[1] Tests to determine TL are described in American Society for Testing and Materials (ASTM) Standard E90.

[2] STC is described in ASTM Standard E413.

Aircraft Noise Characteristics

Noise intrusion from aircraft activities is perceived as more disturbing than other kinds of noise because of two primary characteristics. Unlike many other community noise sources, such as highway noise, which tend to be fairly constant, aircraft noise consists of sporadic individual noise events with a distinct rise and fall pattern. People do not, in general, respond to these events as just another component of the "background noise" of their day-to-day lives. Some people get used to the noise, but many others feel that each individual flyover event is recognizable and disturbing.

The noise level experienced at a particular dwelling will depend on its location relative to the aircraft flight paths and the mode of ongoing aircraft operations (arrivals or departures). For homes very near the airfield, the second quality that makes aircraft noise more intrusive is its higher level, or loudness, than other types of community noise.

Aircraft Sound Spectrum

The noise produced by modern aircraft contains acoustical energy over a wide frequency range. The audible noise includes many sounds from a low-frequency "rumble" to a high-frequency "whine." The exact character depends on the aircraft type and the operation performed (takeoff, landing, or ground run-up). Low-frequency noise (below 500 Hz) penetrates walls, roofs, doors, and windows much more efficiently than does high-frequency noise. Higher frequencies (above 1,000 Hz), however, are carried through cracks and vents better. Also, people hear higher frequency sound better, the human ear being more sensitive above 1,000 Hz than below.

Since aircraft noise differs somewhat from other types of community noise, it is important to identify the characteristics of the noise that sound insulation is protecting against. Most materials and construction methods are more effective at insulating in one part of the frequency spectrum than in others. Knowing the noise characteristics helps in choosing the best materials for sound insulation. This Guide has been designed specifically to protect against noise from the types of aircraft that use MCAS Cherry Point rather than noise from civilian aircraft, highway traffic, or other types of noise sources.

Most of the sound energy from military aircraft operations is found at middle frequencies. This is different from civilian aircraft that have more equal sound at low and middle frequencies. Section 2.4 discusses the process by which sound is transmitted into a dwelling interior.

2.3 Sound Insulation to Reduce Noise

Total "soundproofing" of the dwelling, such that aircraft operations are not heard, is usually not practical or cost-effective. The goal for residential sound insulation is to *reduce* the dwelling

interior noise levels due to aircraft operations to an acceptable level, that is, a level where it no longer interferes with daily activities.

Interior Noise Objectives

The U.S. Department of the Navy has established land use compatibility criteria for exposure to aircraft noise. The land-use compatibility table states that residential use is discouraged in the 65-69 dB DNL zone, and strongly discouraged in the 70-74 dB DNL zone. The table recommends that a home exposed to a DNL of 65 to 69 dB should provide at least 25 dB of NLR, a home exposed to a DNL of 70 to 74 dB should provide at least 30 dB of NLR, and a home exposed to a DNL of 75 to 79 dB should provide at least 35 dB of NLR. The use of other NLR goals may be appropriate in many cases, especially if a noise metric other than DNL is used in the community. The table assumes that typical homes can provide an NLR of 20 dB; separate recommendations are provided for homes exposed to a DNL of 60 to 64 dB in order to ensure that an NLR of 20 dB is provided.

Room Variations

The noise level of different rooms in a house depends on the amount of sound absorption within the room, as well as on the noise entering from outside. Upholstered furniture, drapes, and carpeting absorb sound while hard surfaces do not. The exterior sound level is transmitted through the outside walls (depending on their construction) and is further modified by the absorption inside the room (from the various furnishings) to determine what the interior noise level will be. *The calculations contained in this report are based on the assumption that all rooms would be furnished; noise levels in unfurnished rooms would be higher.*

Expected Dwelling Noise Level Reduction

An acoustically well-insulated home with windows and doors kept closed can provide 30 to 35 dB of NLR whereas more typical, unmodified designs might provide 20 to 25 dB of NLR. Experience has proven that the objectives discussed here are reasonable when construction materials and methods follow the guidelines presented in Sections 3.0 and 4.0. Providing more than 40 dB of noise level reduction is not usually practical for a typical residence. Of course, sound insulation will not have any effect on outdoor activities. The advantage of sound insulation is that it provides a refuge from external aircraft noise levels.

In general, it is more efficient and cost effective to take acoustic performance into account at the start when designing and building a home. Remodeling a pre-existing home is far more costly and time consuming than anticipating and building using good sound insulation techniques. This Guide was developed for new homes; different materials and techniques would be appropriate when renovating houses to achieve the NLR goals.

2.4 Basic Sound Insulation Concepts

Sound Transmission

In order to effectively examine noise control measures for dwellings it is helpful to understand how sound travels from the exterior to the interior of the house. This happens in one of two basic ways: through the solid structural elements and directly through the air. Figure 2-1 illustrates the sound transmission through a wall constructed with a brick exterior, stud framing, interior finish wall, and absorbent material in the cavity.

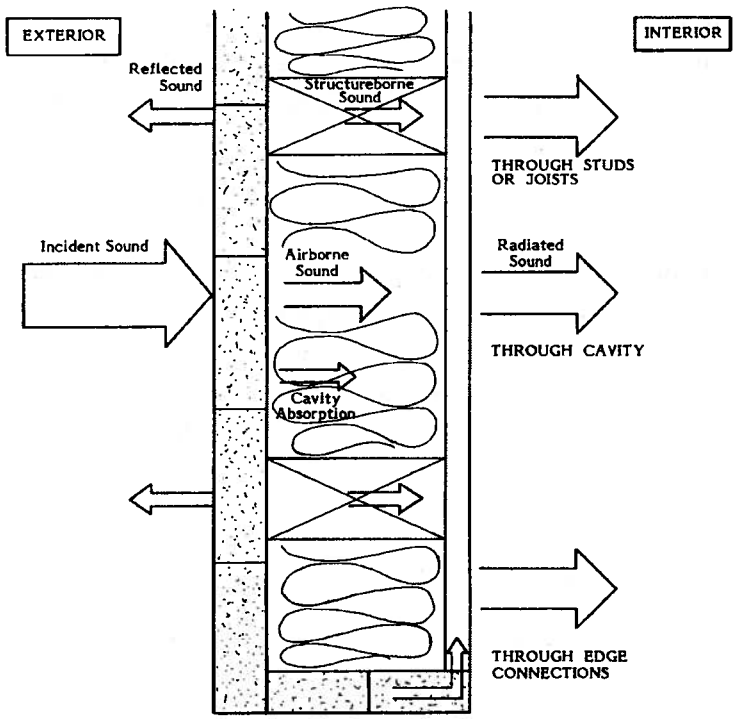

Figure 2-1. Pictorial Representation of Sound Transmission Through Built Construction

The sound transmission starts with noise at the wall exterior. Some of this sound energy will be reflected away and some will make the wall vibrate. The vibrating wall radiates sound into the airspace, which in turn sets the interior finish surface vibrating, with some energy lost in the airspace. This finish surface then radiates sound into the dwelling interior. As the figure shows, some vibrational energy also bypasses the air cavity by traveling through the studs and edge connections.

Openings in the dwelling, which provide air infiltration paths through windows, vents, and leaks, allow sound to travel directly into the interior. This is a very common, and often overlooked, source of noise intrusion. Basically, any way that air enters a home, sound will also enter.

Flanking is a similar concept and usually refers to sound passing around a wall. Examples of common flanking paths include: air ducts, open ceiling or attic plenums, continuous side walls and floors, joist and crawlspaces.

Figure 2-2 displays the three different major paths for noise transmission into a dwelling: air infiltration through gaps and cracks, secondary elements such as windows and doors, and primary building elements such as walls and the roof.

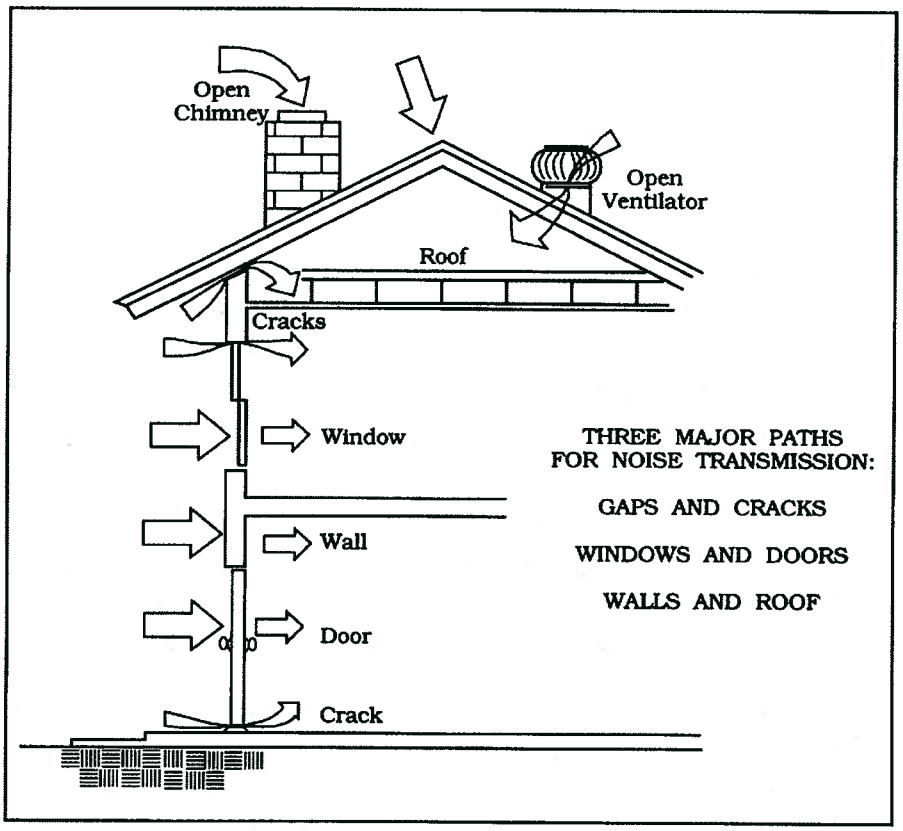

Figure 2-2. Sound Transmission Paths Into Dwelling Interiors

Low-frequency sound is most efficiently transmitted through solid structural elements such as walls, roofs, doors, and windows. High frequencies travel best through the air gaps.

Within these broad categories, different building materials have different responses based on the frequency of the incident sound and varying abilities to insulate against sound.

Reducing Transmitted Sound

The amount of sound energy transmitted through a wall, roof, or floor can be limited in several ways. First, all air infiltration gaps, openings, and possible flanking paths must be eliminated wherever possible. This is the single most important, but occasionally overlooked, step in noise level reduction. This includes keeping windows and doors closed and putting baffles on open-air vents. Some materials reflect more of the incident sound, converting less of it into vibrational energy. The mass of the exterior and interior panels influences how much sound will pass through them. The more mass a structural element has the more energy it takes to set it into vibration, so using heavier building elements generally blocks more noise. Then, absorption in the air cavity, resilient mounting of interior finish panels, and mounting the exterior and interior panels on different studs can further reduce the sound transmitted to the room. The primary approaches for improving sound isolation are:

1. Elimination of openings and flanking paths.
2. Using higher STC windows and doors.
3. Adding mass to walls or ceilings.
4. Isolation of panel elements through increasing their separation, mounting the interior and exterior panels on different studs, or resiliently mounting the interior panels.
5. Adding absorptive materials between the studs or joists.

Acoustical Design

The most important, or controlling, sound paths must be identified in order to know how to modify a dwelling design to meet a specified noise criterion. The ideal sound insulation design would focus on those elements that transmit the most acoustical energy into a room. This eliminates any weak links in the building's insulation envelope.

Windows generally allow more noise intrusion than walls; as more of the wall area is taken up with windows, the overall noise protection decreases. This effect is significant even for massive wall materials, such as brick. Intuition suggests that a brick wall would protect better against sound than siding and this is true when these materials alone are compared. But, putting a weak window or an especially large window into a brick wall will cause the overall construction to perform very poorly since noise enters through the weakest path. On the other hand, installing a high-STC window in a wood-framed sided wall will give much better noise level reduction than building a weak window into a brick wall.

The STC rating, defined in Section 2.1, is a measure of the material's ability to insulate against sound; the higher the STC rating, the better the insulator. Proper use of STC ratings will be discussed in more detail in Section 3.1. Table 2-1 gives a brief list of typical STC ratings for common building elements. Much of the variability for walls and roofs is due to the type of interior finish, the type of studs or joists, and whether there is insulation in the stud or joist cavities. The ratings in Table 2-1 cannot be used directly to estimate noise level reduction because they do not account for the presence of other elements or the areas of each element.

In most cases, after making sure that openings remain sealed, the windows are the controlling sound paths. Using acoustical windows typically does more to improve the sound insulation performance than any other design modification. Exterior doors typically require higher STC ratings. Depending on the noise level reduction goal, other elements may become important. Ceilings and exterior walls may require special construction as well, particularly in the higher DNL noise zones. Treatments for these paths and others are discussed in Sections 3.2 through 3.8 of this Guide.

Table 2-1. Typical STC Ratings for Common New Construction Elements

LARGE ELEMENTS	
EXTERIOR WALLS	STC (dB)[1]
Vinyl Siding on Wood Frame	36-37
Insulated Concrete Forms	42-55
ROOFS	
Vented Attic with Flat Ceiling	49-53
Vaulted Ceiling	41-45
FLOORS	
Elevated House on Pylons	App. 43
Vented Crawlspace	App. 48
SMALL ELEMENTS	
WINDOWS	
Double Pane Glass	24-29
DOORS	
Swinging Steel or Fiberglass	23-25
Swinging Steel or fiberglass with Storm	29-33
Sliding Glass	25-29

[1] A higher STC value indicates greater sound insulation.

Problem Areas

Sound intrusion problems are commonly caused by:

1. Building construction components and configurations not providing sufficient sound insulation.
2. Building elements, such as windows, doors, walls, roofs, and floors chosen and combined in an unbalanced way so that some parts are much weaker sound insulators than others.
3. Unintended openings or sound-flanking paths caused by improper installation of construction elements.

Thermal Insulation

While homes that are well insulated thermally often perform well acoustically, thermal insulation is not always a good indicator of sound insulation. Many thermal windows provide little sound insulation when compared to walls or acoustical windows and are frequently the weak link in the building envelope. However, thermal treatments usually eliminate air infiltration and may serve to improve the acoustical performance of a dwelling for that reason. The presence of insulation in walls or ceilings is far more important than the type of the insulation.

Shielding

The last concept to consider is shielding. This refers to the fact that the side of the dwelling that faces away from the flight path and does not have an open line-of-sight to it will be protected somewhat from the noise. The shielding may be as much as 10 dB in some cases, though values on the order of 5 dB are more common. Sides of the house facing directly toward the flight path are unshielded. Sides that face the flight track at an angle may benefit from some minor shielding effects. Sometimes, however, sound is reflected off nearby buildings in such a way as to counteract the shielding benefits. Shielding must be examined on a case-by-case basis and the possibility of aircraft straying from the usual flight path must be taken into account before assuming a consistent shielding effect. Considering shielding is not useful when predicting indoor noise levels at homes near MCAS Cherry Point, because the aircraft typically fly all around houses instead of only on one side.

3.0 Building Elements

This section provides specific guidelines for modifying standard construction designs and practices to meet the need for aircraft sound insulation in new homes. A general discussion of construction materials and methods is given in Section 3.1. Sections 3.2 through 3.8 address techniques for use with weatherstripping, windows, doors, walls and ceilings, attics, floors, HVAC systems, and other miscellaneous elements.

In high wind (velocity) zones the building code requires using windows and doors that are rated for impact resistance. Any acoustically rated windows or doors must also be able to meet these criteria.

The recommendations apply to all habitable rooms, as well as to rooms that are open to habitable rooms.

3.1 Evaluating Construction Materials and Methods

Informed Use of STC Ratings

STC ratings are the most common measures of acoustical performance given by manufacturers of building materials. For this reason, it is important to understand how to use STC ratings to evaluate construction materials and systems.

Two different construction methods or components may have identical STC ratings and yet may block aircraft noise differently because or their response at different frequencies. One method or component may perform better than another at some important frequencies. Selecting a construction method or component from a group only on the basis of the highest STC rating may not provide the intended sound insulation. This is because the STC rating does not take into account the strong low-frequency nature of both civilian and military aircraft noise. This guide has taken the ability of typical products to block aircraft noise into account. The recommended materials listed in Section 4.0 (and their STC ratings) were evaluated for frequency response prior to formulating the design packages.

Combining Building Elements

As mentioned earlier, the acoustical performance of the building depends on the combined performances of each of the elements. The final result depends on the transmission loss (or STC) and the relative surface areas of the elements. If any of the components has poor insulation properties the overall performance can be seriously weakened. This is why it is important to focus on the weaker elements and to consider the relative areas of the components.

As a rule-of-thumb, if a weaker element will be included in the assembly, its size should be kept to a minimum. For example, if a pane of glass is to be used for a vision panel in a door, it should be kept small and should be constructed of insulated glass. Similarly, very large windows degrade the noise level reduction of an otherwise effective concrete wall. If a cathedral ceiling is included, it should be designed so that there is a larger-than-standard air space between the ceiling and the roofing system, and this space must be insulated. Sensible compromises can be made to preserve the noise level reduction of the home without sacrificing aesthetics, provided the principles explained in this Guide are employed.

3.2 Sealing and Weatherstripping

Good weatherstripping and caulking around windows and doors is crucial to effective sound insulation. The STC rating of the overall assembly can vary by as much as 2 to 4 dB, depending on perimeter infiltration. For these assemblies, any perimeter leakage will degrade the performance of the window or door and can be the controlling factor in the noise isolation. This is generally not an issue with new construction, but homeowners must understand the importance of maintaining weatherstripping in good condition.

For acoustical purposes, compressible neoprene weatherstripping is preferred over felt or other fibrous types. Neoprene is not as porous and compresses better against the window or doorframe. Also, felt and fibrous weatherstripping materials tend to deteriorate more quickly than neoprene and must be replaced more often.

3.3 Windows

Options Overview

The exterior windows are usually one of the weakest elements in the dwelling's sound insulation performance. Improving the acoustical properties of the windows is one of the simplest ways of lowering the overall sound transmission into the house. Design modification options include using thicker glass and wider airspaces between the panes of glass. Specialized acoustical windows provide maximum sound insulation, and should be used in the loudest environments, as specified in Section 4.0.

Acoustical Performance

The thicker, high-quality insulated glass units should be ¾ inch to 1 inch thick and, for the best noise level reduction, should incorporate at least one lite (pane) of laminated glass, preferably ¼ inch thick. Laminated glass provides significantly better transmission loss than standard, float glass. Tempered glass is also acoustically superior to standard glass, but is not nearly as effective as laminated glass. Off-the-shelf thermopane units are typically available with ratings ranging

from STC 24 to 29, and upgraded acoustical units with thicker glass may provide ratings as high as STC 30 to 36.

Acoustical windows differ significantly from ordinary residential windows. The design of an acoustical window has a greater frame depth, the glass lites are heavier, the frame extrusions may be thicker, and the weatherstripping and seals are more substantial. All of these measures are necessary to provide the high degree of sound insulation required for the window assembly.

In order to achieve ratings above approximately STC 36 it is typically necessary to use either a double pane window with a storm unit attached (often referred to as a "combination" window), or an assembly of two single or double pane windows connected together (often referred to as a "dual" window). Figure 3-1 shows a typical acoustical combination window installation with the most important features highlighted. Figure 3-2 shows schematically the features of an acoustical dual window. Combination and dual acoustical windows with STC ratings of 37 to 46 are available in a variety of styles and finishes, including aluminum and vinyl, and special windows with STC ratings in the 50s are available from a few manufacturers. Information on specialized acoustical windows is available in Appendix A. They are considerably more expensive than typical residential windows.

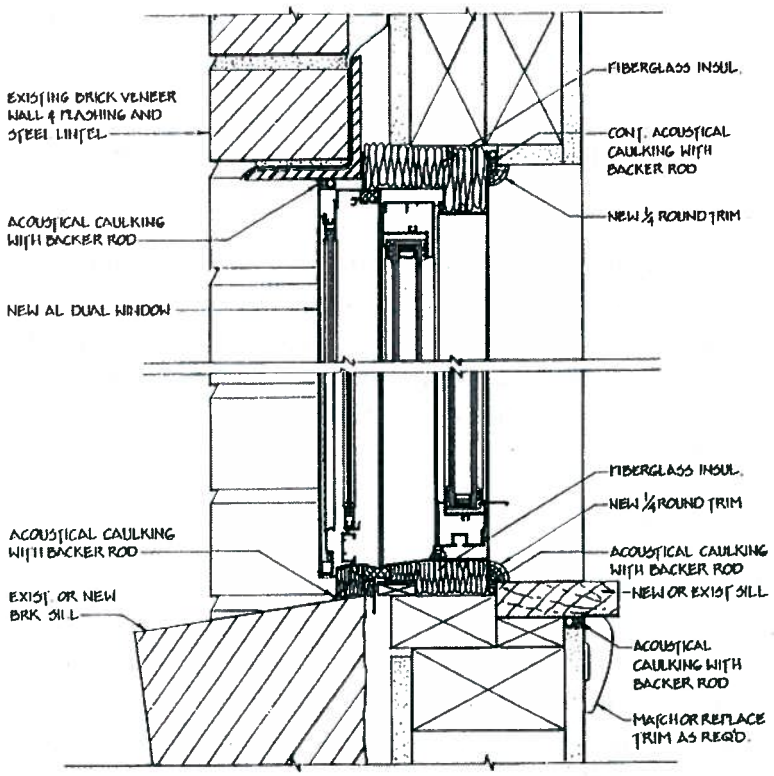

Figure 3-1. Typical Combination Window Installation Detail

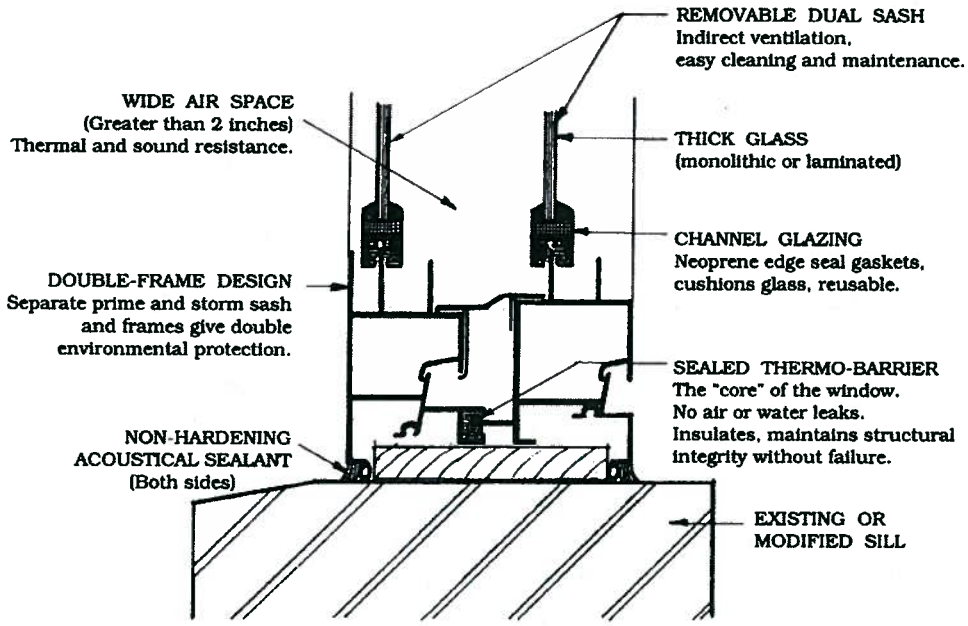

Figure 3-2. Typical Dual Acoustical Window

Thermal Performance

Insulated glass windows are recognized to block the transmission of heat (in winter or summer) much more effectively than single pane glazing. Increasing the thickness of the glass and the airspace, as recommended for noise level reduction, further improves their thermal performance.

Because of the above-mentioned design features, plus the common inclusion of thermal barriers at the frames, acoustical windows perform exceptionally well as thermal barriers. They allow approximately one-tenth the air infiltration of a typical 20-year-old double-hung wood window with single pane glass. The R-value (a measure of thermal resistance) for acoustical windows is R-4. For comparison, the R-values of most off-the-shelf single pane and double pane windows are R-1 and R-3, respectively.

Installation Considerations

For the windows to provide the required noise reduction they must remain tightly closed. Ways to maintain ventilation will be discussed in Section 3.8. It is important to note, however, that this requirement precludes the use of jalousie or louvered windows in a sound insulation design. Double-hung, single-hung, horizontal rolling/sliding, casement, fixed, and awning/hopper windows are all acceptable for noise reduction, provided they have the required STC rating. However, it must be noted that the STC ratings vary a few points between these various operational types for a given window manufacturer or model. Fixed windows normally have the

highest STC rating, sliding/rolling windows have the next highest, hung windows have slightly lower ratings, while casement and awning/hopper windows tend to have the lowest STC ratings.

Other considerations when preparing window specifications include maintainability, warranty, manufacturer's service, and proper installation. It is possible to install the best acoustical window improperly. If it does not fit tightly enough, air infiltration will significantly reduce the effectiveness. Starting with a too-small window unit and filling in the void around the window with a low-mass material such as fiberglass is unacceptable. Continuous wood blocking infill is recommended with fiberglass insulation filling small voids.

3.4 Doors

Options Overview

Doors are comparable to windows in the amount of sound they allow to enter the dwelling. Many typical residential doors require modification or substitution to provide the necessary protection from aircraft noise. As with windows, there are specialized acoustical units available, as well as acoustical storm doors. The following factors are important in evaluating doors for sound insulation:

- Door composition: insulated metal or fiberglass, sliding glass; core material, additional internal insulation, etc.
- Door weight (can be estimated by pull-weight).
- Presence and type of fixed window panels.
- Quality of seals and weatherstripping and how tightly they seal.

The options for improving the noise level reduction of residential doors include:

- Installation of a tightly fitting storm door with thick (or laminated) glass; or use of a specialty acoustical storm door.
- Installation of a secondary French door.
- Use of thicker glass in sliding glass doors or specialty acoustical sliding glass doors.

Standard Doors

STC requirements are outlined in Section 4.0 for each type of door (swinging and sliding doors).

Glass panels in the primary door can reduce the STC rating by several points, depending on the thickness of the lite and the surface area. The thinner the glass and the larger the area it covers, the more it decreases the sound insulation of the door. When vision panels are required, it is best to keep them small and use insulated glass units with thick glass.

Swinging Storm Doors

External storm doors are sometimes used in the MCAS Cherry Point area and can improve the STC rating by approximately 5 to 9 points and up to 19 points with special acoustical storm doors. In order for storm doors to be effective for sound insulation, they should incorporate thick glass (ideally 1/4-inch-thick laminated glass in high noise zones) and have a heavy core. Storm doors must be mounted year-round to provide an acoustical benefit. Replacing the glass panel with a screen insert in the summer months will reduce the sound insulation of the home considerably but many homeowners may wish to exercise this option for periods when aircraft activity is light. A list of acoustical storm door suppliers is included in Appendix B.

Acoustical Swinging Doors

Acoustical doors, with a typical rating of STC 29 to 43, are similar in appearance to standard entrance doors. However, due to the high cost of acoustical doors, it is often preferable instead to use more typical residential doors with acoustical storm doors.

Because of their specialized construction and superior sealing design they provide a very noticeable improvement in noise reduction. Whether metal or wood, the internal construction of acoustical doors differs substantially from standard doors. Layering of materials, along with added absorption and mass, increases their weight to approximately 12 to 14 pounds per square foot.

To eliminate sound flanking between the closed door and the jamb, acoustic doors are designed with special fixed acoustical seals at the sides and top. A drop seal along the bottom activated by a cam rod when the door is closed is sometimes used to make tight contact with the threshold. In other cases, fixed bottom seals that contact a raised threshold or saddle are used. Also, because of their extra weight, acoustical doors usually require reinforcement of the door frame and heavy-duty mounting hardware and hinges. Manufacturers often provide customized frames with their acoustical doors.

Sliding Glass Doors

There are two options for improving the sound-insulating properties of sliding glass doors: using acoustical units, or using primary and secondary doors. The disadvantages of acoustical sliding glass doors are that they are very expensive, very heavy, and can have a high threshold. The disadvantages of using primary and secondary sliding glass doors is having to open two doors to leave the building, and that the two frames would not fit in the width of a typical 2x4 stud wall. This same secondary door concept can be used with French doors. Of course, the installer must ensure that there is no conflict in the operation and opening hardware of the two door sets. Good weatherstripping should be installed on both doors.

Installing a secondary door generally requires building a second frame positioned to mount the door approximately 3 to 4 inches away from the primary door. This dual-door assembly has proven successful in that it raises the STC rating by 14 to 16 points (when the secondary door has an STC 29 rating and utilizes 1/4" laminated glass, and there is at least 3.5" airspace between the primary and secondary door). Figure 3-3 shows a system of two sliding glass doors with the secondary door mounted outside of the typical door position.

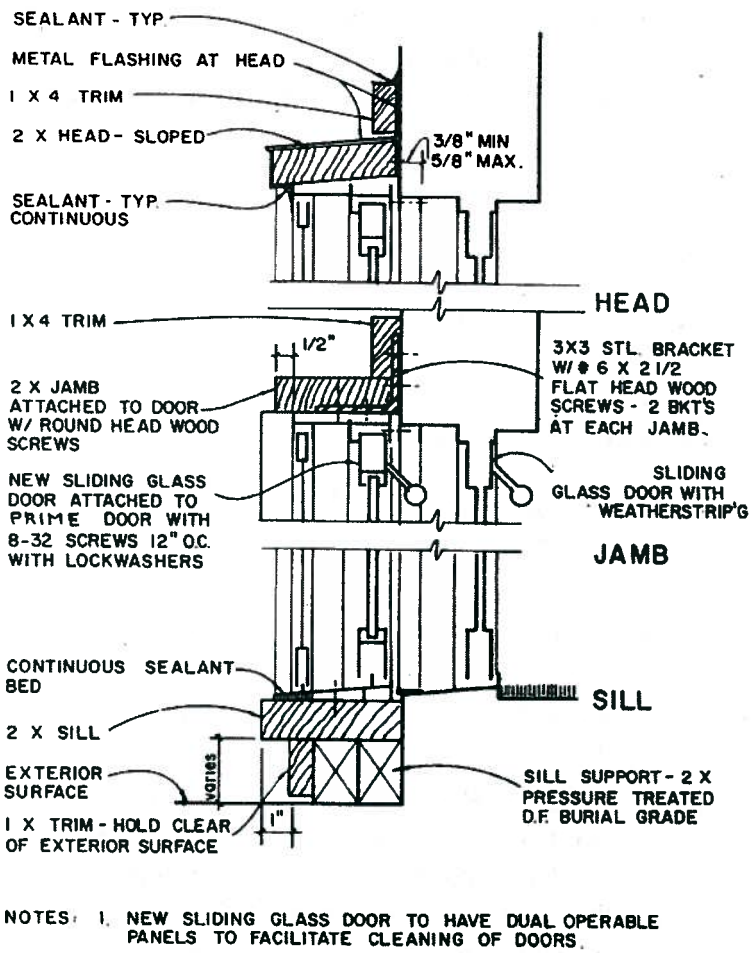

Figure 3-3. Secondary Sliding Glass Door Detail

Door Sidelights and Window and Door Transoms

Door sidelights and window and door transoms should not be neglected. However, there rarely are acoustical tests available for the window or door assembly that includes the applicable transoms or sidelights. Therefore, we recommend treating them as separate windows, even if they are attached to a door.

Installation Considerations

As with windows, it is of critical importance to ensure that the door fits well, that all gaps and leaks are sealed, and that the door remains closed. High-quality acoustical weatherstripping is recommended to ensure the noise reduction of the door. Sound attenuation through standard doors can be improved by fitting them with special acoustical seals, including drop seals mounted to the back or fully mortised in the door's bottom rail, and compressible bulb-type neoprene gaskets at the jambs (sides) and head (top). If the door does not fit squarely into the frame it will not seal properly and unnecessary noise infiltration will result. In all cases, avoid openings such as mail slots in doors or the use of pet doors.

3.5 Walls

Determining Wall Designs

Depending on the dwelling's exterior construction and materials, it may be necessary to use specialized designs for walls. Generally, walls that have vinyl or cement board siding require improvements such as staggered studs or resilient channels in the highest noise impact zones. Dwellings that use insulating concrete forms or other masonry systems typically do not.

For the purposes of this design guide, walls in the MCAS Cherry Point area can be classified as one of the two following types:

- Insulated Concrete Form (ICF) Construction: At least four-inch thick normal weight concrete between approximately 1-3/4" to 2" insulating forms, with 1/2" gypsumboard at interior. The entire wall must have concrete, not just a portion of it, for this designation to apply. If siding or a skim coat of stucco is applied over insulated concrete forms, the wall is still designated an insulated concrete form wall.
- Siding on Wood-Frame Construction: All types of siding including vinyl and cement board. Construction includes siding on 1/2" nominal OSB or plywood sheathing on 2x4 or 2x6 wood studs spaced 16" on center with batt insulation, and 1/2" gypsumboard at the interior. If a portion of the wall is ICF and a portion wood-framed, consider the wall to be sided on wood-frame construction.

The rare instances of Exterior Insulating Finish Systems (EIFS) on wood framing should be designated "Siding on Wood-Frame Construction" for the purposes of this Guide. The rare instances of Stucco on concrete masonry should be designated "Insulated Concrete Form Construction" for the purposes of this Guide.

When studs are spaced 24" on center the acoustical performance may be slightly better than for other sided wood-framed walls. Conversely, when the stud spacing is 8" or 12" on center the acoustical performance may be worse; using this stud spacing is common for the first floor of a

three-floor home, in high-wind (velocity) zones, or when windows or doors comprise a large proportion of the wall.

It is sometimes necessary for structural reasons to use a layer of plywood or OSB at the interior surface of the wood studs behind the gypsum board. This should not adversely affect the STC rating.

Specific Interior Wall Designs for Siding on Wood-Frame Construction

One technique for increasing the mass and resiliency of the wall or ceiling is to attach the gypsumboard to the studs with 1/2-inch, resilient, vibration-isolation channels ("resilient channels", or "RC"). This will provide an STC rating improvement of 7 points over that for a typical wood frame construction. The resilient-mounting channels should be attached to the studs so that they run horizontally for walls (and perpendicular to the joists for ceilings). This minimizes the vibration transmission from the supporting studs (or joists) to the channels and the wallboard. The spacing of the channels should be no closer together than specified by the channel manufacturer; typically this is 24" on center. The screws used to attach the gypsum board to the channels must be short enough that they do not contact the studs. The common installation error of using too long screws allows vibration to travel from the stud to the gypsumboard, rendering the system ineffective. An alternative to this design is to use a new product called resilient sound isolation clips with rigid steel channels. This product is available from PAC International. It is more costly than resilient channels and uses more wall thickness but provides significantly better acoustical performance.

A second technique involves using the resilient channels mentioned above, and changing the wall construction from 2 x 4 studs to 2 x 6 studs. This will increase the STC by 11 points over typical siding on 2x4 stud construction, and will allow space for R-19 insulation.

The third, and most effective, option is to construct the interior wall on a set of staggered studs so that the interior and exterior finish surfaces are not rigidly connected to each other except through the top and bottom plates. This system uses two rows of studs: one row of studs spaced 16" on center supporting the sheathing, and a second row spaced 16" on center supporting the interior wall finish. The end result is that there are studs each 8" on center. Figure 3-4 shows how to implement this construction. This modification provides acoustical decoupling and separation between the exterior and the interior of the room, resulting in a 13-point increase in the STC rating over standard siding on 2x4 studs. A larger space between the interior and exterior panels will yield a greater STC improvement. Section 4.0 references a staggered 2 x 4 stud construction on a 2 x 6 base plate. If it is necessary to have 2x6 studs for strength, a variation on this design is to use 2x6 studs staggered on a 2x8 base. Such a design should provide a generally similar acoustical performance as the 2x4 studs staggered on a 2x6 base. With any staggered stud design it might be necessary to provide additional fire stopping.

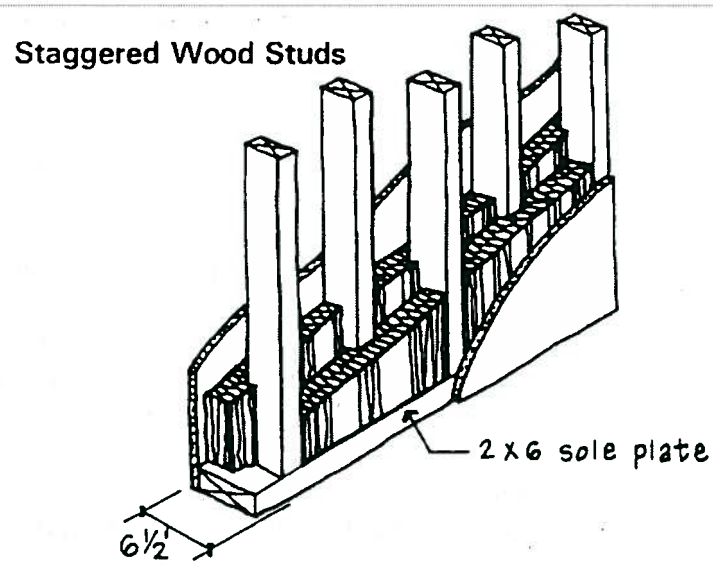

Figure 3-4. Staggered Wood Stud Construction

To absorb sound, fiberglass batts are placed between the studs in the wall cavity. Thermal insulation of at least R-11 should be used to ensure a thick enough layer. Batts or blankets should be held firmly in place between studs, with fasteners if necessary, to prevent sagging; however, packing the insulation such that it is compressed may slightly *reduce* its acoustical (and thermal) performance. Blown-in insulation is not recommended in walls for acoustical purposes because of the tendency to compact over time.

Specific Interior Wall Designs for Insulating Concrete Form (ICF) Construction

The primary way to improve the STC rating of an ICF wall is to select a wider wall that allows a wider pour of concrete. The typical wall was assumed to have a 4″ thick pour of concrete. The next thicker wall considered was with a 6″ thick pour of concrete. The STC ratings of this assembly will vary based on the thickness of the forms and the type of exterior finish.

The wall construction designs referenced above are summarized in Table 3-1. In this table O.C is the on-center spacing of the studs.

Table 3-1. Acoustical Wall Designs and STC Ratings

	Exterior Side	Structure	Interior Side	STC Rating
Resilient Channel on 2x4 studs	Siding, Wood sheathing	2x4 16" O.C. with batt insulation	RC on studs, 1 layer ½" gypsumboard	43
Resilient Channel on 2x6 studs	Siding, Wood sheathing	2x6 16" O.C. with batt insulation	RC on studs, 1 layer ½" gypsumboard	47
Staggered 2x4 on 2x6 base	Siding, Wood sheathing	2x4 16" O.C. for each row (staggered on 2x6 base plate) with batt insulation	1 layer ½" gypsumboard (attached only to interior-side studs)	50
Staggered 2x6 on 2x8 base	Siding, Wood sheathing	2x6 16" O.C. for each row (staggered on 2x8 base plate) with batt insulation	1 layer ½" gypsumboard (attached only to interior-side studs)	Approx. 50
ICF with 4" Concrete	1-3/4" Form	4" normal weight concrete	1/2" Gypsumboard on 1-3/4" Form	High 40s
ICF with 6" Concrete	1-3/4" Form	6" normal weight concrete	1/2" Gypsumboard on 1-3/4" Form	Low 50s

3.6 Ceilings and Roofs

Improved ceilings are sometimes necessary where there is a roof over noise-sensitive rooms such as bedrooms, kitchens, living rooms, family rooms, etc. There is no need to modify the ceiling of any first-floor rooms where they are completely covered by a second story room. Non-habitable rooms, such as garages and mudrooms in breezeways, are generally not given improved ceilings unless they open directly to habitable rooms without interior doors in between the rooms.

Specific Interior Ceiling Modifications

The ceilings of top-floor rooms may need to be modified to provide increased noise protection. The same methods that are used in wall constructions can be used for ceilings. The standard roof construction in the MCAS Cherry Point area is assumed to be: asphalt shingles or standing seam metal roofing, plywood or OSB roof deck, ridge and soffit vents, engineered wood trusses at least 14" deep throughout the span, 10" minimum thickness of blown-in or batt insulation, and 1/2" gypsumboard at the interior. This design is designated "vented attic" construction and has an STC 45 rating.Resilient channels mounted perpendicular to the bottom of the ceiling joists with one layer of ½" gypsumboard attached to the channels will increase the rating to approximtately STC 55.

With some vaulted ceilings the roof framing is less than 14" deep and the STC rating is significantly lower. One such design is shingles, wood roof deck, 2x10 rafters with batt

insulation, and 1/2" gypsumboard. This design has a rating of only STC 33. To provide good acoustical performance the roof framing should be at least 14" deep (throughout the span), when sound insulation is being considered.

Attic access panels, pull-down stairs, and whole-house ceiling fans should have movable or operable covers consisting of 3/4" plywood, or other equally massive material, with continuous neoprene perimeter seals.

Attic Vents

Attics typically have open-air vents at the gable ends or a combination of ridge and soffit vents. Soffit vents are shielded by the roof and generally need no modification. Off-the-shelf acoustical louvers can be applied to baffle the sound passing through gable-end vents. Built-in-place baffles could be used under ridge vents to reduce noise intrusion. These consist of 3/4" plywood covered with 1" thick rigid fiberglass insulation; the plywood panels are oriented in such a way that noise (and air) must be reflected on at least one fiberglass-lined surface before it can move into the attic.

Attic Insulation

When considering the upgrade of thermal insulation to reduce noise levels it is important to understand what the insulation will do. Thermal insulation materials will act to absorb sound that is reverberating in the attic or in the space between flat panels. It does <u>not</u> prevent noise from entering the space. That is, it has no appreciable acoustic "insulating" properties but acts as an absorbent instead. To keep sound out, barriers must be used which increase the mass of the roof or ceiling. As a sound absorbent, fiberglass batts and blown-in fiberglass or mineral fiber can be applied between the rafters or ceiling joists.

The sound absorption of a material should not be confused with noise level reduction (NLR). There is no direct relationship between a material's sound absorptive properties and the overall NLR.

A simple method for determining the proper thickness of sound-absorbent materials is to use the concept of the material's thermal rating (R-value). This R-rating is a commonly used and well-known rating for building products. The R-values and thickness for several common insulation materials are given in Table 3-2. The value of the sound absorption at lower frequencies depends on the thickness of the material. For noise sources with a significant low-frequency component, such as aircraft flyovers, the thickness is the most important parameter. Thicker materials provide better low-frequency sound absorption.

Table 3-2. Material Thickness and R-Value for Common Insulating Materials

Material	Thickness, Inches		
	R-11	R-19	R-30
Roll or Batt Fiberglass	3.5	5.25	9
Blown-In Fiberglass	5	8	13
Mineral Fiber	4	6.5	11

Skylights

Skylights are rare in the MCAS Cherry Point area for new homes. There are possible measures to improve the sound insulation of skylights such as using products with high STC ratings or using secondary interior glass panels with acoustical seals. For the purposes of this guide it is assumed that skylights will not be provided.

3.7 Floors and Crawl Spaces

Options Overview

Dwellings in the MCAS Cherry Point will usually have one of these three types of floor systems at the ground level:

- Concrete slab
- Crawlspace
- Pylon foundations (e.g., for a beach house)

Since noise control measures are concerned with the external building envelope, floors between stories in a home are not addressed.

There are three stages of floor design improvements for sound insulation:

- Eliminating, sealing or baffling any openings.
- Installing insulation between the floor joists.
- Attaching a barrier panel to the underside of the floor joists or between the perimeter of the house and the ground (a skirt).

Concrete slabs require no treatment. Crawl spaces and pylon foundations will be discussed below.

Crawl Spaces

One common floor system for new residences consists of wood joist construction over a vented crawl space. Typically, the crawl space has 8″ nominal concrete block walls. The simplest way to improve the acoustical performance of a house that has a crawl space with masonry walls is to install off-the-shelf noise control louvers to the under-floor vents (see Appendix B); this is similar to the design discussed above for roof vents. These louvers provide a noticeable quieting in the rest of the house. If crawl spaces do not have masonry walls, a massive barrier panel can be used as a skirt connecting the bottom of the walls to the ground. 2″ thick precast concrete panels would be ideal. Alternatively, 2x4 pressure-treated wood studs with ¾″ pressure-treated plywood on each side could be used, as long as the joints between the plywood are covered with batten strips. Where double-swing doors are required in flood plains use a similar construction to improve sound insulation.

Pylon Foundations

Many beach houses are elevated one story using 8x8 wood posts called pylons. This design allows some aircraft noise to enter the house through the floor. The typical floor construction in the MCAS Cherry Point area is 3/4″ plywood on joists (open web wood trusses, plywood joists, or 2x10 joists), with R-19 batt insulation, and 3/8″ plywood covering the bottom of the joists. This assembly has a poor STC rating. However, it will receive a significant amount of shielding from the aircraft flight path by the house. Although it is difficult to quantify this shielding effect, it is likely on the order of 10 STC points. The resulting effective rating is STC 43 if 2x10 joists are used, and higher if deeper structural members are used.

3.8 Mechanical Systems and Building Penetrations

In order to maintain the noise reduction benefits of improving windows and doors and sealing leakage paths, it is important to keep these openings closed. While an acoustically well insulated home can provide 30 to 35 dB of noise reduction, this figure drops to 15 dB whenever the windows and doors are open. Heating, ventilation, and air-conditioning (HVAC) systems do not directly affect the sound insulation performance (except when they have vents to the outdoors), but they enable residents to keep the windows and doors shut year-round and benefit from the sound insulation modifications. The following information is not referenced in Section 4.0 but the ventilation features discussed here are strongly recommended.

HVAC Systems

In the MCAS Cherry Point area the furnaces are typically located in attics. This location unfortunately allows some noise to enter the home through penetrations of the ceiling. This furnace location is acceptable provided ducts in the attic receive special treatments (see

Appendix A). Flexible ductwork should not be used in attics and crawl spaces; heavier sheet metal ducts will provide better sound insulation.

Do not use in-window, through-wall, or through-floor air-conditioners, ventilators, or heaters, i.e., units for which air ducts pass through the building envelope (windows, walls, or floors). On the other hand it is acceptable if only natural gas or refrigerant pipes pass through the building envelope, since these will not allow noise to enter the building. The preferred air-conditioning system is a split system utilizing an outdoor condensing unit.

Ducts to the outside, whether air intake or air exhaust, and all air ducts in the attic or crawl space can be lined with 1-inch acoustical internal lining material, or have at least two 90-degree (right angle) elbows (turns) thereby breaking the line-of-sight to the outside as shown in Figure 3-6. It must be noted that there is concern than this fibrous acoustical lining material will affect air quality. Installing a duct sound attenuator (silencer) is an alternative to this technique; there are silencers available that do not contain fibrous lining. To prevent moisture and grease buildup exhaust fans (bathroom, dryer, kitchen, and range) must not have internal sound lining or silencers that use fibrous lining; the use of the 90-degree elbows and/or fiber-free silencers are appropriate in these cases. These measures ensure that the ventilation system is not bringing additional aircraft noise into the house.

Combustion Air Intake

Fuel-burning appliances such as gas furnaces, gas hot water heaters, and gas dryers can introduce carbon monoxide into the house. To minimize this concern, especially in sound-insulated houses, it is useful to introduce air from the outdoors to the area near the appliance. This is often required in building codes as well. This can be accomplished with small fans called combustion air enforcers.

Combustion Air Exhausts

The exhaust ducts for fuel-burning appliances such as water heaters, furnaces, and gas dryers can also be paths for aircraft noise to enter the home. These ducts should be located in closets and never in living spaces. These ducts should also have at least two 90-degree elbows as discussed above for HVAC ducts.

Dryers

Dryer exhaust ducts can also be paths for aircraft noise to enter the home. Dryers must not be located in living spaces. If they are located near bedrooms they should be in enclosed closets. Always use rigid metal dryer ducts instead of flexible ducts to minimize aircraft noise entering the house.

Fresh Air

It is assumed that all new homes in the MCAS Cherry Point area will have central air-conditioning. Whether the air needs to be heated, cooled, dehumidified, or simply circulated and replenished depends on the season. Refreshing the air supply and moving it around is important for health and comfort no matter what the outside temperature. A fresh-air intake could be installed on an air-handling system to provide the required percentage of fresh makeup air combined with the recirculating air. However, when the system is not operating during mild weather no fresh air would be provided. Therefore, fresh-air systems should have a fresh-air intake and allow for ventilation alone when the residents do not want heating or cooling.

In order to ensure that fresh air is provided year-round, the preferred solution is to use active ventilators. The building code does not require these systems unless the house is considered "unusually tight" and meets three conditions. However, for acoustical purposes the use of active ventilation is recommended, especially in high noise zones. To heat the air in winter these systems typically incorporate an electrically operated heating coil or heat recovery feature.

Whatever ventilation system is used, penetrations of the building envelope must be minimized and located as far as possible from habitable areas of the house.

HVAC Noise and Vibration Control

It is important to limit the amount of noise the HVAC system generates and the noise it carries in from the outside. Provide vibration isolation mounting for all equipment and locate it so that the structure-borne sound and vibration are kept to a minimum.

Kitchen and Bath Fans

Most kitchen and bathroom designs for new homes already incorporate fans for ventilation purposes. If the bathroom exhaust ventilators have ducts to the outside, they should be ducted through the attic as opposed to through a wall. A ducting scheme that incorporates at least one and preferably two right-angle turns is effective at reducing noise infiltration and there should be no direct line-of-sight through the duct from the outside to the inside. In other words, if the duct grilles or covers were removed, it should not be possible to see daylight through the duct. All ducts in the attic should be rigid metal and not flexible; noise may pass through these elements to other rooms of the house. Refer to the manufacturer for allowable duct lengths, numbers of elbows, and sizes of ducts. Kitchen ranges should have re-circulating fans utilizing a charcoal filter instead of a vented range fan.

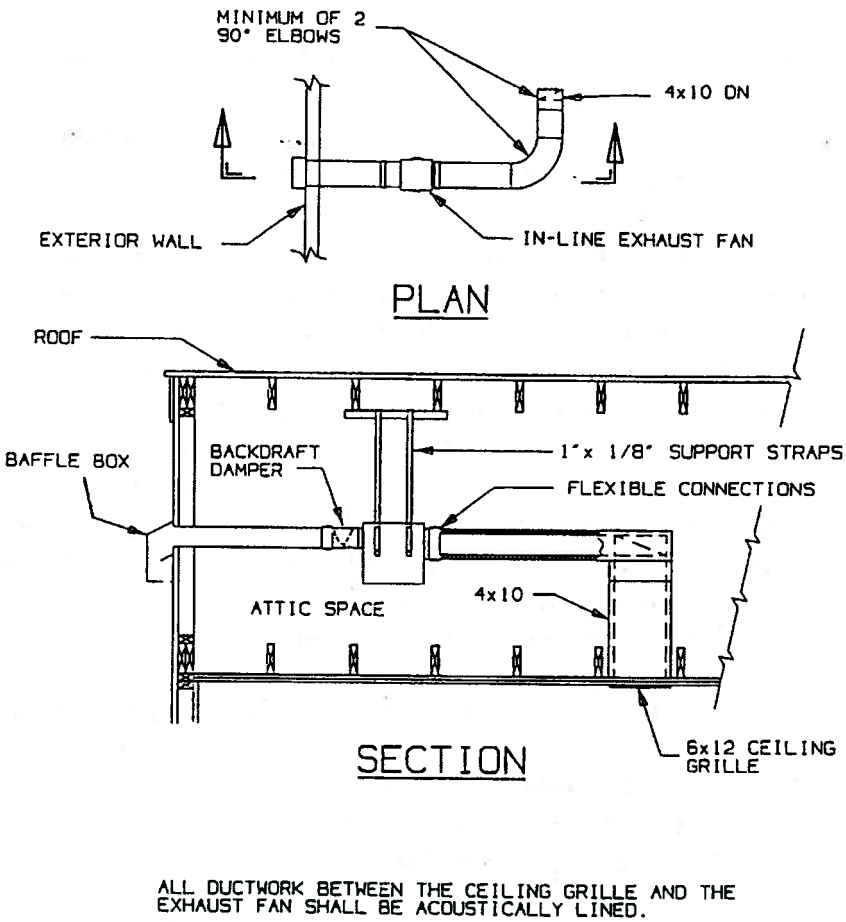

Figure 3-5. Controlling Noise Entering Through Ducts in Attic Space

Fireplaces and Wood Stoves

Some homes in the MCAS Cherry Point area will have prefabricated fuel-burning fireplaces; wood stoves are rare. Ventless units are strongly recommended. For the purposes of this Guide, it is assumed that no vented fireplaces or wood stoves will be allowed.

Whole-house Fans

Some homes in the MCAS Cherry Point area will have whole-house fans. These fans are located in the ceiling of the top floor of the house, usually over a hallway. They allow a significant amount of sound to enter the house. Their use is discouraged in high noise zones.

4.0 Material Selection Chart

The following selection chart is to be used to determine the acoustical design needs of the walls, windows, doors, roof, and floor of each noise-sensitive room of a dwelling. Additional requirements are provided in Appendix A; this material selection chart is supplemental to Appendix A. These recommendations also apply to non-habitable rooms that do not have a door separating them from habitable rooms. For each room, design recommendations are determined by following the chart from left to right. First, the required noise level reduction (NLR) must be determined for the dwelling based on its location in a certain noise contour zone. Second, the type of exterior walls must be selected. If the wall has Insulated Concrete Forms (ICF) use the "ICF" designation, even if the wall also has wood framing at the interior. Use the "Wood Frame" designation if one of the exterior walls or a portion of one of the walls is wood framed. Third, the number of exterior walls must be selected. Count partial walls as full walls. Count two-story walls as two walls. For example, a room with two two-story exterior walls is considered to have four exterior walls. Fourth, calculate the ratio of the area of windows and doors to the total exterior façade area (including the gross wall/window/door area) of the room. The last five columns contain the recommended modifications for the walls, windows, doors, roof, and floor that must be used to achieve the desired noise level reduction.

The wall modifications apply only to exterior walls. Recommended modifications for wood frame walls are either to use single-leaf resilient channels to hang the gypsumboard ("RC"), to use staggered 2x4 studs on 2x6 plates ("stag"), or to use staggered studs with two layers of 1/2" minimum gypsumboard. If the studs must be 2x6 for structural reasons, and the table calls for staggered studs, use 2x6 studs staggered on 2x8 plates.

The door and window modifications only apply to doors and windows that open to the exterior or to partially enclosed spaces such as screened-in porches or garages. The table lists the minimum allowable STC rating.

The roof modifications apply to the roof/ceiling assembly of rooms on the top floor of the house (a room below an attic is considered to be on the top floor). The modifications are either to use two layers of 1/2" minimum gypsumboard, or to hang the gypsumboard using single-leaf resilient channels.

The floor modifications only apply to houses elevated on pylons (e.g., beach houses). The recommended modification for some houses is to use floor framing members that are at least 14" deep with at least 10" thick insulation at with 1/2" minimum plywood or OSB at the bottom chords of the trusses ("deep").Table 4-1.

Table 4-1. Material Selection Chart and Corresponding STC Ratings

NLR	Wall Type	Exterior Walls	Window + Door Ratio	Recommended Modification				
				Wall	Window	Door	Roof	Floor
20	Wd Frame			None	STC 28	None	None	None
	ICF	1		None	None	None	None	
		2+	< 75%	None	None	None	None	
			>= 75%	None	STC 28	None	None	
25	Wood Frame	1	< 25%	None	STC 26	None	None	None
			25-40%	None	STC 28	None	None	None
			> 40%	None	STC 30	STC 29	None	None
		2+	< 20%	None	STC 28	None	None	None
			20-35%	None	STC 30	STC 29	None	None
			> 35%	None	STC 32	STC 29	None	None
	ICF	1	< 40%	None	STC 26	None	None	
			>= 40%	None	STC 30	STC 29	None	
		2+	< 20%	None	STC 26	None	None	
			20-30%	None	STC 28	None	None	
			30-75%	None	STC 30	STC 29	None	
			> 75%	None	STC 32	STC 29	None	
30	Wood Frame	1	< 20%	None	STC 32	STC 31	2 gyp	Deep
			20-30%	None	STC 34	STC 34	2 gyp	Deep
			30-50%	RC	STC 32	STC 31	2 gyp	Deep
			> 50%	RC	STC 34	STC 34	2 gyp	Deep
		2	< 20%	RC	STC 34	STC 31	2 gyp	Deep
			>= 20%	RC	STC 34	STC 34	2 gyp	Deep
		3+	< 20%	RC	STC 34	STC 31	2 gyp	Deep
			20-70%	RC	STC 34	STC 34	2 gyp	Deep
			> 70%	RC	STC 36	STC 34	2 gyp	Deep
	ICF	1	< 20%	None	STC 30	STC 29	2 gyp	
			20-50%	None	STC 32	STC 31	2 gyp	
			> 50%	None	STC 34	STC 34	2 gyp	
		2	< 20%	None	STC 34	STC 31	2 gyp	
			>= 20%	None	STC 34	STC 34	2 gyp	
		3+	< 20%	None	STC 34	STC 31	2 gyp	
			20-70%	None	STC 34	STC 34	2 gyp	
			> 70%	None	STC 36	STC 34	2 gyp	
35	Wood Frame	1	< 25%	RC	STC 36	STC 34	RC	Deep
			>= 25%	Stag	STC 40	STC 40	RC	Deep
		2+	< 15%	RC	STC 38	STC 37	RC	Deep
			15-20%	Stag	STC 38	STC 37	RC	Deep
			20-30%	Stag	STC 42	STC 37	RC	Deep
			> 30%	Stag, 2 gyp	STC 42	STC 40	RC	Deep
	ICF	1	< 15%	None	STC 34	STC 34	RC	
			15-25%	None	STC 36	STC 34	RC	
			25-50%	None	STC 38	STC 37	RC	
			> 50%	None	STC 40	STC 40	RC	
		2+	< 15%	None	STC 40	STC 37	RC	
			15-20%	None	STC 40	STC 40	RC	
			20-30%	None	STC 44	STC 40	RC	
			> 30%	None	STC 44	STC 43	RC	

5.0 Limitations

There are many variables affecting the acoustical performance of a room. The recommendations contained in this Guide are based on assumptions of typical parameters. If the actual building design and construction used don't match these assumptions the noise level reduction will be different. Due to the interrelationship between each of these variables there are no upper limits on individual parameters.

In developing recommendations, typical types of rooms were considered. Conditions that would tend to reduce the acoustical performance include:

1. Using a greater area of windows or doors.
2. Having a greater area of exterior walls.
3. Using *smaller* rooms.
4. Adding wall penetrations such as through-wall air-conditioners, heaters, or fans.
5. Using hard room finishes such as ceramic tile or wood floors, and using few furnishings.

The modifications recommended in this Guide are packages designed to work together. That is, improvements to the windows, doors, and mechanical systems complement improvements to the walls and roof. There are always alternative packages of modifications that would be acceptable from an acoustical standpoint. The goal of this Guide was to present one package of modifications for each situation that is reasonable and cost-effective.

The determination of which rooms these recommendations apply to is not always simple. Generally, they apply to living spaces (kitchens, living rooms, family rooms, bedrooms, offices, dens, sun rooms, etc.) and do not apply to closets, typical bathrooms, most hallways, garages, utility rooms, and screened-in porches. Some large bathrooms, open foyers, or all spaces that are relatively open to a living space should be sound insulated.

The recommendations contained in this Guide are based on calculations using a large number of assumptions and averages of acoustical data for many products. Due to the large variability in acoustical performance of different buildings, and the imprecision of acoustical calculations the author does not guarantee that the acoustical objectives will be met. There is also no margin for error embedded into these recommendations, except to the extent that houses are grouped in ranges of 5-dB outdoor noise exposure. If a margin of error were desired it would be appropriate to use the recommendations for the next higher noise zone or consult a qualified acoustical consultant.

Likewise, the author does not guarantee that the recommended measures will comply with building codes.

APPENDIX A

NOISE LEVEL REDUCTION DESIGN REQUIREMENTS

Appendix A
New Construction: Noise Level Reduction Design Requirements

SECTION 1: PURPOSE

Exterior noise may be isolated and reduced in homes through construction techniques that selectively increase the insulating quality of the exterior of occupied structures. The noise level reduction values specified are 20, 25, 30, and 35 dB.

SECTION 2: GENERAL REQUIREMENTS

A. The Noise Level Reduction (NLR) requirements specified herein may be achieved by any suitable combination of building designs, choices of building materials, and execution of construction details in accordance with established architectural and acoustical principles. The NLR requirements should be applied to all occupied rooms having one or more exterior walls or exterior ceiling. A room without any exterior walls, and which has an occupied space above its entire area, will not be subject to these requirements.

B. Compliance with the construction standards herein is sufficient to comply with the NLR requirements specified in the various noise zones. These standards are applicable to plans and specifications for any proposed residence. A variety of assumptions were necessary to develop these standards. If the plans and specifications do not indicate compliance with the construction standards herein, the applicant shall provide a written statement from a qualified acoustical consultant certifying that the construction of the building as indicated in the plans and specifications will result in a NLR for appropriate occupied rooms at least as great as the NLR requirement specified herein

C. An "exterior" door or window opens to the exterior or to a partially enclosed space such as a screened-in porch. In this standard whenever the words "doors" or "windows" are used it shall be assumed that the standard provision applies only to exterior doors and exterior windows, unless the word "interior" is specifically used for that provision.

D. Sound Transmission Class (STC) ratings for windows and doors are valid only if they are determined by laboratory (not field) tests performed by an independent laboratory for the product. A rating estimated for glass alone is not an acceptable substitute for STC tests of windows or doors, except for determining the rating of sidelights and transoms. Likewise, ratings estimated for door leafs alone are not an acceptable substitute for STC ratings of doors. The installed products must have the same composition and overall configuration such as storm panels, glass type (laminated, tempered, or float glass), glass thickness, spacing between panes of insulated glass, door core, gaskets, weatherstripping, door bottom seals, thresholds, etc., and the same overall configuration as the tested assembly. The overall configuration includes the operational type (casement, double hung, fixed, slider, etc.) in the case of windows, and the general size of glazing (1/8-, 1/4-, 1/2-, or full-view) in the case of doors. Issues that do not affect the acoustical performance such as glass obscuration, internal window muntins, door and window hardware, screens, and applied door moldings can be neglected.

E. Door sidelights and door and window transoms shall be considered "windows" and shall meet the provisions for windows. For these products it is acceptable to reference the laboratory STC rating of the glass alone. However, for the adjacent windows and doors it is still necessary to reference STC tests for the entire assembly, not just the glass or door leaf.

F. For this standard it can be assumed that the rating of a prime-and-storm window combination is STC 36 provided the rating of the storm window alone is at least STC 29 and the airspace between the prime and storm window is at least 1-3/4".

G. For this standard it can be assumed that the rating of a prime-and-storm door combination is STC 37 provided the rating of the storm door alone is at least STC 30 and the airspace between the prime and storm door is at least 2".

H. In order to achieve the STC ratings specified herein special measures are necessary to install doors and windows. These include the use of non-hardening (acoustical) caulk at all hidden surfaces, flexible caulk at all exposed surfaces, and solid continuous blocking to fill all voids over 1/4" around windows and doors.

I. The phrase "Total Exterior Wall Area" as used in this standard includes the exterior wall area of the room as well as the area of all windows and doors contained within the exterior walls.

J. The phrase "Roof" as used in this standard shall refer to a ceiling attached to the bottom edge of roof structural members that are at least 14" deep (the depth is the clear distance between the ceiling gypsumboard and the roof deck) for the portion of the structural member over a living space. The use of shallower roof framing is not allowed without a written statement from a qualified acoustical consultant (see section B above). The best acoustical performance is achieved when there are horizontal ceilings, an accessible attic space above, and a sloped roof.

K. The phrase "Exposed Floor" in this standard shall refer to the floor of a house elevated above the ground without the use of a crawl space. This includes primarily beach houses on pylons.

L. It is difficult to predict the acoustical performance of open plan spaces. Adjacent living spaces that are fully open to each other shalled be grouped and treated as one room. When the rooms are only partially open to each other group them if the partitions separating the rooms are more than 30% open.

M. The number of exterior walls is a parameter that affects the acoustical performance of the room. If the exterior wall is over 14 feet tall it shall count as two exterior walls. Partial walls count as one exterior wall.

SECTION 3: BUILDING REQUIREMENTS FOR A MINIMUM NLR OF 20 dB.

A. Exterior Walls

1. The interior surface of exterior walls shall be gypsum board at least 1/2 inch thick, or an alternative material of equal surface mass.

2. For wood-framed walls: Fiberglass, mineral fiber, or cellulose batt or blanket insulation shall be installed continuously and completely throughout the stud cavity. Batts or blankets should be held firmly in place between the studs, with fasteners if necessary, to prevent sagging; however, packing the insulation such that it is compressed may *slightly reduce* its acoustical (and thermal) performance.

3. Insulated concrete form (ICF) walls, where present, shall contain at least 4" thick normal weight concrete throughout the surface of the wall.

B. Windows

1. 1.Windows in rooms that have at least one wood-framed exterior wall shall have a laboratory sound transmission class rating of at least STC 28.

2. For rooms that have all ICF exterior walls: If the exterior windows and doors together comprise 75% or more of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 28.

C. Doors

1. Exterior doors, and interior doors between occupied spaces and attached garages, unfinished attics, and other non-habitable spaces with an exterior wall or ceiling, shall be fully weatherstripped.

D. Roof-Ceiling Assembly

1. Gypsum board ceilings at least 1/2 inch thick shall be provided. Ceilings shall be substantially airtight with a minimum number of penetrations.

2. Fiberglass, mineral fiber, or cellulose insulation shall be installed continuously and completely throughout the ceiling joist cavity to a depth of at least 10 inches.

3. Roof framing members shall be at least 14" deep for their entire span.

4. Attic access panels shall be constructed of 3/4" thick plywood and shall have continuous neoprene perimeter bulb seals. Pull-down attic stairs shall have moveable or operable covers.

5. Skylights shall not be provided.

E. Floors, Foundations and Basements

1. For houses elevated on pylons: Use plywood or OSB at least 1/2" thick at the underside of the floor joists with at least 10" thick fiberglass, mineral fiber, or cellulose insulation.

2. If crawl spaces do not have masonry walls, a massive barrier panel must be used as a skirt connecting the bottom of the walls to the ground. 2" thick precast concrete panels are ideal barrier skirts. Alternatively, 2x4 pressure-treated wood studs with ¾" pressure-treated plywood on each side may be used, as long as the joints between the plywood are covered with batten strips.

F. Ventilation and Wall Penetrations

1. In-window, through-wall, or through-floor air-conditioning, ventilating, or heating units shall not be used.

2. Through-the-wall/door mailboxes or mail slots shall not be used.

3. A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms, as specified in the North Carolina state building code, without the need to open any windows, doors, or other openings to the exterior.

4. Gravity vent openings in attics shall not exceed the code minimum in number and size.

5. If an attic fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel at least 5 feet long with at least one 90° bend.

6. All vent ducts, including those for bathroom exhaust fans and dryers, connecting the interior space to the outdoors shall contain at least two 90° bends.

7. Vented domestic range fans shall be not used.

8. Vented fireplaces, wood stoves, or gas-powered prefabricated units shall not be used.

9. Vented fuel-burning driven appliances (e.g., gas dryers, gas fireplaces, oil or gas furnaces, and gas water heaters) shall not be located in living spaces (e.g, kitchens, living rooms, bedrooms, etc.). Vent ducts for fuel-burning appliances in non-living spaces (e.g., closets and attics) shall have double-wall sheet metal construction.

10. Whole-house fans shall not be provided.

11. Dryer shall be located in closets or other non-habitable spaces. Dryer ducts shall be rigid metal.

SECTION 4: BUILDING REQUIREMENTS FOR A MINIMUM NLR OF 25 dB.

A. Exterior walls

1. In-window, through-wall, or through-floor air-conditioning, ventilating, or heating units shall not be used.

2. The interior surface of exterior walls shall be gypsum board at least 1/2 inch thick, or an alternative material of equal surface mass.

3. For wood-framed walls: Fiberglass, mineral fiber, or cellulose batt or blanket insulation shall be installed continuously and completely throughout the stud cavity. Batts or blankets should be held firmly in place between the studs, with fasteners if necessary, to prevent sagging; however, packing the insulation such that it is compressed may slightly reduce its acoustical (and thermal) performance.

4. Insulated concrete form (ICF) walls, where present, shall contain at least 4" thick normal weight concrete throughout the surface of the wall.

B. Windows

1. For rooms with at least one wood-framed wall:

   a. The interior surface of exterior walls shall be gypsum board at least 1/2 inch thick, or an alternative material of equal surface mass.
      i. If the exterior windows and doors together comprise less than 25% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 26.
      ii. If the exterior windows and doors together comprise 25-40% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 28.
      iii. If the exterior windows and doors together comprise more than 40% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 30.

   b. If there are two or more exterior walls:
      i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 28.
      ii. If the exterior windows and doors together comprise 20-35% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 30.
      iii. If the exterior windows and doors together comprise more than 35% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 32..

2. For rooms with all ICF walls:

   a. If there is one exterior wall:
      i. If the exterior windows and doors together comprise less than 40% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 26.
      ii. If the exterior windows and doors together comprise 40% or more of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 30.

   b. If there are two or more exterior walls:
      i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 26.
      ii. If the exterior windows and doors together comprise 20-30% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 28.
      iii. If the exterior windows and doors together comprise 30-75% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 30.
      iv. If the exterior windows and doors together comprise more than 75% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 32.

C. Doors

1. For rooms with all ICF walls:

   a. If there is only one exterior wall: If exterior windows and doors together comprise more than 40% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 29.

b. If there are more than one exterior wall: If exterior windows and doors together comprise 20% or more of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 29.

2. For rooms with all ICF walls:

   a. If there is only one exterior wall and the exterior windows and doors together comprise 40% or more of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 29.

   b. If there are more than one exterior wall and the exterior windows and doors together comprise 30% or more of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 29.

3. Interior doors between occupied spaces and attached garages, unfinished attics, or other non-habitable spaces with an exterior wall or ceiling shall have a laboratory sound transmission class rating of at least STC 23.

D. Roof-Ceiling Assembly

1. Gypsum board ceilings at least 1/2 inch thick shall be provided. Ceilings shall be substantially airtight with a minimum number of penetrations.

2. Fiberglass, mineral fiber, or cellulose insulation shall be installed continuously and completely throughout the ceiling joist cavity to a depth of at least 10 inches.

3. Roof framing members shall be at least 14″ deep for their entire span.

4. Attic access panels shall be constructed of 3/4″ thick plywood and shall have continuous neoprene perimeter bulb seals. Pull-down attic stairs shall have moveable or operable covers.

5. Skylights shall not be provided.

E. Floors and Foundations

1. For houses elevated on pylons: Use plywood or OSB at least 1/2″ thick at the underside of the floor joists with at least 10″ thick fiberglass, mineral fiber, or cellulose insulation.

2. If crawl spaces do not have masonry walls, a massive barrier panel must be used as a skirt connecting the bottom of the walls to the ground. 2″ thick precast concrete panels are ideal barrier skirts. Alternatively, 2x4 pressure-treated wood studs with ¾″ pressure-treated plywood on each side may be used, as long as the joints between the plywood are covered with batten strips.

F. Ventilation and Wall and Roof Penetrations

1. In-window, through-wall, or through-floor air-conditioning, ventilating, or heating units shall not be used.

2. Through-the-wall/door mailboxes or mail slots shall not be used.

3. A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms, as specified in the North Carolina state building code, without the need to open any windows, doors, or other openings to the exterior.

4. Gravity vent openings in attics shall not exceed the code minimum in number and size.

5. If an attic fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel at least 5 feet long with at least one 90° bend.

6. All vent ducts, including those for bathroom exhaust fans and dryers, connecting the interior space to the outdoors shall contain at least two 90° bends.

7. Vented domestic range fans shall be not used.

8. Vented fireplaces, wood stoves, or gas-powered prefabricated units shall not be used.

9. Vented fuel-burning appliances (e.g., gas dryers, gas fireplaces, oil or gas furnaces, and gas water heaters) shall not be located in living spaces (e.g, kitchens, living rooms, bedrooms, etc.). Vent ducts for fuel-burning appliances in non-living spaces (e.g., closets and attics) shall have double-wall sheet metal construction.

10. Whole-house fans shall not be provided.

11. Dryer shall be located in closets or other non-habitable spaces. Dryer ducts shall be rigid metal.

SECTION 5: BUILDING REQUIREMENTS FOR A MINIMUM NLR OF 30 dB.

A. Exterior Walls

1. The interior surface of exterior walls shall be gypsum board at least 1/2 inch thick, or an alternative material of equal surface mass.

2. For wood-framed walls:

   a. Fiberglass, mineral fiber, or cellulose batt or blanket insulation shall be installed continuously and completely throughout the stud cavity. Batts or blankets should be held firmly in place between the studs, with fasteners if necessary, to prevent sagging; however, packing the insulation such that it is compressed may slightly reduce its acoustical (and thermal) performance.

   b. If there is one only one exterior wall: If exterior windows and doors together comprise 30% or more of the Total Exterior Wall Area, single-leaf resilient channels shall be used between the studs and gypsum board.

c. If there are two or more exterior walls single-leaf resilient channels shall be used between the studs and gypsum board.

3. Insulated concrete form (ICF) walls, where present, shall contain at least 4" thick normal weight concrete throughout the surface of the wall.

B. Windows

1. For rooms with at least one wood-framed wall:

   a. If there is one exterior wall:
      i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 32.
      ii. If the exterior windows and doors together comprise 20-30% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 34.
      iii. if the exterior windows and doors together comprise 30-50% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 32.
      iv. if the exterior windows and doors together comprise more than 50% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 34.

   b. If there are two exterior walls: The windows shall have a laboratory sound transmission class rating of at least STC 34.

   c. If there are three or more exterior walls:
      i. If the exterior windows and doors together comprise 70% or less of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 34.
      ii. If the exterior windows and doors together comprise more than 70% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 36.

2. For rooms with all ICF walls:

   a. If there is one exterior wall:
      i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 30.
      ii. If the exterior windows and doors together comprise 20 to 50% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 32.
      iii. If the exterior windows and doors together comprise more than 50% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 34.

   b. If there are two exterior walls: The windows shall have a laboratory sound transmission class rating of at least STC 34.

   c. If there are three or more exterior walls:
      i. If the exterior windows and doors together comprise 70% or less of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 34.
      ii. If the exterior windows and doors together comprise more than 70% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 36.

C. Doors

1. For rooms with At least one wood-framed wall:

   a. If there is one exterior wall:
      i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 31.
      ii. If the exterior windows and doors together comprise 20-30% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.
      iii. If the exterior windows and doors together comprise 30-50% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 31.
      iv. If the exterior windows and doors together comprise more than 50% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.

   b. If there are two exterior walls:
      i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 31.
      ii. If the exterior windows and doors together comprise 20% or more of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.

   c. If there are three or more exterior walls:
      i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 31.
      ii. If the exterior windows and doors together comprise 20% or more of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.

2. For rooms with all ICF walls:

   a. If there is one exterior wall:
      i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 29.
      ii. If the exterior windows and doors together comprise 20 to 50% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 31.
      iii. If the exterior windows and doors together comprise more than 50% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.

   b. If there are two exterior walls:
      i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 31.
      ii. If the exterior windows and doors together comprise 20% or more of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.

   c. If there are three or more exterior walls:
      i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 31.
      ii. If the exterior windows and doors together comprise 20% or more of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.

3. Interior doors between occupied spaces and attached garages, unfinished attics , or other non-habitable spaces with an exterior wall or ceiling shall have a laboratory sound transmission class rating of at least STC 29.

D. Roof-Ceiling Assembly

1. Ceilings consisting of at least two layers of at least 1/2-inch thick gypsum board shall be provided. Ceilings shall be substantially airtight with a minimum number of penetrations.

2. Fiberglass, mineral fiber, or cellulose insulation shall be installed continuously and completely throughout the ceiling joist cavity to a depth of at least 10 inches.

3. Roof framing members shall be at least 14" deep for their entire span.

4. Attic access panels shall be constructed of 3/4" thick plywood and shall have continuous neoprene perimeter bulb seals. Pull-down attic stairs shall have moveable or operable covers.

5. Skylights shall not be provided.

E. Floors and Foundations

1. For houses elevated on pylons: Use plywood or OSB at least 1/2" thick at the underside of floor joists that are at least 14" deep with at least 10" thick fiberglass, mineral fiber, or cellulose insulation.

2. If crawl spaces do not have masonry walls, a massive barrier panel must be used as a skirt connecting the bottom of the walls to the ground. 2" thick precast concrete panels are ideal barrier skirts. Alternatively, 2x4 pressure-treated wood studs with ¾" pressure-treated plywood on each side may be used, as long as the joints between the plywood are covered with batten strips.

F. Ventilation and Wall and Roof Penetrations

1. In-window, through-wall, or through-floor air-conditioning, ventilating, or heating units shall not be used.

2. Through-the-wall/door mailboxes or mail slots shall not be used.

3. A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms, as specified in the North Carolina state building code, without the need to open any windows, doors, or other openings to the exterior.

4. Gravity vent openings in attics shall not exceed the code minimum in number and size.

5. If an attic fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel at least 5 feet long with at least one 90° bend.

6. All vent ducts, including those for bathroom exhaust fans and dryers, connecting the interior space to the outdoors shall contain at least two 90° bends.

7. Vented domestic range fans shall be not used.

8. Vented fireplaces, wood stoves, or gas-powered prefabricated units shall not be used.

9. Vented fuel-burning appliances (e.g., gas dryers, gas fireplaces, oil or gas furnaces, and gas water heaters) shall not be located in living spaces (e.g, kitchens, living rooms, bedrooms, etc.). Vent ducts for fuel-burning appliances in non-living spaces (e.g., closets and attics) shall have double-wall sheet metal construction.

10. Whole-house fans shall not be provided.

11. Dryer shall be located in closets or other non-habitable spaces. Dryer ducts shall be rigid metal.

SECTION 6: BUILDING REQUIREMENTS FOR A MINIMUM NLR OF 35 dB.

A. Exterior Walls

1. The interior surface of exterior walls shall be gypsum board at least 1/2 inch thick, or an alternative material of equal surface mass.

2. For wood-framed walls:

   a. Fiberglass, mineral fiber, or cellulose batt or blanket insulation shall be installed continuously and completely throughout the stud cavity. Batts or blankets should be held firmly in place between the studs, with fasteners if necessary, to prevent sagging; however, packing the insulation such that it is compressed may slightly reduce its acoustical (and thermal) performance.

   b. If there is one only one exterior wall:
      i. If exterior windows and doors together comprise less than 25% of the Total Exterior Wall Area single-leaf resilient channels shall be used between the studs and gypsum board.
      ii. If exterior windows and doors together comprise 25% or more of the Total Exterior Wall Area the studs shall be 2x4 studs staggered on 2x6 plates (if the studs need to be 2x6 for structural reasons, use 2x6 studs staggered on 2x8 plates).

   c. If there are two or more exterior walls:
      i. If exterior windows and doors together comprise less than 15% of the Total Exterior Wall Area single-leaf resilient channels shall be used between the studs and gypsum board.
      ii. If exterior windows and doors together comprise 15 to 30% of the Total Exterior Wall Area the studs shall be 2x4 studs staggered on 2x6 plates (if the studs need to be 2x6 for structural reasons, use 2x6 studs staggered on 2x8 plates).
      iii. If exterior windows and doors together comprise more than 30% of the Total Exterior Wall Area the studs shall be 2x4 studs staggered on 2x6 plates (if the studs need to be 2x6 for structural reasons, use 2x6 studs staggered on 2x8 plates), and two layers of 1/2" gypsum board shall be provided at the interior surface of the room.

3. Insulated concrete form (ICF) walls, where present, shall contain at least 4" thick normal weight concrete throughout the surface of the wall.

B. Windows

1. For rooms with at least one wood-framed wall:

   a. If there is one exterior wall:
      i. If the exterior windows and doors together comprise less than 25% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 36.
      ii. If the exterior windows and doors together comprise 25% or more of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 40.

   b. If there are two or more exterior walls:
      i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 38.
      ii. If the exterior windows and doors together comprise 20% or more of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 42.

2. For rooms with all ICF walls:

   a. If there is one exterior wall:
      i. If the exterior windows and doors together comprise less than 15% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 34.
      ii. If the exterior windows and doors together comprise 15 to 25% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 36.
      iii. If the exterior windows and doors together comprise 25 to 50% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 38.
      iv. If the exterior windows and doors together comprise more than 50% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 40.

   b. If there are two or more exterior walls:
      i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 40.
      ii. If the exterior windows and doors together comprise 20% or more of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 44.

C. Doors

1. For rooms with at least one wood-framed wall:

   a. If there is one exterior wall:
      i. If the exterior windows and doors together comprise less than 25% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.
      ii. If the exterior windows and doors together comprise 25% or more of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 40.

b. If there are two or more exterior walls:
   i. If the exterior windows and doors together comprise 30% or less of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 37.
   ii. If the exterior windows and doors together comprise more than 30% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 40.

2. For rooms with all ICF walls:

   a. If there is one exterior wall:
      i. If the exterior windows and doors together comprise less than 25% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.
      ii. If the exterior windows and doors together comprise 25 to 50% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 37.
      iii. If the exterior windows and doors together comprise more than 50% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 40.

   b. If there are two or more exterior walls:
      i. If the exterior windows and doors together comprise less than 15% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 37.
      ii. If the exterior windows and doors together comprise 15 to 30% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 40.
      iii. If the exterior windows and doors together comprise more than 30% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 43.

3. Interior doors between occupied spaces and attached garages, unfinished attics, or other non-habitable spaces with an exterior wall or ceiling shall have a laboratory sound transmission class rating of at least STC 29.

D. Roof-Ceiling Assembly

1. Gypsum board ceilings at least 1/2 inch thick shall be provided. Single-leaf resilient channels shall be used to hang the gypsum board. Ceilings shall be substantially airtight with a minimum number of penetrations.

2. Fiberglass, mineral fiber, or cellulose insulation shall be installed continuously and completely throughout the ceiling joist cavity to a depth of at least 10 inches.

3. Roof framing members shall be at least 14" deep for their entire span.

4. Attic access panels shall be constructed of 3/4" thick plywood and shall have continuous neoprene perimeter bulb seals. Pull-down attic stairs shall have moveable or operable covers.

5. Skylights shall not be provided.

E. Floors and Foundations

1. For houses elevated on pylons: Use plywood or OSB at least 1/2" thick at the underside of floor joists that are at least 14" deep with at least 10" thick fiberglass, mineral fiber, or cellulose insulation.

2. If crawl spaces do not have masonry walls, a massive barrier panel must be used as a skirt connecting the bottom of the walls to the ground. 2" thick precast concrete panels are ideal barrier skirts. Alternatively, 2x4 pressure-treated wood studs with ¾" pressure-treated plywood on each side may be used, as long as the joints between the plywood are covered with batten strips.

F. Ventilation and Wall and Roof Penetrations

1. In-window, through-wall, or through-floor air-conditioning, ventilating, or heating units shall not be used.

2. Through-the-wall/door mailboxes or mail slots shall not be used.

3. A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms, as specified in the North Carolina state building code, without the need to open any windows, doors, or other openings to the exterior.

4. Gravity vent openings in attics shall not exceed the code minimum in number and size.

5. If an attic fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel at least 5 feet long with at least one 90° bend.

6. All vent ducts, including those for bathroom exhaust fans and dryers, connecting the interior space to the outdoors shall contain at least two 90° bends.

7. Vented domestic range fans shall be not used.

8. Vented fireplaces, wood stoves, or gas-powered prefabricated units shall not be used.

9. Vented fuel-burning appliances (e.g., gas dryers, gas fireplaces, gas furnaces, and gas water heaters) shall not be located in living spaces (e.g, kitchens, living rooms, bedrooms, etc.). Vent ducts for fuel-burning driven appliances in non-living spaces (e.g., closets and attics) shall have double-wall sheet metal construction.

10. Whole-house fans shall not be provided.

11. Dryer shall be located in closets or other non-habitable spaces. Dryer ducts shall be rigid metal.

APPENDIX B

MANUFACTURERS OF ACOUSTICAL MATERIALS

Appendix B
Manufacturers of Acoustical Materials

This list represents a partial list of typical suppliers of specialty acoustical products. Other manufacturers not listed may have comparable products. The list below does not imply a product endorsement or recommendation by Wyle Laboratories.

BATTS AND RIGID FIBERGLASS INSULATION

CertainTeed
Headquarters
P.O. Box 860 or
750E Swedesford Rd.
Valley Forge, PA 19482
Tel: 800-233-8990
www.certainteed.com

Johns Manville
P.O. Box 5108
Denver, CO 80217-5108
Tel: 800-654-3103
www.jm.com

Knauf Fiberglass
One Knaff Drive
Shelbyville, IN 46176
Tel: 800-825-4434
Fax: 317-398-3675

Owens Corning Fiberglass Corp.
One Owens Corning Parkway
Toledo, OH 43659
Tel: 800-438-7465 (800-GET-PINK)
www.owenscorning.com

ACOUSTICALLY TESTED DOORS

Algoma Hardwoods
1001 Perry Street
Algoma, WI 54201
Tel: 800-678-8910
www.algomahardwoods.com

Armaclad, Inc.
P.O. Box 70
Waynesboro, PA 17268
Tel: 800-541-6666
www.armaclad.com

Buell Door Company
5200 East Grand Ave.
Suite 500
Dallas, TX 75223
Tel: 800-556-0155
www.buelldoor.com

Ceco Door Products
9159 Telecom Drive
Milan, TN 38358
Tel: 888-232-6366
www.cecodoor.com

Eggers Industries
P.O. Box 1050
Neenah, WI 54957-1050
Tel: 920-722-6444
www.eggersindustries.com

Frieger Specialty Products
9880 Gregg Road
Pico Rivera, CA 90660
Tel: 866-203-5060
www.kriegerproducts.com

Graham Architectural Products
1551 Mt. Rose Avenue
York, PA 17403-2909
Tel: 800-755-6274
www.grahamarch.com

Harvey Industries, Inc.
1400 Main Street
Waltham, MA 02154
Tel: 800-942-7839
www.harveyind.com

Industrial Acoustics Company
1160 Commerce Avenue
Bronx, NY 10462
Tel: 718-931-8000
www.industrialacoustics.com

Jeld-wen
19618 Wildwood Drive
West Linn, OR 97068
Tel: 877-783-2057
www.jeld-wen.com

ACOUSTICALLY TESTED DOORS - *Concluded*

Jamison Door Company
55 J.V. Jamison Drive
P.O. Box 70
Hagerstown, MD 21741-0070
Tel: 800-532-3667
www.jamison-door.com

Krieger Specialty Products
4880 Gregg Road
Pico Rivera, CA 90660
Tel: 866-203-5060
www.kriegerproducts.com

Larson Doors
Tel: 800-352-3360
www.larsondoors.com

Marshfield Doors Systems, Inc.
1401 East 4th Street
Marshfield, WI 54449-7780
Tel: 800-869-3667
www.marshfielddoors.com

Mohawk Flush Doors, Inc.
980 Point Township Road
P.O. Box 112
Northumberland, PA 17857-0112
Tel: 570-473-3557
www.mohawkdoors.com

Mon-Ray, Inc.
801 Boone Avenue North
Minneapolis, MN 55427-4432
Tel: 800-544-3646
www.monray.com

Overly Door Company
574 West Otterman St.
Greensburg, PA 15601
Tel: 800-979-7300
www.overly.com

P.H. Tech Corp.
144 Ferry Street
Buncher Industrial Park
Leetsdale, PA 15056
www.phtech.ca

Pioneer Industries
171 South Newman Street
Hackensack, NJ 07601
Tel: 201-933-1900
www.pioneerindustries.com

Rehau Incorporated
P.O. Box 1706
Leesburg, VA 20177
Tel: 800-247-9445
www.rehau.com

Republic Windows and Doors
930 West Evergreen Ave.
Chicago, IL 60622
Tel: 800-248-1775
www.republicwindows.com

Torrance Aluminum
22850 Perry St.
Perris, CA 92570
Tel: 909-943-0430
www.torrancealuminum.com

Vancouver Door Company
203 5th St., N.W.
P.O. Box 1418
Puyallup, WA 98371
Tel: 800-999-3667
www.vancouverdoorco.com

Wausau Window and Wall Systems
1415 West Street
Wausau, WI 54401
Tel: 715-845-2161
www.wausauwindows.com

Whisper-Like
P.O. Box 2949
Toledo, OH 43606
Tel: 800-227-8246
whisper-like.com

Windor Supply and Manufacturing
4237 S. 74th E. Ave.
Tulsa, OK 74145
Tel: 800-324-1947
www.windor.com

DUCT AND FAN NOISE CONTROL

Acoustical Surfaces, Inc.
123 Columbia Court North, Suite 201
Chaska, MN 55318
Tel: 800-448-0737

Aeroacoustic Corporation
3300 Corporation Way
Darlington, SC 29532
Tel: 843-398-1006
www.aeroacoustic.com

Industrial Acoustics Company
1160 Commerce Avenue
Bronx, NY 10462
Tel: 718-931-8000
www.industrialacoustics.com

McGill Airflow Corporation
One Mission Park
Groveport, OH 43125
Tel: 614-836-9981
www.mcgillairflow.com

DOOR SEALS AND WEATHERSTRIPPING

National Guard Products, Inc.
4985 East Raines Rd.
Memphis, TN 38118
Tel: 800-647-7874
www.ngpinc.com

Pemko Manufacturing Co.
5535 Distribution Drive
Memphis, TN 38141
Tel: 800-824-3018
www.pemko.com

Zero International, Inc.
415 Concord Avenue
Bronx, NY 10455
Tel: 800-635-5335
www.zerointernational.com

ACOUSTICALLY TESTED WINDOWS

Century Manufacturing, Inc.
4620 Andrews St.
North Las Vegas, NV 89031
Tel: 800-654-7027
www.windowtech.com

Graham Architectural Products
1551 Mt. Rose Avenue
York, PA 17403-2909
Tel: 800-755-6274
www.grahamarch.com

Harvey Industries Inc.
1400 Main Steret
Waltham, MA 02154
Tel: 800-942-7839
www.harveyind.com

Industrial Acoustics Company
1160 Commerce Avenue
Bronx, NY 10462
Tel: 718-931-8000
www.industrialacoustics.com

Jeld-wen
19618 Wildwood Drive
West Linn, OR 97068
Tel: 877-783-2057
www.jeld-wen.com

Loewen, Inc.
6465 East Johns Crossing, Suite 400
Duluth, GA 30097
Tel: 800-563-9367
www.loewen.com

Milgard Windows
965 54th Ave. East
Tacoma, WA 98424
Tel: 800-645-4273 (800-MIL-GARD)
www.milgard.com

Mon-Ray, Inc.
801 Boone Avenue North
Minneapolis, N 55427-4432
Tel: 800-544-3646
www.monray.com

ACOUSTICALLY TESTED WINDOWS - *Concluded*

NRG, Inc.
22520 Ecorse Rd.
Taylor, MI 48180
Tel: 312-295-4100

National Gypsum Company
2001 Rexford Road
Charlotte, NC 28211
Tel: 704-365-7300
www.nationalgypsum.com

Peerless Products, Inc.
2403 S. Main Street
Fort Scott, KS 66701
Tel: 866-420-4000
www.peerlessproducts.com

Rehau Incorporated
P.O. Box 1706
Leesburg, VA 20177
Tel: 800-247-9445
www.rehau.com

Republic Windows and Doors
930 West Evergreen Ave.
Chicago, IL 60622
Tel: 800-248-1775
www.republicwindows.com

St. Cloud Window, Inc.
P.O. Box 1577
St. Cloud, MN 56302
Tel: 800-383-9311
www.stcloudwindow.com

Therm-o-lite
635 S. Lafayette Blvd.
South Bend, IN 46601
Tel: 574-234-4004
www.therm-o-lite-windows.com

Torrance Aluminum
22850 Perry St.
Perris, CA 92570
Tel: 909-943-0430
www.torrancealuminum.com

Wausau Window and Wall Systems
1415 West Street
Wausau, WI 54401
Tel: 715-845-2161
www.wausauwindows.com

WALL TREATMENTS

National Gypsum Company
2001 Rexford Road
Charlotte, NC 28211
Tel: 704-365-7300
www.nationalgypsum.com

PAC International Inc.
10680 S.W. Industrial Way
Tualatin, OR 97062-9502
Tel: 866-774-2100
www.pac-intl.com

Quiet Solution, Inc.
522 Almanor Ave.
Sunnyvale, CA 94085
Tel: 800-797-8438
www.quietsolution.com

USG
125 South Franklin
Chicago, IL 60606
Tel: 312-606-4000
www.usg.com

APPENDIX C

INDEPENDENT CERTIFIED ACOUSTICAL TESTING LABORATORIES

Appendix C
Independent Certified Acoustical Testing Laboratories

This list represents a partial list of Certified Acoustical Testing Laboratories. The list below does not imply an endorsement or recommendation by Wyle Laboratories. The National Voluntary Laboratory Accreditation Program (NVLAP) maintains a Directory of Accredited Laboratories on their website:

http://ts.nist.gov/ts/htdocs/210/214/scopes/acots.htm

Acoustic Systems Acoustical
Research Facility, Inc.
415 East St. Elmo Road
P.O. Box 3610
Austin, TX 78764
512/444-1961

Western Electro-Acoustic Lab., Inc.
25132 Rye Canyon Loop
Santa Clarita, CA 91355
661-775-3741

Architectural Testing Inc.
130 Derry Ct.
York, PA 17402
717-764-7700

Stork-Twin City Testing, Inc.
662 Cromwell Avenue
St. Paul, MN 55114-1776
651-645-3601

Riverbank Acoustical Labs, Inc.
1512 Batavia Avenue
Geneva, Illinois 60134
630-232-0104

Orfield Laboratories, Inc.
2709 E. 25th Street
Minneapolis, MN 55406
612-721-2455

APPENDIX D

GLOSSARY

Appendix D
Glossary

Absorption Coefficient The sound-absorbing ability of a material. Values of absorption coefficient are a function of the frequency of the incident sound. The values of sound absorption coefficients usually range from about 0.01 (for hard smooth surfaces) to about 1.0 (for thick absorptive fiberglass).

Acoustical Treatment Applying design principles in architectural acoustics to reduce noise or vibration and to correct acoustical problems.

Acoustics The science of sound, including the generation, transmission, and effects of sound waves, both audible and inaudible.

Airborne Sound Sound traveling through air rather than through solid materials or the structure of the building.

Ambient Noise Level Sometimes called the "background" noise, the level of noise that is all-encompassing within a given environment. It is usually made up of many different sounds, some originating near to and far from the receiver.

American National Standards Institute (ANSI) A voluntary federation of organizations concerned with developing standards covering a broad spectrum of topics.

American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) A professional organization which identifies and publishes specifications and standard practices relating to all aspects of heating, ventilation, refrigeration, and air conditioning.

American Society for Testing and Materials (ASTM) An organization which develops and publishes recommended practices and standards for a broad range of testing and material properties issues.

Architectural Acoustics The science of sound, including its production, transmission, control, and effects within buildings.

Attenuation The reduction of sound.

A-Weighted Sound Level A sound measure, in decibels, that reflects the heightened sensitivity of the human ear to sound frequencies between 1000 and 6000 Hz, and the relatively reduced sensitivity to sound below 1000 Hz or above 6000 Hz. The A-weighted sound level is used to predict the relative "noisiness" or "annoyance" of many common sounds.

Background Noise Ambient noise from all sources unrelated to a any particular sound. Background noise may include airborne, structureborne, and instrument noise.

Balanced Design A noise control design in which all important noise paths transmit the same amount of acoustic energy into the space, avoiding any "weak links" so that the combined effect ensures an acceptable noise level.

Building Officials and Code Administrators International (BOCA) *See International Building Code.*

Dampen To cause a reduction, usually through dissipation, of the sound energy.

Day-Night Average Sound Level (DNL or L_{dn}) The day-night average sound level is a measure of the average noise environment over a 24-hour day. It is the 24-hour energy-averaged, A-weighted sound level with a 10 dB penalty applied to the nighttime levels which occur between 10:00 p.m. to 7:00 a.m.

Decibel (dB) The term used to describe sound levels.

Design Criteria Design goals used in acoustical and noise control design of buildings. Design criteria may be stated either as the maximum allowable noise levels inside buildings or as noise reduction values (from outside to inside) required for certain types of buildings or rooms.

DNL See Day-Night Average Sound Level.

Environmental Noise Unwanted sound from various outdoor noise sources. Environmental noise sources include aircraft, cars, trucks, buses, railways, industrial plants, construction activities, lawnmowers, etc.

Frequency The number of oscillations per second of a vibrating object, measured in Hertz (Hz).

Hertz The unit used to designate frequency. Specifically, the number of cycles per second.

International Building Code (IBC) A comprehensive building code published by the International Code Council (ICC) covering the fire, life, and structural safety aspects of all buildings and related structures. As of January 2003, the three largest building code organizations in America merged. Building Officials and Code Administrators International (BOCA), Southern Building Code Congress International (SBCCI), and the International Conference of Building Officials (ICBO) integrated to form the International Code Council (ICC). Municipalities may still reference earlier versions of BOCA, UBC, and SBC (as well as IBC). Also, states typically have their own building codes that may incorporate all or part of these codes.

Loudness The attribute of a sound, on a scale extending from very soft to very loud. Loudness depends most on the sound pressure or energy of the source, but it also depends upon the frequency and wave form of the source (because the human ear is more sensitive to some frequencies and forms than others).

Masking The ability of one sound to block out the perception of another sound. For example, radio static may mask voices in a nearby room. Masking may involve the intentional use of an unobtrusive background noise to cover some other specific intruding sound.

Noise Any sound which is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying.

Noise Contours Lines or "footprints" of noise level usually drawn around a noise source (such as an airport, industrial plant or highway). The lines are generally drawn in 5-decibel increments so that they resemble elevation contours found in topographic maps.

Noise Exposure The cumulative noise reaching the ear of a person over a specified period of time (e.g., a work shift, a day, a working life, or a lifetime).

Noise Level Reduction (NLR) The difference between A-weighted sound levels indoors and outdoors.

Noise Reduction (NR) The difference, in decibels, of the average sound levels in two adjacent areas or rooms. Noise reduction could be from outside to inside, or from one room to another. Noise reduction combines the effects of the building construction plus the effect of acoustic absorption present in the receiving room. By knowing the noise reduction values and the outdoor noise levels one can determine the Noise Level Reduction (NLR).

Octave The interval between two sound frequencies having a ratio of 2. For example, if the center frequency of one octave is 125 Hz, the next octave up will be centered at 250 Hz. and the octave above that will be at 500 Hz.

Octave Band A frequency range which is one octave wide. Standard octave bands are designed by their center frequency.

Octave Band Center Frequency The average of the upper and lower frequencies of the octave. Standard octave band center frequencies in the audible range are 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000, and 16,000 hertz.

One-Third Octave Band A frequency range which is one-third octave wide. Standard one-third octave bands are designed by their center frequency.

One-Third Octave Band Center Frequency The average of the upper and lower frequencies of the one-third octave bands. Standard one-third octave band center frequencies in the audible range are:

25.0	100	400	1600	6300
31.5	125	500	2000	8000
40.0	160	630	2500	10,000
50.0	200	800	3150	12,500
63.0	250	1000	4000	16,000
80.0	315	1250	5000	20,000

Receiver The listener who hears a sound or the measuring microphone which detects the sound transmitted by the source.

Reverberation The persistence of sound in an enclosed space, as a result of multiple reflections, after the sound source has stopped. The more absorptive the room is, the shorter the reverberation time will be. Generally, if the reverberation time is too short, people feel that the room is "dead" while if it is too long, there is confusion among sounds.

Shielding The ability of hills or structures to physically block sound or create shadow zones where sound levels are reduced.

Sound Absorption The ability of sound-absorbing materials to trap sound and convert it to heat or some other form of energy.

Sound Insulation Reducing the sound level inside a building through the use of specific building construction materials, and component assemblies which provide noise reduction.

Sound Transmission Class (STC) A single-number rating derived from measured values of transmission loss, in accordance with ASTM Classification E413, "Determination of Sound Transmission Class". It provides an evaluation of the sound-isolating properties of built construction against sounds of speech, radio, television, etc.

Sound Transmission Loss (TL) A measure of a built construction's ability to reduce sound passing through it, expressed in decibels.

Source The object which generates the sound.

Southern Building Code (SBC) *See International Building Code.*

Spectral Characteristics/Spectrum The frequency content of the noise produced by the source.

Structureborne Sound Sound energy transmitted through a solid medium such as the building structure.

Thermal Insulation A material or assembly of materials used primarily to provide resistance to heat flow.

TL See Sound Transmission Loss.

Uniform Building Code (UBC) *See International Building Code.*

Ventilation - When a house is sound insulated it is necessary to close windows to achieve the benefits of the modifications. To replace the cooling effects of open windows, air conditioning should be provided. To provide fresh air an additional fan should be provided which draws in outdoor air and heats the air when it is cold outside. To ensure complete combustion if there are gas or oil powered appliances in the house, it is appropriate to add a combustion air enforcer fan.

Sound Ratings

The acoustical performance of windows and doors is often expressed in terms of the STC rating. A higher STC rating generally indicates better sound insulation performance. Typical off-the-shelf windows and doors have a rating of approximately STC 23-29. Depending upon the size of the windows and doors, which noise zone the house is located in, and other factors, the recommended rating varies from STC 28 to 44.

Providing windows with ratings up to STC 36 can be accomplished using a double-pane window with laminated glass. To achieve ratings of STC 38 to 44 it is typically necessary to use combination (three-track) windows or dual (four-track) windows.

For both doors and windows it is important to verify the accuracy of the STC rating. For an STC rating quoted by a manufacturer to be meaningful it must be supported by a laboratory test report performed on the same model of window or door proposed to be used in the house.

Thermal Performance

Insulated glass windows block the transmission of heat (in winter or summer) more effectively than single-pane windows. Increasing the thickness of glass and the airspace, as necessary to improve the STC rating, further improves the thermal performance and reduces utility costs.

Sound Insulation Costs

Sound insulation costs vary widely depending upon such factors as:

- Outdoor noise zone,
- Construction of the residence, and
- Availability of contractors

For More Information

To get a copy of the full *New Construction Acoustical Design Guide* contact one of the following offices nearest you:

Carteret County Planning & Develop. 252.728.8497
Craven County Planning & Insp. 252.636.6618
City of Havelock Planning & Insp. 252.444.6411
Town of Emerald Isle Plan. & Insp. 252.354.3338
Town of Bogue Planning & Zoning 252.393.3055
Community Plans & Liaison Office
MCAS Cherry Point 252.466.4197

Soon a free computer program will also be available. This program will allow the user to estimate the scope and cost to sound insulate each room in a house.

wyle laboratories

New Construction Acoustical Design Guide for MCAS Cherry Point and MCALF Bogue Field

Prepared for:
Technical Advisory Committee of the Eastern Carolina Joint Land Use Study

Prepared by:
Wyle Acoustics Group
Wyle Laboratories, Inc.
wyleacoustics.com

Overview

This guide was developed for homeowners, local planning departments and design professionals interested in sound insulating residences. Reducing the level of aircraft noise inside a home is referred to as sound insulation. Aircraft noise interferes with typical activities in homes such as watching television, talking on the telephone, and sleeping. The document entitled *New Construction Acoustical Design Guide* provides an overview of sound insulation concepts and step-by-step guidelines for sound insulating a new home near MCAS (Marine Corps Air Station) Cherry Point and MCALF (Marine Corps Auxiliary Landing Field) Bogue Field. It is meant to be used in conjunction with noise overlay zones developed by the surrounding communities through the joint land use study process.

Noise Contours

Noise levels around airfields are typically expressed by dividing the community into various noise zones using noise contours. Different sound insulation techniques are recommended depending upon the noise zone in which the proposed house will be located. The Department of the Navy provides guidance that the indoor noise level not exceed a DNL of 45 decibels. In order to provide this noise level it is necessary for each room of the house to provide Noise Level Reductions (NLR) of 20, 25, 30, or 35 decibels, depending on the outdoor noise zone. For an explanation of DNL and noise contours refer to the brochure entitled *Living in Harmony with the Air Station Next Door* (see contact information on reverse side)..

Sound Insulation Techniques

For homes located in areas with high noise levels, standard building methods, even those designed for thermal efficiency, are normally inadequate to protect inhabitants from external noise. For this reason, building design and construction methods may have to be modified.

Noise enters a house through all exterior elements, including walls, roofs, doors, windows, range exhaust ducts, chimneys, etc. Each of these paths must be addressed if significant noise reduction is desired.

Typical sound insulation modifications include:

Windows - the single most important modification is to use acoustical windows or add acoustical storm windows. Acoustical windows typically have thicker glass, heavier vinyl extrusions, and tighter-fitting seals. The most common type of acoustical window is a combination or three-track window consisting of a double-pane aluminum or vinyl window with an attached storm window. Another common type is a dual or four-track window consisting of two vinyl or aluminum windows attached together.

Doors - Acoustical doors and/or acoustical storm doors should be used. These products are heavier than typical doors and have a special type of weatherstripping. For sliding glass doors it is often less costly to use a secondary sliding door which has moderately good acoustical performance in combination with a typical sliding door, in lieu of using only a prime sliding door which has very good acoustical performance.

Walls - For houses with sided wood-framed walls it is often necessary to hang the gypsumboard on resilient channels or use 2x4 studs staggered on 2x6 base plates in order to meet the acoustical design goals. For houses with concrete walls no modification is typically necessary.

Ceilings - In high noise zones it is often necessary to upgrade ceilings of the top floor rooms by using two layers of gypsumboard for the ceiling or hanging the ceiling using resilient channels.

Floors - Houses elevated on pylons may need deeper floor joists and thicker insulation between the joists in high noise zones.

Fireplaces - The recommended modifications for fireplaces are to either provide a special acoustical chimney-top damper, or to provide tight-fitting glass doors over the fireplace.

Exhaust Fans - Kitchen range hood or in-wall fans that duct to the exterior are a significant noise leak. In general, using ductless range fans is the best course of action.

Appendix B - Noise Reduction Standards for Insulating Structures Exposed to Aircraft Operations

April 2005

Guidelines for Sound Insulation of Residences Exposed to Aircraft Operations

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1.0 Introduction

This Chapter gives an overview of the purpose for the *Guidelines*, background information on their origin, the development of this revised edition, and a description of the document's organization.

1.1 Purpose and Intent of the Guidelines

Residences located near airports and military air installations experience many economic benefits from the facility, but are unfortunately exposed to aircraft noise, sometimes resulting in significant adverse impacts. However, using proper construction techniques and materials minimizes the impact of aircraft noise and reduces interference with regular indoor activities. The *Guidelines* provide a comprehensive overview of sound insulation techniques for homeowners and builders concerned with modifying an existing home or constructing a new one that incorporates sound insulation principles. They also give guidance to planning, zoning and building code officials who may want to incorporate zoning overlays and model building codes for residences near airports and military air installations.

This publication is concerned with the sound insulation of homes, apartments, and nursing homes, both existing and new. Sound insulation programs may include public buildings such as schools and churches. The techniques described here can be applied to non-residential buildings up to a point, but institutional and commercial structures usually have different building elements (such as window-wall structures), different mechanical systems and different building code requirements that must be met. For those reasons, the *Guidelines* are only recommended for residential buildings.

The *Guidelines* seek to provide clear, unambiguous direction that is practical and can be implemented with minimal additional cost. However, construction quality is especially important for maintaining the acoustical integrity of a design. For example, a good window that has been installed improperly will allow a significant amount of noise into the building. High-quality construction standards are absolutely essential for these techniques to work effectively. Similarly, because all building elements must work together to reduce noise intrusion; if some of the guidance offered here is used but other elements are neglected, the overall benefit may be substantially reduced.

The intent of the *Guidelines* is to address a wide range of common building types, and give practical, cost-effective measures to reduce noise impacts. Sound insulation treatments have been developed to account for: (1) the variety of construction materials and methods used in new and existing houses, and (2) the need to provide a noticeable improvement in indoor noise levels. The techniques described here were tested through simulations on prototypical rooms and have been carefully analyzed to ensure their acoustical effectiveness. The measures have also been field-tested on thousands of homes being renovated through federally funded airport noise mitigation

programs. However, because no general text can provide the kind of specific guidance that is required for actual construction, users of the *Guidelines* may wish to seek professional assistance when undertaking sound insulation in their own homes, as a commercial enterprise, or within a community noise mitigation program.

In general, there are no safety factors built into the recommendations in this report, except to the extent that homes are grouped into 5 dB ranges of outdoor noise exposure. The recommendations provided in this guide are based on the predicted average performance of rooms in houses. However, there is inherent variability in the acoustical performance of different buildings, both well above and well below the average. When greater precision is desired or to evaluate conditions not covered in this document, consult with a qualified acoustical consultant, or use the recommendations for the next higher noise zone. To ensure that the recommended measures comply with the building codes consult with a qualified architect.

The recommendations in this document are based on an average of many types of aircraft. Noise levels inside homes due to specific aircraft will differ from those for average aircraft. The amount of low-frequency or high-frequency energy produced by the aircraft plays a significant role in determining overall outdoor and indoor noise levels. For example, noise levels inside homes exposed only to aircraft arrivals, which produce less low-frequency noise, will be slightly lower than those inside homes exposed to both arrivals and departures. Also, the frequency content of military jet aircraft differ from that of civilian jet aircraft, as does the frequency content of jet and propeller aircraft. The recommendations contained in these *Guidelines* are based on calculations using the frequency content of military jet operations. For more recommendations at houses impacted predominantly by propeller aircraft, helicopters, or civilian jet aircraft see Section 3.4.

This report does not address special low-frequency problems such as vibration and rattling, vibration-induced noise, or noise-induced vibration.

1.2 Background

Aircraft noise has been recognized as a community problem since at least the 1960s when jets became common at commercial airports. Acousticians and architects began developing methods to sound insulate homes with the first airport-sponsored program in 1967 at Los Angeles International Airport. Since then, literally tens of thousands of American homes have been modified to reduce interior noise. There was a need to condense this knowledge and practical guidance into a form that is usable by the average homeowner, as well as by building professionals and concerned local and military officials.

In the late 1980s, the US Dept. of the Navy and the Federal Aviation Administration (FAA) jointly commissioned the preparation of *Guidelines for Sound Insulation of Residences Exposed to Aircraft Operations*. That document was completed in 1989 and, after initial release internal to those two agencies, was published more broadly in October 1992 by the Dept. of Transportation as Publication DOT/FAA/PP 92-5.

Over the course of the decade following the initial release, the Navy and FAA received feedback that the *Guidelines*, while very useful, needed revision in some elements. Areas of concern included simplifying the methods used to specify treatments and materials and updating the cost information. To address these weaknesses, the Navy has sponsored a substantial update to the *Guidelines*, preserving the basic functionality but revising both the approach to prescribing treatments and the costs for implementing them.

Major changes from the original version include:

- A revised organization wherein the main text serves as a concise overview of the material and much of the technical material is given in appendices,
- Recommendations are made on a room-by-room basis for existing homes and on a whole house basis for new construction,
- The inclusion of Sound Transmission Class rather than Exterior Wall Rating for specifying building products,
- The costs have been updated to reflect 2004 values, and
- Calculations performed using the specific frequency content of various types of aircraft.

1.3 Document Organization

Chapters two through five take the user through a step-by-step process to learn how to sound insulate a room, a house, or a group of homes. The appendices provide additional information of interest to various users, depending on their role in sound insulation efforts.

Chapter 2 – Noise Reduction Requirements – Information is given on how to determine the noise reduction required for a home, based on the DNL zone. Goals are established for reducing noise to an acceptable level inside the house. Typical sound insulation characteristics of standard construction are discussed as well as the factors that influence sound insulation in general.

Chapter 3 – Sound Insulating Existing Homes – The types of rooms to be insulated are identified and look-up tables are provided for sound insulation treatments in existing homes.

Chapter 4 – Sound Insulating New Homes – Look-up tables give the treatments required to achieve the level of noise reduction needed in new homes.

Chapter 5 – Sound Insulation Costs – Estimates are given for the cost of construction in existing rooms and new homes, as well as cost multipliers for different regions of the country.

Appendix A – New Home Floor Plans – Floor plans for 21 prototype homes are given in Appendix A. These are the homes for which modifications are specified in Chapter 4. Homeowners, builders and program managers may find this information useful.

Appendix B – Basic Concepts – Appendix B contains a discussion of basic acoustics concepts such as how sound travels, how sound insulation works and how aircraft noise impacts residents. This appendix will be of general interest to all users of the *Guidelines*.

Appendix C – Sound Insulation Methods – Information is given on how to design and specify sound insulation treatments and what to look for during construction to see that the designs are implemented correctly to achieve the acoustical goals listed in Chapter 2. This appendix will be of interest to homeowners, architects, engineers, builders/developers, and building inspectors.

Appendix D – Model Building Code – A model building code that has been developed for the communities surrounding an air installation, which predominantly has military jet aircraft, provides sample language to include in a zoning ordinance or building code to incorporate sound insulation requirements. This model building code would have to be adapted considering the predominant aircraft at the specific air installation, the prevalent local building methods, and state and local building code requirements. This appendix will be of interest to planning and zoning officials, building inspectors, and builders/developers.

Appendix E – Manufacturers and Suppliers – A list of sources for acoustically-rated products gives contact information that will be of interest to homeowners, architects, engineers, and builders/developers.

Appendix F – Testing Laboratories – A list of laboratories tells where products can be tested to determine their acoustical performance. This appendix will be of greatest interest to architects and engineers specifying or approving products as well as manufacturers of products.

Appendix G – Glossary – Definitions of a wide variety of acoustical and sound insulation terms are given in this appendix. The glossary will be of general interest to all users of the *Guidelines*.

Appendix H – Bibliography – A list of references is given that indicates where to go for more information. This appendix will be of general interest to all users of the *Guidelines*.

1.4 Supplemental Computer Program

The recommendations and cost estimates contained in Chapters 3, 4, and 5 are for a variety of existing rooms and prototypical new houses. However, it is not feasible to address every possible room or house type. To supplement this document, a computer program was developed that enables the user to input the style of room construction and determine the recommended scope and approximate cost of sound insulation. This program is on the disk in the front of this report. To obtain an additional copy of this program, contact the regional Naval Facilities Engineering Command office near you:

NAVAL FACILITIES ENGINEERING COMMAND OFFICES	
NAVFAC Headquarters, Washington Navy Yard, Washington, DC	Contact: Alan Zusman E-mail: alan.zusman@Navy.mil Telephone: (202) 685-9181
NAVFAC Atlantic, Norfolk, VA	Contact: Fred Pierson E-mail: Fred.Pierson@Navy.mil Telephone: (757) 322 4935
NAVFAC Southwest Division, San Diego, CA	Contact: Robert Henderson E-mail: Robert.K.Henderson@Navy.mil Telephone (619) 532 1622
NAVFAC Southern Division, Charleston, SC	Contact: Richard Jolly E-mail: Richard.Jolly@Navy.mil Telephone: (843) 820 5889

2.0 Noise Reduction Requirements

This chapter discusses various aspects of determining the noise reduction goals for a residence. Basic goals for mitigating aircraft noise are introduced in Section 2.1. Then, Section 2.2 explains how to determine the level of noise to which a home is exposed. This is followed by a discussion of interior noise guidance in Section 2.3 and information on how well typical dwellings meet this guidance in Section 2.4. Finally, Section 2.5 provides information on how sound insulation treatments will be specified in the *Guidelines*.

2.1 Mitigating Aircraft Noise

Aircraft noise is disturbing to people because of several different factors. First, the sound may include a combination of low frequency rumble and higher-pitched whine from jet engines, the throbbing of helicopters, or the steady, annoying buzz of smaller aircraft. Second, unlike highway noise which is generally constant and may fade into the background, each aircraft overflight is likely to be recognized as a distinct event, calling attention to itself when it interrupts speech or some other activity.

Individuals differ in their response to noise. In an aircraft noise-affected neighborhood, a number of residents may be very annoyed by aircraft overflights, while quite a few others may not. If properly implemented, the recommendations in the *Guidelines* will reduce noise inside the home to levels that most people would find acceptable. Aircraft noise will still be discernible; sound insulation is not sound elimination. People will know that an aircraft is passing overhead but, with implementation of the techniques outlined in this document, the noise in most cases should not interfere with normal daily indoor activities. However, individuals who are most sensitive to noise may continue to be annoyed. Overall, the number of people who perceive unacceptable indoor noise levels can be significantly reduced by the use of proper renovation and construction techniques.

Sound insulation of homes and schools has proven to be very effective at mitigating adverse noise impacts across the country. For this reason, many civilian airports undertake sound insulation programs, often with the assistance of federal funds under the authority of the FAA in the form of matching grants. While most users of the *Guidelines* are anticipated to be homeowners and building professionals, information is also given for local officials considering a residential sound insulation program.

2.2 Aircraft Noise Exposure Zones

Communities near military air installations and joint-use facilities are exposed to varying levels of noise depending on how close they are to the air installation and whether or not they experience direct overflights on a regular basis. Generally, the closer a house is to a flight corridor, the louder the noise will be. Military airfields and civilian airports typically document the levels of noise exposure around their facility using computer-generated noise contours. These contours may be obtained from the airfield or airport, or depending on the community, from other sources such as the local public library or the department of planning and zoning. The contours usually represent the average, annual noise exposure due to all flight operations and take into account the number of flights, the types of aircraft, the flight tracks they use, and whether the flights occur during the day or at night. Nighttime noise, defined as that occurring after 10 PM and before 7 AM, is counted more heavily in the noise calculations because it is more intrusive than daytime noise.

In most parts of the US, noise contours are depicted in terms of the Day Night Average Sound Level, or DNL[1]. In California, a similar metric is used, the Community Noise Equivalent Level, or CNEL. Regardless of whether DNL or CNEL is used, the noise contours are generally shown as "noise footprints" on the ground in levels such as 60 dB, 65 dB, 70 dB, 75 dB and so on. The higher the number, the greater the noise level.

2.3 Interior Noise Reduction Goals

The DoD and other Federal agencies have determined that noise exposure below 65 dB DNL (or 65 dB CNEL) is generally compatible with residential development. At 65 dB and higher, however, homes may need varying levels of sound insulation treatment to ensure that noise levels inside the house are sufficiently reduced, should local governments approve residential development in these areas at and above 65 dB. To determine the correct level of acoustical treatment, it is necessary to determine in which noise exposure zone the house is located. This is simply a matter of finding the house location on a noise contour map, such as the one shown in Figure 2-1, and noting whether the house is outside the 60 dB contour line, between the 60 and 65 dB lines, between the 65 and 70 dB lines, between the 70 and 75 dB lines, between the 75 and 80 dB lines or inside the 80 dB line. Once the noise exposure zone is determined, the interior noise reduction goals can be established and the treatments specified. The tables in the *Guidelines* that prescribe treatments have columns for each of these noise zones.

[1] See Appendix B for a more complete explanation of DNL and CNEL.

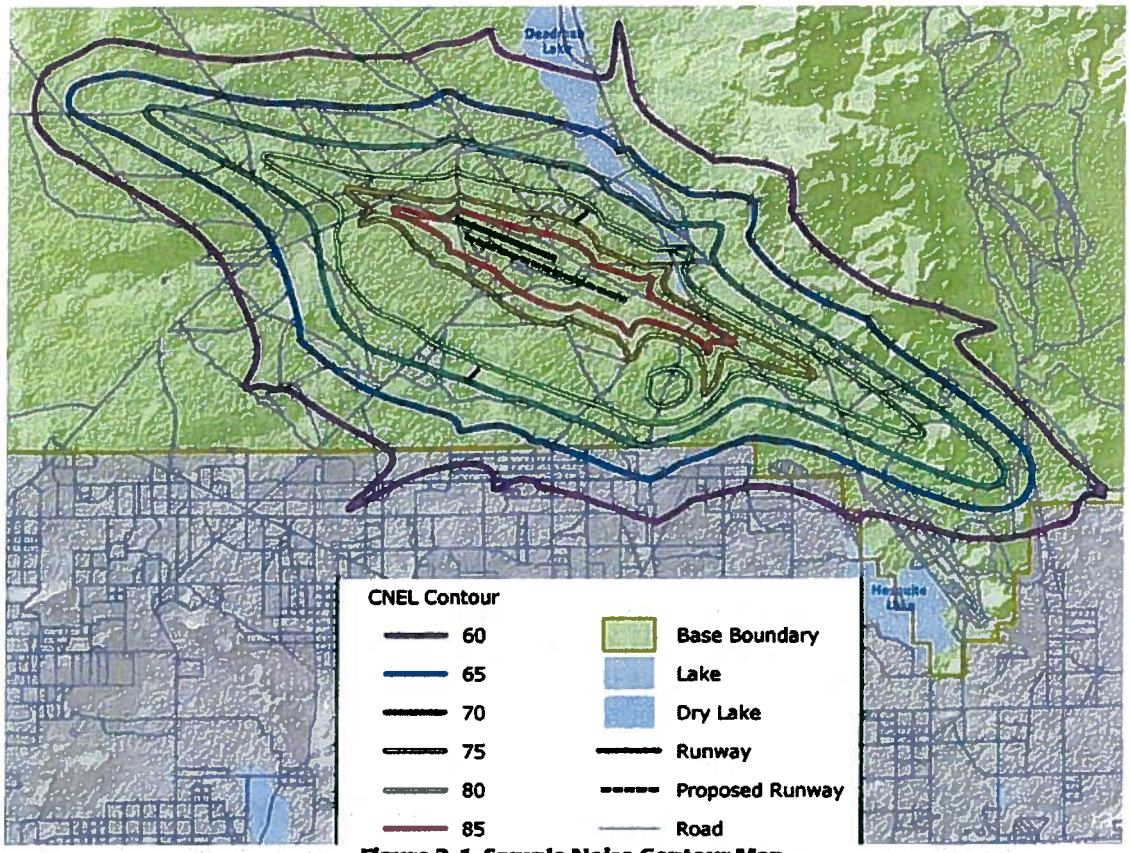


Figure 2-1. Sample Noise Contour Map

The Environmental Protection Agency (EPA) and the Federal Aviation Administration (FAA) have established an interior DNL goal of 45 dB. This is based on the assumption that when the exterior DNL is 65 dB, and a building provides 20 dB of outdoor-to-indoor noise level reduction (NLR), activity interference for most people is minimal[2]. While the Department of Defense (DoD) does not specify an interior noise goal, they do provide guidance that the NLR be at least 25 dB for homes located between the 65 and 70 dB DNL noise contours, and 30 dB for homes located between the 70 and 75 dB DNL noise contours. This is equivalent to providing guidance that the DNL not exceed 45 dB indoors. Reducing the DNL to this level through sound insulation will reduce the interior noise levels to a level where aircraft noise no longer interferes with daily activities such as watching TV, talking on the phone, or sleeping.

The land-use compatibility table shown in Table 2-1 was issued by the Chief of Naval Operations (OPNAVINST 11010.36B, Dec. 2002). The Air Force and FAA use similar tables. This table specifies the outside-to-inside NLR to be provided for various land uses such as residences, hospitals and others, by noise impact zone. The table refers to DNL but the guidance applies to

[2] See Appendix B for an explanation of NLR.

CNEL as well without adjustments. For example, Table 2-1 recommends that a home exposed to a DNL of 65 to 70 dB should provide at least 25 dB of NLR and a home exposed to a DNL of 70 to 75 dB should provide at least 30 dB of NLR. These are the NLRs that would result in an interior DNL of 45 dB. The use of other NLR goals may be appropriate in some cases, especially if a noise metric other than DNL or CNEL is used for a particular area or if there are special concerns.

For sound insulating existing homes there should be two acoustical goals: the target NLR, and the reduction in noise level. The target NLR can be found in Table 2-1, possibly in local zoning ordinances, or from an acoustical consultant. Typically, homes are only sound insulated if the interior noise level could be reduced significantly; a 5 dB reduction in noise level is generally considered significant. The recommended modifications in Section 3 include the NLR goal corresponding to the noise zone, as well as this 5 dB reduction. For example a room exposed to an outdoor DNL of 70 dB would have a target NLR of 25 dB. But if the existing NLR is 22 dB, the room should be designed to achieve an NLR of 27 dB. For this reason two similar rooms could have dramatically different recommended modifications in the lower noise zones.

The outdoor DNL, the NLR, and the 5 dB reduction goal discussed above are all based on A-weighted sound levels (see Appendix B). By definition A-weighted sound levels are more based on middle- and high-frequency sound than on low-frequency sound. Therefore, the recommended measures in this report are not focused on low-frequency noise mitigation. If the home is exposed <u>only</u> to strong low frequency noise, as would be the case when aircraft primarily depart <u>away</u> from a home located near the end of a runway, additional noise control measures would be appropriate. Some types of aircraft produce more low-frequency noise than others. For recommendations relating to aircraft type see Section 3.4.

Table 2-1. Air Installations Compatible Use Zones Suggested Land Use Compatibility in Noise Zones

Land Use		Suggested Land Use Compatibility						
		Noise Zone 1 (DNL or CNEL)		Noise Zone 2 (DNL or CNEL)		Noise Zone 3 (DNL or CNEL)		
SLUCM NO	LAND USE NAME	<55	55-64	65-69	70-74	75-79	80-84	85+
	Residential							
11	Household Units	Y	Y 1	N 1	N 1	N	N	N
11.11	Single units: detached	Y	Y 1	N 1	N 1	N	N	N
11.12	Single units: semidetached	Y	Y 1	N 1	N 1	N	N	N
11.13	Single units: attached row	Y	Y 1	N 1	N 1	N	N	N
11.21	Two units: side-by-side	Y	Y 1	N 1	N 1	N	N	N
11.22	Two units: one above the other	Y	Y 1	N 1	N 1	N	N	N
11.31	Apartments: walk-up	Y	Y 1	N 1	N 1	N	N	N
11.32	Apartment: elevator	Y	Y 1	N 1	N 1	N	N	N
12	Group quarters	Y	Y 1	N 1	N 1	N	N	N
13	Residential Hotels	Y	Y 1	N 1	N 1	N	N	N
14	Mobile home parks or Courts	Y	Y 1	N	N	N	N	N
15	Transient lodgings	Y	Y 1	N 1	N 1	N 1	N	N
16	Other residential	Y	Y 1	N 1	N 1	N	N	N
20	***Manufacturing***							
21	Food & kindred products; Manufacturing	Y	Y	Y	Y2	Y3	Y4	N
22	Textile mill products; Manufacturing	Y	Y	Y	Y2	Y3	Y4	N
23	Apparel and other finished products; products made from fabrics, leather and similar materials; manufacturing	Y	Y	Y	Y2	Y3	Y4	N
24	Lumber and wood products (except furniture); manufacturing	Y	Y	Y	Y2	Y3	Y4	N
25	Furniture and fixtures; manufacturing	Y	Y	Y	Y2	Y3	Y4	N
26	Paper and allied products; manufacturing	Y	Y	Y	Y2	Y3	Y4	N
27	Printing, publishing, and allied industries	Y	Y	Y	Y2	Y3	Y4	N
28	Chemicals and allied products; manufacturing	Y	Y	Y	Y2	Y3	Y4	N
29	Petroleum refining and related industries	Y	Y	Y	Y2	Y3	Y4	N

Table 2-1. Air Installations Compatible Use Zones Suggested Land Use Compatibility in Noise Zones - *continued*

Land Use		Suggested Land Use Compatibility						
		Noise Zone 1 (DNL or CNEL)		Noise Zone 2 (DNL or CNEL)		Noise Zone 3 (DNL or CNEL)		
SLUCM NO.	LAND USE NAME	<55	55-64	65-69	70-74	75-79	80-84	85+
30	***Manufacturing (continued)***							
31	Rubber and misc. plastic products; manufacturing	Y	Y	Y	Y 2	Y 3	Y 4	N
32	Stone, clay and glass products; manufacturing	Y	Y	Y	Y 2	Y 3	Y 4	N
33	Primary metal products; manufacturing	Y	Y	Y	Y 2	Y 3	Y 4	N
34	Fabricated metal products; manufacturing	Y	Y	Y	Y 2	Y 3	Y 4	N
35	Professional scientific, and controlling instruments; photographic and optical goods; watches and clocks	Y	Y	Y	25	30	N	N
39	Miscellaneous manufacturing	Y	Y	Y	Y 2	Y 3	Y 4	N
40	***Transportation, communication and utilities***							
41	Railroad, rapid rail transit, and street railway transportation	Y	Y	Y	Y 2	Y 3	Y 4	N
42	Motor vehicle transportation	Y	Y	Y	Y 2	Y 3	Y 4	N
43	Aircraft transportation	Y	Y	Y	Y 2	Y 3	Y 4	N
44	Marine craft transportation	Y	Y	Y	Y 2	Y 3	Y 4	N
45	Highway and street right-of-way	Y	Y	Y	Y 2	Y 3	Y 4	N
46	Automobile parking	Y	Y	Y	Y 2	Y 3	Y 4	N
47	Communication	Y	Y	Y	25 5	30 5	N	N
48	Utilities	Y	Y	Y	Y 2	Y 3	Y 4	N
49	Other transportation, communication and utilities	Y	Y	Y	25 5	30 5	N	N
50	***Trade***							
51	Wholesale trade	Y	Y	Y	Y 2	Y 3	Y 4	N
52	Retail trade – building materials, hardware and farm equipment	Y	Y	Y	Y 2	Y 3	Y 4	N
53	Retail trade – shopping centers	Y	Y	Y	25	30	N	N
54	Retail trade - food	Y	Y	Y	25	30	N	N

Table 2-1. Air Installations Compatible Use Zones Suggested Land Use Compatibility in Noise Zones - *continued*

Land Use		Suggested Land Use Compatibility						
		Noise Zone 1 (DNL or CNEL)		Noise Zone 2 (DNL or CNEL)		Noise Zone 3 (DNL or CNEL)		
SLUCM NO	LAND USE NAME	<55	55-64	65-69	70-74	75-79	80-84	85+
50	***Trade (Continued)***							
55	Retail trade – automotive, marine craft, aircraft and accessories	Y	Y	Y	25	30	N	N
56	Retail trade – apparel and accessories	Y	Y	Y	25	30	N	N
57	Retail trade – furniture, home, furnishings and equipment	Y	Y	Y	25	30	N	N
58	Retail trade – eating and drinking establishments	Y	Y	Y	25	30	N	N
59	Other retail trade	Y	Y	Y	25	30	N	N
60	***Services***							
61	Finance, insurance and real estate services	Y	Y	Y	25	30	N	N
62	Personal services	Y	Y	Y	25	30	N	N
62.4	Cemeteries	Y	Y	Y	Y 2	Y 3	Y 4,11	Y 6,11
63	Business services	Y	Y	Y	25	30	N	N
63.7	Warehousing and storage	Y	Y	Y	Y 2	Y 3	Y 4	N
64	Repair Services	Y	Y	Y	Y 2	Y 3	Y 4	N
65	Professional services	Y	Y	Y	25	30	N	N
65.1	Hospitals, other medical fac.	Y	Y 1	25	30	N	N	N
65.16	Nursing Homes	Y	Y	N 1	N 1	N	N	N
66	Contract construction services	Y	Y	Y	25	30	N	N
67	Government Services	Y	Y 1	Y 1	25	30	N	N
68	Educational services	Y	Y 1	25	30	N	N	N
69	Miscellaneous	Y	Y	Y	25	30	N	N
70	***Cultural, entertainment and recreational***							
71	Cultural activities (& churches)	Y	Y1	25	30	N	N	N
71.2	Nature exhibits	Y	Y1	Y1	N	N	N	N
72	Public assembly	Y	Y1	Y	N	N	N	N
72.1	Auditoriums, concert halls	Y	Y	25	30	N	N	N
72.11	Outdoor music shells, amphitheaters	Y	Y 1	N	N	N	N	N
72.2	Outdoor sports arenas, spectator sports	Y	Y	Y 7	Y 7	N	N	N
73	Amusements	Y	Y	Y	Y	N	N	N
74	Recreational activities (include golf courses, riding stables, water rec.)	Y	Y1	Y1	25	30	N	N
75	Resorts and group camps	Y	Y 1	Y 1	Y 1	N	N	N
76	Parks	Y	Y 1	Y 1	Y 1	N	N	N
79	Other cultural, entertainment and recreation	Y	Y 1	Y 1	Y 1	N	N	N

Table 2-1. Air Installations Compatible Use Zones Suggested Land Use Compatibility in Noise Zones - *concluded*

Land Use		Suggested Land Use Compatibility						
		Noise Zone 1 *(DNL or CNEL)*		Noise Zone 2 *(DNL or CNEL)*		Noise Zone 3 *(DNL or CNEL)*		
SLUCM NO.	LAND USE NAME	<55	55-64	65-69	70-74	75-79	80-84	85+
80	*Resource Production and Extraction*							
81	Agriculture (except live stock)	Y	Y	Y 8	Y 9	Y 10	Y 10,11	Y 10,11
81.5,	Livestock farming	Y	Y	Y 8	Y 9	N	N	N
81.7	Animal breeding	Y	Y	Y 8	Y 9	N	N	N
82	Agriculture related activities	Y	Y	Y 8	Y 9	Y 10	Y 10,11	Y 10,11
83	Forestry Activities	Y	Y	Y 8	Y 9	Y 10	Y 10,11	Y 10,11
84	Fishing Activities	Y	Y	Y	Y	Y	Y	Y
85	Mining Activities	Y	Y	Y	Y	Y	Y	Y
89	Other resource production or extraction	Y	Y	Y	Y	Y	Y	Y

SLUCM	Standard Land Use Coding Manual, U.S. Department of Transportation
Y (Yes)	Land Use and related structures compatible without restrictions.
N (No)	Land Use and related structures are not compatible and should be prohibited.
Y[x] (Yes with Restrictions)	The land use and related structures are generally compatible. However, see note(s) indicated by the superscript.
N[x] (No with exceptions)	The land use and related structures are generally incompatible. However, see notes indicated by the superscript.
NLR (Noise Level Reduction)	Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25, 30, 04 35	The numbers refer to Noise Level Reduction levels. Land Use and related structures generally compatible however, measures to achieve NLR of 25, 30 or 35 must be incorporated into design and construction of structures. However, measures to achieve an overall noise reduction do not necessarily solve noise difficulties outside the structure and additional evaluation is warranted. Also, see notes indicated by superscripts where they appear with one of these numbers.
DNL	Day-Night Average Sound Level.
CNEL	Community Noise Equivalent Level (Normally within a very small decibel difference of DNL)
L_{dn}	Mathematical symbol for DNL.

Notes For Table 2-1. Suggested Land Use Compatibility In Noise Zones

1.

a) Although local conditions regarding the need for housing may require residential use in these Zones, residential use is discouraged in DNL 65-69 and strongly discouraged in DNL 70-74. The absence of viable alternative development options should be determined and an evaluation should be conducted locally prior to local approvals indicating that a demonstrated community need for the residential use would not be met if development were prohibited in these Zones.

b) Where the community determines that these uses must be allowed, measures to achieve and outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB in DNL 65-69 and NLR of 30 dB in DNL 70-74 should be incorporated into building codes and be in individual approvals; for transient housing a NLR of at least 35 dB should be incorporated in DNL 75-79.

c) Normal permanent construction can be expected to provide a NLR of 20 dB, thus the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation, upgraded Sound Transmission Class (STC) ratings in windows and doors and closed windows year round. Additional consideration should be given to modifying NLR levels based on peak noise levels or vibrations.

d) NLR criteria will not eliminate outdoor noise problems. However, building location and site planning, design and use of berms and barriers can help mitigate outdoor noise exposure NLR particularly from ground level sources. Measures that reduce noise at a site should be used wherever practical in preference to measures that only protect interior spaces.

2. Measures to achieve NLR of 25 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

3. Measures to achieve NLR of 30 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

4. Measures to achieve NLR of 35 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

5. If project or proposed development is noise sensitive, use indicated NLR; if not, land use is compatible without NLR.

Notes For Table 2-1. Suggested Land Use Compatibility In Noise Zones - *concluded*

6. No buildings.

7. Land use compatible provided special sound reinforcement systems are installed.

8. Residential buildings require a NLR of 25.

9. Residential buildings require a NLR of 30.

10. Residential buildings not permitted.

11. Land use not recommended, but if community decides use is necessary, hearing protection devices should be worn.

The *Guidelines* are targeted at rooms where people spend extended periods of time engaged in activities such as speaking, watching TV or sleeping. These noise-sensitive rooms, referred to as the "habitable rooms" or "living spaces", include living rooms, kitchens, family rooms, dining rooms, and bedrooms. Typical residential building design and construction methods, even those that are thermally efficient, are normally inadequate to protect occupants from external noise that may interfere with their activities, especially in the higher noise zones. In non-habitable rooms such as bathrooms, garages, mudrooms, and breezeways, higher noise levels may be tolerated and standard design and construction methods can typically be used. However, if the non-habitable room opens directly to a habitable room without interior doors in between, it may be necessary to apply sound insulation techniques to the non-habitable room in order to protect adjacent spaces.

2.4 Typical Dwelling Noise Reduction

A typical home exposed predominantly to military jet operations incorporating standard designs and built with standard materials might provide 20 to 30 dB of NLR when the windows and doors are kept closed if the home is in good condition. In contrast, an acoustically well insulated home can provide 30 to 35 dB of NLR. (In either case, a house with the windows open will be much noisier). Providing more than 35 to 40 dB of NLR is not usually practical for a residence.

As discussed in Chapters 3 and 4, the NLR of any given room or house depends significantly on the characteristics of the room and on the construction of the house. The more windows and doors there are in a room, and the larger these openings are, the more noise will enter. In general, brick is a better sound insulator than siding; small windows allow less noise transmission than large ones of the same construction; solid core or heavy doors protect better than hollow, light-weight doors; and there is a benefit from reducing the number of openings such as through-wall

ventilators, mail slots, and chimneys. Cathedral or vaulted ceilings allow more noise in than do ceilings with attic spaces above; basements and crawlspaces allow noise to pass through where a slab foundation would have blocked it. All of these factors, and many more, have been taken into account in the analyses and recommendations of Chapters 3 and 4.

2.5 Specifying Building Materials for Sound Insulation

The following chapters recommend modifications to existing homes or design changes to new homes in order to meet the noise reduction goals outlined above. In order to articulate the requirements for the windows, doors, and other building materials to be used, it is necessary to understand how acoustical performance is specified. The *Guidelines* use the most common descriptor of acoustical performance, Sound Transmission Class, or STC. The STC rating of a window, door or other building assembly indicates how well the product or assembly blocks sound. The higher the STC value, the better it protects against sound transmission.

Manufacturers send their products to independent acoustical testing laboratories to document the STC rating of their windows and doors. Appendix E lists some manufacturers of acoustically-rated products, and Appendix F lists several testing laboratories.

STC ratings have been determined for a large number of building elements, as well as for assemblies of elements. The tables prescribing acoustical treatments in Chapters 3 and 4 give STC ratings for recommended windows and doors. Generally, windows and doors specified in the *Guidelines* have STC ratings of 24 to 46, with the higher ratings required in higher noise zones.

One characteristic that is central to effective sound insulation must be stressed: all building elements must work together in a balanced manner to reduce noise intrusion. Combining strong windows with an acoustically-weak door will allow significant noise into the home. Therefore, it is important to apply all of the modifications recommended in the packages of Chapters 4 and 5 to meet the noise reduction goals. Leaving out one part may compromise the effectiveness of all the others.

3.0 Sound Insulating Existing Homes

This chapter approaches an existing home as a collection of rooms in order to specify the set of recommended modifications, or treatments, that will meet the interior noise goals discussed in Chapter 2. Recommended treatments are given on a room-by-room basis. All the information needed to develop a balanced combination ("package") of sound insulation treatments for an existing home is given here (new homes are discussed in Chapter 4). Estimated costs for these treatments are given in Chapter 5.

Section 3.1 explains how rooms differ from one another. Section 3.2 includes a table defining 75 types of rooms covering a wide range of room configurations encountered. Specific guidance for each room type, organized by noise impact zone, is given in Section 3.3. Instructions for dealing with special conditions are given in Section 3.4.

Since the construction of houses varies so much throughout the country a computer program was developed to complement this document. This program, included on the disk in the front of this report, can be used to determine the approximate scope and cost to sound insulate a room. To obtain an additional copy of this program contact the regional Naval Facilities Engineering Command office near you (see Section 1.4 for contact information).

3.1 Room Variations

The noise level of different rooms in a house depends on two factors, the noise entering from the outside and the sound absorption within the room itself. The exterior sound is transmitted through the perimeter building elements (depending on their construction) and is further modified by the absorption inside the room to determine the interior noise level. For example, upholstered furniture, drapes, and carpeting absorb sound and reduce the noise level. For this reason, a bedroom or living room with carpeting and soft furniture is likely to be quieter than a kitchen having all hard surfaces. The recommendations that follow are based on the assumption that rooms would be normally furnished and that noise levels would be evaluated approximately six feet from the exterior walls.

As might be anticipated, only perimeter walls – those facing the outside – allow noise from the exterior to enter. A room with two perimeter walls will have more noise intrusion than a room with only one perimeter wall. Similarly, for a room of a given size, the number and type of windows and doors will greatly affect the noise transmission from the outside. Generally, more noise passes through windows and doors than enters through walls and ceiling/roof assemblies. Also, rooms protected by an upper story will generally be quieter than rooms that have a roof or attic above them. All these factors influence the noise level in the room, the type of sound insulation treatments that would be recommended to improve the noise reduction, and the cost of sound insulation.

3.2 Room Types

A large number of typical rooms are defined and modifications given room-by-room so that a composite set of recommendations can be developed for almost any existing house. Rooms are described and differentiated based on the following factors:

- Exterior wall construction (masonry, siding on wood frame, stucco on wood frame),
- Openings and penetrations (through-wall or in-window fans or air conditioners, Jalousie windows)
- Number of exterior walls,
- Type of room (e.g., bedroom, kitchen, living),
- Number and type of doors,
- Roof and ceiling construction, and
- Number of windows.

Each room has a specific identification (ID) code that is keyed to the treatments. Different rooms are described in Table 3-1 and are given ID codes. Once this ID code is known, the user can turn to Section 3.3 which gives modifications for each of these room types by ID code and noise impact zone. Section 3.2 may be used in sequence with the tables of Section 3.3 for each room in the house, first identifying the type of room to be analyzed and then finding the modifications that are recommended for that room.

To use Table 3-1, first choose the construction of the outside wall(s) of the particular room. If a room has more than one wall type, use the acoustically weaker category (appearing first in Table 3-1). "Siding" includes wood, vinyl, aluminum, asbestos, cement board, asphalt shingles, or any other type of siding, shakes, or shingles on wood frame construction. The data used in this report is an average for insulated and uninsulated wood frame walls. If your walls are uninsulated, modifications might be appropriate in lower noise zones even if none are indicated in Table 3-2. Conversely, if your walls are insulated some of the modifications in low noise zones may be unnecessary. "Siding/Paneling" indicates sided walls as above, except that the interior side of the walls have light (wooden or synthetic) paneling on studs with no drywall or plaster behind them. "Brick/Block/ICF" indicates that there are bricks, concrete blocks, or Insulating Concrete Forms (ICF) in the wall, regardless of the type of exterior or interior finish. ICF consists of approximately two-inch thick foam forms with approximately four inches of normal weight concrete poured between them. "Stucco/Studs" indicates Stucco or Exterior Insulation and Finish Systems (EIFS) that is applied onto a wood frame, not onto masonry. EIFS consists of a thin (approximately 1/8") stucco application on approximately one- to two-inch thick foam panels. The calculations used to develop this report used an average of acoustical data for thin and thick stucco. For rooms with thin stucco it would be appropriate to use slightly more stringent modifications than indicated in Table 3-2. "Block/Siding" is used for Basement Dens or Recreation rooms to indicate that while most of the room is concrete block or buried concrete walls, sometimes a half buried basement will have some wood frame sided walls above ground level. Note that room identifier numbers (ID codes) are given at the left side of the table.

Table 3-1. Existing Room Types and ID Codes

Step 1	Step 2	Step 3	Step 4			Step 5	
Wall Type and ID Code	Misc. Wall Openings[1]	Exterior Walls	Room Type	Doors[2] Sliding Glass Door	Doors[2] Hinged Doors	Roof/Ceiling Notes	Number of Windows[2,3]
Siding with Thin Paneling on Studs (with no masonry)							
1	A/C, VRF	1	Bed/Den	No	No	Attic above with a drywall or plaster ceiling	1
2	A/C, VRF	2	Living/Family	No	1+	Full story above	3
3	None	2	Bed/Den	No	No	Attic above acoustic tile ceiling	2
4	None	3	Sun Room	No	1	Vaulted ceiling	4
5	None	3	Sun Room	1	No	Attic above with a drywall or plaster ceiling	6
Siding with Gypsum Board or Plaster on Studs (with no masonry)							
6	A/C, VRF	1	Living/Family	No	No	Full story above	2
7	A/C, VRF	1	Living/Family	1	No	Full story above	2
8	A/C, VRF	1	Kit/Din/Break	No	No	Full story above	1
9	A/C, VRF	2	Bed/Den	No	No	Attic above with a drywall or plaster ceiling	2
10	A/C, VRF	2	Bed/Den	No	No	Acoustic tile ceiling, crawl space above.	3+
11	A/C, VRF	2	Living/Family	No	No	Attic above with a drywall or plaster ceiling	2
12	A/C, VRF	2	Living/Family	No	1+	Vaulted ceiling with some acoustic tiles	2+
13	A/C, VRF	2	Living/Family	1	No	Vaulted ceiling	4
14	A/C, VRF	2	Kit/Din/Break	1	No	Full story above	2
15	A/C, VRF	2	Kit/Din/Break	No	1	Attic above with a drywall or plaster ceiling	1
16	A/C, VRF	3	Bed/Den	No	No	Vaulted ceiling	4
17	Jalousie	1	Bed/Den	No	No	Open beam roof, no ceiling	2
18	Jalousie	1	Kit/Din/Break	No	1	Open beam roof, no ceiling	2
19	Jalousie	2	Bed/Den	1	No	Full story above	3
20	Jalousie	2	Living/Family	No	1	Attic above with a drywall or plaster ceiling	4
21	Jalousie	3	Sun Room	No	No	Open beam roof, no ceiling	5
22	None	1	Bed/Den	No	No	Attic above with a drywall or plaster ceiling	1+
23	None	1	Bed/Den	No	No	Full story above	2
24	None	1	Living/Family	1	No	Attic above with a drywall or plaster ceiling	1
25	None	1	Living/Family	No	1	Full story above	2
26	None	1	Kit/Din/Break	1	No	Attic above with a drywall or plaster ceiling	1
27	None	2	Bed/Den	1	No	Attic above with a drywall or plaster ceiling	1
28	None	2	Bed/Den	No	No	Attic above with a drywall or plaster ceiling	1
29	None	2	Bed/Den	No	1+	Full story above	2
30	None	2	Bed/Den	No	No	Attic above acoustic tile	4
31	None	2	Living/Family	1	No	Full story above	2
32	None	2	Living/Family	No	No	Vaulted ceiling	3
33	None	2	Living/Family	No	1+	Full story above	4+
34	None	2	Living/Family	No	No	Open beam roof, no ceiling	4
35	None	2	Kit/Din/Break	No	No	Attic above acoustic tile	2
36	None	2	Kit/Din/Break	No	1+	Full story above	2
37	None	2	Kit/Din/Break	1	No	Attic above with a drywall or plaster ceiling	3
38	None	3	Bed/Den	No	No	Vaulted ceiling	2
39	None	3	Bed/Den	1	No	Attic above with a drywall or plaster ceiling	6
40	None	3	Living/Family	1	1	Full story above	6
41	None	3	Sun Room	1	No	Attic above with a drywall or plaster ceiling	7+

Notes:
1. "A/C, VRF" = Openings in the wall including through-wall or in-window air-conditioners, vented range fans, and evaporative coolers ("swamp coolers")
2. "+" = with a storm door or storm windows
3. Consider one large window as two windows in this table

Table 3-1. Existing Room Types and ID Codes - *concluded*

Step 1	Step 2	Step 3	Step 4	Step 5			
Wall Type and ID Code	Misc. Wall Openings[1]	Exterior Walls	Room Type	Doors[2] Sliding Glass Door	Doors[2] Hinged Doors	Roof/Ceiling Notes	Number of Windows[2,3]
Half Concrete Block; Half Siding on Stud							
42	Jalousie	3	Sun Room	No	1	Open beam roof, no ceiling	10
43	None	1	Bsmt Den/Rec	No	No	1/2 height buried walls. Full story above	2
44	None	3	Bsmt Den/Rec	No	No	1/2 height buried walls. Full story above	6
45	None	3	Bsmt Den/Rec	No	1	1/2 height buried walls. Full story above	4
Stucco or Exterior Insulation and Finish Systems (EIFS) on Stud (with no masonry)							
46	A/C, VRF	1	Bed/Den	No	No	Attic above acoustic tile	2
47	A/C, VRF	1	Living/Family	No	1	Full story above	3
48	A/C, VRF	1	Kit/Din/Break	1	No	Attic above with a drywall or plaster ceiling	2
49	A/C, VRF	2	Bed/Den	1	No	Vaulted Ceiling	3
50	A/C, VRF	2	Living/Family	1	1	Open beam roof, no ceiling	3
51	A/C, VRF	2	Sun Room	No	1	Full story above	8
52	None	1	Bed/Den	No	No	Full story above	1
53	None	1	Living/Family	1	No	Attic above with acoustic tile ceiling	2+
54	None	1	Kit/Din/Break	No	No	Full story above	1+
55	None	2	Bed/Den	No	No	Attic above with a drywall or plaster ceiling	4
56	None	2	Living/Family	No	1	Vaulted ceiling with some acoustic tiles	5
57	None	2	Kit/Din/Break	No	1	Attic above with a drywall or plaster ceiling	2
Brick; Concrete Block; or Insulating Concrete Forms (ICF); may have siding or stucco over block							
58	A/C, VRF	1	Bed/Den	No	No	Attic above with a drywall or plaster ceiling	1
59	A/C, VRF	1	Living/Family	1	No	Vaulted ceiling with some acoustic tiles	2
60	A/C, VRF	1	Kit/Din/Break	No	1	Open beam roof, no ceiling	2
61	A/C, VRF	2	Bed/Den	1	No	Full story above	3
62	A/C, VRF	2	Living/Family	1	1	Full story above	4
63	A/C, VRF	2	Kit/Din/Break	No	No	Attic above with a drywall or plaster ceiling	1
64	None	1	Bed/Den	No	No	Attic above with a drywall or plaster ceiling	1
65	None	1	Living/Family	No	No	Attic above with a drywall or plaster ceiling	2
66	None	1	Kit/Din/Break	No	No	Full story above	1
67	None	2	Bed/Den	No	No	Full story above	2
68	None	2	Bed/Den	No	No	Attic above acoustic tile	4
69	None	2	Living/Family	1	1	Full story above	0
70	None	2	Kit/Din/Break	1	No	Vaulted ceiling with some acoustic tiles	1
71	None	2	Bsmt Den/Rec	No	No	Fully buried, Full story above	0
72	None	2	Bsmt Den/Rec	No	1	1/2 buried. Full story above	3
73	None	3	Living/Family	No	2	Vaulted ceiling	4
74	None	3	Bsmt Den/Rec	No	No	3/4 height buried walls. Full story above	5
75	None	3	Bsmt Den/Rec	No	1	3/4 height buried walls. Full story above	3

Notes:
1. "A/C, VRF" = Openings in the wall including through-wall or in-window air-conditioners, vented range fans, and evaporative coolers ("swamp coolers")
2. "+" = with a storm door or storm windows
3. Consider one large window as two windows in this table

In the column labeled "Step 2" note whether the room has a through-wall or in-window air conditioner (A/C), vented range fan (VRF), or evaporative cooler ("swamp cooler"). The calculations used to develop this report were based on leaky in-window air conditioners. If these are present in your room, choose a room with "A/C, VRF" in the Step 2 column. The calculations used to develop this report were based on leaky in-window air-conditioners. If more tight-fitting equipment such as a through-wall unit are present, the required modifications would be slightly different. If these are not present, but there are louvered "Jalousie" windows, choose a row labeled "Jalousie". "Jalousie" windows consist of many narrow horizontal glass pieces operated with a crank. "Jalousie" windows have significantly poorer acoustical performance than other windows. If none of these options are present, select a room with "None" in the step 2 column. If the room has central air conditioning instead of through-wall or in-window air conditioners select "None."

Under the "Step 3" column find a room with the same number of exterior walls as the room you are planning to sound insulate. Count partial walls as full walls.

The next important parameter for sound insulation in "Step 4" is what the room is used for. The table gives five types of habitable rooms[3]: bedroom or den; living room or family room; kitchen, dining or breakfast room; basement den or recreation room; and sun room. A "walkout" basement room (that is, a room with at least one exterior wall that is completely above ground) would be considered a "bedroom or den" or a "living room or family room", but not a basement den or recreation room." Herein a sun room is considered a room that has a relatively large area of exterior exposure given its size, usually by having 2 or 3 exterior walls, and has a large area of windows or doors. The size of the room affects noise levels due to aircraft. For the calculations used to develop this report the following room areas were assumed: 10 by 12 feet in bedrooms or dens, 12 by 16 feet in living or family rooms, 10 by 14 feet in kitchens, dining, or breakfast rooms, and 10 by 12 feet in sunrooms. Basement dens or recreation rooms were assumed to be 10 by 12 feet if they had one exterior wall, 12 by 14 feet if they had two, and 12 by 24 feet if they had three. Select the room with the generally most similar use even if the dimensions are somewhat different. These calculations assume that bedrooms would be carpeted; living rooms, sun rooms, and recreation rooms would have 50% rug coverage; and kitchens would have a hard floor. Do not substitute a kitchen for a bedroom or living room, because the interior furnishings (and, as a result, the room absorption) are very different.

Finally, select the room that most closely approximates your room (step 5). If your room is very similar to a room described in the table, note the ID code to use in Section 3.3. Review the choices given in the table along that row (in the Doors, Roof/Ceiling and Windows columns) and note any ways that your room may differ from the room described in the table. The calculations used to develop this report were based on all six-foot wide doors being sliding glass doors. If you have a six-foot wide hinged patio door, additional modifications may be required in the lower noise zones, since hinged doors tend to perform more poorly than sliding doors. The roof/ceiling column lists most of the rooms as having an attic above a drywall or plaster ceiling, a vaulted ceiling (i.e., a sloped ceiling with no attic above), an acoustic tile ceiling with an attic above, a full story above, an open beam roof without a ceiling, or a 2-story tall (e.g., a 16-foot high) flat ceiling. A room with an acoustical tile ceiling suspended below or attached to a drywall or plaster ceiling, is considered to have a "drywall or plaster ceiling." It was assumed that all existing ceilings have insulation above them. For the basement rooms, walls are described in this column as either three-quarters below grade or one-half below grade.

For most rooms a window size of three feet wide and five feet tall was assumed in the calculations used for this report. For three-quarter buried basements the windows were assumed to be 2'-3" wide and 1'-3" tall. If the windows in your room are not these sizes, try to choose a room in the table that has approximately the same total area of windows.

In general, if your room has characteristics that tend to make it perform more poorly than the selected room in the table, two things happen. First, it may require <u>less</u> stringent modifications to provide a noticeable <u>reduction</u> in noise level. Second, it may require <u>more</u> stringent modifications to provide an appropriate interior noise level. The result is that the room may need additional

[3] For a discussion of habitable rooms, see Section 2.3.

modifications if the house were located in some DNL zones but not in others. For example, if the existing walls of room 22 do not currently have insulation, the room may need modifications in the 65-70 dB DNL zone.

In Section 3.3, the packages of modifications are recommended for your room, given the noise level to which your house is exposed.

3.3 Sound Insulation Treatments for Existing Rooms

This section provides recommendations for sound insulating rooms in existing dwellings. ID codes from Table 3-1 are used in Table 3-2. Table 3-2 gives the recommended modifications for each room type in Section 3-2, depending on your home's noise exposure zone. For recommendations of houses exposed predominantly to noise from propeller aircraft, helicopters, or civilian aircraft see Section 3.4.

In Table 3-2 modifications are recommended separately for each perimeter building element of the room such as the walls, windows, doors and ceilings. To ensure adequate reduction in noise level, keeping in mind that costs to provide these modifications are higher, it is always acceptable to use the package of recommendations for higher noise zones. The following information will be helpful in interpreting the recommendations.

Walls

For walls the recommendations use the following options, depending on what is needed to meet the interior noise goals. The options are listed in order of increasing ability to reduce noise. For example, option 4 reduces noise more effectively than option 3. Note that it is always acceptable to use a higher number option, since those nearer the bottom of the list have the best acoustical performance.

(1) "1 gyp" which is to add insulation to the wall if none exists and add one layer of 5/8" gypsum board to the wall (fire-rated gypsum board is recommended because it is heavier than regular gypsum board and is therefore a better sound insulator),

(2) "2 gyp" which is to add insulation to the wall if none exists and add two layers of fire-rated 5/8" gypsum board to the wall,

(3) "Furr" which is to remove the existing wall board, add 2x2 wood plates beside the existing plates, add 2x2 wood studs spaced 16" on center but staggered relative to the existing studs, add 5" thick batt insulation, and add a new layer of fire-rated 5/8" gypsum board,

(4) "Furr, 2 gyp" which is the same as (3) but with two layers of gypsum board instead of one, and

(5) "Furr, RC, 2 gyp" which is the same as (4) but with single-leaf resilient channels installed between the studs and first layer of gypsum board. This option is not listed in Table 3-2 but is used in the supplemental computer program.

Infill of In-Wall Air Conditioners and Vented Range Fans

For in-wall air conditioners ("A/C"), vented range fans ("VRF"), or evaporative coolers ("Swamp Coolers") the recommendations are either to do nothing or to "remove" the unit. For through-wall air conditioners and evaporative coolers, this means to remove the unit, patch the sheathing and siding to match the rest of the wall, add insulation, and patch the interior finish to match the rest of the wall. For vented range fans, this means to replace the unit with a ductless model and block the duct with batt insulation. If it is desired to keep the vented range fan, it may be acceptable to add at least two 90-degree elbows in the duct if none are present. Consult the fan manufacturer and local code requirements pertaining to air quality and moisture within the home. However, installing a ductless model will provide greater acoustical benefits.

Windows

Replace the windows with new windows that have a specified STC rating. In many cases it is also acceptable to add storm windows over the existing windows, although this is not possible with jalousie windows. If the existing windows are double pane windows in good condition a new storm window could be added. Adding an acoustical storm window with a rating of STC 29 could be used whenever the table calls for an STC 36 or lower.

Likewise, a new prime-and-storm window assembly could be used. If an STC rating is only available for the prime window, it can be assumed that adding a storm window would increase the STC rating of the prime windows. Adding an acoustical storm window with a rating of STC 29 would yield an STC rating for the prime-and-storm assembly at least approximately 8 points higher than for the prime window alone.

If the room in Table 3-1 does not have storm windows yet the existing room does, it is appropriate to use new windows with higher ratings than are specified in Table 3-2. Use an STC rating 2 points or more higher if you currently have single pane windows with storm windows, and use an STC rating 4 points or more higher if you currently have double pane windows with storm windows.

Table 3-2. Modifications for Existing Rooms

Room ID	Room Elements	Noise Zone (dB, DNL)			
		60 - 65	65 - 70	70 - 75	75 - 80
1	Walls	None	None	None	1 gyp
	Windows	None	None	STC 32	STC 32
	Ceiling	None	None	None	None
	A/C, VRF	None	None	Remove	Remove
2	Walls	None	1 gyp	1 gyp	1 gyp
	Windows	None	STC 30	STC 30	STC 38
	Door	None	None	None	New + storm
	A/C, VRF	None	Remove	Remove	Remove
3	Walls	None	None	1 gyp	2 gyp
	Windows	None	None	STC 32	STC 34
	Ceiling	None	None	1 gyp	1 gyp
4	Walls	None	1 gyp	1 gyp	2 gyp
	Windows	None	STC 32	STC 34	STC 42
	Door	None	STC 31	STC 31	STC 40
	Ceiling	None	None	None	1 gyp
5	Walls	None	1 gyp	1 gyp	Furr
	Windows	None	STC 38	STC 34	STC 42
	Door	None	None	STC 32	STC 37
	Ceiling	None	None	None	None
6	Walls	None	None	None	None
	Windows	None	None	STC 30	STC 38
	A/C, VRF	None	None	Remove	Remove
7	Walls	None	None	None	None
	Windows	None	STC 32	STC 36	STC 40
	Door	None	None	None	STC 37
	A/C, VRF	None	Remove	Remove	Remove
8	Walls	None	None	None	2 gyp
	Windows	None	None	STC 30	STC 36
	A/C, VRF	None	Remove	Remove	Remove
9	Walls	None	None	None	1 gyp
	Windows	None	None	STC 30	STC 42
	Ceiling	None	None	None	None
	A/C, VRF	None	None	Remove	Remove
10	Walls	None	None	None	1 gyp
	Windows	None	None	STC 34	STC 36
	Ceiling	None	None	None	1 gyp
	A/C, VRF	None	None	Remove	Remove
11	Walls	None	None	None	2 gyp
	Windows	None	None	STC 30	STC 36
	Ceiling	None	None	None	None
	A/C, VRF	None	None	Remove	Remove
12	Walls	None	None	None	2 gyp
	Windows	None	None	STC 34	STC 36
	Door	None	None	STC 31	New + storm
	Ceiling	None	None	None	RC
	A/C, VRF	None	None	Remove	Remove
13	Walls	None	None	None	2 gyp
	Windows	None	STC 36	STC 34	STC 40
	Door	None	None	STC 32	STC 37
	Ceiling	None	None	None	RC
	A/C, VRF	None	Remove	Remove	Remove
14	Walls	None	None	1 gyp	Furr
	Windows	None	STC 34	STC 34	STC 38
	Door	None	None	STC 34	New + storm
	A/C, VRF	None	Remove	Remove	Remove
15	Walls	None	None	None	Furr
	Windows	None	STC 32	STC 36	STC 38
	Door	None	None	STC 37	New + storm
	Ceiling	None	None	None	None
	A/C, VRF	None	Remove	Remove	Remove

Note: These modifications apply only to military jet aircraft. For modifications at houses impacted predominantly by propeller aircraft, helicopters, or civilian jet aircraft, see section 3.4.

Table 3-2. Modifications for Existing Rooms - *continued*

Room ID	Room Elements	Noise Zone (dB, DNL) 60 - 65	65 - 70	70 - 75	75 - 80
16	Walls	None	None	None	2 gyp
	Windows	None	STC 34	STC 34	STC 42
	Ceiling	None	None	None	RC
	A/C, VRF	None	Remove	Remove	Remove
17	Walls	None	None	None	1 gyp
	Windows	STC 24	STC 24	STC 28	STC 38
	Ceiling	1 gyp	1 gyp	1 gyp	1 gyp
18	Walls	None	None	None	2 gyp
	Windows	STC 26	STC 28	STC 34	STC 40
	Door	None	None	STC 34	New + storm
	Ceiling	1 gyp	1 gyp	1 gyp	RC
19	Walls	None	None	None	2 gyp
	Windows	None	STC 28	STC 32	STC 40
	Door	None	None	STC 32	STC 37
20	Walls	None	None	None	2 gyp
	Windows	None	STC 28	STC 32	STC 40
	Door	None	None	STC 31	STC 34
	Ceiling	None	None	None	None
21	Walls	None	None	None	2 gyp
	Windows	STC 26	STC 28	STC 36	STC 44
	Ceiling	1 gyp	1 gyp	1 gyp	RC
22	Walls	None	None	None	2 gyp
	Windows	None	None	None	STC 40
	Ceiling	None	None	None	None
23	Walls	None	None	None	1 gyp
	Windows	None	None	None	STC 34
24	Walls	None	None	None	None
	Windows	None	None	STC 38	STC 38
	Door	None	None	STC 34	STC 37
	Ceiling	None	None	None	None
25	Walls	None	None	None	None
	Windows	None	None	STC 34	STC 40
	Door	None	None	STC 34	STC 34
26	Walls	None	None	None	Furr, 2 gyp
	Windows	None	None	STC 32	STC 42
	Door	None	None	STC 34	STC 37
	Ceiling	None	None	None	RC, 2 gyp
27	Walls	None	None	1 gyp	2 gyp
	Windows	None	None	STC 38	STC 40
	Door	None	None	STC 34	STC 37
	Ceiling	None	None	None	None
28	Walls	None	None	None	2 gyp
	Windows	None	None	None	STC 40
	Ceiling	None	None	None	None
29	Walls	None	None	1 gyp	1 gyp
	Windows	None	None	STC 36	STC 38
	Door	None	None	New + storm	New + storm
30	Walls	None	None	None	1 gyp
	Windows	None	None	STC 36	STC 38
	Ceiling	None	None	1 gyp	1 gyp
31	Walls	None	None	None	2 gyp
	Windows	None	None	STC 40	STC 40
	Door	None	None	STC 37	STC 37
32	Walls	None	None	2 gyp	2 gyp
	Windows	None	None	STC 36	STC 36
	Ceiling	None	None	None	RC
33	Walls	None	None	1 gyp	1 gyp
	Windows	None	None	STC 38	STC 40
	Door	None	None	New + storm	New + storm

Note: These modifications apply only to military jet aircraft. For modifications at houses impacted predominantly by propeller aircraft, helicopters, or civilian jet aircraft, see section 3.4.

Table 3-2. Modifications for Existing Rooms - *continued*

Room ID	Room Elements	Noise Zone (dB, DNL) 60 - 65	65 - 70	70 - 75	75 - 80
34	Walls	None	None	None	2 gyp
	Windows	None	None	STC 32	STC 38
	Ceiling	1 gyp	1 gyp	1 gyp	RC
35	Walls	None	None	1 gyp	2 gyp
	Windows	None	None	STC 36	STC 36
	Ceiling	None	None	1 gyp	1 gyp
36	Walls	None	None	1 gyp	Furr
	Windows	None	None	STC 34	STC 38
	Door	None	None	New + storm	New + storm
37	Walls	None	None	None	Furr
	Windows	None	STC 34	STC 38	STC 42
	Door	None	STC 34	STC 34	New + storm
	Ceiling	None	None	None	None
38	Walls	None	None	2 gyp	2 gyp
	Windows	None.	None	STC 40	STC 42
	Ceiling	None	None	None	RC, 2 gyp
39	Walls	None	None	None	2 gyp
	Windows	None	None	STC 38	STC 44
	Door	None	None	STC 32	STC 37
	Ceiling	None	None	None	RC, 2 gyp
40	Walls	None	None	None	Furr
	Windows	None	None	STC 40	STC 40
	Swing door	None	None	STC 31	New + storm
	Sliding glass door	None	None	STC 32	STC 37
41	Walls	None	None	None	Furr, 2 gyp
	Windows	None	None	STC 38	STC 42
	Door	None	None	STC 34	STC 37
	Ceiling	None	None	None	None
42	Walls	None	None	None	None
	Windows	STC 26	STC 30	STC 34	STC 42
	Door	None	None	STC 34	STC 37
	Ceiling	1 gyp	1 gyp	1 gyp	1 gyp
43	Walls	None	None	None	None
	Windows	None	None	STC 34	STC 36
44	Walls	None	None	None	1 gyp
	Windows	None	None	STC 36	STC 38
45	Walls	None	None	None	1 gyp
	Windows	None	None	STC 38	STC 38
	Door	None	None	STC 31	STC 34
46	Walls	None	None	None	None
	Windows	None	None	STC 30	STC 36
	Ceiling	None	None	None	None
	A/C, VRF	None	None	Remove	Remove
47	Walls	None	None	None	None
	Windows	None	STC 32	STC 32	STC 36
	Door	None	None	None	STC 34
	A/C, VRF	None	Remove	Remove	Remove
48	Walls	None	None	None	2 gyp
	Windows	None	STC 32	STC 34	STC 44
	Door	None	None	STC 32	STC 37
	Ceiling	None	None	None	RC, 2 gyp
	A/C, VRF	None	Remove	Remove	Remove
49	Walls	None	None	None	None
	Windows	None	STC 34	STC 34	STC 40
	Door	None	None	None	STC 37
	Ceiling	None	None	None	None
	A/C, VRF	None	Remove	Remove	Remove

Note: These modifications apply only to military jet aircraft. For modifications at houses impacted predominantly by propeller aircraft, helicopters, or civilian jet aircraft, see section 3.4.

Table 3-2. Modifications for Existing Rooms - *continued*

Room ID	Room Elements	Noise Zone (dB, DNL)			
		60 - 65	65 - 70	70 - 75	75 - 80
50	Walls	None	None	None	None
	Windows	None	None	STC 34	STC 40
	Swing door	None	None	STC 34	STC 37
	Sliding glass door	None	None	None	STC 34
	Ceiling	1 gyp	1 gyp	1 gyp	RC
	A/C, VRF	None	Remove	Remove	Remove
51	Walls	None	None	None	None
	Windows	None	STC 32	STC 34	STC 40
	Door	None	STC 29	STC 31	STC 37
	A/C, VRF	None	Remove	Remove	Remove
52	Walls	None	None	None	None
	Windows	None	None	None	STC 34
53	Walls	None	None	None	None
	Windows	None	None	None	STC 36
	Door	None	None	None	STC 32
	Ceiling	None	None	None	1 gyp
54	Walls	None	None	None	None
	Windows	None	None	None	STC 38
55	Walls	None	None	None	None
	Windows	None	None	STC 34	STC 36
	Ceiling	None	None	None	None
56	Walls	None	None	None	None
	Windows	None	None	STC 34	STC 40
	Door	None	None	STC 31	STC 37
	Ceiling	None	None	None	None
57	Walls	None	None	None	None
	Windows	None	None	STC 34	STC 40
	Door	None	None	STC 31	STC 40
	Ceiling	None	None	None	None
58	Walls	None	None	None	None
	Windows	None	None	None	STC 30
	Ceiling	None	None	None	None
	A/C, VRF	None	None	Remove	Remove
59	Walls	None	None	None	None
	Windows	None	None	STC 32	STC 38
	Door	None	None	None	STC 34
	Ceiling	None	None	None	None
	A/C, VRF	None	None	Remove	Remove
60	Walls	None	None	None	None
	Windows	None	None	STC 34	STC 40
	Door	None	None	STC 31	STC 34
	Ceiling	1 gyp	1 gyp	1 gyp	RC
	A/C, VRF	None	Remove	Remove	Remove
61	Walls	None	None	None	None
	Windows	None	STC 32	STC 34	STC 38
	Ceiling	None	None	None	STC 34
	A/C, VRF	None	Remove	Remove	Remove
62	Walls	None	None	None	None
	Windows	None	STC 32	STC 36	STC 40
	Swing door	None	STC 31	STC 31	STC 34
	Sliding glass door	None	None	None	STC 34
	A/C, VRF	None	Remove	Remove	Remove
63	Walls	None	None	None	None
	Windows	None	None	None	STC 34
	Ceiling	None	None	None	None
	A/C, VRF	None	Remove	Remove	Remove
64	Walls	None	None	None	None
	Windows	None	None	None	STC 34
	Ceiling	None	None	None	None

Note: These modifications apply only to military jet aircraft. For modifications at houses impacted predominantly by propeller aircraft, helicopters, or civilian jet aircraft, see section 3.4.

Table 3-2. Modifications for Existing Rooms - *concluded*

Room ID	Room Elements	Noise Zone (dB, DNL) 60 - 65	65 - 70	70 - 75	75 - 80
	Windows	None	None	None	STC 34
	Ceiling	None	None	None	None
66	Walls	None	None	None	None
	Windows	None	None	None	STC 34
67	Walls	None	None	None	None
	Windows	None	None	None	STC 34
68	Walls	None	None	None	None
	Windows	None	None	STC 36	STC 38
	Ceiling	None	None	None	None
69	Walls	None	None	None	None
	Swing door	None	None	STC 34	STC 34
	Sliding glass door	None	None	STC 32	STC 34
70	Walls	None	None	None	None
	Windows	None	None	STC 32	STC 42
	Door	None	None	STC 34	STC 37
	Ceiling	None	None	None	RC
71	Walls	None	None	None	None
	Windows	None	None	None	None
72	Walls	None	None	None	None
	Windows	None	None	STC 34	STC 36
	Door	None	None	STC 31	STC 34
73	Walls	None	None	None	None
	Windows	None	None	STC 34	STC 40
	Door	None	None	STC 31	STC 37
	Ceiling	None	None	None	None
74	Walls	None	None	None	None
	Windows	None	None	None	None
75	Walls	None	None	None	None
	Windows	None	None	None	STC 34
	Door	None	None	None	STC 31

Note: These modifications apply only to military jet aircraft. For modifications at houses impacted predominantly by propeller aircraft, helicopters, or civilian jet aircraft, see section 3.4.

Doors

One of the following recommendations will be given:

(1) "STC xx". A new prime door should be installed that meets the stated STC requirement. If there is difficulty obtaining a prime door that has a sufficiently high STC rating without the use of a storm door, or if a storm door is desired, it may be acceptable to use a prime-and-storm door combination that meets the STC requirement given in the table. If an existing swinging door is in good condition a new acoustical storm door which has a rating of at least STC 29 could be added whenever the table calls for STC 36 or lower. If an existing sliding glass door is in good condition a new acoustical secondary sliding door which has a rating of at least STC 29 and 3/16" (minimum) tempered or laminated glass could be added whenever the table calls for STC 37 or lower.

(2) "+ storm". Add an acoustical storm door with a rating of at least STC 29. The storm is installed over the existing door without modifying the existing door (except for upgrading the weather-stripping of swinging doors, which is always advised). Although it is not normal to see a sliding glass door with a secondary "storm" door, this modification is recommended in many cases. See Appendix E for a list of door and acoustical weather-stripping manufacturers.

(3) "New + storm". Replace the door with a new prime door having an STC 29 rating or higher, in combination with a new storm door having an STC 29 or higher. Typically, it is necessary to use solid-core wood doors with acoustical gaskets in order to achieve STC 29 for a prime door.

(4) "Remove". In some extreme cases there is no feasible sound insulation modification for the highest noise zone. This option is not listed in Table 3-2 but may be needed under certain circumstances when using the supplemental computer program. If removing the door and infilling the hole in the wall (in combination with other modifications) would sufficiently reduce the noise level, this is noted in the table. Replacing the prime door with a new prime door that has an STC 29 rating, providing a three-foot vestibule, and using an STC 32 storm door would be an acceptable substitute to removing the door.

Ceilings

For ceilings one of the following recommendations will be given:

(1) "1 gyp" which is add 6" insulation (if none is present) and add one layer of fire-rated 5/8" gypsum board to the ceiling,

(2) "RC" which is to remove the existing ceiling (if present), add 6" batt insulation, install single-leaf resilient channels, and install a new layer of fire-rated 5/8" gypsum board, and

(3) "RC, 2 gyp" which is to remove the existing ceiling (if present), add 6" batt insulation, install single-leaf resilient channels, and install two new layers of fire-rated 5/8" gypsum board below the resilient channels.

(4) "Flat, RC, 2 gyp" which is the same as (3) but with a flat ceiling where there currently is a vaulted ceiling. This option is not listed in Table 3-2 but is used in the supplemental computer program.

Note that in some cases the rafters or ceiling joists may not be strong enough to carry the added weight. Consult a structural engineer or architect before using options 1, 3, or 4.

For all accessible attics that have less than six inches of insulation, it is recommended to add batt or blown-in insulation. The total depth of insulation should be selected to comply with the local building and energy codes.

These modifications were selected to meet the interior noise reduction goals listed in Section 3.2. These goals were affected both by the desired interior noise level and the need to provide a noticeable reduction in noise level. In many cases, especially in the lower noise zones, this latter goal controlled the recommendations. For example, trying to meet the noise goals in Section 3.2 might require treatments that provide a two to three dB improvement. However, since it generally takes a 5 dB improvement in order to be noticeable, the recommendations given here always aim to achieve that for existing homes. This is why rooms that have in-wall air-conditioners typically require fewer modifications to walls, windows, doors, and ceilings. Simply removing the in-wall unit provides a substantial change in noise level.

3.4 Special Conditions

Table 3-3 gives a list of special circumstances that often occur in existing homes, and for which recommendations have been developed. All of these recommendations are based on experience of what works with actual renovated homes. For non-habitable rooms, no modifications are required. For example, if a duct from a gas-fired water heater is in an unfinished basement area no modification is necessary.

Table 3-3. Special Modifications by DNL Noise Zone

Element	60 - 65	65 – 70	70 – 75	75 - 80
Skylights	Add secondary interior glass	Add secondary interior 1/4" laminated glass	Add secondary interior ¼" laminated glass or replace with STC 38 units	Remove
Fireplaces, vented prefab units	Add damper or doors	Add chimney damper	Add chimney damper and doors	Add chimney damper and doors
Wood stoves	Double-wall duct	Remove	Remove	Remove
Combusting exhaust, dryer duct	Double-wall rigid duct; use combustion air enforcer	Enclose in chase; use combustion air enforcer	Enclose in chase; use combustion air enforcer	Enclose in chase; use combustion air enforcer
Gravity heating systems	Remove	Remove	Remove	Remove
Pet doors, mail slots	Remove	Remove	Remove	Remove
Attic insulation[4]	Ok	Provide 5.25-8"	Provide 9-13"	Provide 9-13"
Attic access panels	Ok	Replace with 3/4" plywood and seals	Replace with 3/4" plywood and seals	Replace with 3/4" plywood and seals
Pull-down attic stairs	Ok	Add cover	Add cover	Add cover
Whole-house attic fan	Add interior cover	Add interior cover	Add interior cover	Remove
Elevated floors	Ok	5.25-8" insulation, ½" OSB	14" trusses, 9-13" insulation, ½" OSB	14" trusses, 9-13" insulation, ½" OSB

Note: These modifications apply only to military jet aircraft. For modifications at houses impacted predominantly by propeller aircraft, helicopters, or civilian jet aircraft, see section 3.4.

Most of the special modifications listed in Table 3-3 are very important for achieving the noise reduction goal. However, in some cases, minor exceptions can be made to these recommendations if the performance of other room elements is significantly greater than would have been required to meet the noise reduction goal. Such exceptions would have to be evaluated on a case-by-case basis. In these cases, an acoustical engineer could evaluate the alternative design.

When interpreting Table 3-3, the following notes apply:

Skylights – For skylights the recommended modifications are to add secondary interior glass panels, to replace the units with special acoustical skylights, or to remove the skylights.

[4] For attic insulation requirements consult the local building and energy codes.

Fireplaces – The recommended modifications for fireplaces and vented prefabricated units are to either provide a special acoustical chimney-top damper, or to provide tight-fitting glass doors over the fireplace.

Attic Insulation – If there is currently little insulation between ceiling joists in attics, add blown-in or batt insulation to provide the total depth listed in Table 3-3. The higher end of the range is for blown-in insulation. Do not use blown-in insulation at sloped joists. Protect attic vents or recessed lights and fans in the ceiling from the additional insulation by appropriate means.

Attic Access and Attic Fans – Attic access panels can be significant sound leaks if they are located in habitable rooms; in closets or corridors they are usually not a significant sound leak. The recommended modification is to replace the panels with thicker wood and add acoustical seals (gaskets) around the perimeter. For pull-down attic stairs and whole-house fans it is often necessary to add a cover panel; for attic stairs the cover could be above or below the stairs, but for whole-house fans the cover would have to be below the fan. The cover would consist of a 3/4" thick plywood panel that either slides or swings out of the way of the stairs or fan.

Elevated Floors – Beach houses are often elevated using tall pylons. In these cases aircraft noise can enter the house through the floor. The recommended modification is to use floor trusses that are at least 14" deep with blown-in or batt insulation, and ½" (nominal) OSB or plywood at the bottom chords. The high end of the insulation thickness range is for blown-in insulation and the low end is for batt.

Rooms that face away from the predominant aircraft flight path will be exposed to lower sound levels due to shielding provided by the house. The amount of shielding can vary greatly but can be as high as 10 dB when all aircraft fly only on the opposite side of the house.

Sound Insulation of Manufactured Homes

There are Federal requirements for the construction and safety of manufactured homes. The National Manufactured Housing Construction and Safety Standards Act of 1974 (Title VI of Pub. L. 93-383, 88 Stat. 700, 42 U.S.C. 5401, et seq.) required the U.S. Department of Housing and Urban Development (HUD) to establish construction and safety standards for manufactured homes. The resulting Manufactured Home Construction and Safety Standards, generally referred to as the "HUD Code"(24 CFR 3280), regulate the design and construction of all manufactured homes in the U.S. A manufactured home (formerly known as a mobile home or trailer) by definition must have "continued transportability." In contrast, a modular home is assembled from panels and is installed on a site-built permanent foundation. Therefore, modular homes do not have continued transportability and are not covered by the HUD Code (see 24 CFR 3280.7). A manufacturer may elect to construct a structure that is both a manufactured home and a modular home (see 24 CFR 3282.12).

Only the HUD Code can be used to limit the construction of manufactured homes, with certain exceptions related to wind and snow loads, and foundation design. States and localities cannot preempt the Federal requirements with respect to the construction and safety of a manufactured home. A locality can require that all other types of housing be built to attain certain noise level

reduction goals, but they cannot for manufactured homes. A locality can only prohibit the use of manufactured homes in certain locations such as in a specified noise zone.

Manufactured homes and some modular homes use thinner gypsum board and particular types of mechanical systems. In addition, where it is necessary to add layers of gypsum board to walls or ceilings, there is a question as to whether the structure can carry the extra weight. This may make it impossible or cost prohibitive to modify existing manufactured homes for sound insulation. Some manufacturers may be able to supply homes that meet sound insulation requirements in the lower noise exposure zones (60-65 and possibly 65-70 dB DNL).

Aircraft Type

The recommendations presented in Tables 3-2, 3-3, 4-2, and 4-3 are based on calculations using the frequency content of military jet aircraft operations. As noted earlier different aircraft types produce different frequency content. Generally, military jet aircraft produce the highest sound levels at frequencies between 200 and 1000 Hz. Civilian aircraft typically produce high sound levels at 50 to 400 Hz, propeller aircraft produce high sound levels at 60 to 250 Hz, and helicopters produce high sound levels at 10 to 80 Hz. Due to the strong low-frequency content of noise from propeller aircraft, helicopters, and civilian aircraft, noise from these types of aircraft can more easily penetrate into a house than can noise from military jet aircraft. The noise generated by these aircraft is more difficult to attenuate than the higher frequency military aircraft noise. Therefore, for a given outdoor noise exposure, expressed in terms of DNL, the indoor noise exposure will be higher if these other types of aircraft are the predominant noise sources than if military jet aircraft are predominant.

To account for the strong low-frequency noise produced by these aircraft, it is necessary to use more stringent modifications to the house in order to realize the NLR goals outlined in this report. In Tables 3-2, 3-3, 4-2, and 4-3 use the recommended modifications for the next higher DNL noise zone. For example, if an existing house is located in the 70-75 dB DNL zone and is exposed predominantly to civilian aircraft, the recommended modifications are those presented in Tables 3-2 and 3-3 in the column labeled 75-80 dB. If the house to be sound insulated is in the 75-80 dB DNL zone Tables 3-2, 3-3, 4-2, and 4-3 will not be applicable. In this case, or whenever the room to be sound insulated is not included in these tables, use the supplemental computer program (see Section 1.4).

Figure 3-1 shows the frequency spectra shapes used in the calculations. Note that the absolute sound levels (dB) are irrelevant in this figure; the intent is just to show the shape of the spectra. It can be seen from the figure that propeller aircraft, helicopters, and civilian aircraft have spectra with strong low-frequency content. It can also be seen from this figure that the shape of the helicopter spectrum is a steep slope at the lowest evaluated frequency bands of 50 and 63 Hz. This indicates that helicopters produce as high or higher sound levels below 50 Hz than above 50 Hz. Since the analysis did not consider sound below 50Hz, sound levels inside houses exposed predominantly to helicopter operations will be higher than predicted using these guidelines, and additional modifications to homes may be necessary.

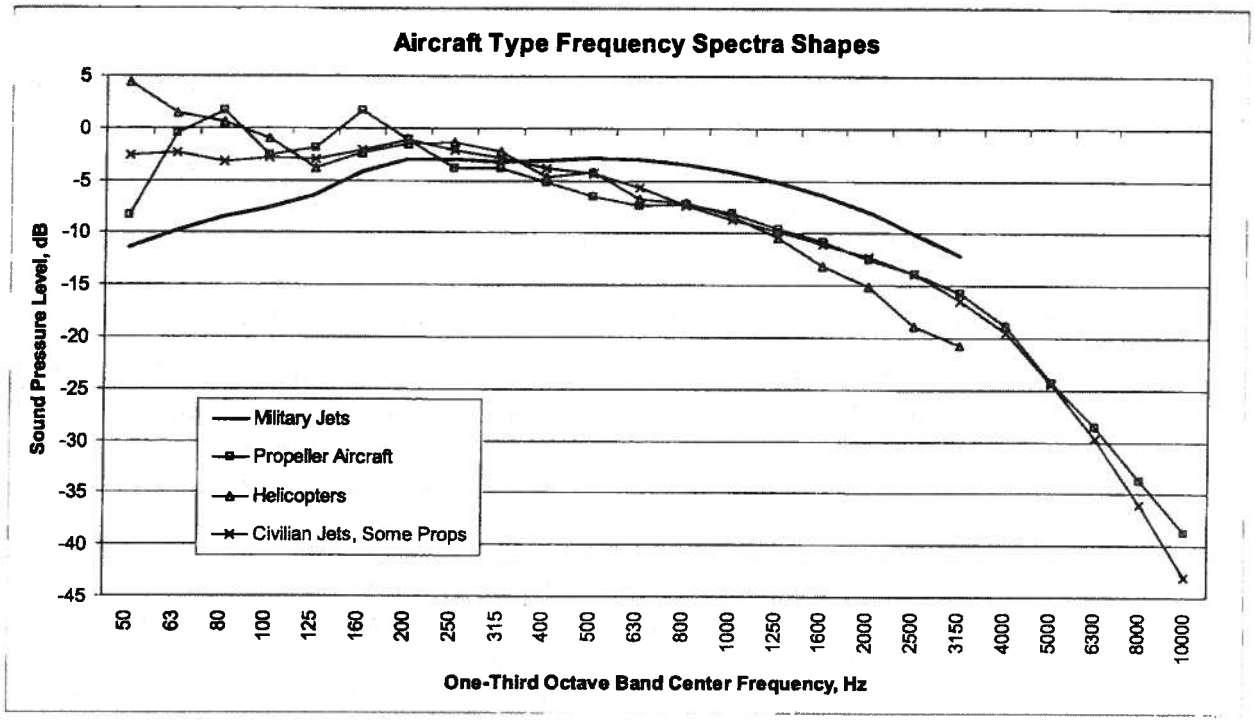


Figure 3-1. Spectra Summary

The DNL at most houses is determined in 5 dB ranges by identifying the two DNL contours between which the house is located. In some cases it is possible to determine the DNL to the nearest dB. In these cases use the adjustments to the DNL shown in Table 3-4. To use this table first determine the DNL at the house and select the appropriate column. Next, select the appropriate row based on the predominant type of aircraft. Finally, read the value in the table and add it to the outdoor DNL at the house. Use this new DNL value to select modifications in Tables 3-2, 3-3, 4-2, and 4-3.

Table 3-4. Additions to DNL

	Outdoor DNL Noise Zone (dB)				
Type of Aircraft	60 - 65	65 - 68	68 - 72	72 - 75	75 - 80
Propeller Aircraft or Helicopters	3	3	4	5	6
Mostly Civilian Jets with some Propeller Aircraft	2	3	3	3	4

4.0 Sound Insulating New Homes

This chapter addresses new home construction by specifying what is required to sound insulate a wide variety of new house types. Section 4.1 explains why houses differ from one another in their ability to block noise. Section 4.2 identifies 21 typical homes found around the country for which treatments are specified. Sound insulation modifications are given for these prototype homes in Section 4.3. For special conditions, such as attic fans and fireplaces, refer to Section 4.4. Section 4.5 addresses additional design considerations, such as where to locate bedrooms and patios, using vestibules to reduce noise, and other suggestions.

Since the construction of houses varies so much throughout the country a computer program was developed to complement this document. This program, included on the disk in the front of this report, can be used to determine the approximate scope and cost to sound insulate a room. To obtain an additional copy of this program contact the regional Naval Facilities Engineering Command office near you (see Section 1.4 for contact information).

New houses require different sound insulation treatments than existing houses for three reasons. First, they allow the flexibility of selecting more appropriate materials instead of having to remove existing materials. Second, many older construction methods are not encountered with new construction. Third, since there is no existing room there is no requirement to provide a significant reduction in the existing interior noise level.

As with the existing rooms it was assumed that the rooms would be normally furnished, bedrooms would be carpeted, living rooms would have 50% rug coverage, kitchens would have hard floors, and noise levels would be evaluated approximately six feet from exterior walls.

4.1 House Variations

In preparing the *Guidelines*, researchers identified typical homes that are found throughout the country. Construction techniques described herein are targeted at the most common types of homes. These house types include a wide variety of houses, and the rooms within each house may be used individually for an even wider application.

The principle features that differentiate homes for sound insulation purposes are:

- Exterior wall material (brick, concrete block, insulating concrete forms, siding, stucco, EIFS, or combination),
- Type of roof structure (flat built-up roof, attic, cathedral ceiling),
- Type of foundation (basement, crawlspace, pylons, or slab),
- Number of stories,
- Size and number of windows and doors, and
- Dwelling type (single-family, duplex, townhouse, apartment, or manufactured home).

In addition to the features noted above, other characteristics influence the final noise reduction of the house, including the following:

- Attached garages and large wrap-around porches may provide shielding from noise for those sides of the house.
- The use of cathedral ceilings or flat built-up roofs without an attic above are strongly discouraged because an attic provides a more effective noise buffer.
- Openings or penetrations such as chimneys, whole house attic fans, pet doors, and through-wall heating and air conditioning units are strongly discouraged because they allow noise infiltration.

4.2 Prototype Homes

This section defines the prototype homes for which modifications are presented in Table 4-2. These prototypes represent the majority of designs currently being built.

To use the *Guidelines* for new homes, first identify the type of house to be sound insulated from among the 21 prototype models given in Table 4-1. Select the prototype that most closely resembles the home being designed. For the appropriate dwelling type, choose the house that has the correct exterior wall construction and the correct number of stories rather than the exact house size or number of rooms.

Table 4-1. Prototype Homes[1]

House ID No.	House Category and Description[2]
	Single-Family Houses
1	1-Story with Sided 2x4 Walls (vaulted ceilings)
2	1-Story with Brick, Concrete Block, or ICF Walls
3	1-Story with Stucco on 2x6 Walls
4	1-Story with Brick, Concrete Block, or ICF Walls
5	2-Story with Sided 2x6 Walls
6	2-Story with Stucco or EIFS on 2x6 Walls
7	2-Story with Brick , Concrete Block or ICF Walls (master bedroom with vaulted ceiling)
8	Beach House with Sided 2x4 Walls, on Pylons
	Duplexes
9	2-Story Duplex with Sided 2x4 Walls

1 Thumbnail floor plans for these homes are given in Appendix A.

2 All homes have flat gypsum board ceilings with sloped roofs unless otherwise indicated.

Table 4-1. Prototype Homes[1] - *concluded*

House ID No.	House Category and Description[2]
	Townhouses
10	18'-Wide 3½ Story with Brick, Concrete Block, or ICF Walls
11	24'-Wide End-unit 2-Story with Brick, Concrete Block, or ICF Front Walls, and Sided 2x4 End and Rear Walls
12	20'-Wide with Sided 2x4 Walls
13	24'-Wide End-unit with Sided 2x4 Walls
	Apartments and Nursing Homes
14	Apartment with Brick Walls and Through-Wall A/C Unit
15	Top Floor Apartment with Brick Walls (flat built-up roof)
16	Corner Top-Floor Apartment with Sided 2x4 Walls (flat built-up roof)
17	End Apartment with Sided 2x4 Walls
18	Top-Floor Apartment with Sided 2x4 Walls
	Modular and Manufactured Homes
19	1-Story Modular Home with Sided 2x4 Walls (bedrooms with vaulted ceilings)
20	Small Manufactured Home with Sided 2x6 Walls (vaulted ceilings)
21	Large Manufactured Home with Sided 2x4 Walls (vaulted ceilings)

1 Thumbnail floor plans for these homes are given in Appendix A.

2 All homes have flat gypsum board ceilings with sloped roofs unless otherwise indicated.

See Section 4.4 for special features that may apply. Homes with unique room shapes, materials, or dimensions that differ significantly from the average may require the services of an acoustical consultant in order to ensure adequate noise reduction.

4.3 Sound Insulation Treatments for New Construction

Once the house ID code has been located in Section 4.2, the plans and treatments given on the following pages may be used to determine the recommended package of design modifications and material specifications necessary to meet the noise goals discussed in Chapter 2. Each prototype home is described as a schedule of wall, window, door, ceiling and other modifications to standard construction. If the actual home to be modified has rooms similar to those from several different prototype homes, model rooms may be combined for a different overall house. To do this, make sure the model rooms have the same exterior material, number of exterior walls, and the same ceiling/roof characteristics as the actual rooms.

Table 4-2 lists modifications for each new home prototype. The prototypes are identified in Table 4-1 and floor plans for each are given in Appendix A. For recommendations of houses exposed predominantly to noise from propeller aircraft, helicopters, or civilian aircraft see Section 3.4. To ensure adequate reduction in noise level, keeping in mind that costs to provide the modifications are higher, it is always acceptable to use the package of modifications for higher noise zones. Modifications are generally given for habitable rooms that have exterior walls. The following abbreviations are used; some of these modifications may not be listed in Table 4-2 but are used by the supplemental computer program.

- "2 gyp" = use two layers of ½" minimum gypsum board for exterior walls or ceilings,
- "2 OSB" = use two layers of 7/16" oriented strand board or plywood sheathing,
- "RC" = use single-leaf resilient channels mounted horizontally across the wall studs, or ceiling joists (or roof rafters for vaulted ceilings),
- "Stag" = use 2x4 studs staggered on a 2x6 base plate (see drawing in Appendix C). If 2x6 studs must be used for structural reasons, use 2x6 studs staggered on a 2x8 base,
- "ICF" = insulating concrete forms consisting of approximately two-inch foam forms with at least four-inch normal weight concrete poured between,
- "EIFS" = exterior insulation and finish system consisting of a thin stucco application (approximately 1/8") on 1" to 2" thick foam panels,
- "Cement" = use 10 mm thick cement stucco finish,
- "STC xx" = sound transmission class rating required for the window or door, and
- "Trusses" = use floor trusses that are at least 14" deep with at least 9" thick batt insulation between the trusses, and ½" thick (nominal) plywood or OSB at the bottom chords of the trusses. This recommendation only applies to elevated houses such as house 8.

Wherever the "Room Elements" column lists a door with a storm door, all of the modifications in that row also use a storm door. A typical new prime door with a full-view storm door has a rating of approximate STC 33. To achieve STC 37 with a storm door, use a typical new prime door with an STC 28 storm door, which has 3/16" minimum tempered or laminated glass. To achieve STC 40 with a storm door use a typical new prime door with an STC 30 storm door, which has 3/16" minimum tempered or laminated glass. To achieve STC43 with a storm door use a typical prime door with an STC 32 storm door, which has ¼" laminated glass.

For sliding doors an STC 42 can be achieved with a typical new double pane sliding door plus an STC 29 secondary sliding door.

Table 4-2. Modifications for New Construction

House No.	Room Type	Room Elements	Noise Zone (dB, DNL) 60 - 65	65 - 70	70 - 75	75 - 80
1	Master Bed	14x14				
		Siding	None	None	None	RC
		2 Windows	None	None	STC 30	STC 34
		Vaulted clg.	None	None	None	None
1	Bed 2	12x11				
		Siding	None	None	None	RC
		2 Windows	None	None	STC 32	STC 36
		Vaulted clg.	None	None	None	None
1	Bed 3	10x11				
		Siding	None	None	None	RC
		1 Window	None	None	STC 32	STC 34
		Vaulted clg.	None	None	None	None
1	Living/ Dining/ Kitchen/ Foyer	14x40				
		Siding	None	None	None	RC
		5 Windows	None	None	STC 32	STC 32
		2 drs w/storms	None	None	STC 33	STC 37
		Vaulted clg.	None	None	None	RC
2	Master Bed	16x12				
		Brick	None	None	None	None
		3 Windows	None	None	STC 28	STC 32
		Attic	None	None	None	None
2	Bed 2	10x12				
		Brick	None	None	None	None
		1 Window	None	None	STC 28	STC 34
		Attic	None	None	None	None
2	Bed 3	10x12				
		Brick	None	None	None	None
		1 Window	None	None	STC 28	STC 34
		Attic	None	None	None	None
2	Living/ Dining	27x13				
		Brick	None	None	None	None
		3 Windows	None	None	STC 30	STC 34
		1 door	None	None	STC 29	STC 34
		Attic	None	None	None	None
2	Kitchen	10x12				
		Attic	None	None	None	None
2	Family	18x15				
		Brick	None	None	None	None
		1 Window	None	STC 26	STC 32	STC 38
		Sliding gl. dr.	None	None	STC 32	STC 34
		Vaulted clg.	None	None	None	RC

Note: These modifications apply only to military jet aircraft. For modifications at houses impacted predominantly by propeller aircraft, helicopters, or civilian jet aircraft, see section 3.4.

Table 4-2. Modifications for New Construction - *continued*

House No.	Room Type	Room Elements	Noise Zone (dB, DNL) 60 - 65	65 - 70	70 - 75	75 - 80
3	Master Bed	15x18 Stucco 2 Windows Attic	None None None	None None None	None STC 26 None	RC, 2 gyp STC 30 2 gyp
3	Bed 2	11x11 Stucco 1 Window Attic	None None None	None None None	None STC 26 None	None STC 34 None
3	Bed 3	13x11 Stucco 1 Window Attic	None None None	None None None	None STC 26 None	None STC 34 None
3	Study	13x11 Stucco 1 Window Attic	None None None	None None None	None STC 26 None	None STC 34 None
3	Dining	13x11 Stucco 1 Window Attic	None None None	None None None	None STC 28 None	None STC 36 None
3	Living/ Foyer	14x14 Stucco 3 Windows 2 Doors Attic	None None None	None STC 28 None None	None STC 34 STC 31 None	RC, 2 gyp STC 38 STC 37 2 gyp
3	Family/ Kitchen/ Nook	15x17, 10x21 Stucco 5 Windows Hinged patio dr. Attic	None None None None	None None None None	None STC 32 STC 31 None	RC, 2 gyp STC 36 STC 34 2 gyp
4	Master Bed	13x13 Brick 2 Windows Attic	None None None	None None None	None STC 26 None	None STC 32 None
4	Bed 2	10x10 Brick 2 Windows Attic	None None None	None None None	None STC 28 None	None STC 34 None
4	Bed 3	8x14 Brick 1 Window Attic	None None None	None None None	None STC 26 None	None STC 32 None
4	Living/ Dining/ Kitchen/ Foyer	26x26 Brick 10 Windows 1 Door w/storm Attic	None None None None	None STC 28 None None	None STC 32 None None	None STC 38 STC 37 None
5	Master Bed	14x21 Siding 2 Windows Attic	None None None	None None None	None STC 30 None	RC STC 32 None
5	Bed 2	12x12 Siding 2 Windows Attic	None None None	None None None	None STC 30 None	RC STC 34 None
5	Bed 3	10x12 Siding 1 Window Attic	None None None	None None None	None STC 28 None	RC STC 32 None
5	Dining/ Foyer	13x12 Siding 2 Windows 1 Door w/ storm	None None None	None STC 26 None	RC STC 32 None	Stag, 2 gyp STC 36 STC 40

Note: These modifications apply only to military jet aircraft. For modifications at houses impacted predominantly by propeller aircraft, helicopters, or civilian jet aircraft, see section 3.4.

Table 4-2. Modifications for New Construction - *continued*

House No.	Room Type	Room Elements	Noise Zone (dB, DNL) 60 - 65	65 - 70	70 - 75	75 - 80
5	Living	12x22 Siding 3 Windows	None None	None None	None STC 32	RC STC 34
5	Family/ Kitchen/ Nook	13x22 Siding 5 Windows 1 door	None None None	None STC 28 None	None STC 32 STC 29	RC STC 36 STC 29
6	Master Bed	16x17 Stucco 2 Windows Attic	None None None	None STC 26 None	None STC 32 None	RC, 2 gyp STC 34 2 gyp
6	Bed 2	11x12 Stucco 1 Window Attic	None None None	None None None	None STC 26 None	RC, 2 gyp STC 30 None
6	Bed 3	10x12 Stucco 2 Windows Attic	None None None	None None None	None STC 30 None	RC, 2 gyp STC 34 None
6	Study	11x13 Stucco 3 Windows	None None	None None	None STC 30	RC, 2 gyp STC 34
6	Dining	11x13 Stucco 3 Windows Sliding gl. dr.	None None None	None STC 28 None	None STC 34 STC 32	RC, 2 gyp STC 40 STC 37
6	Living/ Foyer	17x20 Stucco 3 Windows 1 Door	None None None	None None None	None STC 32 STC 29	RC, 2 gyp STC 36 STC 34
6	Kitchen	12x12 Stucco 4 Windows	None None	None STC 28	None STC 34	RC, 2 gyp STC 38
7	Master Bed	15x19 Brick 5 Windows Vaulted clg.	None None None	None None None	None STC 28 None	None STC 34 None
7	Bed 2	12x13 Brick 1 Window 1 Door Attic	None None None None	None None None None	None STC 26 None None	None STC 32 STC 31 None
7	Bed 3	11x13 1 Window Vaulted clg.	None None	None None	None None	STC 30 None
7	Bed 4	11x13 Brick 2 Windows Attic	None None None	None None None	None STC 28 None	None STC 32 None
7	Game	14x18 Brick 1 Window Attic	None None None	None None None	None None None	None STC 28 None
7	Alcove	10x8 Brick 2 Windows Attic	None None None	None None None	None STC 30 None	None STC 34 None
7	Play	12x10 Brick 1 Window Attic	None None None	None None None	None None None	None STC 30 None
7	Study/ Foyer	11x16 Brick 2 Windows 1 Door Attic	None None None None	None None None None	None STC 26 None None	None STC 34 STC 29 None

Note: These modifications apply only to military jet aircraft. For modifications at houses impacted predominantly by propeller aircraft, helicopters, or civilian jet aircraft, see section 3.4.

Table 4-2. Modifications for New Construction – *continued*

House No.	Room Type	Room Elements	Noise Zone (dB, DNL) 60 - 65	65 - 70	70 - 75	75 - 80
7	Dining	12x16 Brick 3 Windows	None None	None STC 26	None STC 32	None STC 36
7	Living	17x13 Brick 6 Windows Attic	None None None	None STC 26 None	None STC 30 None	None STC 36 None
7	Kitchen/ Nook	15x26 Brick 3 Windows 1 Door w/storm	None None None	None None None	None STC 28 None	None STC 34 None
7	Family	14x20 Brick 3 Windows Attic	None None None	None None None	None STC 28 None	None STC 32 None
8	Master Bed	12x16 Siding 3 Windows Attic	None None None	None None None	None STC 32 None	RC STC 34 None
8	Bed 2	14x15 Siding 3 Windows Attic	None None None	None None None	None STC 32 None	RC STC 34 None
8	Living/ Dining	14x32 Siding 5 Windows Sliding gl. dr. Floor	None None None None	None STC 26 None None	RC STC 32 STC 32 None	RC STC 40 STC 34 Trusses
8	Kitchen/ Foyer	10x12 Siding 1 Window 1 door Floor	None None None None	None None None None	RC STC 32 STC 31 None	RC STC 34 STC 37 Trusses
9	Living	12x14 Siding 1 Window 1 Door	None None None	None None None	RC STC 28 STC 29	RC STC 36 STC 34
9	Family/ Kitchen	23x15 Siding 3 Windows	None None	None None	None STC 34	RC STC 34
9	Master Bed	14x14 Siding 2 Windows Attic	None None None	None None None	None STC 28 None	RC STC 32 None
9	Bed 2	11x11 Siding 1 Window Attic	None None None	None None None	None STC 32 None	RC STC 34 None
9	Bed 3	10x12 Siding 1 Window Attic	None None None	None None None	None STC 28 None	RC STC 32 None
10	Living	12x18 Brick 2 Windows 1 Door w/ storm	None None None	None None None	None STC 30 None	None STC 34 STC 37
10	Kitchen	17x13 Brick 2 Windows Sliding gl. dr.	None None None	None None None	None STC 30 STC 32	None STC 38 STC 34
10	Dining	14x9 Attic	None	None	None	None

Note: These modifications apply only to military jet aircraft. For modifications at houses impacted predominantly by propeller aircraft, helicopters, or civilian jet aircraft, see section 3.4.

Table 4-2. Modifications for New Construction - *continued*

House No.	Room Type	Room Elements	Noise Zone (dB, DNL) 60 - 65	65 - 70	70 - 75	75 - 80
10	Master Bed	12x13 Brick 2 Windows Attic	None None None	None None None	None STC 28 None	None STC 32 None
10	Bed 2	9x11 Brick 2 Windows Attic	None None None	None None None	None STC 28 None	None STC 34 None
10	Bed 3	8x11 Brick 1 Window Attic	None None None	None None None	None STC 26 None	None STC 32 None
10	Family	18x20 Brick 2 Windows	None None	None None	None STC 26	None STC 32
11	Living/ Foyer	13x19 Siding Brick 3 Windows 1 Door	None None None None	None None STC 26 None	RC None STC 30 STC 29	RC None STC 38 STC 34
11	Family	13x11 Siding 2 Windows	None None	None None	RC STC 28	RC STC 34
11	Dining/ Kitchen	10x21 Siding 1 Window	None None	None None	None STC 30	RC STC 32
11	Master Bed	12x15 Siding 2 Windows Attic	None None None	None None None	None STC 30 None	RC STC 32 None
11	Bed 2	11x12 Siding 1 Window Attic	None None None	None None None	None STC 26 None	RC STC 30 None
11	Bed 3	10x12 Brick 1 Window Attic	None None None	None None None	None None None	None STC 30 None
12	Living/ Dining/ Kitchen	16x20 Siding 1 Window 1 Sliding gl. dr.	None None None	None None None	RC STC 30 None	RC STC 38 STC 34
12	Master Bed	11x16 Siding 2 Windows Attic	None None None	None None None	None STC 28 None	RC STC 32 None
12	Bed 2	9x12 Siding 1 Window Attic	None None None	None None None	None STC 30 None	RC STC 34 None
12	Bed 3	9x12 Siding 1 Window Attic	None None None	None None None	None STC 30 None	RC STC 34 None
13	Living/ Kitchen/ Nook	21x23 Siding 7 Windows 1 door	None None None	None STC 26 None	None STC 36 STC 34	RC STC 38 STC 34
13	Dining	10x12 Siding 2 Windows Attic	None None None	None STC 26 None	None STC 34 None	RC STC 36 None

Note: These modifications apply only to military jet aircraft. For modifications at houses impacted predominantly by propeller aircraft, helicopters, or civilian jet aircraft, see section 3.4.

Table 4-2. Modifications for New Construction - *continued*

House No.	Room Type	Room Elements	Noise Zone (dB, DNL) 60 - 65	65 - 70	70 - 75	75 - 80
13	Master Bed	13x15 Siding 3 Windows 1 Sliding gl. dr. Attic	None None None None	None None None None	None STC 34 STC 32 None	RC STC 36 STC 34 None
13	Bed 2	11x13 Siding 2 Windows Attic	None None None	None None None	None STC 32 None	RC STC 34 None
13	Bed 3	11x13 Siding 2 Windows Attic	None None None	None None None	None STC 30 None	RC STC 34 None
13	Family	23x19 Siding 4 Windows Sliding gl. dr. Attic	None None None None	None None None None	None STC 34 STC 32 None	RC STC 38 STC 34 None
14	Living	15x14 Brick 3 Windows A/C	None None None	None None None	None STC 32 None	None STC 34 Remove
15	Living/ Bed	16x17 Siding 2 Windows Built-up roof	None None None	None None None	None STC 28 None	None STC 34 None
16	Living/ Dining	18x13 Siding Sliding gl. dr. Built-up roof	None None None	None None None	None STC 32 None	Stag STC 34 None
16	Kitchen	10x9 Attic	None	None	None	None
16	Bed	14x13 Siding 2 Windows Built-up roof	None None None	None None None	None STC 32 None	Stag STC 32 None
16	Sun Room	10x8 Siding 3 Windows Built-up roof	None None None	None STC 30 None	RC STC 34 None	Stag, 2 gyp STC 38 2 gyp
17	Living/ Dining/ Kitchen	31x15 Siding 2 Windows Sliding gl. dr. 1 Door	None None None None	None STC 32 None STC 31	RC STC 34 STC 32 STC 34	Stag, 2 gyp STC 40 STC 34 STC 40
17	Master Bed	10x10 Siding 2 Windows	None None	None None	None STC 32	Stag STC 34
17	Bed 2	10x10 Siding 1 Window	None None	None None	None STC 28	Stag STC 32
18	Living/ Dining/ Kitchen	15x18 Siding 3 Windows 1 Door Attic	None None None None	None None None None	None STC 32 STC 31 None	RC STC 34 STC 34 None
18	Master Bed	10x15 Siding Sliding gl. dr. Attic	None None None	None None None	None STC 32 None	RC STC 34 None
18	Bed 2	10x11 Siding 2 Windows Attic	None None None	None None None	None STC 28 None	RC STC 32 None

Note: These modifications apply only to military jet aircraft. For modifications at houses impacted predominantly by propeller aircraft, helicopters, or civilian jet aircraft, see section 3.4.

Table 4-2. Modifications for New Construction - *continued*

House No.	Room Type	Room Elements	Noise Zone (dB, DNL) 60 – 65	65 – 70	70 – 75	75 – 80
19	Living	16x13 Siding 2 Windows 1 Door Attic	None None None None	None None None None	None STC 34 STC 31 None	Stag STC 36 STC 31 None
19	Dining/ Kitchen	17x13 Siding 2 Windows 1 Door w/storm Attic	None None None None	None None None None	RC STC 30 None None	Stag STC 36 STC 37 None
19 +	Master Bed	12x11 Siding 2 Windows Vaulted clg.	None None None	None None None	None STC 32 None	Stag STC 34 None
19	Bed 2	11x10 Siding 2 Windows Vaulted clg.	None None None	None None None	None STC 32 None	Stag STC 34 None
19	Bed 3	9x11 Siding 1 Window Vaulted clg.	None None None	None None None	None STC 28 None	Stag STC 32 None
20	Living/ Dining/ Kitchen	14x29 Siding 5 Windows 2 Doors Vaulted clg.	None None None None	None STC 26 None None	2 gyp STC 38 STC 34 2 gyp	Noise Reduction Goals Are Not Achievable For This Noise Zone
20	Master Bed	12x14 Siding 2 Windows Vaulted clg.	None None None	None None None	None STC 32 None	Noise Reduction Goals Are Not Achievable For This Noise Zone
20	Bed 2	10x14 Siding 1 Window Vaulted clg.	None None None	None None None	None STC 26 None	2 gyp STC 38 2 gyp
21	Living/ Dining	23x26 Siding 4 Windows 2 Doors Sliding gl. dr. Vaulted clg.	None None None None None	None None None None None	None STC 30 STC 34 STC 32 None	Noise Reduction Goals Are Not Achievable For This Noise Zone
21	Master Bed	18x13 Siding 2 Windows Vaulted clg.	None None None	None None None	None STC 32 None	Noise Reduction Goals Are Not Achievable For This Noise Zone
21	Bed 2	11x13 Siding 1 Window Vaulted clg.	None None None	None None None	None STC 26 None	2 gyp STC 36 None
21	Bed 3	11x13 Siding 1 Window Vaulted clg.	None None None	None None None	None STC 30 None	Noise Reduction Goals Are Not Achievable For This Noise Zone

Note: These modifications apply only to military jet aircraft. For modifications at houses impacted predominantly by propeller aircraft, helicopters, or civilian jet aircraft, see section 3.4.

4.4 Special Conditions

Table 4-3 gives a list of special considerations for new homes for which recommendations have been developed. For non-habitable rooms, no modifications are required. See Section 3.4 for additional notes.

Table 4-3. Special Modifications by DNL Noise Zone

	DNL Noise Zone			
Building Element	60 - 65	65 – 70	70 – 75	75 - 80
Skylights	STC 28	STC 38	STC 38	Not allowed
Fireplaces, vented prefab units	Add damper or doors	Add chimney damper	Not allowed	Not allowed
Wood stove	Double wall duct	Not allowed	Not allowed	Not allowed
Combustion exhaust, dryer duct	Double wall rigid duct	Enclose in chase; use combustion air enforcer	Enclose in chase; use combustion air enforcer	Enclose in Chase; use combustion air enforcer
A/C in window or in wall	Not allowed	Not allowed	Not allowed	Not allowed
Gravity heating systems	Not allowed	Not allowed	Not allowed	Not allowed
Pet doors, mail slots	Not allowed	Not allowed	Not allowed	Not allowed
Vented kitchen range or in-wall fan	At least 2 90-degree turns in duct	At least 2 90-degree turns in duct	Use ductless	Use ductless
Attic insulation[5]	–	R19, 5.25-8"	R30, 9-13"	R30, 9-13"
Attic access panels	–	Use 3/4" plywood and seals	Use 3/4" plywood and seals	Use 3/4" plywood and seals
Pull-down attic stairs	–	Add cover	Add cover	Add cover
Whole-house attic fan	Allowed with cover	Allowed with cover	Allowed with cover	Not allowed

Note: These modifications apply only to military jet aircraft. For modifications at houses impacted predominantly by propeller aircraft, helicopters, or civilian jet aircraft, see section 3.4.

Recommendations for manufactured homes and for homes exposed predominantly to noise from propeller aircraft, helicopters, or civilian aircraft are presented in Section 3.4.

4.5 Additional Design Considerations

Building a new house offers important opportunities to design noise reduction in the planning stage. Many of these factors, such as avoiding cathedral ceilings or overly large windows, have

[5] Thermal transmittance is measured in terms of the R-value. For attic insulation requirements consult the local building and energy codes. Thermal resistance is expressed in terms of the R-value. If the building or energy code requires a higher R-value, meet the code requirement.

already been noted. However, there are several additional design considerations that may be very beneficial when planning a new home:

Room Location – Locate bedrooms and other noise sensitive rooms on the side of the house away from the aircraft flight tracks. Using the house structure itself to shield habitable rooms can provide as much as 5 to 10 dB of additional noise reduction.

Outside Spaces – Locate decks and patios or other outdoor gathering places on the side of the house away from the aircraft flight tracks. One of the most common complaints from residents is the difficulty of enjoying their decks and yards when aircraft are flying nearby. Careful location of entertainment areas can reduce adverse impacts. However, locating such areas on the side of the house away from the flight tracks may not be feasible, especially if the bedrooms are also located on that side of the house, recognizing that something has to be on the other side.

Multiple Stories – Build "up" with multiple-story structures instead of using single-story homes. Upper floors protect the rooms below from noise and, consequently, the first floor of a two-story house is noticeably quieter than a single-story home.

Vegetation – Do not rely on trees or shrubs to reduce noise. They are only useful for slightly reducing the noise of aircraft that are at a very low elevation (i.e., when they are departing away from the house). It takes several hundred feet of solid forest to make a significant difference in noise exposure, even for low elevation noise and this does not protect from overflight noise. However, many residents report that they experience some benefit from a visual screen between them and the aircraft, whether the noise is reduced or not.

Vestibules & Mudrooms – Include vestibules and enclosed mudrooms in home designs where possible. Vestibules and mudrooms are non-habitable spaces that buffer the more noise-sensitive rooms from exterior doors, eliminating the need to upgrade the doors. Doors are a significant noise leak and providing acoustical doors can be costly.

Porches & Patios – Enclose patios or porches with some form of walls and windows instead of using only screens. Walls and/or windows can significantly reduce noise in these somewhat habitable indoor spaces. However, be sure to separate the patio or porch from other interior spaces with walls and a door. See the modifications recommended for existing sunrooms in Table 3-2 for ideas if the patio is intended to be habitable.

Ventilation and Air Conditioning – Install a central air-conditioning system instead of relying on open windows, window A/C units, or in-wall units for cooling. This is very important for reducing noise leaks.

5.0 Sound Insulation Costs

This chapter provides cost estimates for renovating existing homes and building new homes using sound insulation methods. Section 5.1 discusses cost considerations for renovating existing houses to achieve the NLR goals, and Section 5.2 addresses the cost of sound insulating new homes. Section 5.3 discusses cost multipliers to be used for various regions.

The cost to sound insulate a new or existing house can vary greatly from one house to the next. To address this variability, a computer program was developed to complement this document. This program, included on the disk in the front of this report, can be used to determine the required scope and cost to sound insulate a room. To obtain an additional copy of this program contact the regional Naval Facilities Engineering Command office near you (see Section 1.4 for contact information).

Sound insulation costs are affected by a variety of factors including:

- Home size
- Home design (number and size of windows, type of roof, etc.)
- Exterior noise exposure zone
- Local and state building codes and local code interpretation
- Community location
- Selected product manufacturers

For projects that sound insulate multiple dwellings, such as Federally-funded sound insulation programs at commercial airports, other factors also influence costs, including:

- Program management, contract structure, and oversight
- Number of homes in contract

Sound insulation designs for existing and new homes have many common elements. For example, both require specially designed and tested windows and doors, extra wall and ceiling treatments (in higher noise zones), and mechanical system upgrades. For new construction, upgrading acoustically-rated products is less costly than replacing elements, which is necessary for sound insulation renovations.

Sound insulation renovation costs for existing homes around airports generally range from $10,000 to more than $50,000 per home, depending on the factors discussed above. Sound insulation impacts on new construction costs are expected to be much lower. Sections 5.1 and 5.2 give estimates for sound insulation costs associated with the measures described in Chapters 3 and 4 of the *Guidelines*. Note that cost estimates for some products are based on data from a small number of manufacturers; costs may vary based on which manufacturers serve your area, which types of products are offered in your area, and the competitiveness of the market.

The costs to provide energy recovery ventilators in this section include a system that has a heat and moisture recovery feature. This feature is useful to reduce heating costs in the winter, and to

balance humidity. Systems that do not have this feature, such as heat recovery ventilators, ventilators with re-heat coils, or simple ventilators, will be less expensive.

5.1 Existing Homes

Renovation typically entails replacing many doors and windows. The costs included in this section are for the full replacement cost. In contrast, the costs in the following section for new construction only include the increased costs associated with using special products. The cost to sound insulate an existing structure also includes a variety of elements that are unique to renovation, such as contractor mobilization costs, inefficiencies if the homeowner continues to live in the house during renovation, and additional labor and materials to work around existing conditions. These costs do not include any associated asbestos or lead abatement efforts. Such abatement might be appropriate when disturbing asbestos-containing ceiling tiles, siding, floor tiles, stucco, caulk, or insulation, or when disturbing lead-based paint or stain. Renovation, like new construction, can be performed on single homes or on a group of homes at a time; however, the costs will vary depending on how many are renovated at a time. Large groups cost less on a per-home basis but require more effort to organize and schedule. These factors combine to raise the per-home cost of renovation above what the same building materials and techniques would have cost in a new home.

Table 5-1 gives unit costs for a variety of sound insulation elements for renovation of an existing home, assuming it is part of a larger sound insulation program. These costs were based on sound-insulating 20 to 50 homes at a time. Costs to sound insulate a single home will be somewhat higher. The costs are given on a per-unit basis including labor, materials, overhead, profit, licenses, bonding, and all related contractor costs. These costs do not include design fees, administrative costs of the funding organization, or construction contingencies. The specific treatments are explained in more detail in Section 3.3. For windows and doors, costs are only listed for the selected commonly available STC ratings.

The costs to provide air-conditioning in Table 5-1 do not include new ducts. The cost for ducts can vary widely depending on the size and configuration of the house. There are also ductless cooling systems that can be used.

The costs in Table 5-1 associated with removing existing wall and ceiling finishes do not include any upgrades to the electrical system that may be required by the building code. Nor do the costs include any necessary upgrades to knob-and-tube wiring in attics that needs to be replaced when attic insulation is added. Finally, the costs do not include relocation of electrical meters, which may be required by the building inspector.

Table 5-1. Estimated Unit Costs for Renovation Insulation Elements

Item	Unit	Average Unit Cost
30"x48" STC 32 window	Each	$ 420.00
36"x72" STC 32 window	Each	$ 581.00
30"x48" STC 36 window	Each	$ 442.00
36"x72" STC 36 window	Each	$ 613.00
30"x48" STC 40 window	Each	$ 553.00
36"x72" STC 40 window	Each	$ 766.00
30"x48" STC 44 window	Each	$ 851.00
36"x72" STC 44 window	Each	$ 1,179.00
2'x3'-6" skylight interior glass panel	Each	$ 360.00
Replace 2'x3'-6" skylight with new STC 38 unit	Each	$ 634.50
3'-0"X6'-8" STC 29 swinging wood prime door	Each	$ 1,223.00
3'-0"X6'-8" STC 40 swinging wood prime door	Each	$ 1,748.00
Swinging acoustical storm door	Each	$ 524.00
6'-0"x6'-8" STC 34 sliding glass door	Each	$ 1,847.00
6'-0"x6'-8" STC 37 sliding glass door	Each	$ 2,037.00
6'-0"x6'-8" secondary sliding glass door	Each	$ 1,157.00
Addition of one layer of gypsum board with insulation	Square-foot	$ 4.37
Addition of two layers of gypsum board with insulation	Square-foot	$ 6.29
Removing gyp board, adding staggered 2x2 studs, adding insulation, then adding new 5/8" gypsum board ("Furr" in Table 3-2)	Square-foot	$ 9.72
Same, with 2 layers ("Furr, 2 gyp" in Table 3-2)	Square-foot	$ 11.64
Same, with 2 layers and resilient channels between studs and 1st layer	Square foot	$ 13.10
Acoustical fireplace doors	Pair	$ 695.00
Chimney-top acoustical damper	Each	$ 365.00
Upgrade attic access panel or build cover for pull-down stair or whole-house ceiling fan	Each	$ 400.00
Addition of 6" of attic insulation	Square-foot	$ 1.38
Addition of one layer of ceiling 5/8" gypsum board	Square-foot	$ 5.24
Removing existing ceiling, then adding resilient channels and 5/8" gypsum board	Square-foot	$ 9.97
Same, with 2 layers	Square-foot	$ 12.70
Infilling a through-wall air-conditioner	Each	$ 461.00
New central air-conditioning and heating system (does not include ERV or new ducts)	System	$ 7,702.00
Addition of cooling system to existing forced-air heating system (includes cooling coil and condenser; does not include new ducts)	System	$ 3,169.00
Energy recovery ventilator (ERV)	System	$ 1,957.00
Combustion air enforcer	System	$ 472.00
Upgraded electrical panel (keeping existing meter)	Each	$ 2,140.00

Table 5-2 presents a sample worksheet for the costs of sound insulating a single home that is part of a sound insulation program consisting of 20 to 50 homes. Note that insulating only one home at a time may be more expensive.

Table 5-2. Sample Worksheet for Per Home Renovation Cost

Element	Unit	No. of units	Unit Cost	Total
30"x48" STC 40 Window	Each	15	$553.00	$8,295.00
36"x72" STC 40 Window	Each	4	$766.00	$3,064.00
2'x3'-6" skylight interior glass panel	Each	2	$360.00	$720.00
STC 29 swinging wood prime door	Each	2	$1,223.00	$2,446.00
Swinging acoustical storm door	Each	2	$524.00	$1,048.00
Addition of one layer of gypsum board to walls	Square feet	500	$4.37	$2,185.00
New A/C system	System	1	$7,702.00	$7,702.00
Upgraded electrical panel	Each	1	$2,140.00	$2,140.00
Infilling a through-wall air-conditioner	Each	2	$461.00	$461.00
Total				$28,061.00

5.2 New Homes

The cost to build a sound insulated home is only slightly higher than the cost to build a standard home. Some design considerations may have no cost associated with them, such as locating bedrooms away from the flight pattern. Table 5-3 gives the estimated additional costs, beyond standard construction, associated with each of the building elements on a per-unit basis. The unit costs are based on the assumption that the typical wall construction consists of 2x4 wood studs spaced 16" on-center with one layer of 7/16" wood sheathing and vinyl siding on the exterior and one layer of 1/2" gypsum board on the interior. It is assumed that central air-conditioning will be included in typical house construction in warm climate regions.

Table 5-3. Additional Costs for Sound Insulating New Construction

Item	Unit	Average Additional Unit Cost
30"x48" STC 32 window	Each	$ 16.00
36"x72" STC 32 window	Each	$ 23.00
30"x48" STC 36 window	Each	$ 66.00
36"x72" STC 36 window	Each	$ 91.00
30"x48" STC 40 window	Each	$ 147.00
36"x72" STC 40 window	Each	$ 203.00
30"x48" STC 44 window	Each	$ 195.00
36"x72" STC 44 window	Each	$ 270.00
2'x3'-6" STC 38 skylight	Each	$ 150.00
STC 29 swinging acoustical storm door (added cost assumes no storm door would have been used otherwise)	Each	$ 300.00
STC 29 swinging acoustical prime door	Each	$ 162.00
STC 34 swinging acoustical prime door	Each	$ 486.00
STC 40 swinging acoustical prime door	Each	$ 873.00
6'-0"x6'-8" STC 34 sliding glass door	Each	$ 437.00
6'-0"x6'-8" STC 37 sliding glass door	Each	$ 1,312.00
6'-0"x6'-8" secondary sliding glass door	Each	$ 500.00
Adding a second layer of gypsum board to walls	Square-foot	$ 0.70
Adding resilient channels to walls	Square foot	$ 1.10
Adding second layer of gypsum board to sloped ceilings	Square foot	$ 1.41
Adding resilient channels to sloped ceilings	Square-foot	$ 2.31
Using staggered 2x4 wood studs	Square-foot	$ 1.68
Using ½" thick cement in lieu of 1/8" exterior finish	Square foot	$ 4.00
Using 14" deep floor trusses in lieu of 2x10 joists	Square-foot	Varies
Adding a second layer of 7/16" wood sheathing	Square-foot	$ 1.10
Acoustical fireplace doors	Pair	$ 670.00
Chimney-top acoustical damper	Each	$ 365.00
Provide ¾" gasketed cover for pull-down attic stairs or whole house fan	Each	$ 400.00
Providing an energy recovery ventilator	System	$ 1,957.00
Providing a combustion air enforcer	System	$ 472.00

5.3 Location Cost Factors

The U.S. Department of Housing and Urban Development (HUD) studies housing and construction costs in the United States. HUD research shows that one of the determinants of home construction cost is whether the home is located in a rural or urban area. Costs are consistently higher in cities than in rural communities, and also differ between geographic regions. Baseline costs given in Tables 5-1 and 5-3 reflect the national average in 2004. To determine the cost of a particular project, multiply those costs by the factors given in Table 5-4.

Table 5-4. Regional Cost Multipliers

Area	Multiplier (based on percent of national median)
National Median	1.00
Inside Metropolitan Statistical Area (MSA)	1.00
Outside MSA	0.98
Northeast (CT, ME, MA, NH, NJ, NY, PA, RI, VT)	1.20
Midwest (IL, IN, IA, KS, MI, MN, MO, NE, ND, OH, SD, WI)	1.09
South (AL, AR, DE, DC, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, WV)	0.90
West (AK, AZ, CA, CO, HI, ID, MT, NV, NM, OR, UT, WA, WY)	1.17

Appendix A
New Home Floor Plans

Plans used are based on the room types and sizes of actual homes on the market as of September 2003.

Appendix A:
New Home Floor Plans

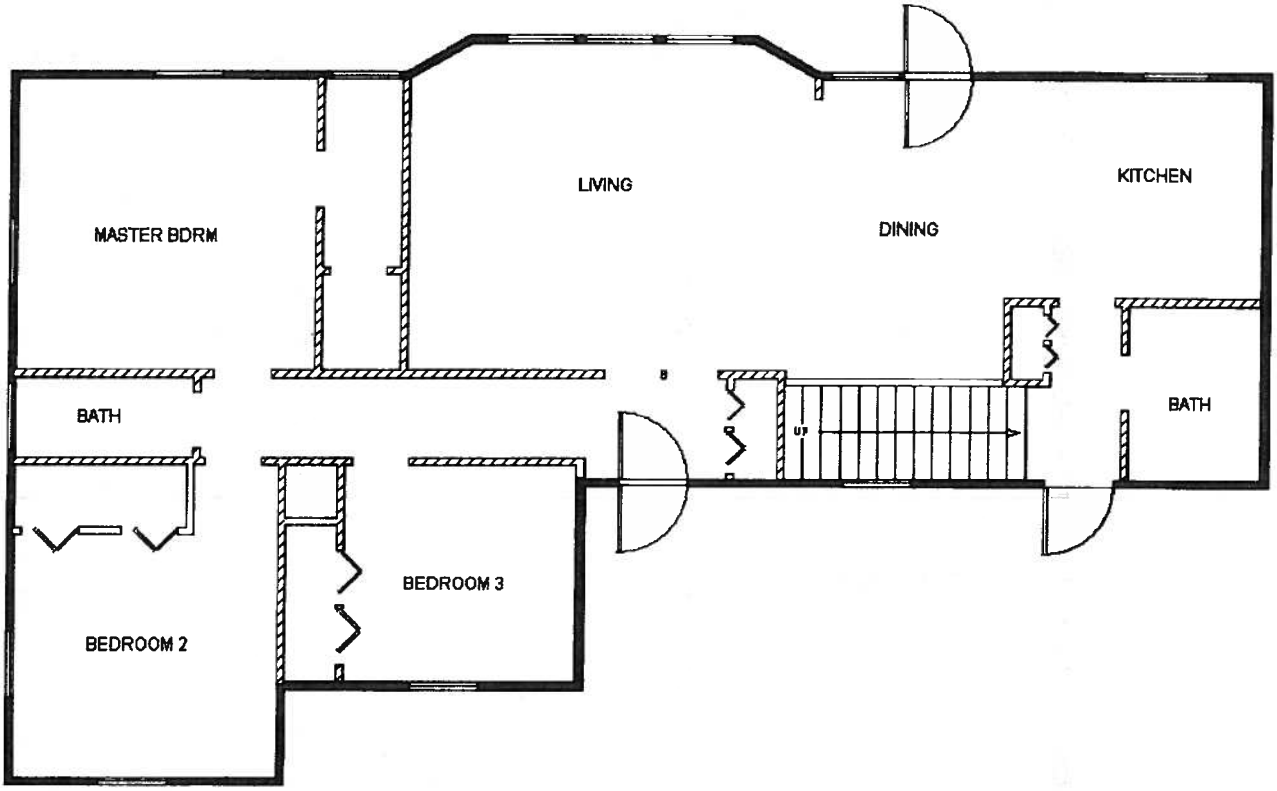
TYPICAL NEW HOUSES: PLAN THUMBNAILS AND DESCRIPTIONS

House ID No.	House Category and Description[2]
	Single-Family Houses
1	1-Story with Sided 2x4 Walls
2	1-Story with Brick, Concrete Block, or ICF Walls
3	1-Story with Stucco on 2x6 Walls
4	1-Story with Brick, Concrete Block, or ICF Walls
5	2-Story with Sided 2x6 Walls
6	2-Story with Stucco or EIFS on 2x6 Walls
7	2-Story with Brick , Concrete Block or ICF Walls
8	Beach House with Sided 2x4 Walls, on Pylons
	Duplexes
9	2-Story Duplex with Sided 2x4 Walls
	Townhouses
10	18'-Wide 3½ Story with Brick, Concrete Block, or ICF Walls
11	24'-Wide End-unit 2-Story with Brick, Concrete Block, or ICF Front Walls, and Sided 2x4 End and Rear Walls
12	20'-Wide with Sided 2x4 Walls
13	24'-Wide End-unit with Sided 2x4 Walls
	Apartments and Nursing Homes
14	Apartment with Brick Walls and Through-Wall A/C Unit
15	Top Floor Apartment with Brick Walls
16	Corner Top-Floor Apartment with Sided 2x4 Walls
17	End Apartment with Sided 2x4 Walls
18	Top-Floor Apartment with Sided 2x4 Walls
	Modular and Manufactured Homes
19	1-Story Modular Home with Sided 2x4 Walls
20	Small Manufactured Home with Sided 2x6 Walls
21	Large Manufactured Home with Sided 2x4 Walls

[1] Thumbnail floor plans for these homes are given in Appendix A.

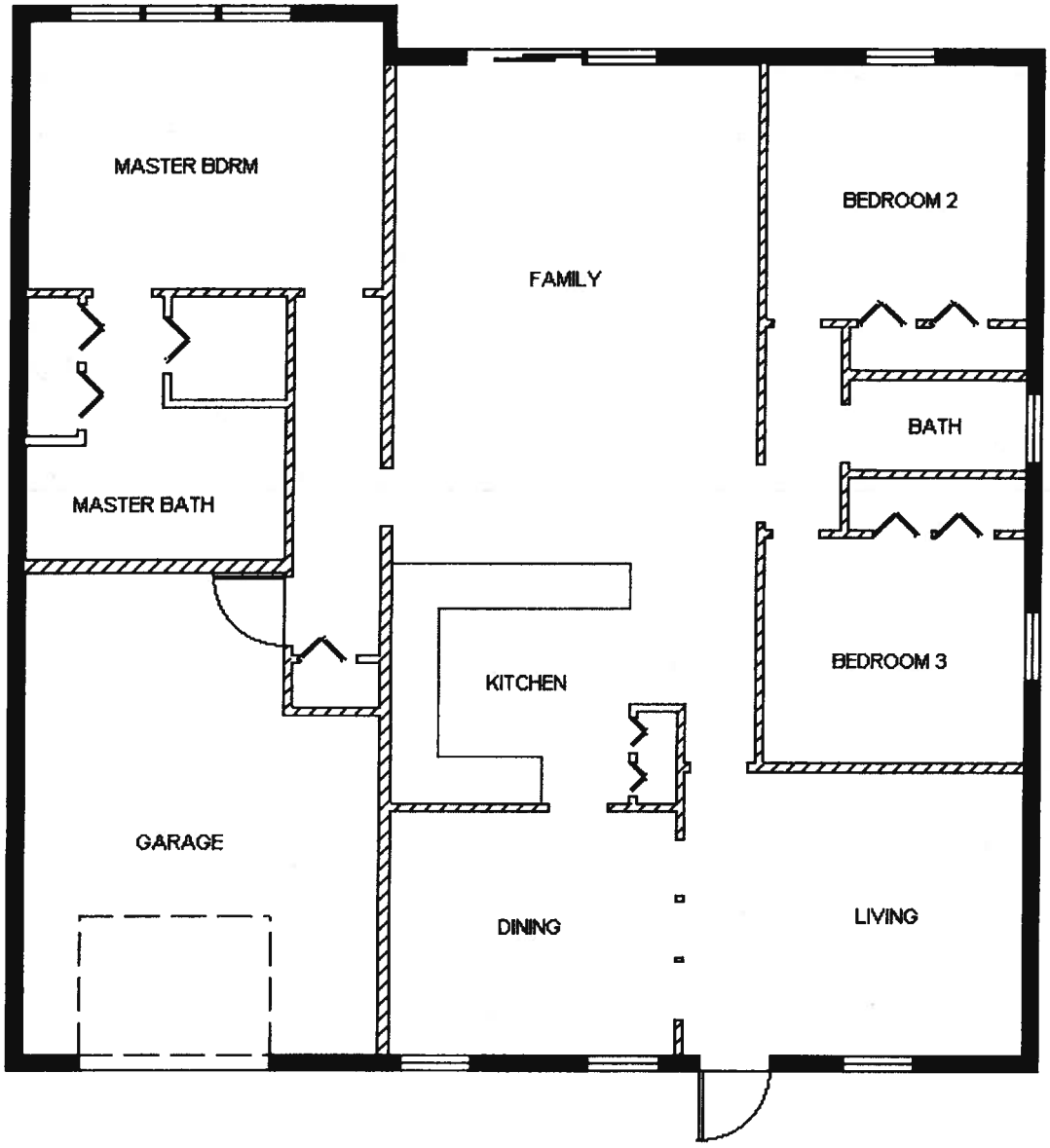
[2] All homes have flat gypsum board ceilings with sloped roofs unless otherwise indicated.

House 1: One-Story with Sided Walls



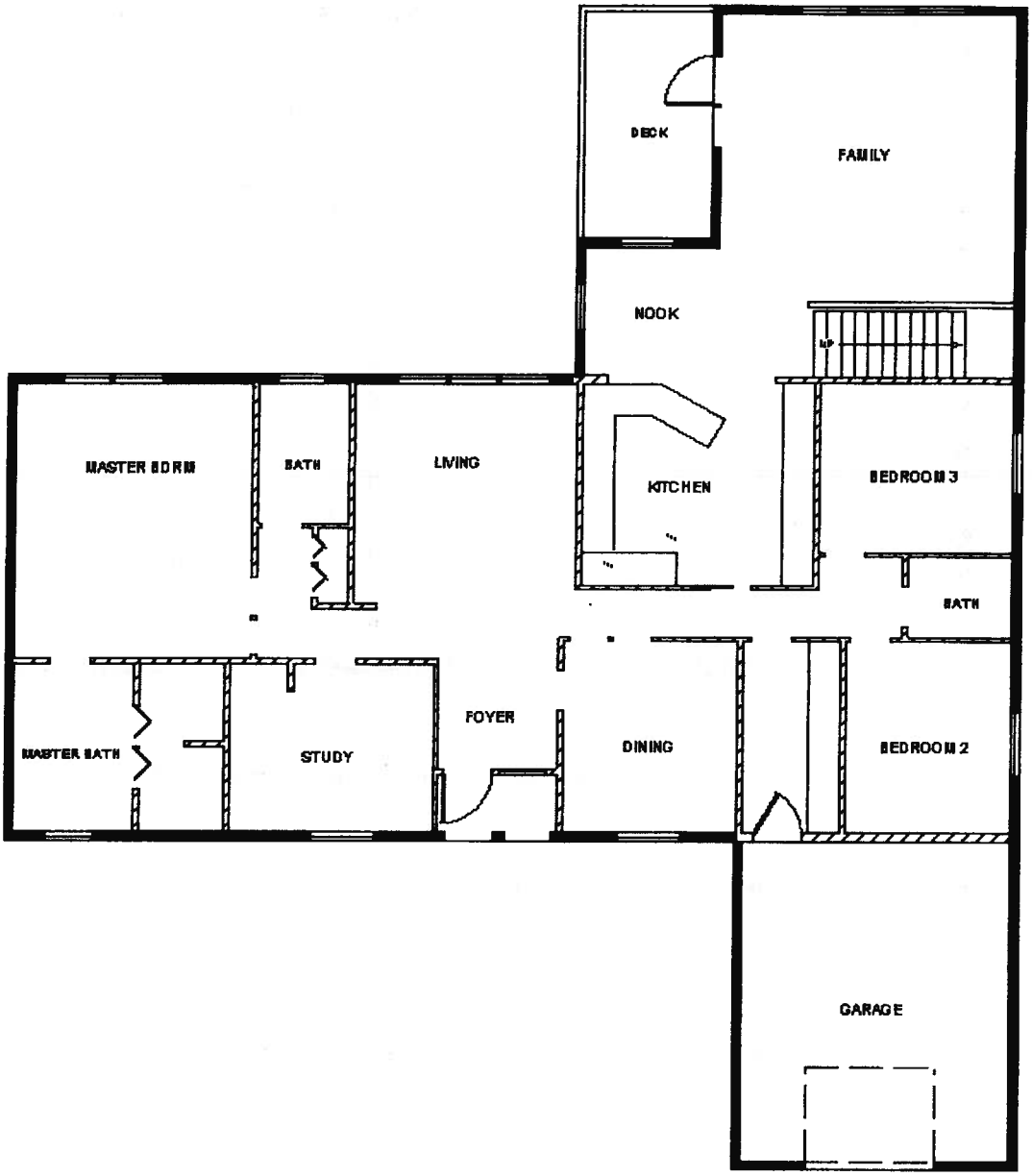
Walls:	Siding on 2x4 wood studs
Windows:	Double pane glass
Ceilings:	9′ high
Roof:	Vaulted ceiling

House 2: One-Story with Masonry Walls



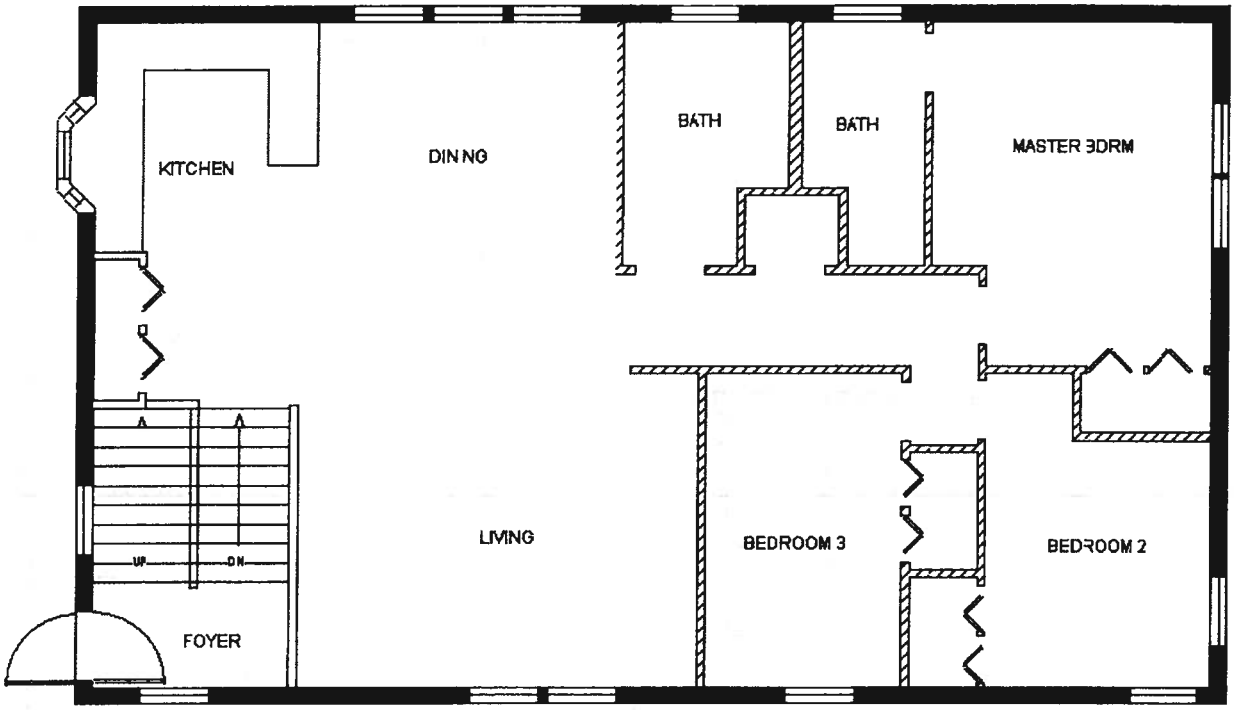
Walls:	Brick, painted concrete masonry units, or insulating concrete forms
Windows:	Double pane glass
Ceilings:	9′ high
Roof:	Vented attic with sloped roof

House 3: One Story with Stucco Walls



Walls:	Stucco or EIFS on 2x6 wood studs
Windows:	Double pane glass
Ceilings:	8′ high
Roof:	Vented attic with sloped roof

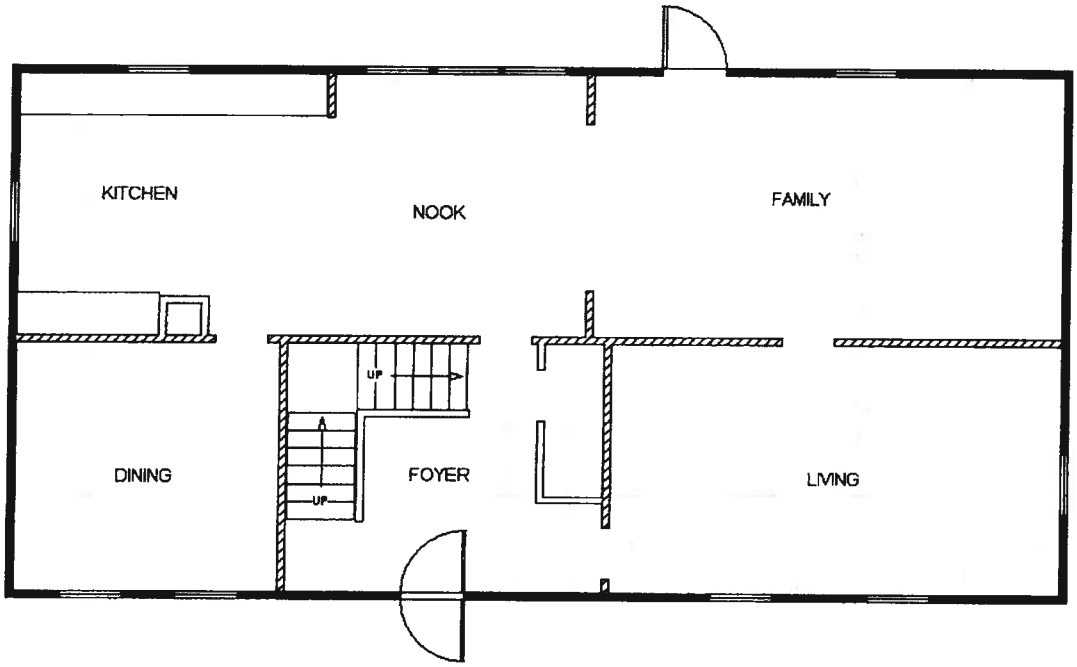
House 4: One-Story with Masonry Walls



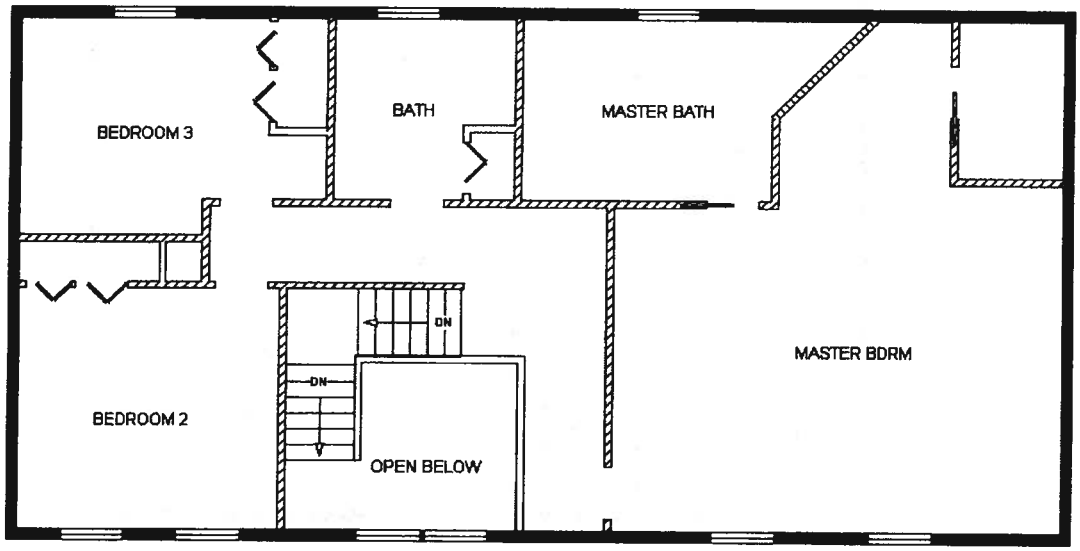
Walls:	Brick, concrete masonry units, or insulating concrete forms
Windows:	Double pane glass
Ceilings:	9′ high
Roof:	Vented attic with sloped roof

House 5: Two-Story with Sided Walls

1st Floor



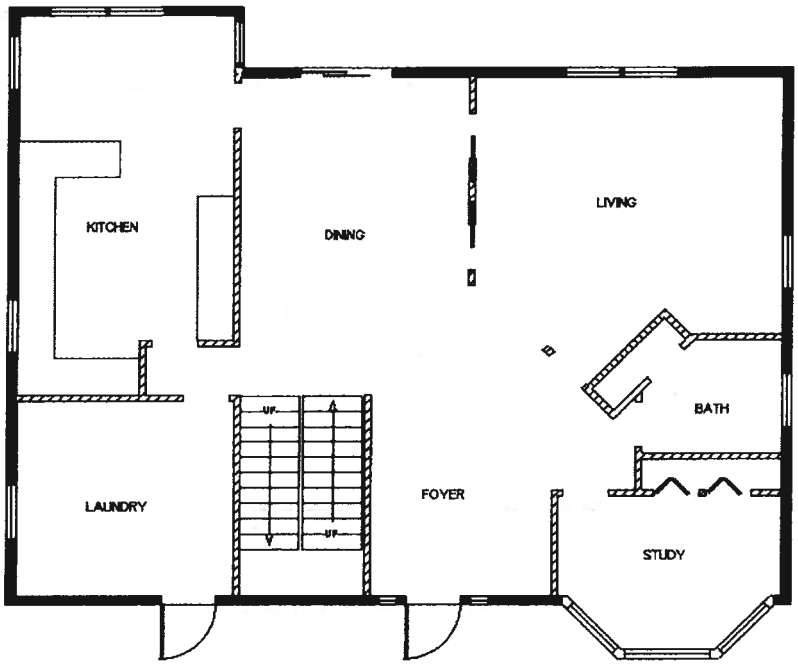
2nd Floor



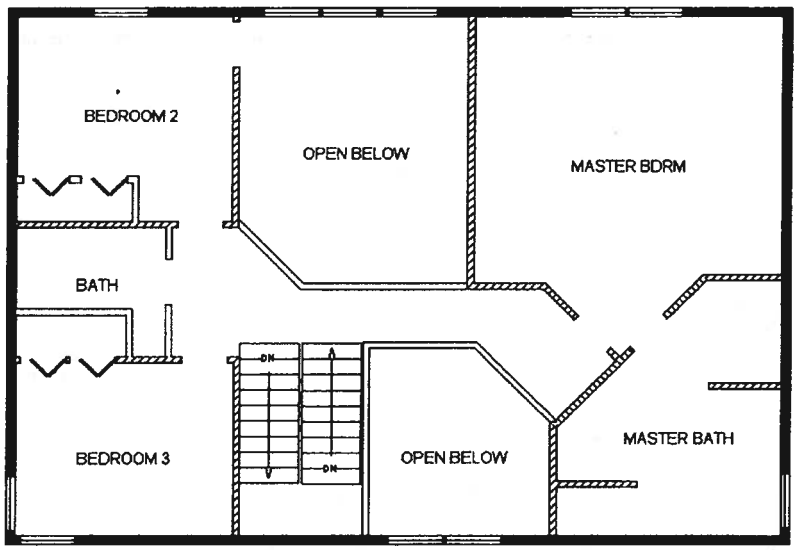
Walls:	Siding on 2x6 wood studs
Windows:	Double pane glass with removable storm windows
Ceilings:	8′ high
Roof:	Vented attic with sloped roof

House 6: Two-Story with Stucco Walls

1st Floor



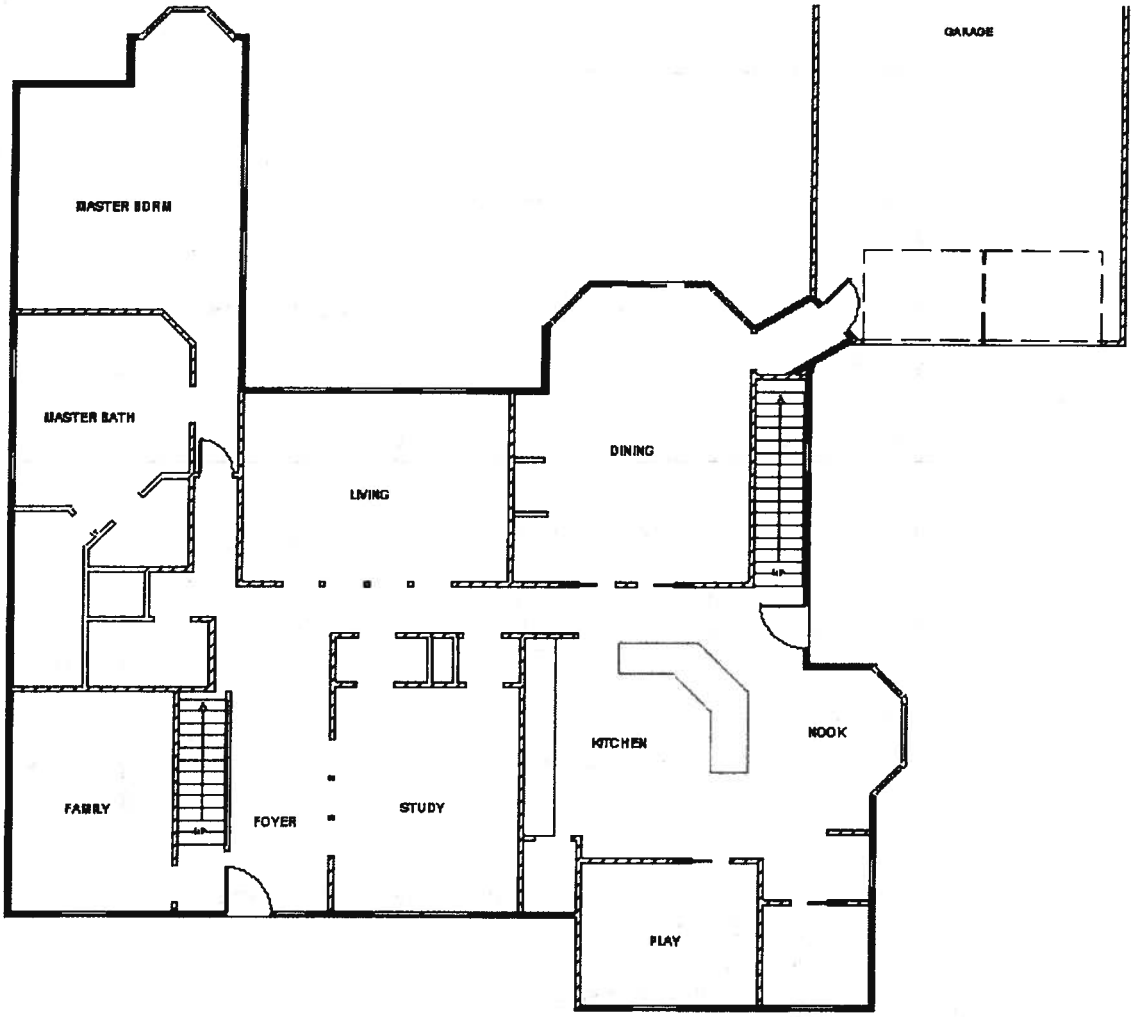
2nd Floor



Walls:
Stucco or EIFS on 2x6 wood studs
Windows: Double pane glass
Ceilings: 8′ high
Roof: Vented attic with sloped roof

House 7: Two-Story with Masonry Walls

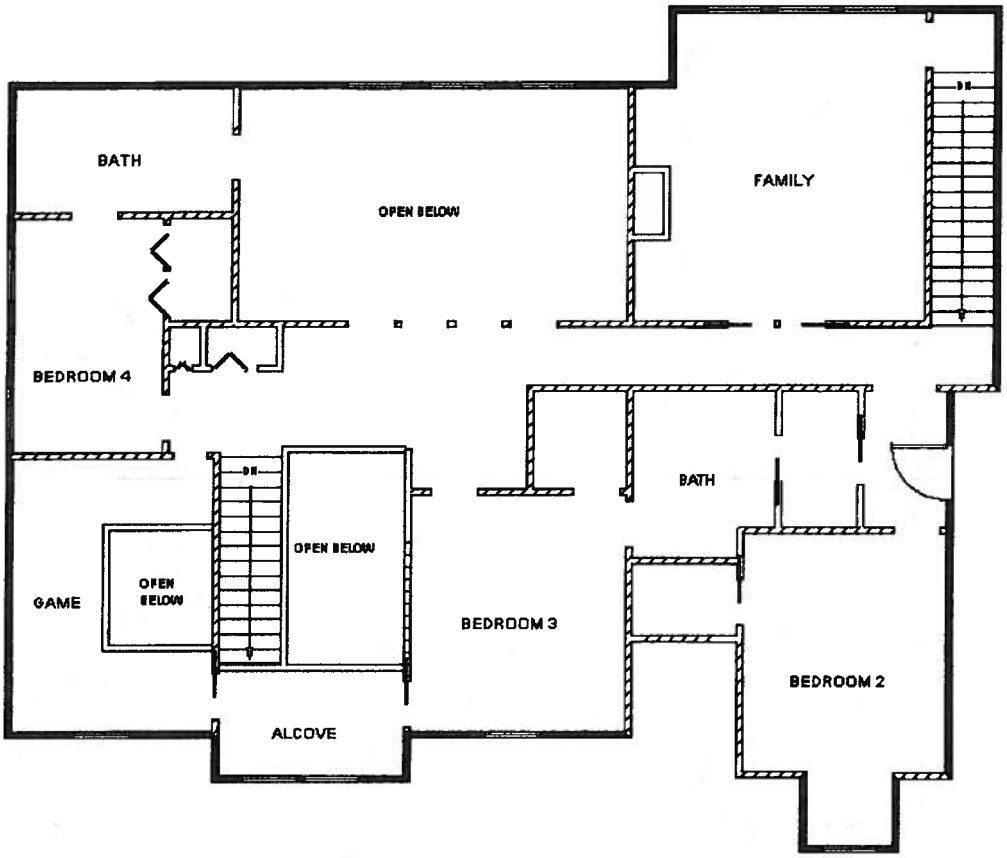
1st Floor



Walls:	Brick, concrete block, or insulating concrete forms
Windows:	Double pane glass
Ceilings:	8′ high
Roof:	Vented attic with sloped roof (Vaulted ceiling in Master Bedroom)

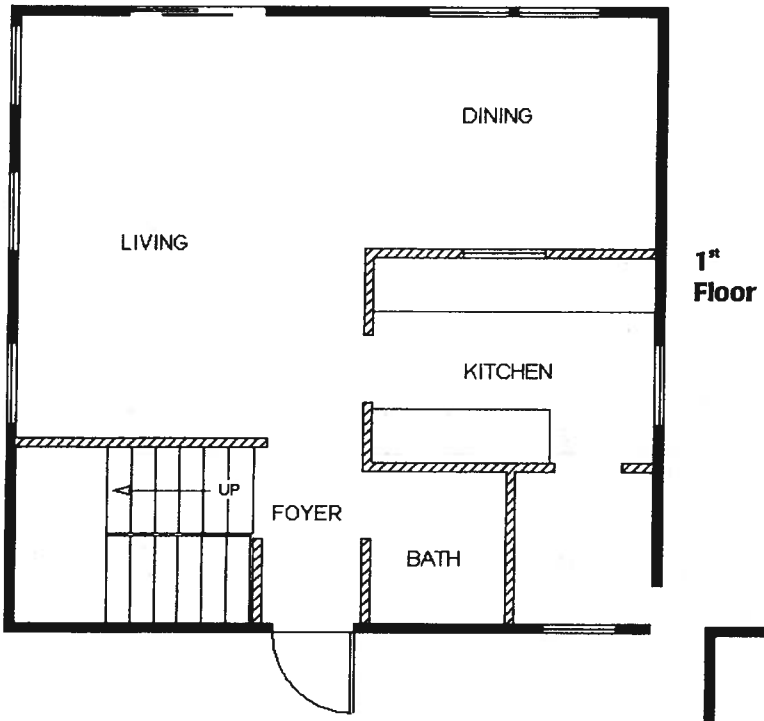
House 7: Two-Story with Masonry Walls - *concluded*

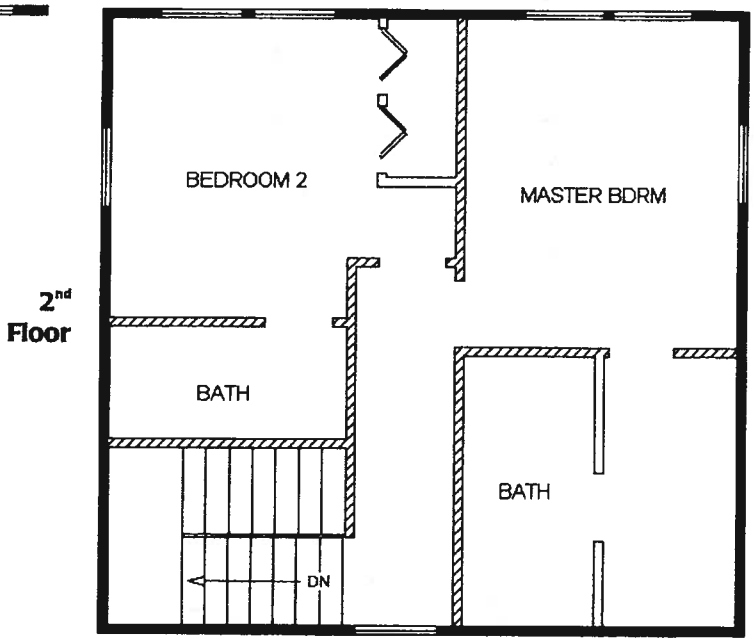
2nd Floor



Walls:	Brick, concrete blocks, or insulating concrete forms
Windows:	Double pane glass
Ceilings:	8′ high
Roof:	Vented attic with sloped roof

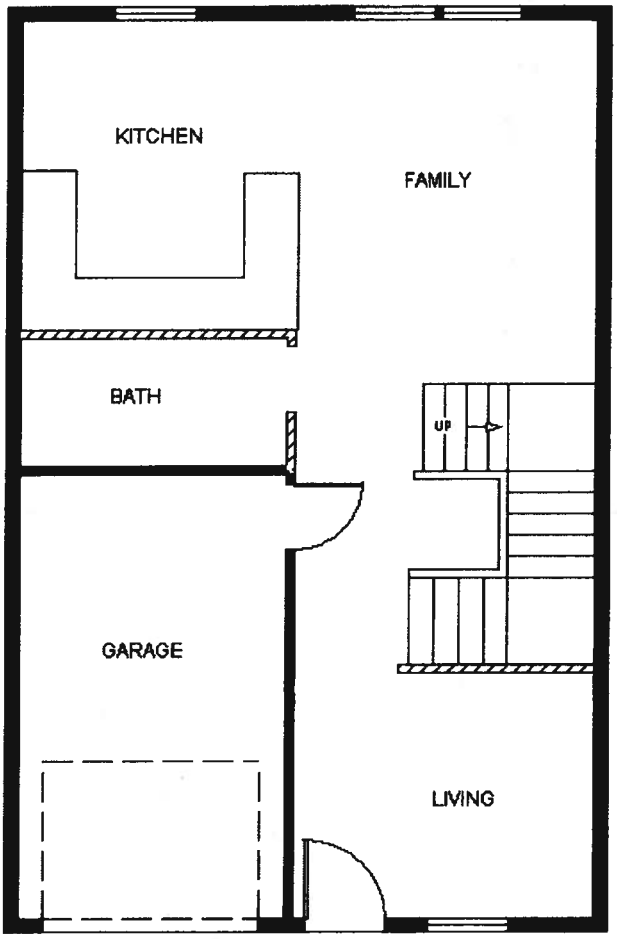
House 8: Beach House with Sided Walls on Pylons



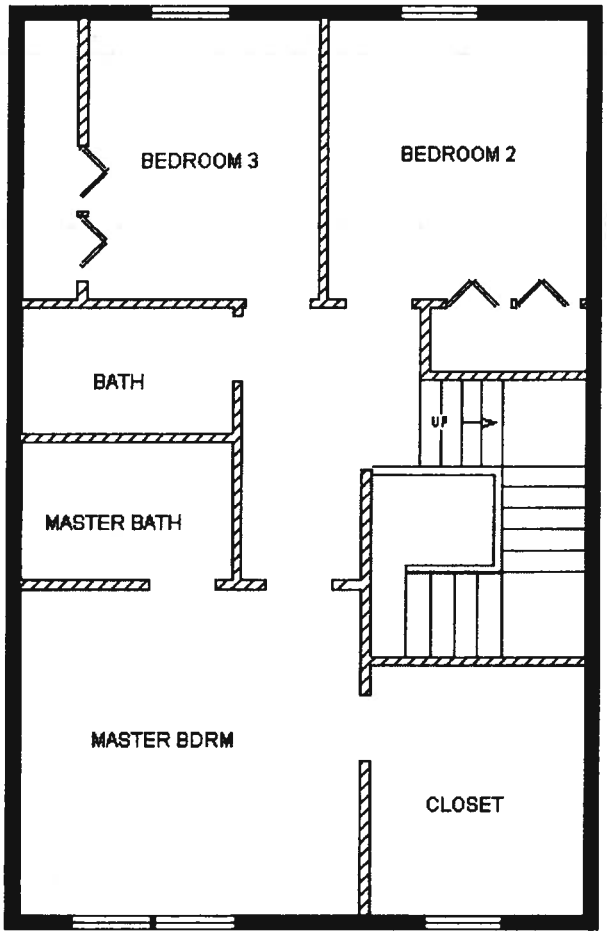


Walls:	Siding on 2x4 wood studs
Windows:	Single pane glass
Ceilings:	9′ high
Roof:	Vented attic with sloped roof

House 9: Two-Story Duplex with Sided Walls



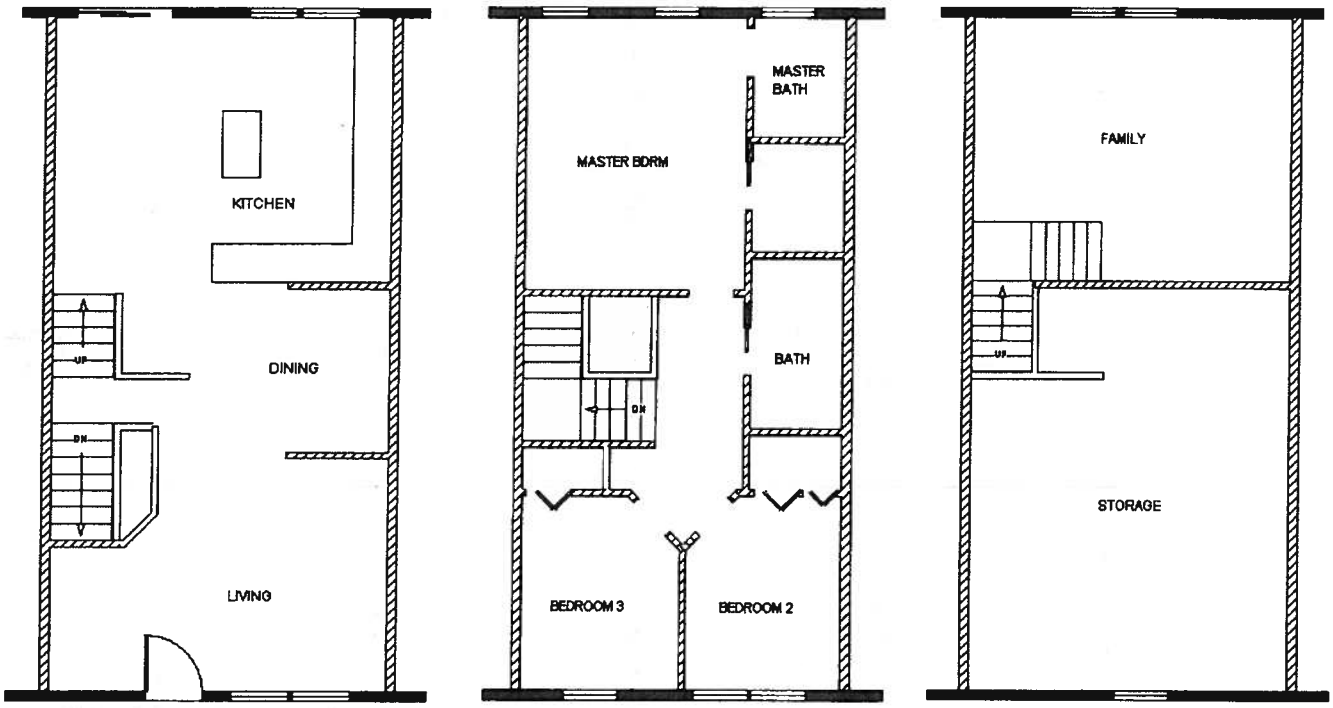
1st Floor



2nd Floor

Walls:	Siding on 2x4 wood studs
Windows:	Double pane glass
Ceilings:	9′ high
Roof:	Vented attic with sloped roof

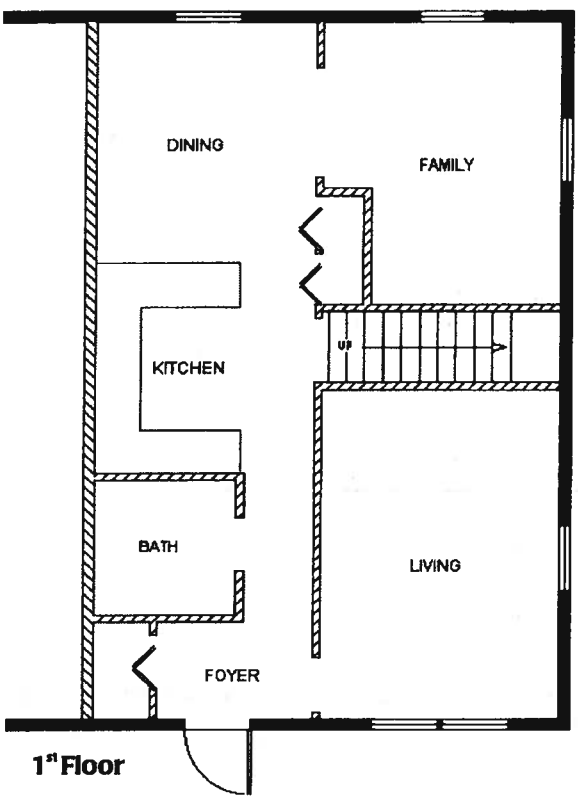
House 10: 18'- Wide Middle-of-Row Townhouse with Brick Walls



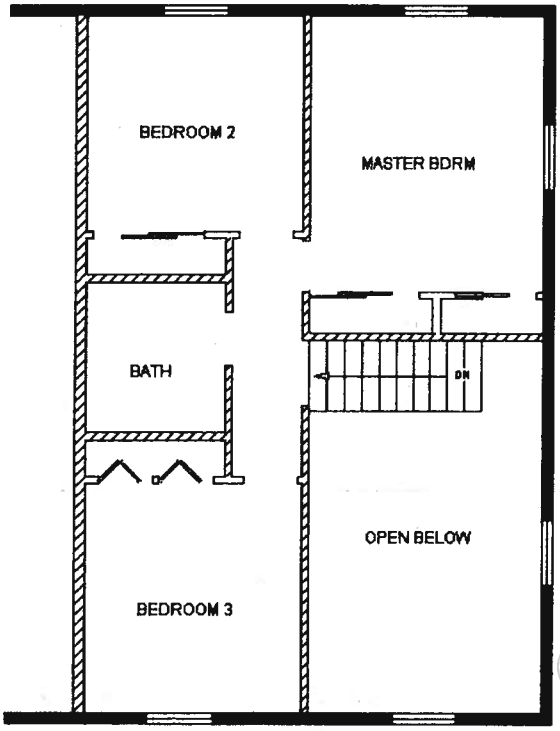
1st Floor 2nd Floor 3rd Floor

Walls:	Brick, painted concrete masonry units, or insulating concrete forms
Windows:	Double pane glass
Ceilings:	9' high
Roof:	Vented attic with sloped roof

House 11: 24'-Wide End-of-Row Townhouse with Brick Walls



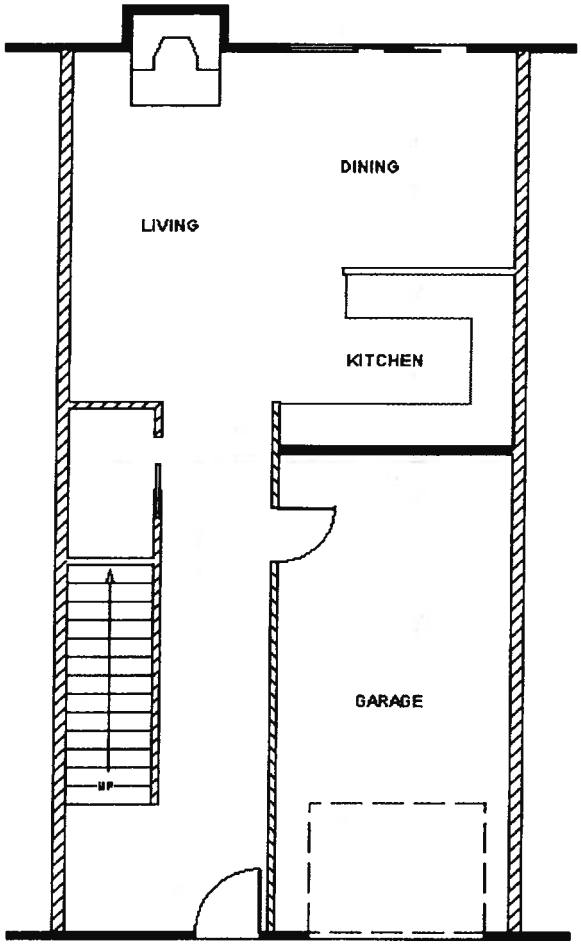
1st Floor



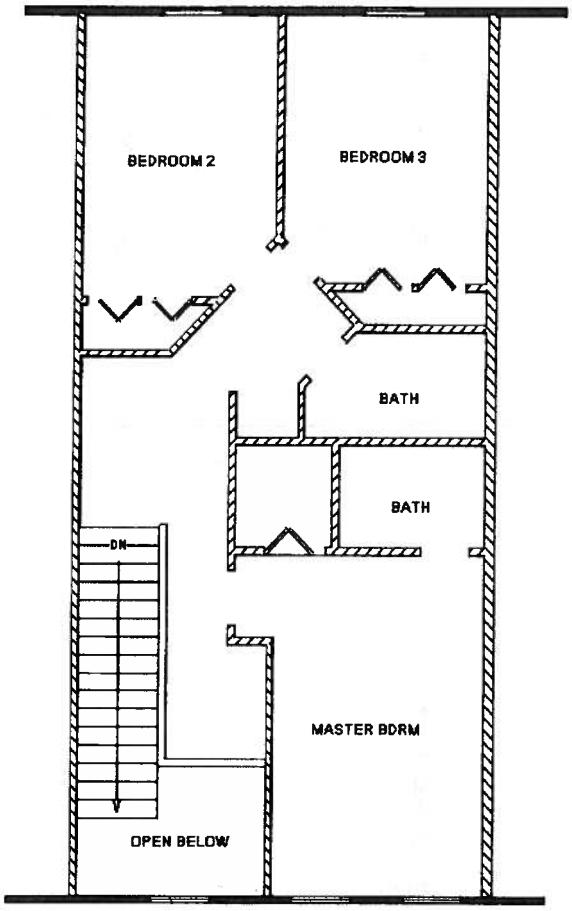
2nd Floor

Walls:	Brick front walls; sided 2x4 stud end and rear walls
Windows:	Double pane glass
Ceilings:	9' high
Roof:	Vented attic with sloped roof

House 12: 20′-Wide Middle-of-Row Townhouse with Sided Walls



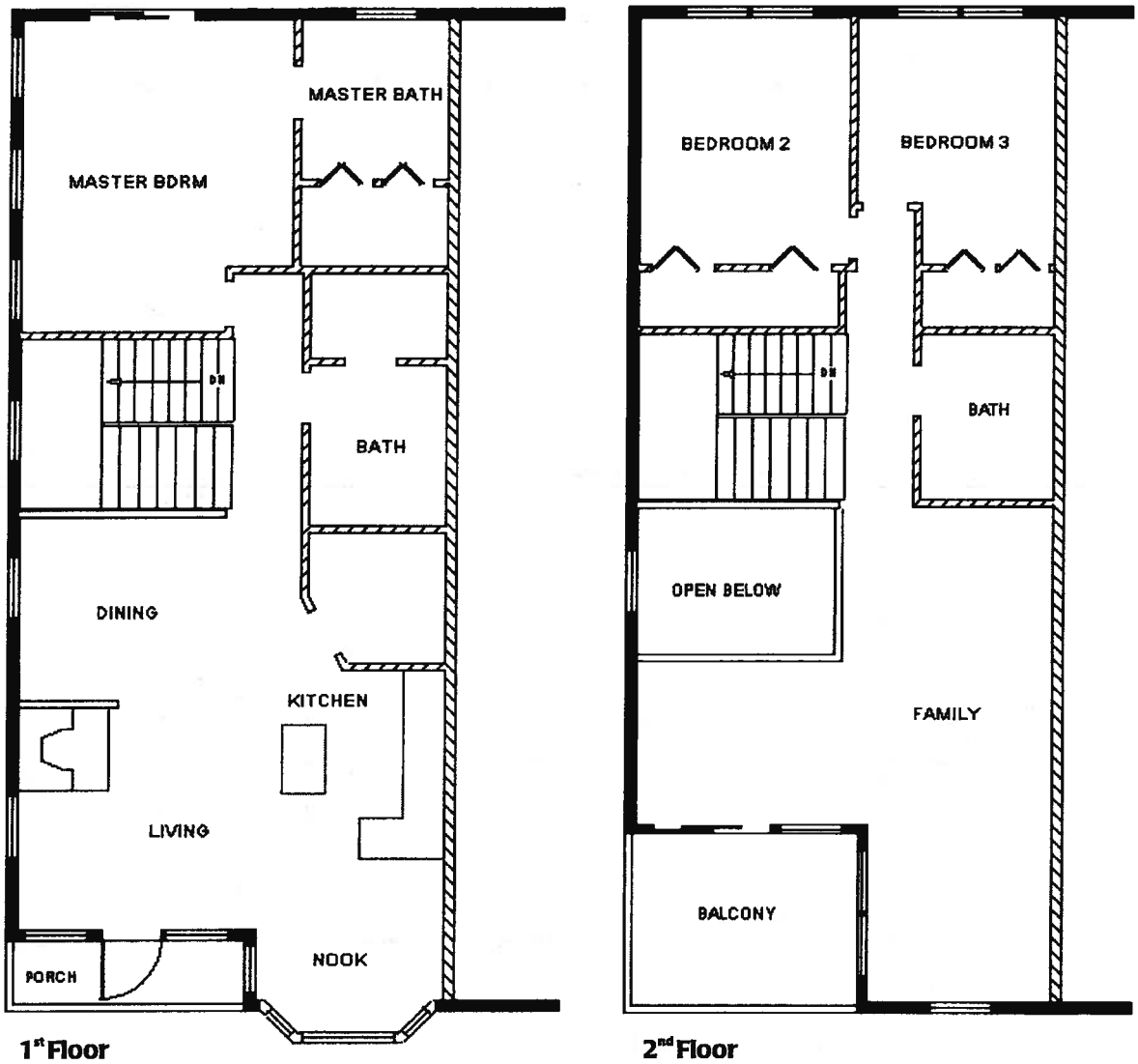
1st Floor



2nd Floor

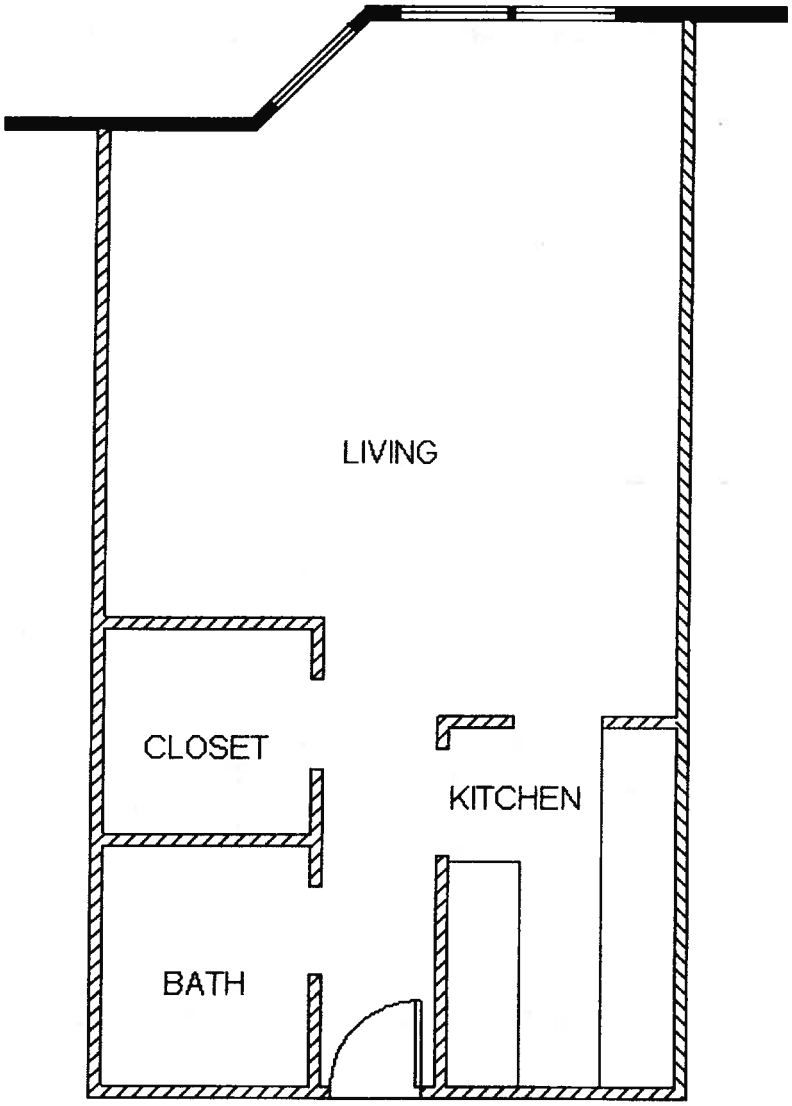
Walls:	Siding on 2x4 wood studs
Windows:	Double pane glass
Ceilings:	9′ high
Roof:	Vented attic with sloped roof

House 13: 24'-Wide End-of-Row Townhouse with Sided Walls



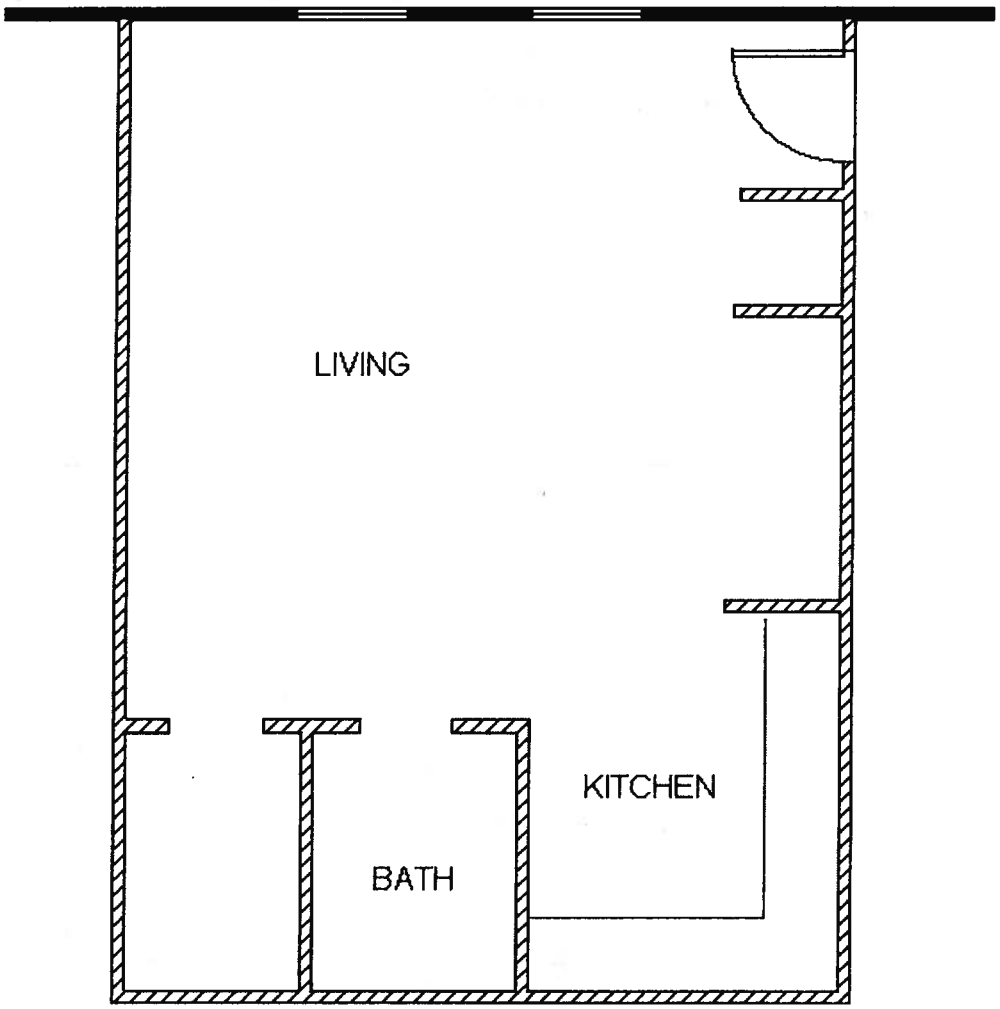
Walls:	Siding on 2x4 wood studs
Windows:	Double pane glass with removable storm windows
Ceilings:	8' high
Roof:	Vented attic with sloped roof

House 14: Efficiency Apartment with Brick Walls and Through-Wall A/C



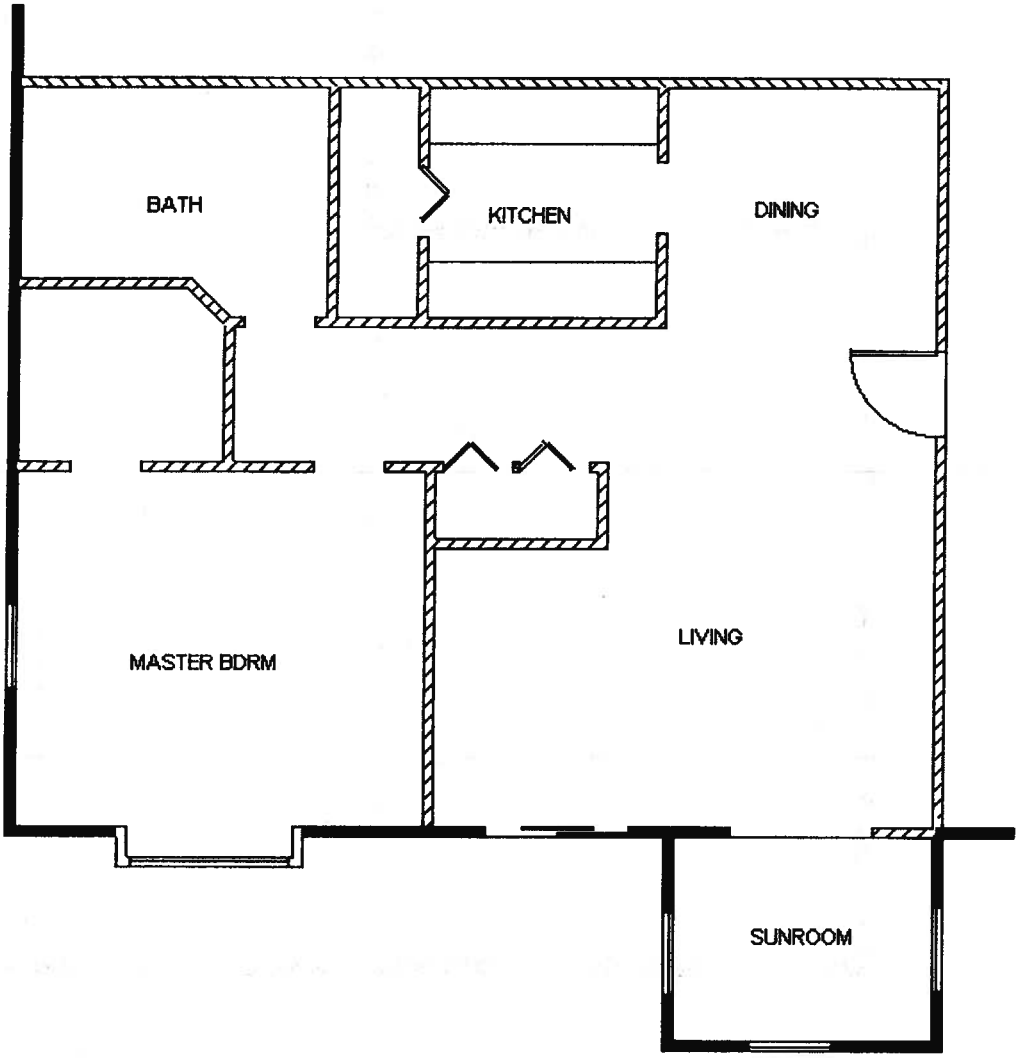
Walls:	Brick
Windows:	Double pane glass; A/C under one window
Ceilings:	8′ high
Roof:	Additional apartment above

House 15: Top Floor Efficiency Apartment with Brick Walls



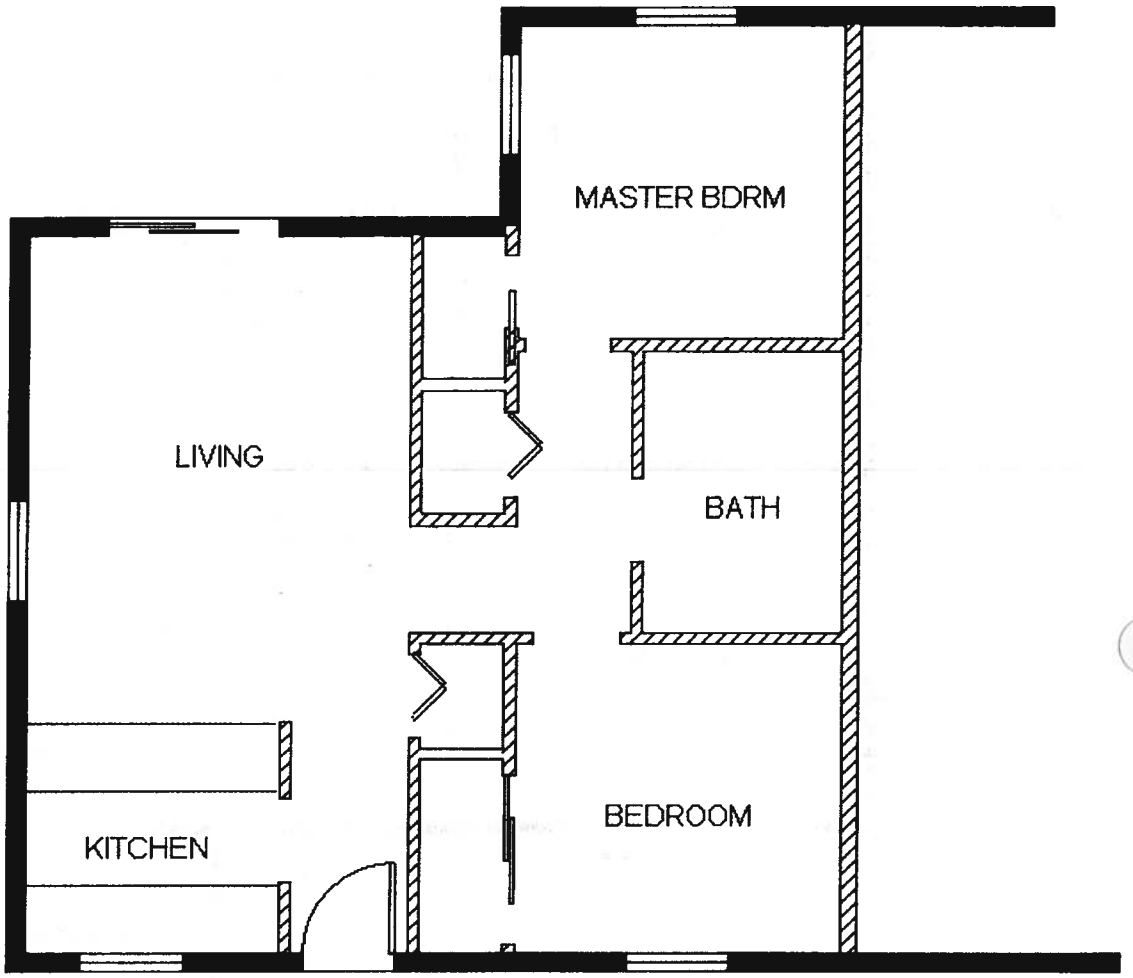
Walls:	Brick
Windows:	Double pane glass
Ceilings:	9′ high
Roof:	Flat built-up roof

House 16: Corner Top-Floor Apartment with Sided Walls



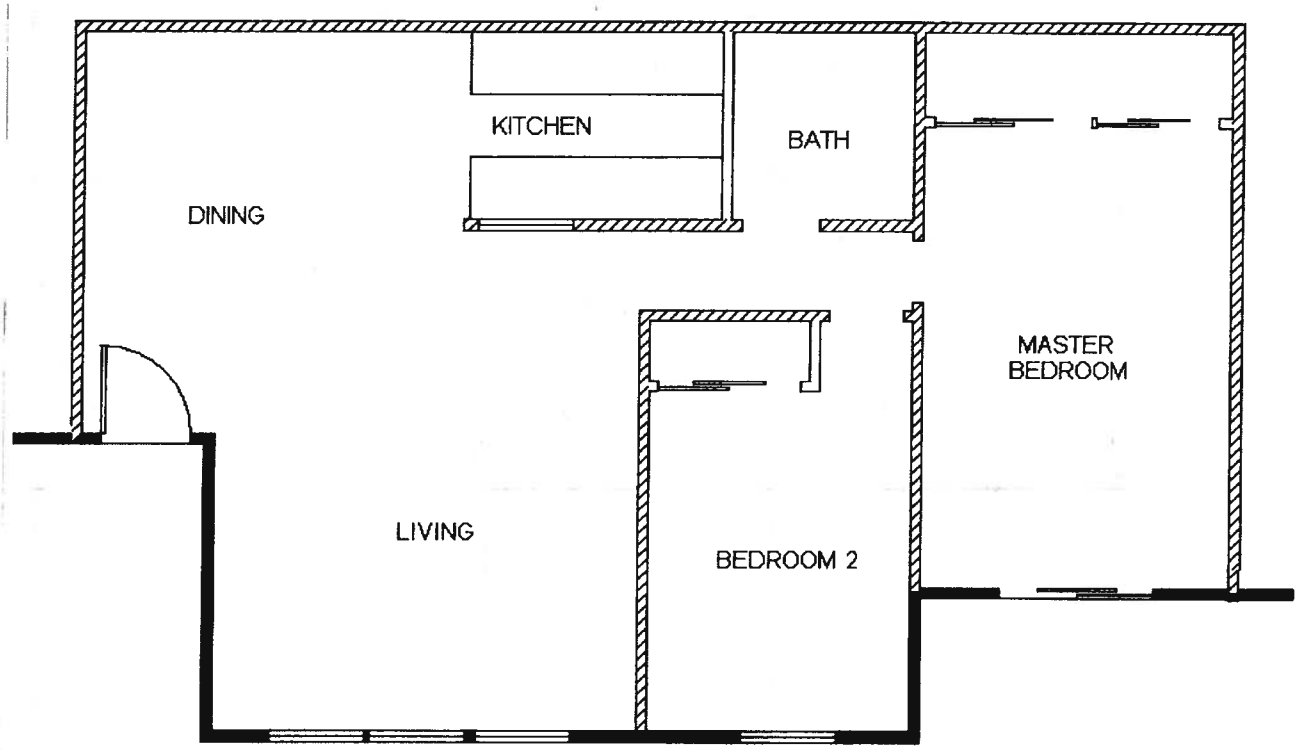
Walls:	Siding on 2x4 wood studs
Windows:	Double pane glass
Ceilings:	8′ high
Roof:	Flat built-up roof

House 17: End Apartment with Sided Walls



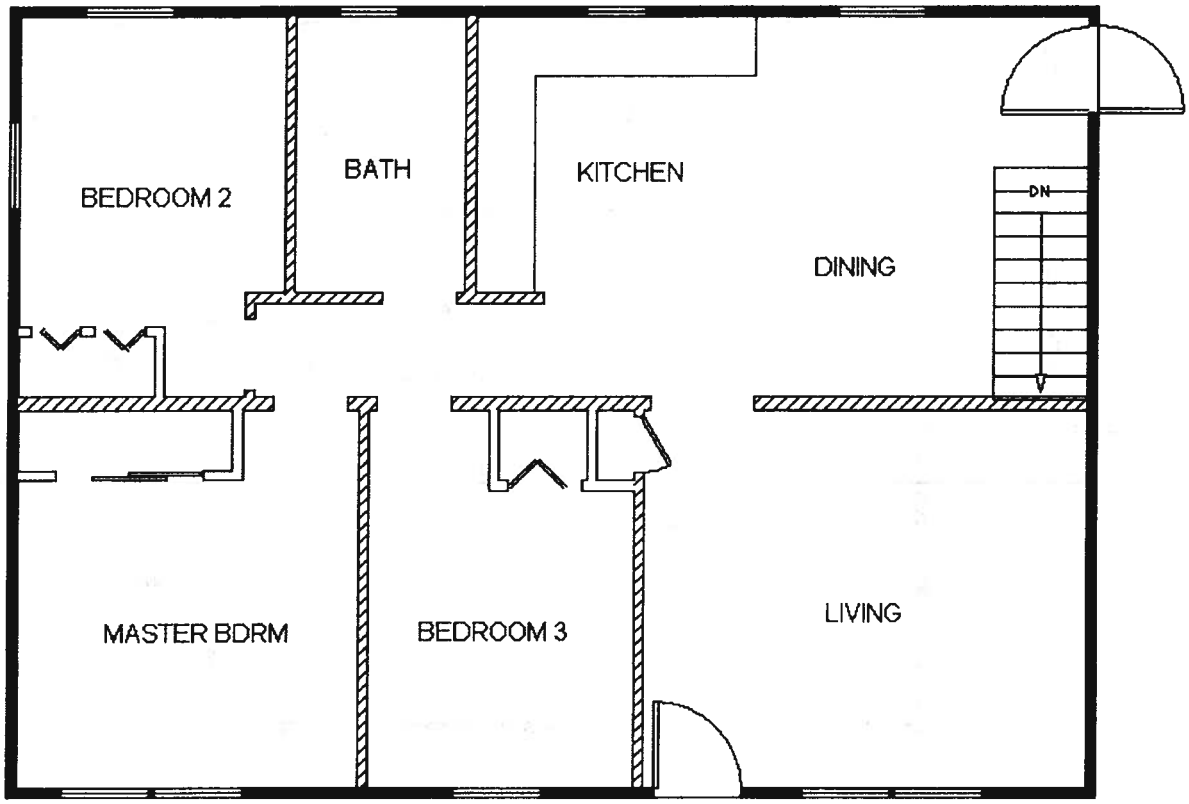
Walls:	Siding on 2x4 wood studs
Windows:	Double pane glass
Ceilings:	8′ high
Roof:	Additional apartment above

House 18: Top Floor Apartment with Sided Walls



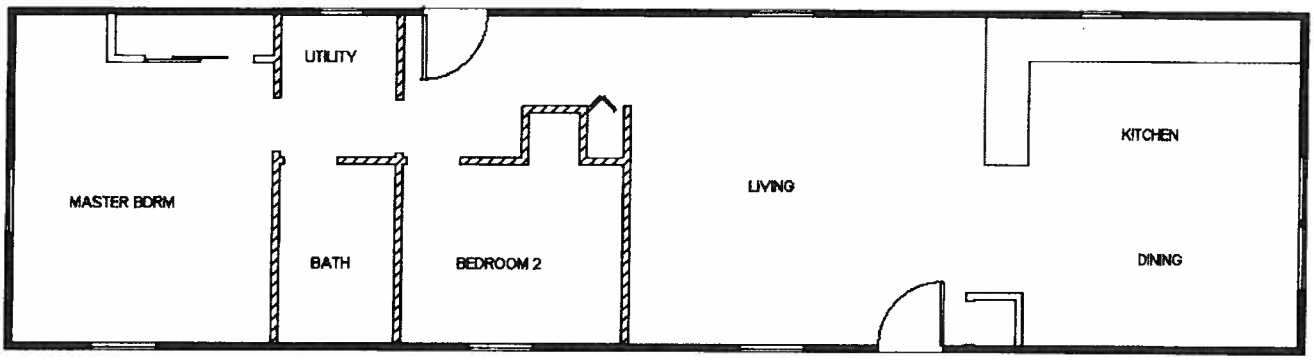
Walls:	Siding on 2x4 wood studs
Windows:	Double pane glass
Ceilings:	9′ high
Roof:	Vented attic with sloped roof

House 19: One-Story Modular Home with Sided Walls



Walls:	Siding on 2x4 wood studs
Windows:	Double pane glass
Ceilings:	8′ high
Roof:	Vented attic with sloped roof (Vaulted ceiling in bedrooms)

House 20: Small Manufactured Home with Sided Walls



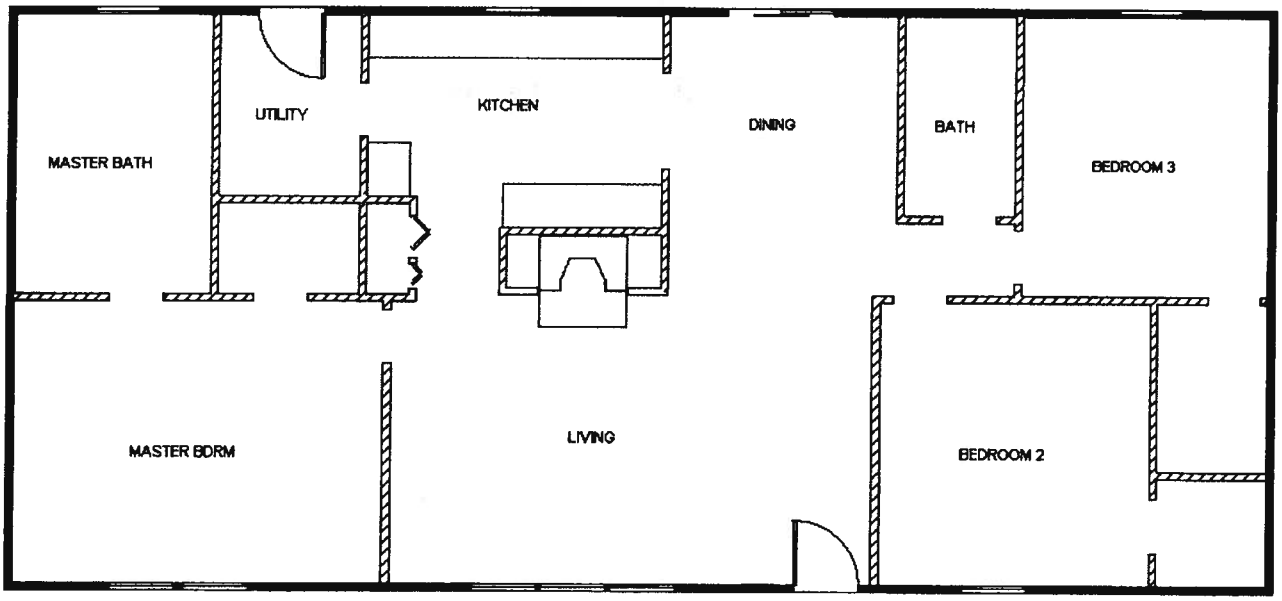
Walls: Siding on 2x6 wood studs

Windows: Single pane glass with removable storm windows

Ceilings: 8′ high

Roof: Vaulted ceiling

House 21: Large Manufactured Home with Sided Walls



Walls: Siding on 2x4 wood studs

Windows: Single pane glass with removable storm windows

Ceilings: 8′ high

Roof: Vaulted ceiling

Appendix B

Basic Concepts

Appendix B:
Basic Concepts

Descriptors Used in Noise Control

A number of different metrics (measures) have been developed to express various aspects of acoustics. It is important to understand several of them in order to make the best use of this document.

Aircraft noise is generally expressed in terms of its A-weighted sound level, in units called "decibels." Strictly speaking, the decibel unit should be abbreviated only by "dB"; however, for clarity "dBA" or "dB(A)" are often used to highlight the fact that the sound level measurement has been A-weighted (this weighting system is described below).

In most cases, the noise exposure in areas around airbases and airports is expressed in terms of the Day-Night Average Sound Level, which is abbreviated by "DNL" in text and "Ldn" in equations. DNL is a measure of the average A-weighted sound level of all aircraft flights occurring in a 24-hour period with nighttime flight operations being counted more heavily as described below. The unit of DNL is also the decibel. In California, noise exposure around airbases and airports is expressed in terms of the Community Noise Equivalent Level (CNEL). CNEL is identical to DNL except that, in addition to the penalty added to nighttime flight operations, there is a penalty added to evening operations – those occurring between 7 PM and 10 PM.

The sound insulation properties of building construction materials are described by Sound Transmission Loss (TL) or Sound Transmission Class (STC). These measures of sound insulation are also described below.

A-Weighted Sound Level

The two most obvious characteristics of sound are the level and frequency. Sound Level is essentially a measure of loudness and refers to how much energy or power a sound has when we hear it. Frequency is essentially a measure of pitch. A deep-voiced baritone singer has a lower frequency (or pitch) than a soprano voice, though they may be equally loud. Hertz (abbreviated Hz) is the unit used to indicate frequency and is equal to the number of sound waves (cycles) per second. For reference, middle C on a piano has a frequency of exactly 256 Hz. The normal human ear can detect sound frequencies ranging from about 20 Hz to about 15,000 Hz. People do not hear all sounds over this wide range of frequencies equally well, however. The human ear is most sensitive to sounds in the 1,000 to 6,000 Hz range.

In order to reflect the differences in hearing sensitivity to different frequencies, sounds are usually described in terms of A-weighted sound levels. When a sound is A-weighted, sound levels measured in the 1,000 to 6,000 Hz frequency range are *increased* by a specified amount to account for the fact that the ear perceives them as louder compared to other frequencies. Similarly, sound levels measured at frequencies outside this range are *decreased* because the ear is less sensitive in those regions.

Day-Night Average Sound Level (DNL) and Noise Contours

Aircraft noise exposure in a community is usually described in terms of noise contour maps. These indicate bands or zones around air installations where the average noise level can be expected to fall within the ranges specified by the contour lines. The Department of Defense (DoD) suggests that in areas with a noise exposure of DNL 65 dB and higher residential use is discouraged. Most noise contour maps show contour levels of DNL/CNEL 65 dB and above in 5 dB increments.

The acoustic metric used for noise contours is typically either the Day-Night Average Sound Level (DNL or Ldn) or Community Noise Equivalent Level (CNEL). Both DNL and CNEL are cumulative measures of the noise exposure during a 24-hour calendar day. A 10 dB penalty is added to noise events occurring between 10:00 p.m. and 7:00 a.m. to reflect their greater intrusiveness and potential for disturbing sleep. In addition, for CNEL (but not DNL) there is a 5 dB penalty added to evening events occurring between 7 pm and 10 pm. Both DNL and CNEL result from averaging the A-weighted sound pressure level over 24 hours for aircraft activities taking place on an average day. For air installation noise contours, the average day is determined by analyzing flight activity over the period of one full year. This gives an indication of the year-round average noise exposure for the community. Some installations use noise contours that have been generated for an average "busy" day rather than an annual average day. This reflects the noise exposure when base activity is high, rather than averaging all days together throughout the year.

Since the DNL is a function of both the aircraft noise level and the number of aircraft operations, there is no simple relationship between the DNL and the maximum noise level. For a given DNL, the maximum noise level is higher when there are fewer aircraft operations. Consider two houses exposed to a DNL of 70 dB: one near a busy, large airfield, and one near a smaller, less busy airfield. The maximum noise level will generally be higher at the smaller airfield since the DNL is determined based on only a few aircraft overflights.

Sound insulation metrics

Sound Transmission Loss (TL)[1]

This is the physical measure that describes the sound insulation value of a building element such as a window or wall. Values of TL are determined in acoustical laboratories under controlled testing methods prescribed by the American Society for Testing and Materials (ASTM). The TL is expressed in decibels (dB), and the greater the sound insulation, the higher the TL value and the less sound will be transmitted through the building material. TL values are determined for different frequency ranges (octave bands) and give an indication of how a building product or assembly responds differently to sounds at different frequencies.

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[1] Tests to determine TL are described in American Society for Testing and Materials (ASTM) Standard E90.

Sound Transmission Class (STC)[2]

Since working with a series of TL measurements for different frequencies can be cumbersome, a single-number descriptor based on the TL values has been developed. This rating method is called the Sound Transmission Class (STC). As with the TL, the greater the STC rating for a construction method or component, the higher the sound insulation. Originally, STC ratings were developed as a single-number descriptor for the TL of interior office or apartment walls for typical office noise and speech spectra. Now, they are used for exterior building components as well. Most acoustical materials and components are commonly specified in terms of their STC ratings.

Outdoor to Indoor Transmission Class (OITC)

OITC is a single-number rating of the ability of a facade or facade element to sound insulate against transportation noise.[3] It is similar to the more commonly-used Sound Transmission Class (STC) rating; the general difference is that OITC was developed to assess the annoyance of transportation noise while STC was developed to assess the interference with speech. Specifically, OITC differs from STC in two main respects: (1) it includes lower frequencies common in transportation noise but absent in speech, and (2) it is calculated by summing sound contributions at all frequencies, while STC is calculated (in part) based on noise at individual frequencies. Therefore, if a home is exposed to strong low-frequency noise, as would be the case when aircraft primarily depart away from a house located near the end of a runway, the OITC rating would be a more appropriate measure than STC of the sound insulating ability of a product or assembly.

Effective Wall Rating (EWR)

EWR is a single-number rating calculated in a similar manner to STC. The primary difference between EWR and STC is that EWR is determined more by the low-frequency performance of the system and was developed specifically to rate the ability of a system to block the transmission of transportation noise indoors. Since EWR is not in common use today it was not used to express recommendations in this report.

Noise insulation from aircraft operations

Interference With Activities

The problem of aircraft noise has been recognized and studied in this country since the 1950s. Opinion surveys indicate that interference with telephone usage, listening to television and radio, and conversations evoke the most complaints. However, after a home has been sound insulated, residents

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[2] STC is described in ASTM Standard E413.

[3] The OITC rating is determined based on sound transmission loss data using ASTM E 1332 "Standard Classification for Determination of Outdoor-Indoor Transmission Class."

notice improvements in their ability to carry out these normal activities as well as to fall asleep and to concentrate.

Fears of permanent hearing damage from flyovers have been shown to be unfounded. A large number of studies on the physical health effects of aircraft noise exposure have led to the general conclusion that residences near airports are not exposed to high enough sound levels to warrant concern. The principal effect of aircraft noise on airfield neighbors is annoyance caused by interference with daily activities.

Aircraft Noise Characteristics

Noise intrusion from aircraft activities is perceived as more disturbing than other kinds of noise because of two primary characteristics. First, unlike many other community noise sources such as highway noise which tend to be fairly constant, aircraft noise consists of sporadic individual noise events with a distinct rise and fall pattern. People do not, in general, respond to these events as just another component of the "background noise" of their day-to-day lives. Some people get used to the noise, but many others feel that each individual flyover event is recognizable and disturbing.

The second quality of aircraft noise that makes it more intrusive than other types of community noise is its higher level at homes very near the air installation. Of course, the noise level experienced at a particular dwelling will depend on its location relative to the aircraft flight paths and the mode of ongoing aircraft operations (arrivals or departures).

Aircraft Sound Spectrum

The noise produced by modern aircraft contains acoustical energy over a wide frequency range. The audible noise includes many sounds from a low-frequency "rumble" to a high-frequency "whine."

The exact character depends on the aircraft type and the operation performed (takeoff, landing, or ground run-up). Low-frequency noise (below 250 Hz) penetrates walls, roofs, doors, and windows much more efficiently than does high-frequency noise. Higher frequencies (above 1,000 Hz), however, are carried through cracks and vents better. Also, people hear higher frequency sound better, the human ear being more sensitive above 1,000 Hz than below.

Since aircraft noise differs somewhat from other types of community noise, it is important to identify the characteristics of the noise against which sound insulation protects residents. Most materials and construction methods are more effective at insulating in one part of the frequency spectrum than other parts, and materials vary from one another in this regard. Knowing the noise characteristics helps in choosing the best materials for sound insulation. These *Guidelines* have been designed specifically to protect against military jet aircraft noise rather than highway noise or some other problem.

Most of the sound energy from military jet aircraft operations is found at lower and middle frequencies. While much of this energy is below the most sensitive region of people's hearing range, it can be heard well enough to be annoying and it can cause disturbing structural vibration in a dwelling. The next section discusses the process by which sound is transmitted into a dwelling interior.

Sound insulation concepts

Sound Transmission

In order to effectively examine noise control measures for dwellings it is helpful to understand how sound travels from the exterior to the interior of the house, penetrating the building perimeter. This happens in one of two basic ways: through the solid structural elements and directly through the air. Figure B-1 illustrates the sound transmission through a wall constructed with brick exterior, wood studs, an interior finish, and absorbent material in the stud cavities.

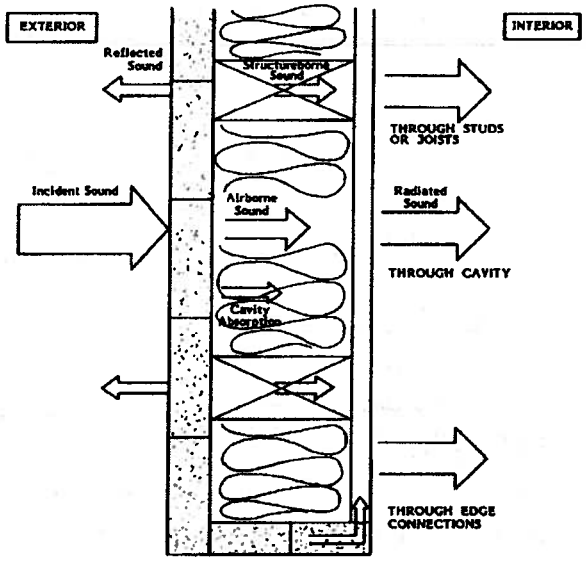


Figure B-1. Pictorial Representation of Sound Transmission Through Built Construction

The sound transmission starts with noise at the wall exterior. Some of this sound energy will be reflected away and some will make the wall vibrate. The vibrating wall radiates sound into the airspace, which in turn sets the interior finish surface vibrating, with some energy lost in the airspace. This finish surface then radiates sound into the dwelling interior. As the figure shows, some vibrational energy also bypasses the air cavity by traveling through the studs and edge connections.

Openings in the dwelling (which provide air infiltration paths through windows, vents, and leaks) allow sound to travel directly into the interior. This is a very common, and often overlooked, source of noise intrusion. Basically, any way that air enters a home, sound will also enter.

Flanking is a similar concept and usually refers to sound passing around a wall. Examples of common flanking paths include: air ducts, open ceiling or attic plenums, joist and crawlspaces.

Figure B-2 displays the three different major paths for noise transmission into a dwelling: air infiltration through gaps and cracks, secondary elements such as windows and doors, and primary building elements such as walls and the roof.

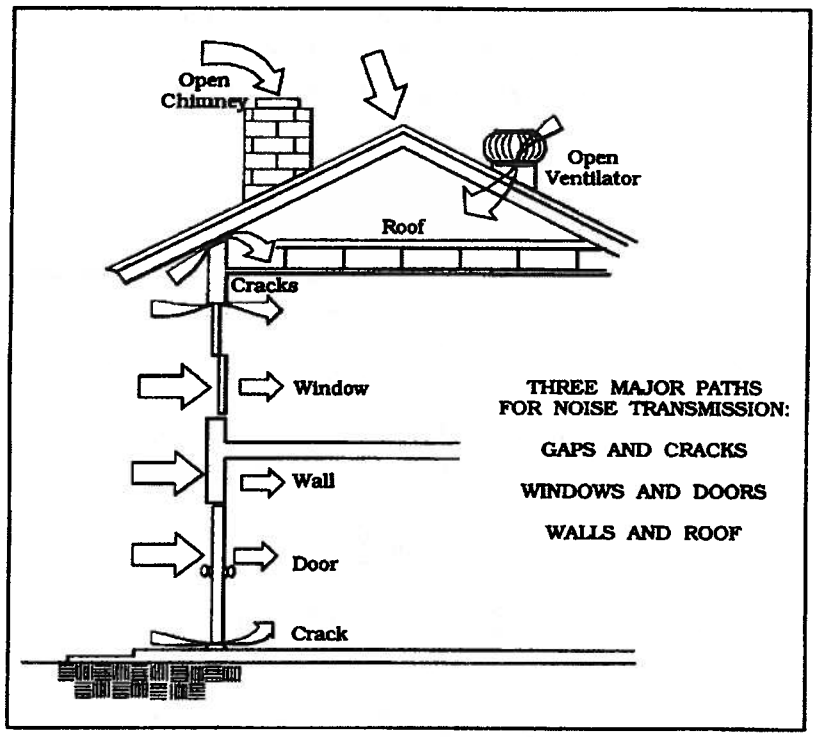


Figure B-2. Sound Transmission Paths Into Dwelling Interiors

Low-frequency sound is most efficiently transmitted through lightweight structural elements such as walls, roofs, doors, and windows. High frequencies travel best through the air gaps.

Within these broad categories, different building materials have different responses based on the frequency of the incident sound and varying abilities to insulate against sound.

Reducing Transmitted Sound

The amount of sound energy transmitted through a wall, roof, or floor can be limited in several ways. First, all air infiltration gaps, openings, and possible flanking paths must be eliminated wherever possible. This is the single most important, but occasionally overlooked, step in noise level reduction. This includes keeping windows and doors closed and putting baffles on open-air vents. Some materials reflect more of the incident sound, converting less of it into vibrational energy. The overall mass of the

exterior and interior panels influences how much sound will pass through them. The more mass a structural element has the more energy it takes to set it into vibration, so using heavier building elements generally blocks more noise. Then, absorption in the air cavity, resilient mounting of interior finish panels, and mounting the exterior and interior panels on different studs can further reduce the sound transmitted to the room. In summary, the primary approaches for improving sound isolation are:

1. Elimination of openings and flanking paths.
2. Using higher STC windows and doors.
3. Adding mass to walls or ceilings.
4. Isolation of panel elements through increasing their separation, mounting the interior and exterior panels on different studs, or resiliently mounting the interior panels.
5. Adding absorptive materials between the studs or joists.

Acoustical Design

The most important, or controlling, sound paths must be identified in order to know how to modify a dwelling design to meet a specified noise criterion. The ideal sound insulation design would focus on those elements that transmit the most acoustical energy into a room. This eliminates any weak links in the building's sound insulated perimeter. The concept of designing sound insulation treatments so that all parts of the exterior perform equally well – avoiding "weak links" – is called *balanced design.*

Windows generally allow more noise intrusion than walls; as more of the wall area is taken up with windows, the overall noise protection decreases. This effect is significant even for massive wall materials, such as brick. The mass law mentioned above suggests that a brick wall would protect better against sound than siding and this is true when these materials alone are compared. However, putting a weak window or an especially large window into a brick wall will cause the overall construction to perform very poorly since noise enters through the weakest path. On the other hand, installing a high-STC window in a wood-framed wall will give much better noise level reduction than building a weak window into a brick wall.

The STC rating, defined in Appendix G, is a measure of a material's ability to insulate against sound; the higher the STC rating, the better the insulator.

In most cases, when all openings remain sealed, the windows are the controlling sound paths. Using acoustical windows typically does more to improve the sound insulation performance than any other design modification. Exterior doors typically also require high STC ratings. Depending on the noise level reduction goal, other elements may become important. Ceilings and exterior walls may require special construction, particularly in the higher DNL/CNEL noise zones. Treatments for these paths and others are discussed in Appendix C – Sound Insulation Methods.

Problem Areas

Sound intrusion problems are commonly caused by:

1. Building construction components and configurations not providing sufficient sound insulation.
2. Building elements, such as windows, doors, walls, roofs, and floors chosen and combined in an unbalanced way so that some parts are much weaker sound insulators than others.
3. Unintended openings or sound-flanking paths caused by improper installation of construction elements.

Thermal Insulation

While homes that are well insulated thermally often perform well acoustically, thermal insulation is not always a good indicator of sound insulation. Many thermal windows provide significantly less sound insulation than acoustical windows or walls, and are frequently the weak link in the building perimeter. However, thermal treatments usually eliminate air infiltration and may serve to improve the acoustical performance of a dwelling for that reason. The presence of thermal insulation in walls or ceilings is far more important than the type of the insulation.

Shielding

The last concept to consider is shielding. This refers to the fact that the side of the dwelling that faces away from the flight path and does not have an open line-of-sight to it will be protected somewhat from the noise. The shielding may be as much as 10 dB in some cases, though values on the order of 5 dB are more common. Sides of the house facing directly toward the flight path are unshielded. Sides that face the flight track at an angle may benefit from some minor shielding effects. Sometimes, however, sound is reflected off nearby buildings in such a way as to counteract the shielding benefits. Shielding must be examined on a case-by-case basis and the possibility of aircraft straying from the usual flight path must be taken into account before assuming a consistent shielding effect.

In general, a new dwelling should be oriented on the lot so that bedrooms and TV-viewing rooms face away from the flight track. This will reduce the need to add extra sound insulation components to protect these noise-sensitive living areas.

Appendix C

Sound Insulation Methods

Appendix C:
Sound Insulation Methods

This section provides specific guidelines for modifying standard construction designs and practices to meet the need for aircraft sound insulation. A general discussion of construction materials and methods is given below. Individual sections address techniques for use with weatherstripping, windows, doors, walls and ceilings, attics, floors, HVAC systems, and other miscellaneous elements.

Evaluating Construction Materials and Methods

Informed Use of STC Ratings

STC ratings are the most common measures of acoustical performance given by manufacturers of building materials. For this reason, it is important to understand how to use STC ratings to evaluate construction materials and systems.

Two different construction methods or components may have identical STC ratings and yet may block aircraft noise differently because or their response at different frequencies. One method or component may perform better than another at some important frequencies. Selecting a construction method or component from a group only on the basis of the highest STC rating may not provide the intended sound insulation. This is because the STC rating does not take into account the strong low-frequency nature of aircraft noise. This guide has taken the ability of typical products to block military jet aircraft noise into account. The recommended materials listed in Sections 3 and 4 (and their STC ratings) were evaluated for frequency response prior to formulating the design packages.

Combining Building Elements

As mentioned earlier, the acoustical performance of the building depends on the combined performances of each of the elements. The final result depends on the transmission loss (or STC) and the relative surface areas of the elements. If any of the components has poor insulation properties the overall performance can be seriously weakened. This is why it is important to focus on the weaker elements and to consider the relative areas of the components.

As a rule-of-thumb, if a weaker element will be included in the assembly, its size should be kept to a minimum. For example, if a pane of glass is to be used for a vision panel in a door, it should be kept small and should be constructed of insulated glass. Similarly, very large windows degrade the noise level reduction of an otherwise effective brick wall. If a cathedral ceiling is included, it should be designed so that there is a larger-than-standard air space between the ceiling and the roof deck, and this space must be insulated. Sensible compromises can be made to preserve the noise level reduction of the home without sacrificing aesthetics, provided the principles explained in this Guide are employed.

Sealing and Weatherstripping

Good weatherstripping and caulking around windows and doors is crucial to effective sound insulation. The STC rating of the overall assembly can vary by as much as 2 to 4 points, depending on perimeter infiltration. For these assemblies, any perimeter leakage will degrade the performance of the window or door and can be the controlling factor in the noise isolation. This is generally not an issue with new construction, but homeowners must understand the importance of maintaining weatherstripping in good condition.

For acoustical purposes, compressible neoprene weatherstripping is preferred over felt or other fibrous types. Neoprene is not as porous and compresses better against the doorframe. Also, felt and fibrous weatherstripping materials tend to deteriorate more quickly than neoprene and must be replaced more often.

Windows

Options Overview

The exterior windows are usually one of the weakest elements in the dwelling's sound insulation performance. Improving the acoustical properties of the windows is one of the simplest ways of lowering the overall sound transmission into the house. Design modification options include using thicker glass and wider airspaces between the panes of glass. Specialized acoustical windows provide maximum sound insulation, and should be used in the loudest environments, as specified in Sections 3 and 4.

Acoustical Performance

The thicker, high-quality insulated glass units should be ¾ inch to 1 inch thick and, for the best noise level reduction, should incorporate at least one lite (pane) of laminated glass, preferably ¼ inch thick. Laminated glass provides significantly better transmission loss than standard float glass. Tempered glass is also acoustically superior to standard glass, but is not nearly as effective as laminated glass. Off-the-shelf thermopane units are typically available with ratings ranging from STC 24 to 29, and upgraded acoustical units with thicker glass often provide ratings from STC 30 to 36.

Acoustical windows differ significantly from ordinary residential windows. The design of an acoustical window has a greater frame depth, the glass lites are heavier, and the weatherstripping and seals are more substantial. Most importantly, they have additional lites. The two most common types of acoustical windows are a double pane window with a storm unit attached ("combination window"), or an assembly of two single or double pane windows connected together ("dual window"). All of these measures are necessary to provide the high degree of sound insulation required for the window assembly. Figure C-1 shows a typical combination window installation with the most important features noted. Figure C-2 shows schematically the

features of a dual window. Combination or dual windows with STC ratings of 37 to 46 are available in a variety of styles and finishes, including aluminum and vinyl, and special windows with STC ratings in the 50s are available from a few manufacturers. A list of acoustically-tested window manufacturers is included in Appendix E. They are considerably more expensive than typical residential windows.

For renovation the acoustical performance of a new window required to meet the noise reduction reguirements of section 2 is related to the performance of the existing windows. That is, if the existing windows are better than average it would be more difficult to reduce noise levels noticeably (by 5 dB). Conversely, if the existing windows are worse than average it would be easier to achieve a 5 dB reduction in noise level. The condition of the existing windows was not considered when developing the recommendations in section 3 due to the wide variations in existing conditions and the difficulty in evaluating the acoustical performance of existing windows. Therefore, if you believe your existing windows would have a better-than-average acoustical performance, it would be necessary to use an STC rating higher than is indicated in Table 3-2.

Also, not all new windows of the same construction provide the same acoustical performance. Fixed windows tend to out-perform sliding and hung windows, while casement and awning windows tend to perform more poorly. Also, for some window designs smaller windows perform better due to the relatively smaller proportion of glass, while for other window designs larger windows perform better due to the relatively smaller proportion of frame.

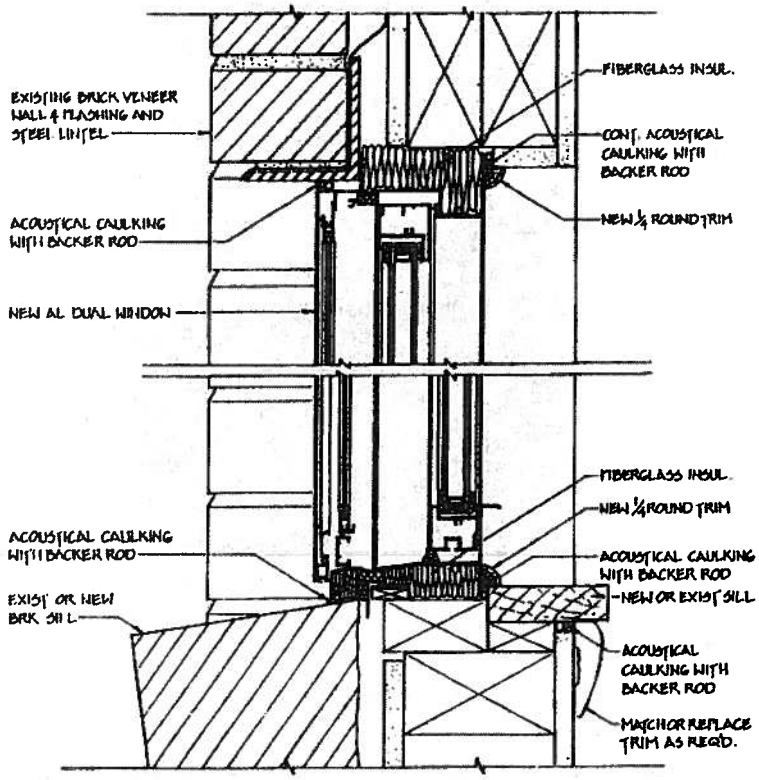


Figure C-1. Typical Combination Window Detail

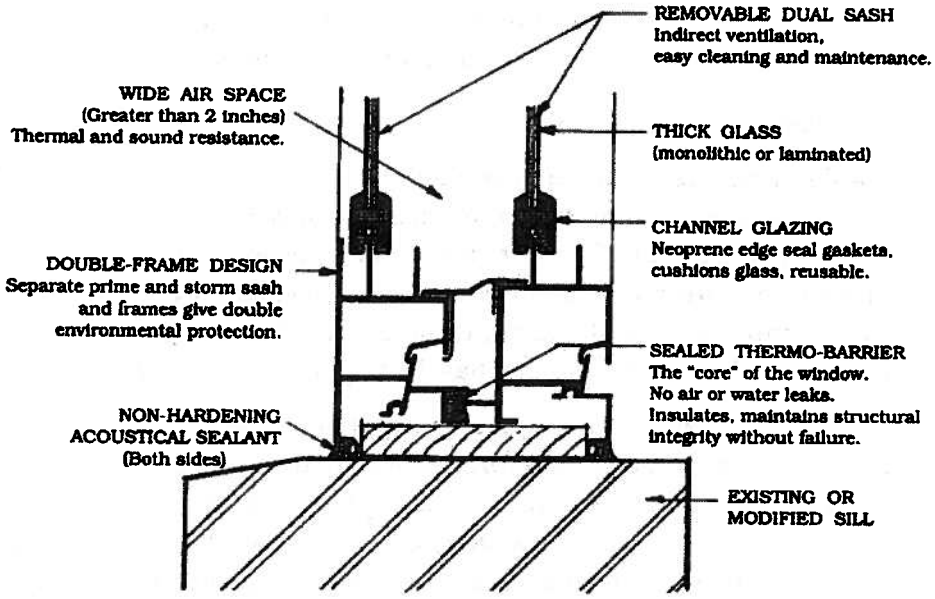


Figure C-2. Typical Dual Window Detail

Typical Combination Window

Thermal Performance

Insulated glass windows block the transmission of heat (in winter or summer) much more effectively than single pane glazing. Increasing the thickness of the glass and the airspace, as recommended for noise level reduction, further improves their thermal performance.

Because of the above-mentioned design features, plus the common inclusion of thermal barriers at the frames, acoustical windows perform exceptionally well as thermal barriers. They allow significantly less air infiltration and have a higher R-value (a measure of thermal resistance) than most off-the-shelf single pane and double pane windows.

Installation Considerations

For the windows to provide the required noise reduction they must remain tightly closed. Ways to maintain ventilation will be discussed below in the section titled, "Mechanical Systems and Building Penetrations." It is important to note, however, that this requirement precludes the use of jalousie (louvered) windows in a sound insulation design. Any type (such as double-hung, single-hung, horizontal sliding, casement, fixed, awning/hopper, etc.) of window is acceptable for noise reduction, provided it has the required STC rating.

Other considerations when preparing window specifications include maintainability, warranty, manufacturer's service, and proper installation. It is possible to install the best acoustical window improperly. If it does not fit tightly enough, air infiltration will significantly reduce the effectiveness. Starting with a too-small window unit and filling in the void around the window with a low-mass material such as fiberglass is unacceptable. Continuous wood blocking infill is recommended with fiberglass insulation filling small voids.

Doors

Options Overview

Doors are comparable to windows in the amount of sound they allow to enter the dwelling. Many typical residential doors require modification or substitution to provide the necessary protection from aircraft noise. As with windows, there are specialized acoustical units available, as well as acoustical storm doors. The following factors are important in evaluating doors for sound insulation:

- Door composition: hollow core wood, solid core wood, insulated metal or fiberglass, sliding glass; core material, additional internal insulation, etc.,
- Door weight (can be estimated by pull-weight),
- Presence and type of fixed window panels, and
- Quality of seals and weatherstripping and how tightly they seal.

The options for improving the noise level reduction of residential doors include:

1. Installation of a new swinging door with gaskets,
2. Installation of a tightly fitting storm door with thick (or laminated) glass,
3. Use of a specialty acoustical swinging door,
4. Use of a specialty acoustical swinging storm door,
5. Use of thicker glass in sliding glass doors, and
6. Specialty acoustical sliding glass doors.

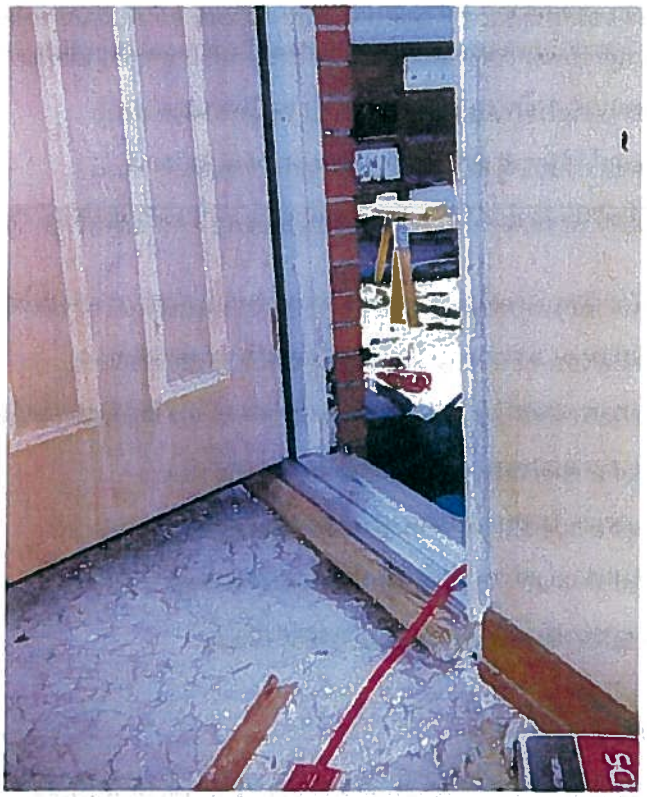
Standard Doors

Standard entrance doors can be expected to have ratings of STC 21 to 27. STC requirements are outlined in Sections 3 and 4 for each type of door (swinging and sliding doors).

Glass panels in the primary door can reduce the STC rating by several points, depending on the thickness of the lite and the surface area. The thinner the glass and the larger the area it covers, the more it decreases the sound insulation of the door. When vision panels are required, it is best to keep them small and use insulated glass units with thick glass.

Swinging Storm Doors

External storm doors are common in many parts of the country and can improve the STC rating by 5 to 19 points. In order for storm doors to be effective for sound insulation, they should incorporate thick glass (ideally 1/4-inch-thick laminated glass) and have a heavy core. Storm doors must be mounted year-round. Replacing the glass panel with a screen insert in the summer months will reduce the sound insulation of the home considerably but many homeowners may wish to exercise this option for periods when aircraft activity is light. A list of acoustical storm door suppliers is included in Appendix E.



Typical STC 29 Door

Acoustical Swinging Doors

Acoustical doors, with a typical rating of STC 29 to 43, are similar in appearance to standard entrance doors. Because of their specialized construction and superior sealing design they provide a very noticeable improvement in noise reduction. While metal doors are available, wood doors often have higher STC ratings and are preferred by many homeowners. Whether metal or wood, the internal construction of acoustical doors differs substantially from standard doors. Layering of materials, along with added absorption and mass, increases their weight to approximately 12 to 14 lbs per square foot.

To eliminate sound flanking between the closed door and the jamb, acoustic doors are designed with special fixed acoustical seals at the sides and top. A drop seal along the bottom activated by a cam rod when the door is closed is sometimes used to make tight contact with the threshold. In other cases, fixed bottom seals that contact a raised threshold or saddle are used. Also, because of their extra weight, acoustical doors usually require reinforcement of the door frame and heavy-duty mounting hardware and hinges. Manufacturers often provide customized frames with their acoustical doors. Due to the high cost of acoustical doors, it is often preferable instead to use more typical residential doors with acoustical storm doors.

Sliding Glass Doors

There are two options for improving the sound-insulating properties of sliding glass doors: using acoustical units, or using primary and secondary doors. The disadvantages of acoustical sliding glass doors are that they are very expensive, very heavy, and can have a high threshold. The disadvantages of using primary and secondary sliding glass doors are that the user must open two doors to leave the building, and that the two frames would not fit in the width of a typical 2x4 stud wall. This same secondary door concept can be used with hinged patio doors. Of course, the installer must ensure that there is no conflict in the operation and opening hardware of the two door sets. Good weatherstripping should be installed on both doors.

Installing a secondary sliding glass door generally requires building a second frame positioned to mount the door approximately 2 to 3 inches away from the primary door. This dual-door assembly has proven successful in that it raises the STC rating by 5 to 7 points or more. Figure C-3 shows a system of two sliding glass doors with the secondary door mounted outside of the typical door position.

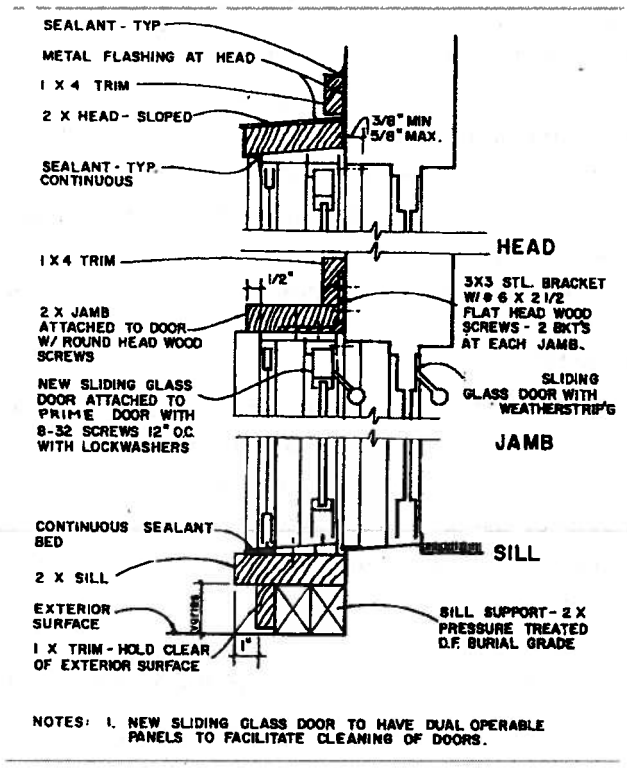


Figure C-3. Secondary Sliding Glass Door Detail

Installation Considerations

As with windows, it is of critical importance to ensure that the door fits well, that all gaps and leaks are sealed, and that the door remains closed. High-quality acoustical weatherstripping is recommended to ensure the acoustical performance of the door. Sound attenuation through standard doors can be improved by fitting them with special acoustical seals, such as drop seals mounted to the back or fully mortised in the door's bottom rail, and compressible bulb-type neoprene gaskets at the jambs (sides) and head (top). If the door does not fit squarely into the frame it will not seal properly and unnecessary noise infiltration will result. In all cases, avoid openings such as mail slots in doors or the use of pet doors.

Walls and Ceilings

Determining Wall and Ceiling Designs

Depending on the dwelling's exterior construction and materials, it may be necessary to use specialized designs for walls. Generally, walls that have vinyl, aluminum, asbestos, cement board, asphalt, or wood siding, shakes or shingles on wood or steel studs require improvements such as additional layers of gypsumboard, staggered studs, or resilient channels in the highest noise impact zones. Dwellings which use brick, concrete block, insulated concrete forms (ICF), concrete, and other masonry materials typically do not; in very high noise zones the performance of these systems can be improved by using 6″ to 8″ thick masonry or concrete.

For the purposes of this design guide, the following materials can be grouped:

1) Brick, Concrete Block, or ICF Construction: At least 4-inch-thick mansonry or concrete and 1/2" gypsumboard at the interior. The entire exterior wall is constructed of masonry or concrete, not just a portion.

2) Stucco on Wood Frame Construction: Stucco or EIFS over sheathing on wood or metal studs, and 1/2" gypsumboard at the interior. Entire exterior wall is stucco or EIFS, not partial siding or other material.

3) Siding on Wood Frame Construction: All types of siding, shakes, and shingles on sheathing on wood or metal studs, and 1/2" gypsum board at interior.

Thin stone (up to 1-1/2″) can be grouped with stucco construction while thick stone (2″ or greater) can be grouped with brick construction.

Many buildings combine siding with other exterior construction materials such as brick veneer, stone, or stucco. For the purposes of this Guide, the siding and siding-combination constructions are taken to have approximately the same sound insulation performance. Because noise penetrates through the weakest available element, unless the siding area is very limited, noise will penetrate through that part of the building envelope. Generally, if a particular wall is shielded from the flight track or is protected by a heavily roofed porch, the need for supplementary wall treatments is reduced.

Improved ceilings are sometimes necessary where there is an attic over habitable or noise-sensitive rooms such as bedrooms, living rooms, family rooms, etc. There is no need to modify the ceiling of any first-floor rooms where they are completely covered by a second story room. Non-habitable rooms, such as garages and mudrooms in breezeways, are generally not given improved ceilings unless they open directly to habitable rooms without interior doors in between the rooms.

In some regions of the country it is appropriate to use a vapor barrier either on the interior or exterior surface of walls or ceilings. However, it is never appropriate to use two vapor barriers in the same wall or ceiling, since this can trap moisture and cause rot and mold. When there is no existing vapor barrier it may be appropriate to add one during renovation. In some northern climates it is appropriate to use vapor barriers at the interior side of walls and ceilings. In such cases, impermeable paint could be used as a vapor barrier.

Specific Wall Designs

Brick, concrete block, and ICF walls generally need no modifications. Sided wood-framed walls and some stucco wood-framed walls require improvements in high noise zones.

One technique for increasing the mass and resiliency of the wall or ceiling is to attach the gypsumboard to the studs with 1/2-inch, resilient, vibration-isolation channels ("resilient channels", or "RC"). This will provide an STC rating improvement of 7 points over that for typical sided wood frame construction. The resilient channels should be attached to the studs so that they run horizontally for walls (and perpendicular to the joists for ceilings). This minimizes the vibration transmission from the supporting studs (or joists) to the channels and the wallboard. The screws used to attach the gypsum board to the channels must be short enough that they do not contact the studs. The common installation error of using too long screws allows vibration to travel from the stud to the gypsumboard, rendering the system ineffective.

A second technique involves using the resilient channels mentioned above, and changing the wall construction from 2 x 4 studs to 2 x 6 studs. This will increase the STC by 11 points over typical sided wood frame construction, and will allow space for R-19 insulation.

The third, and most effective, option is to construct the interior wall on a set of staggered studs so that the interior and exterior finish surfaces are not rigidly connected to each other except through the top and bottom plates. This system uses two rows of studs: one row of studs spaced 16" on center supporting the sheathing, and a second row spaced 16" on center supporting the interior wall finish. The end result is that there are studs each 8" on center. Figure C-4 shows how to implement this construction. This modification provides acoustical decoupling and separation between the exterior and the interior of the room, resulting in a 13 point increase in the STC rating over typical sided wood frame construction. At windows and doors it is necessary to use 2 x 6 studs; therefore, the acoustical benefit of staggered studs is dramatically reduced when there are many windows and doors. A larger space between the interior and exterior panels will yield a greater STC improvement.

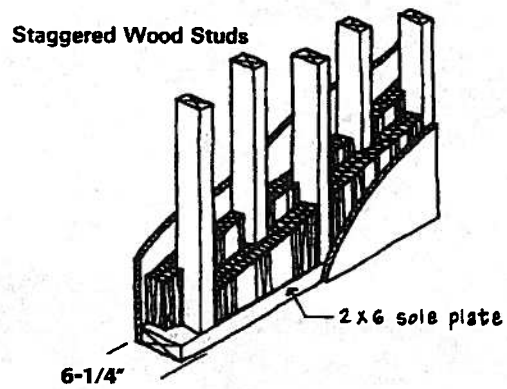


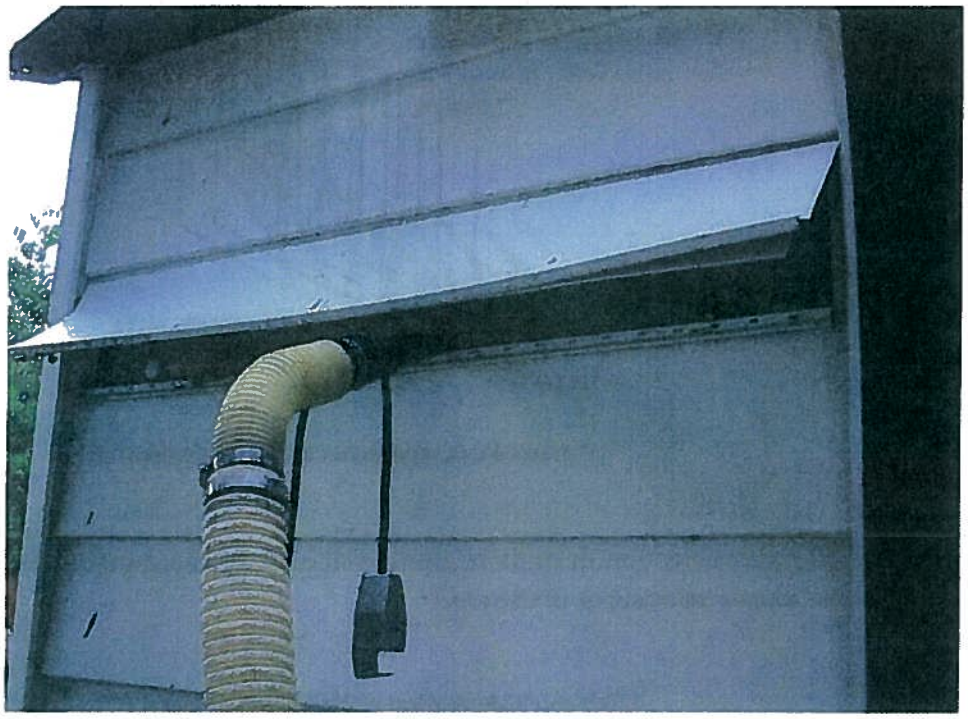
Figure C-4. Staggered Wood Stud Construction

The three wall construction designs referenced above are summarized in Table C-1. In this table o.c. is the on-center spacing of the studs.

Table C-1. Acoustical Wall Designs and STC Ratings

	Exterior Side	Studs	Interior Side	STC Rating
Resilient Channel on 2x4 studs	Vinyl Siding, 7/16" OSB sheathing	2x4 16" O.C. with batt insulation	RC on studs, 1 layer ½" gypsumboard	43
Resilient Channel on 2x6 studs	Vinyl Siding, 7/16" OSB sheathing	2x6 16" O.C. with batt insulation	RC on studs, 1 layer ½" gypsumboard	47
Staggered 2x4 on 2x6 base	Vinyl Siding, 7/16" OSB sheathing	2x4 16" O.C. for each row (staggered on 2x6 base plate) with batt insulation	1 layer ½" gypsumboard (attached only to interior-side studs)	50

To absorb sound, fiberglass batts are placed between the studs in the wall cavity. Thermal insulation of at least R-11 should be used to ensure a thick enough layer. Batts or blankets should be held firmly in place between studs, with fasteners if necessary, to prevent sagging; however, packing the insulation such that it is compressed may slightly *reduce* its acoustical (and thermal) performance. Although blown-in insulation should be used for existing walls, it is not recommended in new walls for acoustical purposes because of the tendency to compact over time.



Installation of Blown-in Insulation

Although stucco wood-framed walls perform better than sided wood-framed walls they often need modifications in high noise zones. The modifications discussed above would also work for stucco walls. An additional modification for stucco walls is to use ½" thick cement stucco in lieu of 1/8" thick finish.

The wall assemblies discussed so far use materials in common use today. There are advanced materials available that are not widely used. One such material is a constrained layer visco-elastic polymer panel. This is essentially a gypsum board panel with layers of steel or vinyl and adhesive inside. The steel or vinyl add mass to the assembly while the adhesive adds damping; massive, damped panels have better sound insulation performance than regular gypsum board panels. Two examples of this product are the QuietRock™ QR-530 "Serenity" panel by Quiet Solution, Inc., and the Hush Rock HR-300 panel by BRD Noise and Vibration Control Inc.

Another new product is the resilient sound isolation clip (RSIC) by PAC International and the ISOMax resilient sound isolation wall and ceiling clip by Kinetics Noise Control. These are similar to a traditional "resilient channel" in concept, but with better sound insulation performance. With these systems a clip is screwed into the wood studs, a thick steel channel is snapped onto or slid into the clips, and gypsum board is screwed into the channels. Sound insulation is provided by the rubber isolator that is part of the clips. Note that the wall thickness

is 1-1/8" greater with the PAC International assembly than with traditional resilient channels, and 7/16" greater with the Kinetics System.

Specific Ceiling Modifications

The ceilings of top-floor rooms may need to be modified to provide increased noise protection. The same methods that are used in wall constructions can be used for ceilings. A typical roof construction is asphalt shingles, 7/16" OSB sheathing, 14" trusses at 16" O.C., batt insulation, and 1/2" gypsumboard at the interior. This design has an STC 45 rating. Resilient channels mounted perpendicular to the ceiling joists, on the bottom of the joists, with one layer of ½" gypsumboard attached to the channels, will increase the rating to approximately STC 55.

Attic access panels, pull-down stairs, and whole-house ceiling fans should have movable or operable covers consisting of ¾" plywood, or another equally massive material, with continuous neoprene perimeter seals.

Attics and Roofs

Options Overview

Home designs incorporating unoccupied attic space over all living areas are recommended for dwellings exposed to aircraft noise. Skylights can be used if 1/4-inch-thick glazing or insulated thermopane glass is used at the bottom of the skylight well to supplement whatever glazing is used at the top of the well. In addition to these basic rules, it may be necessary to used improved roof, attic, or ceiling designs. Improvements could include baffles in the attic vents, extra insulation to absorb sound reverberating in the attic space, and an upgraded roof deck.

The use of cathedral ceilings is strongly discouraged for homes exposed to aircraft noise, particularly where the necessary NLR is 30 dB or higher. Rather than a true open-beam or cathedral ceiling, a mock-cathedral or vaulted ceiling with a small attic space above is recommended. Open-beam ceilings should never be used when the necessary NLR is 20 dB or higher.

Sound Transmission Paths

Sound enters through the roof in two paths: directly through vents and other leaks; and by vibrating the roof itself, thereby radiating acoustical energy into the air within the attic. If there is no attic the sound passes immediately into the living space under the roof. This is why homes with open-beam or cathedral ceilings often have very limited noise level reduction through the roof. Where there is an attic, the sound enters and reflects off of the attic surfaces, reverberating in the space. Since much of the sound energy has been dissipated, less sound passes through the finished ceiling to the room below.

Attic Vents

Attics typically have open-air vents at the ends (for a gabled roof), in the roof deck, or a combination of ridge and soffit vents. The sound entering through these vents may be significant. Off-the-shelf acoustical louvers can be applied to baffle the sound passing through gable end vents. Most off-the-shelf noise control baffles are rectangular and this requires the use of rectangular vents in the dwelling design. Soffit vents under the eaves can be left unmodified when other measures are implemented, since they are somewhat shielded from direct exposure to the aircraft noise.

Any type of attic vent that opens directly through the roof toward the aircraft flight tracks is discouraged. This includes gravity vents, vents in the roof deck, and some active or positive ventilation systems. If these vents are used, built-in-place baffles can be used under them to reduce noise intrusion. Built-in-place baffles consist of pieces of 3/4" thick plywood covered with 2" thick rigid fiberglass insulation; the plywood panels are oriented in such a way that noise (and air) must be reflected on at least one fiberglass-lined surface before it can move into the attic. These baffles could also be used for ridge vents. In general, acoustical louvers are preferred over built-in-place baffles due to the possibility that the built-in-place baffles may reduce ventilation through the attic. Figure C-5 shows a typical built-in-place gable vent baffle design.

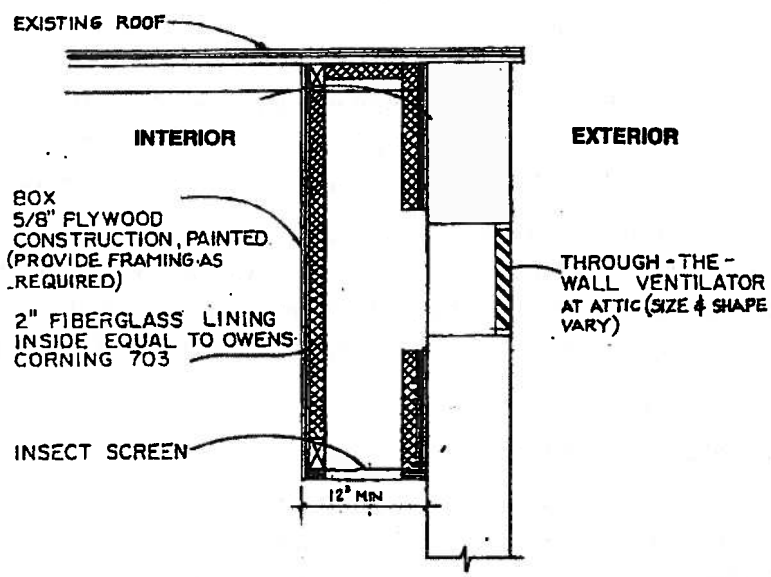


Figure C-5. Built-in-place Gable Baffle

Attic Insulation

When considering the upgrade of thermal insulation to reduce noise levels it is important to understand what the insulation will do. Thermal insulation materials will act to absorb sound that is reverberating in the attic or in the space between flat panels. It does <u>not</u> prevent noise

from entering the space. That is, it has no appreciable acoustic "insulating" properties but acts as an absorbent instead. To keep sound out, barriers must be used which increase the mass of the roof or ceiling. As a sound absorbent, fiberglass batts and blown-in fiberglass or mineral fiber can be applied between the rafters, between the ceiling joists, or in conjunction with a plywood or gypsumboard barrier. To prevent fires knob-and-tube wiring in attics should be replaced with modern insulated wiring before adding thermal or sound-absorbing insulation in the attic.

The absorption of a material should not be confused with noise level reduction (NLR). There is no direct relationship between a material's absorptive properties and the overall NLR.

A simple method for determining the proper thickness of sound-absorbent materials is to use the concept of the material's thermal rating (R-value). This R-rating is a commonly used and well-known rating for building products. The R-values and thickness for several common insulation materials are given in Table C-2. The value of the sound absorption at lower frequencies depends on the thickness of the material. For noise sources with a significant low-frequency component, such as aircraft flyovers, the thickness is the most important parameter. Thicker materials provide better low-frequency sound absorption.

Table C-2. Material Thickness and R-Value For Common Insulating Materials

Material	Thickness, Inches		
	R-11	R-19	R-30
Roll or Batt Fiberglass	3.5	5.25	9
Blown-In Fiberglass	5	8	13
Mineral Fiber	4	6.5	11

Floors, Basements, and Crawl Spaces

Options Overview

Dwellings will usually have one of these four types of floor systems:

1. Concrete slab
2. Crawlspace
3. Basement
4. Pylons (beach houses)

Since noise control measures are concerned with the external building envelope, floors between stories in a home are not addressed.

Concrete slabs require no treatment. Crawl spaces, basements, and pylons will be discussed below.

Crawl Spaces

One common floor system consists of wood joist construction over a vented crawl space. Using insulation batts between joists is also very effective acoustically. The simplest way to improve the acoustical performance of a house that has a crawl space with masonry walls is to install off-the-shelf noise control louvers to the under-floor vents; this is similar to the design discussed above for roof vents. These louvers provide a noticeable quieting in the rest of the house. If crawl spaces do not have masonry walls, a massive barrier panel can be used as a skirt connecting the bottom of the walls to the ground. 2″ thick precast concrete panels would be ideal. Alternatively, 2x4 pressure-treated wood studs with ¾″ pressure-treated plywood on each side could be used, as long as the joints between the plywood are covered with batten strips.

Basements

Basements can be modified with a combination of methods discussed in other sections of this guide. Windows should have 1/4-inch-thick laminated glass or insulated glass units. Storm windows and doors can be added for further protection. Large vents or openings should be baffled if the exposed wall faces the flight track. Dryer vents and other vents should be constructed of sheet metal (rather than plastic or flexible ducts) to limit the amount of noise that will enter through them and then pass through the duct wall to the surrounding room. Thermal insulation can be installed between the joists to absorb sound reverberating in the basement.

Garages

Fire codes may prohibit the use of exposed insulating material above garages. If part of the basement consists of a garage with a garage-door facing the flight path, a fire-rated gypsumboard ceiling may be used. Also, a gypsumboard or plywood barrier or a finished ceiling can be hung under the first-floor with R-11 insulation between the joists, similar to the treatment discussed for attics.

Pylons

Elevated beach houses allow noise to enter through the floor. The depth of the floor trusses should be maximized, a thick layer of insulation must be provided between the trusses, the subfloor should consist of ¾″ thick OSB or plywood, and at last ½″ (nominal) thick OSB or plywood should be used at the bottom of the trusses.

Mechanical Systems and Building Penetrations

In order to maintain the noise reduction benefits of improving windows and doors and sealing leakage paths, it is important to keep these openings closed. While an acoustically well-insulated home can provide 30 to 35 dB of noise reduction, this figure drops to 15 dB whenever the windows and doors are open. Heating, ventilation, and air-conditioning (HVAC) systems often do not directly affect the sound insulation performance, but they enable residents to keep the windows and doors shut year-round and benefit from the sound insulation modifications. Some of the following information is not referenced in Sections 3 and 4 but the ventilation features discussed here are strongly recommended.

Wall or Ceiling Units

Any mechanical unit that penetrates exterior walls or the ceiling allows aircraft noise to enter the house. This includes in-window or through-wall air conditioners, through-wall or ducted range fans, whole-house ceiling fans, and evaporative coolers ("swamp coolers"). In most sound-insulated homes these units must be removed and their function restored elsewhere by using new ducted central air-conditioning systems or recirculating range fans. Evaporative coolers are also not appropriate due to concerns about the build-up of moisture in tight sound-insulated houses. If the units must remain, operable covers can be installed consisting of ¾" plywood and continuous perimeter neoprene bulb seals. Central (ceiling-mounted) evaporative coolers can be retrofitted with 2" internally sound-lined five-foot long sheet metal ducts in the attic.

Gravity Heating Systems

Gravity heating systems are combustion-driven appliances located in a crawl space used to heat a home by allowing the warm air to enter the house through a hole in the floor. Theses systems should be removed from existing sound insulated homes and not used in new homes. Instead use a forced air or hot water-based heating system that does not require a hole in the building envelope.

Fresh Air and Air Circulation

New homes and many existing homes in much of the country have central air-conditioning. Whether the air needs to be heated, cooled, dehumidified, or simply circulated and replenished depends on the season. Refreshing the air supply and moving it around is important for health and comfort no matter what the outside temperature. A fresh-air intake could be installed on an air-handling system to provide the required percentage of fresh makeup air combined with the recirculating air. However, when the system is not operating during mild weather no fresh air would be provided. Therefore, the system in a sound-insulated house should, at a minimum, have a fresh-air intake and allow for ventilation alone when the residents do not want heating or cooling.

In order to ensure that fresh air is provided year-round, the preferred solution is to use active ventilators. Also, in cold climates we recommend using re-heat coils, heat recovery ventilation (HRV) or energy recovery ventilators (ERV) to minimize heat loss in winter. ERVs are similar to HRVs, except they exchange moisture as well as heat. An HRV or ERV system has four ducts: (1) a fresh air intake duct connecting the outdoors to a fan unit, (2) a fresh air supply duct connecting the fan unit to habitable areas of the home (typically connected to a central forced air duct system), (3) an exhaust air return duct connecting bathrooms and/or kitchens to the fan unit, and (4) an exhaust discharge duct connecting the fan unit to the outdoors.

The licensed professional designing the mechanical system must ensure that the building code requirements for fresh airflow volume are met. Guidance in ASHRAE 62.2-2003 is useful to determine the appropriate amount of fresh air. Care must be exercised to ensure that condensation does not form on ducts in exterior walls, attics, crawl spaces, and other poorly insulated areas. Condensation can lead to water damage, rot, and mold.

Whatever ventilation system is used, penetrations of the building envelope must be minimized and located as far as possible from habitable areas of the house.

Combustion Air Intake and Exhaust

Fuel-burning appliances such as gas furnaces, oil boilers, gas hot water heaters, and gas dryers can introduce carbon monoxide into the house. To minimize this concern, especially in sound insulated houses, it is useful to introduce air from outdoors to the area near the appliance. This is often required in building codes as well. This can be accomplished with small fans called combustion air enforcers.

There is a separate concern that the appliance's exhaust duct, as well as the combustion air enforcer, will allow aircraft noise to enter the house. This is only a concern if the appliance is in a habitable room, which they rarely are. The solution in low noise zones is to use a double-wall rigid metal duct. In high noise zones the solution is to enclose the unit in a closet or enclose the duct in a chase.

Noise and Vibration Control

It is important to limit the amount of noise the HVAC system generates and the noise it carries in from the outside. Taking the steps outlined below will help to minimize the noise from fans, airflow, equipment vibration, and aircraft noise sources:

1. Provide vibration isolation mounting for all equipment and locate it so that the structure-borne sound and vibration are kept to a minimum.
2. Use ducting materials appropriate to the location to minimize the sound transmitted through the system. Flexible ductwork should not be used in attics and crawl spaces; heavier sheet metal ducts will provide better sound insulation.

3. Ducts to the outside, whether intake or exhaust, and all ducts in the attic or crawl space can be lined with 1-inch acoustical internal lining material, or have at least two 90-degree (right angle) elbows (turns) thereby breaking the line-of-sight to the outside as shown in Figure C-6. It must be noted that there is concern than this fibrous acoustical lining material will affect air quality. Installing a duct sound attenuator (silencer) is an alternative to this technique; there are silencers available that do not contain fibrous lining. To prevent moisture and grease buildup, exhaust fans (bathroom, dryer, kitchen, and range) must not have internal sound lining or silencers that use fibrous lining; the use of the 90-degree elbows and/or fiber-free silencers are appropriate in these cases. These measures ensure that the ventilation system is not bringing additional aircraft noise into the house.
4. Do not use in-window, through-wall, or through-floor air-conditioners, ventilators, or heaters, i.e., units for which air ducts pass through the building envelope (windows, walls, or floors). On the other hand it is acceptable if only natural gas or refrigerant pipes pass through the building envelope, since these will not allow noise to enter the building. The preferred air-conditioning system is a split system utilizing an outdoor condensing unit.

Kitchen and Bath Fans

Most kitchen and bathroom designs for new homes already incorporate fans for ventilation purposes. A ducting scheme that incorporates at least one and preferably two right-angle turns is effective at reducing noise infiltration and there should be no direct line-of-sight through the duct from the outside to the inside. In other words, if the duct grilles or covers were removed, it should not be possible to see daylight through the duct. All ducts in the attic should be rigid metal and not flexible; noise may pass through these elements to other rooms of the house. Ideally, the vents will be on the side of the roof facing away from the flight path.

Dryers

Dryers exhaust ducts can also be paths for noise to enter a home. Dryers must not be located in habitable spaces. If electric dryers are located near bedrooms or other habitable spaces they may be located in enclosed closets with solid (non-louvered) doors. Always use rigid metal dryer ducts instead of flexible ducts to minimize aircraft noise entering the house.

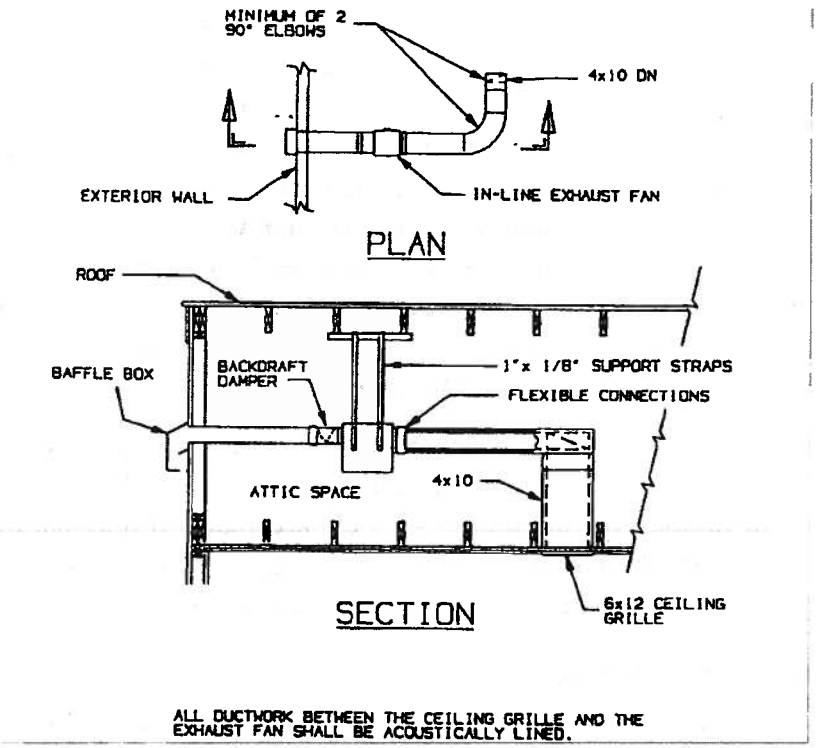


Figure C-6. Controlling Noise Entering Through Ducts in Attic Space

Fireplaces, Prefabricated Units, and Wood Stoves

Frequently, homes with fireplaces or gas-powered prefabricated units will require some type of design modification. This is especially true if the outside noise exposure is high, or the fireplace or prefabricated unit is in a room used for watching TV or sleeping. The treatment package consists of two parts. First, glass doors are mounted at the front of the fireplace or prefabricated unit. Second, the in-chimney damper must be installed so that all edges seal around the damper. Any air gaps or leaks will allow sound to pass through. The glass doors by themselves provide a noticeable improvement and these two treatments, in combination, have proven to be very effective at reducing the noise entering along this path. Chimney-top dampers have also been used successfully when tightly installed.

Wood stoves with indoor exhaust ducts present a greater sound leak than fireplaces. Using a double-wall rigid duct will help block noise, but in many cases it is necessary to remove the wood stove and patch the wall or ceiling finish in order to meet the acoustical design goal.

Appendix D

Model Building Code

Noise Level Reduction Design Requirements

Appendix D:
Model Building Code
Noise Level Reduction Design Requirements

SECTION 1: PURPOSE

Exterior noise may be isolated and reduced in homes through construction techniques that selectively increase the sound insulating quality of the exterior of occupied structures. The noise level reduction values specified are 20, 25, 30, and 35 dB.

SECTION 2: GENERAL REQUIREMENTS

A. The Noise Level Reduction (NLR) requirements specified herein may be achieved by any suitable combination of building designs, choices of building materials, and execution of construction details in accordance with established architectural and acoustical principles. The NLR requirements should be applied to all occupied rooms having one or more exterior walls or exterior ceiling. A room without any exterior walls, and which has an occupied space above its entire area, will not be subject to these requirements.

B. Compliance with the construction standards herein is sufficient to comply with the NLR requirements specified in the various noise zones. These standards are applicable to plans and specifications for any proposed residence. A variety of assumptions were necessary to develop these standards. If the plans and specifications do not indicate compliance with the construction standards herein, the applicant shall provide a written statement from a qualified acoustical consultant certifying that the construction of the building as indicated in the plans and specifications will result in a NLR for appropriate occupied rooms at least as great as the specified NLR requirement.

C. An "exterior" door or window opens to the exterior or to a partially enclosed space such as a screened-in porch. In this standard whenever the words "doors" or "windows" are used it shall be assumed that the standard provision applies only to exterior doors and exterior windows, unless the word "interior" is specifically used for that provision.

D. Sound Transmission Class (STC) ratings for windows and doors are valid only if they are determined by laboratory (not field) tests performed by an independent laboratory for the product. A rating estimated for glass alone is not an acceptable substitute for STC tests of windows or doors, except for determining the rating of sidelights and transoms. Likewise, ratings estimated for door leafs alone are not an acceptable substitute for STC ratings of doors. The installed products must have the same composition and overall configuration such as storm panels, glass type (laminated, tempered, or float glass), glass thickness, spacing between panes of insulated glass, door core, gaskets, weatherstripping, door bottom seals, thresholds, etc., and the same overall configuration as the tested assembly. The overall configuration includes the operational type (casement, double hung, fixed, slider, etc.) in the case of windows, and the general size of glazing (1/8-, 1/4-, 1/2-, or full-view) in the case of doors. Issues that do not affect the acoustical performance such as glass

obscuration, internal window muntins, door and window hardware, screens, and applied door moldings can be neglected.

E. Door sidelights and door and window transoms shall be considered "windows" and shall meet the provisions for windows. For these products it is acceptable to reference the laboratory STC rating of the glass alone. However, for the adjacent windows and doors it is still necessary to reference STC tests for the entire assembly, not just the glass or door leaf.

F. For this standard it can be assumed that the rating of a prime-and-storm window combination is STC 36 provided the rating of the *storm* window alone is at least STC 29 and the airspace between the prime and storm window is at least 1-3/4" for all sashes.

G. For this standard it can be assumed that the rating of a prime-and-storm door combination is STC 37 provided the rating of the *storm* door alone is at least STC 30 and the airspace between the prime and storm door is at least 2".

H. In order to achieve the STC ratings specified herein special measures are necessary to install doors and windows. These include the use of non-hardening (acoustical) caulk at all hidden surfaces, flexible caulk at all exposed surfaces, and solid continuous blocking to fill all voids over 1/4" around windows and doors.

I. The phrase "Total Exterior Wall Area" as used in this standard includes the exterior wall area of the room as well as the area of all windows and doors contained within the exterior walls.

J. The phrase "Roof" as used in this standard shall refer to a ceiling attached to the bottom edge of roof structural members that are at least 14" deep (the depth is the clear distance between the ceiling gypsumboard and the roof deck) for the portion of the structural member over a living space. The use of shallower roof framing is not allowed without a written statement from a qualified acoustical consultant (see section B above). The best acoustical performance is achieved when there are horizontal ceilings, an accessible attic space above, and a sloped roof.

K. The phrase "Exposed Floor" in this standard shall refer to the floor of a house elevated above the ground without the use of a crawl space. This includes primarily beach houses on pylons.

L. It is difficult to predict the acoustical performance of open plan spaces. Adjacent habitable spaces that are fully open to each other shall be grouped and treated as one room. When the rooms are only partially open to each other, group them if the partitions separating the rooms are more than 30% open.

M. The number of exterior walls is a parameter that affects the acoustical performance of the room. If the exterior wall is over 12 feet tall it shall count as two exterior walls. Partial walls count as one exterior wall.

N. The phrase "wood-framed walls" refers to any walls that do not have brick veneer, concrete blocks, or poured concrete.

SECTION 3: BUILDING REQUIREMENTS FOR A MINIMUM NLR OF 20 dB

A. Exterior Walls

1. The interior surface of exterior walls shall be gypsum board at least 1/2 inch thick, or an alternative material of equal surface mass.

2. For wood-framed walls: Fiberglass, mineral fiber, or cellulose batt or blanket insulation shall be installed continuously and completely throughout the stud cavity. Batts or blankets should be held firmly in place between the studs, with fasteners if necessary, to prevent sagging; however, packing the insulation such that it is compressed may *slightly reduce* its acoustical (and thermal) performance.

3. Insulated concrete form (ICF) or masonry walls, where present, shall contain at least 4" thick normal weight concrete or masonry throughout the surface of the wall.

B. Windows

1. For rooms that have at least one wood-framed exterior wall: Windows shall have a laboratory sound transmission class rating of at least STC 28.

2. For rooms that have all ICF exterior walls: If the exterior windows and doors together comprise 75% or more of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 28.

C. Doors

1. Exterior doors, and interior doors between occupied spaces and attached garages, unfinished attics, and other non-habitable spaces with an exterior wall or ceiling, shall be fully weatherstripped.

D. Roof-Ceiling Assembly

1. Gypsum board ceilings at least 1/2 inch thick shall be provided at top floor. Ceilings at top floor shall be substantially airtight with a minimum number of penetrations.

2. Fiberglass, mineral fiber, or cellulose insulation shall be installed continuously and completely throughout the ceiling joist cavity to a depth of at least 10 inches. Batt or blanket insulation shall be used at sloped ceilings.

3. Roof framing members shall be at least 14″ deep for their entire span.

4. Attic access panels shall be constructed of 3/4″ thick plywood and shall have continuous neoprene perimeter bulb seals. Pull-down attic stairs shall have moveable or operable covers constructed of 3/4″ thick plywood and shall have continuous neoprene perimeter bulb seals.

5. Skylights shall not be provided.

E. Floors, Foundations and Basements

1. For houses elevated on pylons: Use plywood or OSB at least 1/2″ thick at the underside of the floor joists with at least 10″ thick fiberglass, mineral fiber, or cellulose insulation.

2. If crawl spaces do not have masonry walls, a massive barrier panel must be used as a skirt connecting the bottom of the walls to the ground. 2″ thick precast concrete panels are ideal barrier skirts. Alternatively, 2x4 pressure-treated wood studs with ¾″ pressure-treated plywood on each side may be used, as long as the joints between the plywood are covered with batten strips. In flood zones use double-swing plywood flood gates in lieu of vents to the extent allowable by code.

F. Ventilation and Wall Penetrations

1. In-window, through-wall, or through-floor air-conditioning, ventilating, or heating units shall not be used.

2. Through-the-wall/door mailboxes or mail slots shall not be used.

3. A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms, as specified in the North Carolina state building code, without the need to open any windows, doors, or other openings to the exterior.

4. Gravity vent openings in attics shall not exceed the code minimum in number and size.

5. If an attic fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel at least 5 feet long with at least one 90° bend.

6. All vent ducts, including those for bathroom exhaust fans and dryers, connecting the interior space to the outdoors shall be rigid metal and contain at least two 90° bends, or one 90° bend and a total length of at least 20 feet (or the maximum length allowed by the dryer manufacturer).

7. Vented domestic range fans shall be not used.

8. Vented wood stoves shall not be used. Where vented fireplaces or vented gas-powered prefabricated units are used provide acoustical chimney top dampers and use tight-fitting 1/4" tempered glass fireplace doors.

9. Vented fuel-burning appliances (e.g., gas dryers, gas fireplaces, oil or gas furnaces, and gas water heaters) shall not be located in habitable spaces (e.g, kitchens, living rooms, bedrooms, etc.). Vent ducts for fuel-burning appliances in non-habitable spaces (e.g., closets and attics) shall have double-wall sheet metal construction.

10. Whole-house fans shall not be provided.

11. All ducts in attics shall be rigid metal.

12. Dryers shall be located in closets or other non-habitable spaces. Dryer ducts shall be rigid metal.

SECTION 4: BUILDING REQUIREMENTS FOR A MINIMUM NLR OF 25 dB

A. Exterior walls

1. The interior surface of exterior walls shall be gypsum board at least 1/2 inch thick, or an alternative material of equal surface mass.

2. For wood-framed walls: Fiberglass, mineral fiber, or cellulose batt or blanket insulation shall be installed continuously and completely throughout the stud cavity. Batts or blankets should be held firmly in place between the studs, with fasteners if necessary, to prevent sagging; however, packing the insulation such that it is compressed may slightly reduce its acoustical (and thermal) performance.

3. Insulated concrete form (ICF) or masonry walls, where present, shall contain at least 4" thick normal weight concrete or masonry throughout the surface of the wall.

B. Windows

1. For rooms with at least one wood-framed wall:

   a. If there is only one exterior wall:
      i. If the exterior windows and doors together comprise less than 25% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 26.
      ii. If the exterior windows and doors together comprise 25-40% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 28.

iii. If the exterior windows and doors together comprise more than 40% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 30.

b. If there are two or more exterior walls:
   i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 28.
   ii. If the exterior windows and doors together comprise 20-35% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 30.
   iii. If the exterior windows and doors together comprise more than 35% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 32.

2. For rooms with all ICF walls:

   a. If there is only one exterior wall:
      i. If the exterior windows and doors together comprise less than 40% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 26.
      ii. If the exterior windows and doors together comprise 40% or more of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 30.

   b. If there are two or more exterior walls:
      i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 26.
      ii. If the exterior windows and doors together comprise 20-30% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 28.
      iii. If the exterior windows and doors together comprise 30-75% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 30.
      iv. If the exterior windows and doors together comprise more than 75% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 32.

C. Doors

1. For rooms with at least one wood-framed wall:

   a. If there is only one exterior wall: If exterior windows and doors together comprise more than 40% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 29.

   b. If there are more than one exterior wall: If exterior windows and doors together comprise 20% or more of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 29.

2. For rooms with all ICF walls:

   a. If there is only one exterior wall and the exterior windows and doors together comprise 40% or more of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 29.

   b. If there are more than one exterior wall and the exterior windows and doors together comprise 30% or more of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 29.

3. Interior doors between occupied spaces and attached garages, unfinished attics, or other non-habitable spaces with an exterior wall or ceiling shall have a laboratory sound transmission class rating of at least STC 23.

D. Roof-Ceiling Assembly

1. Gypsum board ceilings at least 1/2 inch thick shall be provided at top floor. Ceilings at top floor shall be substantially airtight with a minimum number of penetrations. Where recessed lights are used in top-floor ceilings provide a gypsum board enclosure around the lighting fixture and seal the gypsum board joints with caulk or joint compound.

2. Fiberglass, mineral fiber, or cellulose insulation shall be installed continuously and completely throughout the ceiling joist cavity to a depth of at least 10 inches. Batt or blanket insulation shall be used at sloped ceilings.

3. Roof framing members shall be at least 14" deep for their entire span.

4. Attic access panels shall be constructed of 3/4" thick plywood and shall have continuous neoprene perimeter bulb seals. Pull-down attic stairs shall have moveable or operable covers constructed of 3/4" thick plywood and shall have continuous neoprene perimeter bulb seals.

5. Skylights shall not be provided.

E. Floors and Foundations

1. For houses elevated on pylons: Use plywood or OSB at least 1/2" thick at the underside of the floor joists with at least 10" thick fiberglass, mineral fiber, or cellulose insulation.

2. If crawl spaces do not have masonry walls, a massive barrier panel must be used as a skirt connecting the bottom of the walls to the ground. 2" thick precast concrete panels are ideal barrier skirts. Alternatively, 2x4 pressure-treated wood studs with ¾" pressure-treated plywood on each side may be used, as long as the joints between the plywood are covered with batten strips. In flood zones use double-swing plywood flood gates in lieu of vents to the extent allowable by code.

F. Ventilation and Wall and Roof Penetrations

1. In-window, through-wall, or through-floor air-conditioning, ventilating, or heating units shall not be used.

2. Through-the-wall/door mailboxes or mail slots shall not be used.

3. A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms, as specified in the North Carolina state building code, without the need to open any windows, doors, or other openings to the exterior.

4. Gravity vent openings in attics shall not exceed the code minimum in number and size.

5. If an attic fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel at least 5 feet long with at least one 90° bend.

6. All vent ducts, including those for bathroom exhaust fans and dryers, connecting the interior space to the outdoors shall be rigid metal and contain at least two 90° bends, or one 90° bend and a total length of at least 20 feet (or the maximum length allowed by the dryer manufacturer).

7. Vented domestic range fans shall be not used.

8. Vented wood stoves shall not be used. Where vented fireplaces or vented gas-powered prefabricated units are used provide acoustical chimney top dampers and use tight-fitting 1/4" tempered glass fireplace doors.

9. Vented fuel-burning appliances (e.g., gas dryers, gas fireplaces, oil or gas furnaces, and gas water heaters) shall not be located in habitable spaces (e.g, kitchens, living rooms, bedrooms, etc.). Vent ducts for fuel-burning appliances in non-habitable spaces (e.g., closets and attics) shall have double-wall sheet metal construction.

10. Whole-house fans shall not be provided.

11. All ducts in attics shall be rigid metal.

12. Dryers shall be located in closets or other non-habitable spaces. Dryer ducts shall be rigid metal.

SECTION 5: BUILDING REQUIREMENTS FOR A MINIMUM NLR OF 30 dB

A. Exterior Walls

1. The interior surface of exterior walls shall be gypsum board at least 1/2 inch thick, or an alternative material of equal surface mass.

2. For wood-framed walls:

   a. Fiberglass, mineral fiber, or cellulose batt or blanket insulation shall be installed continuously and completely throughout the stud cavity. Batts or blankets should be held firmly in place between the studs, with fasteners if necessary, to prevent sagging; however, packing the insulation such that it is compressed may slightly reduce its acoustical (and thermal) performance.

   b. If there is one only one exterior wall: If exterior windows and doors together comprise 30% or more of the Total Exterior Wall Area, single-leaf resilient channels shall be used between the studs and gypsum board.

   c. If there are two or more exterior walls single-leaf resilient channels shall be used between the studs and gypsum board.

3. Insulated concrete form (ICF) or masonry walls, where present, shall contain at least 4" thick normal weight concrete or masonry throughout the surface of the wall.

B. Windows

1. For rooms with at least one wood-framed wall:

   a. If there is only one exterior wall:
      i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 32.
      ii. If the exterior windows and doors together comprise 20-30% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 34.
      iii. if the exterior windows and doors together comprise 30-50% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 32.
      iv. if the exterior windows and doors together comprise more than 50% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 34.

b. If there are two exterior walls: The windows shall have a laboratory sound transmission class rating of at least STC 34.

c. If there are three or more exterior walls:
   i. If the exterior windows and doors together comprise 70% or less of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 34.
   ii. If the exterior windows and doors together comprise more than 70% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 36.

2. For rooms with all ICF walls:

a. If there is only one exterior wall:
   i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 30.
   ii. If the exterior windows and doors together comprise 20 to 50% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 32.
   iii. If the exterior windows and doors together comprise more than 50% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 34.

b. If there are two exterior walls: The windows shall have a laboratory sound transmission class rating of at least STC 34.

c. If there are three or more exterior walls:
   i. If the exterior windows and doors together comprise 70% or less of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 34.
   ii. If the exterior windows and doors together comprise more than 70% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 36.

C. Doors

1. For rooms with at least one wood-framed wall:

a. If there is only one exterior wall:
   i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 31.

ii. If the exterior windows and doors together comprise 20-30% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.
iii. If the exterior windows and doors together comprise 30-50% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 31.
iv. If the exterior windows and doors together comprise more than 50% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.

b. If there are two exterior walls:
   i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 31.
   ii. If the exterior windows and doors together comprise 20% or more of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.

c. If there are three or more exterior walls:
   i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 31.
   ii. If the exterior windows and doors together comprise 20% or more of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.

2. For rooms with all ICF walls:

a. If there is only one exterior wall:
   i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 29.
   ii. If the exterior windows and doors together comprise 20 to 50% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 31.
   iii. If the exterior windows and doors together comprise more than 50% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.

b. If there are two exterior walls:
   i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 31.
   ii. If the exterior windows and doors together comprise 20% or more of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.

c. If there are three or more exterior walls:
   i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 31.
   ii. If the exterior windows and doors together comprise 20% or more of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.

3. Interior doors between occupied spaces and attached garages, unfinished attics, or other non-habitable spaces with an exterior wall or ceiling shall have a laboratory sound transmission class rating of at least STC 29.

D. Roof-Ceiling Assembly

1. Ceilings consisting of at least two layers of at least 1/2-inch thick gypsum board shall be provided at top floor. Ceilings at top floor shall be substantially airtight with a minimum number of penetrations. Where recessed lights are used in top-floor ceilings provide a gypsum board enclosure around the lighting fixture and seal the gypsum board joints with caulk or joint compound.

2. Fiberglass, mineral fiber, or cellulose insulation shall be installed continuously and completely throughout the ceiling joist cavity to a depth of at least 10 inches. Batt or blanket insulation shall be used at sloped ceilings.

3. Roof framing members shall be at least 14″ deep for their entire span.

4. Attic access panels shall be constructed of 3/4″ thick plywood and shall have continuous neoprene perimeter bulb seals. Pull-down attic stairs shall have moveable or operable covers constructed of 3/4″ thick plywood and shall have continuous neoprene perimeter bulb seals.

5. Skylights shall not be provided.

E. Floors and Foundations

1. For houses elevated on pylons: Use plywood or OSB at least 1/2″ thick at the underside of floor joists that are at least 14″ deep with at least 10″ thick fiberglass, mineral fiber, or cellulose insulation.

2. If crawl spaces do not have masonry walls, a massive barrier panel must be used as a skirt connecting the bottom of the walls to the ground. 2″ thick precast concrete panels are ideal barrier skirts. Alternatively, 2x4 pressure-treated wood studs with ¾″ pressure-treated plywood on each side may be used, as long as the joints between the plywood are covered with batten

strips. Use acoustical louvers for all vents. In flood zones use double-swing plywood flood gates in lieu of vents to the extent allowable by code.

F. Ventilation and Wall and Roof Penetrations

1. In-window, through-wall, or through-floor air-conditioning, ventilating, or heating units shall not be used.

2. Through-the-wall/door mailboxes or mail slots shall not be used.

3. A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms, as specified in the North Carolina state building code, without the need to open any windows, doors, or other openings to the exterior.

4. Gravity vent openings in attics shall not exceed the code minimum in number and size.

5. If an attic fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel at least 5 feet long with at least one 90° bend.

6. All vent ducts, including those for bathroom exhaust fans and dryers, connecting the interior space to the outdoors shall be rigid metal and contain at least two 90° bends, or one 90° bend and a total length of at least 20 feet (or the maximum length allowed by the dryer manufacturer).

7. Vented domestic range fans shall be not used.

8. Vented fireplaces, wood stoves, or gas-powered prefabricated units shall not be used.

9. Vented fuel-burning appliances (e.g., gas dryers, gas fireplaces, oil or gas furnaces, and gas water heaters) shall not be located in habitable spaces (e.g, kitchens, living rooms, bedrooms, etc.). Vent ducts for fuel-burning appliances in non-habitable spaces (e.g., closets and attics) shall have double-wall sheet metal construction.

10. Whole-house fans shall not be provided.

11. All ducts in attics shall be rigid metal.

12. Dryers shall be located in closets or other non-habitable spaces. Dryer ducts shall be rigid metal.

SECTION 6: BUILDING REQUIREMENTS FOR A MINIMUM NLR OF 35 dB

A. Exterior Walls

1. The interior surface of exterior walls shall be gypsum board at least 1/2 inch thick, or an alternative material of equal surface mass.

2. For wood-framed walls:

   a. Fiberglass, mineral fiber, or cellulose batt or blanket insulation shall be installed continuously and completely throughout the stud cavity. Batts or blankets should be held firmly in place between the studs, with fasteners if necessary, to prevent sagging; however, packing the insulation such that it is compressed may slightly reduce its acoustical (and thermal) performance.

   b. If there is one only one exterior wall:
      i. If exterior windows and doors together comprise less than 25% of the Total Exterior Wall Area single-leaf resilient channels shall be used between the studs and gypsum board.
      ii. If exterior windows and doors together comprise 25% or more of the Total Exterior Wall Area the studs shall be 2x4 studs staggered on 2x6 plates (if the studs need to be 2x6 for structural reasons, use 2x6 studs staggered on 2x8 plates).

   c. If there are two or more exterior walls:
      i. If exterior windows and doors together comprise less than 15% of the Total Exterior Wall Area single-leaf resilient channels shall be used between the studs and gypsum board.
      ii. If exterior windows and doors together comprise 15 to 30% of the Total Exterior Wall Area the studs shall be 2x4 studs staggered on 2x6 plates (if the studs need to be 2x6 for structural reasons, use 2x6 studs staggered on 2x8 plates).
      iii. If exterior windows and doors together comprise more than 30% of the Total Exterior Wall Area the studs shall be 2x4 studs staggered on 2x6 plates (if the studs need to be 2x6 for structural reasons, use 2x6 studs staggered on 2x8 plates), and two layers of 1/2" gypsum board shall be provided at the interior surface of the room.

3. Insulated concrete form (ICF) or masonry walls, where present, shall contain at least 4" thick normal weight concrete or masonry throughout the surface of the wall.

B. Windows

1. For rooms with at least one wood-framed wall:

   a. If there is only one exterior wall:
      i. If the exterior windows and doors together comprise less than 25% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 36.

ii. If the exterior windows and doors together comprise 25% or more of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 40.

b. If there are two or more exterior walls:
   i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 38.
   ii. If the exterior windows and doors together comprise 20% or more of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 42.

2. For rooms with all ICF walls:

   a. If there is only one exterior wall:
      i. If the exterior windows and doors together comprise less than 15% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 34.
      ii. If the exterior windows and doors together comprise 15 to 25% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 36.
      iii. If the exterior windows and doors together comprise 25 to 50% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 38.
      iv. If the exterior windows and doors together comprise more than 50% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 40.

   b. If there are two or more exterior walls:
      i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 40.
      ii. If the exterior windows and doors together comprise 20% or more of the Total Exterior Wall Area the windows shall have a laboratory sound transmission class rating of at least STC 44.

C. Doors

1. For rooms with at least one wood-framed wall:

   a. If there is only one exterior wall:

i. If the exterior windows and doors together comprise less than 25% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.
ii. If the exterior windows and doors together comprise 25% or more of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 40.

b. If there are two or more exterior walls:
i. If the exterior windows and doors together comprise 30% or less of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 37.
ii. If the exterior windows and doors together comprise more than 30% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 40.

2. For rooms with all ICF walls:

a. If there is only one exterior wall:
i. If the exterior windows and doors together comprise less than 25% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 34.
ii. If the exterior windows and doors together comprise 25 to 50% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 37.
iii. If the exterior windows and doors together comprise more than 50% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 40.

b. If there are two or more exterior walls:
i. If the exterior windows and doors together comprise less than 15% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 37.
ii. If the exterior windows and doors together comprise 15 to 30% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 40.
iii. If the exterior windows and doors together comprise more than 30% of the Total Exterior Wall Area the doors shall have a laboratory sound transmission class rating of at least STC 43.

3. Interior doors between occupied spaces and attached garages, unfinished attics, or other non-habitable spaces with an exterior wall or ceiling shall have a laboratory sound transmission class rating of at least STC 29.

D. Roof-Ceiling Assembly

1. Gypsum board ceilings at least 1/2 inch thick shall be provided at top floor. Single-leaf resilient channels shall be used to hang the gypsum board at top floor. Ceilings at top floor shall be substantially airtight with a minimum number of penetrations. Recessed lights shall not be used in top-floor ceilings.

2. Fiberglass, mineral fiber, or cellulose insulation shall be installed continuously and completely throughout the ceiling joist cavity to a depth of at least 10 inches. Batt or blanket insulation shall be used at sloped ceilings.

3. Roof framing members shall be at least 14″ deep for their entire span.

4. Attic access panels shall be constructed of 3/4″ thick plywood and shall have continuous neoprene perimeter bulb seals. Pull-down attic stairs shall have moveable or operable covers constructed of 3/4″ thick plywood and shall have continuous neoprene perimeter bulb seals.

5. Skylights shall not be provided.

E. Floors and Foundations

1. For houses elevated on pylons: Use plywood or OSB at least 1/2″ thick at the underside of floor joists that are at least 14″ deep with at least 10″ thick fiberglass, mineral fiber, or cellulose insulation.

2. If crawl spaces do not have masonry walls, a massive barrier panel must be used as a skirt connecting the bottom of the walls to the ground. 2″ thick precast concrete panels are ideal barrier skirts. Alternatively, 2x4 pressure-treated wood studs with ¾″ pressure-treated plywood on each side may be used, as long as the joints between the plywood are covered with batten strips. Use acoustical louvers for all vents. In flood zones use double-swing plywood flood gates in lieu of vents to the extent allowable by code.

F. Ventilation and Wall and Roof Penetrations

1. In-window, through-wall, or through-floor air-conditioning, ventilating, or heating units shall not be used.

2. Through-the-wall/door mailboxes or mail slots shall not be used.

3. A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms, as specified in the North Carolina state building code, without the need to open any windows, doors, or other openings to the exterior.

4. Gravity vent openings in attics shall not exceed the code minimum in number and size.

5. If an attic fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel at least 5 feet long with at least one 90° bend.

6. All vent ducts, including those for bathroom exhaust fans and dryers, connecting the interior space to the outdoors shall be rigid metal and contain at least two 90° bends, or one 90° bend and a total length of at least 20 feet (or the maximum length allowed by the dryer manufacturer).

7. Vented domestic range fans shall be not used.

8. Vented fireplaces, wood stoves, or gas-powered prefabricated units shall not be used.

9. Vented fuel-burning appliances (e.g., gas dryers, gas fireplaces, gas furnaces, and gas water heaters) shall not be located in habitable spaces (e.g, kitchens, living rooms, bedrooms, etc.). Vent ducts for fuel-burning driven appliances in non-habitable spaces (e.g., closets and attics) shall have double-wall sheet metal construction.

10. Whole-house fans shall not be provided.

11. All ducts in attics shall be rigid metal.

12. Dryers shall be located in closets or other non-habitable spaces. Dryer ducts shall be rigid metal.

Appendix E

Manufacturers and Suppliers

Appendix E:
Manufacturers of Acoustical Materials

This list represents a partial list of typical manufacturers of specialty acoustical products. Other manufacturers not listed may have comparable products. The list below does not imply a product endorsement or recommendation by Wyle Laboratories or the Navy.

INSULATION

CertainTeed
Headquarters
P.O. Box 860 or
750E Swedesford Rd.
Valley Forge, PA 19482
Tel: 800-233-8990
www.certainteed.com

Johns Manville
P.O. Box 5108
Denver, CO 80217-5108
Tel: 800-654-3103
www.jm.com

Knauf Fiberglass
One Knaff Drive
Shelbyville, IN 46176
Tel: 800-825-4434
Fax: 317-398-3675

Owens Corning Fiberglass Corp.
One Owens Corning Parkway
Toledo, OH 43659
Tel: 800-438-7465 (800-GET-PINK)
www.owenscorning.com

ACOUSTICALLY TESTED DOORS

Algoma Hardwoods
1001 Perry Street
Algoma, WI 54201
Tel: 800-678-8910
www.algomahardwoods.com

Armaclad, Inc.
P.O. Box 70
Waynesboro, PA 17268
Tel: 800-541-6666
www.armaclad.com

Buell Door Company
5200 East Grand Ave.
Suite 500
Dallas, TX 75223
Tel: 800-556-0155
www.buelldoor.com

Ceco Door Products
9159 Telecom Drive
Milan, TN 38358
Tel: 888-232-6366
www.cecodoor.com

Eggers Industries
P.O. Box 1050
Neenah, WI 54957-1050
Tel: 920-722-6444
www.eggersindustries.com

Frieger Specialty Products
9880 Gregg Road
Pico Rivera, CA 90660
Tel: 866-203-5060
www.kriegerproducts.com

Graham Architectural Products
1551 Mt. Rose Avenue
York, PA 17403-2909
Tel: 800-755-6274
www.grahamarch.com

Harvey Industries, Inc.
1400 Main Street
Waltham, MA 02154
Tel: 800-942-7839
www.harveyind.com

Industrial Acoustics Company
1160 Commerce Avenue
Bronx, NY 10462
Tel: 718-931-8000
www.industrialacoustics.com

Jeld-wen
19618 Wildwood Drive
West Linn, OR 97068
Tel: 877-783-2057
www.jeld-wen.com

ACOUSTICALLY TESTED DOORS - *Concluded*

Jamison Door Company
55 J.V. Jamison Drive
P.O. Box 70
Hagerstown, MD 21741-0070
Tel: 800-532-3667
www.jamison-door.com

Krieger Specialty Products
4880 Gregg Road
Pico Rivera, CA 90660
Tel: 866-203-5060
www.kriegerproducts.com

Larson Doors
Tel: 800-352-3360
www.larsondoors.com

Marshfield Doors Systems, Inc.
1401 East 4th Street
Marshfield, WI 54449-7780
Tel: 800-869-3667
www.marshfielddoors.com

Mohawk Flush Doors, Inc.
980 Point Township Road
P.O. Box 112
Northumberland, PA 17857-0112
Tel: 570-473-3557
www.mohawkdoors.com

Mon-Ray, Inc.
801 Boone Avenue North
Minneapolis, MN 55427-4432
Tel: 800-544-3646
www.monray.com

Overly Door Company
574 West Otterman St.
Greensburg, PA 15601
Tel: 800-979-7300
www.overly.com

P.H. Tech Corp.
144 Ferry Street
Buncher Industrial Park
Leetsdale, PA 15056
www.phtech.ca

Pioneer Industries
171 South Newman Street
Hackensack, NJ 07601
Tel: 201-933-1900
www.pioneerindustries.com

Rehau Incorporated
P.O. Box 1706
Leesburg, VA 20177
Tel: 800-247-9445
www.rehau.com

Republic Windows and Doors
930 West Evergreen Ave.
Chicago, IL 60622
Tel: 800-248-1775
www.republicwindows.com

Torrance Aluminum
22850 Perry St.
Perris, CA 92570
Tel: 909-943-0430
www.torrancealuminum.com

Vancouver Door Company
203 5th St., N.W.
P.O. Box 1418
Puyallup, WA 98371
Tel: 800-999-3667
www.vancouverdoorco.com

Wausau Window and Wall Systems
1415 West Street
Wausau, WI 54401
Tel: 715-845-2161
www.wausauwindows.com

Whisper-Like
P.O. Box 2949
Toledo, OH 43606
Tel: 800-227-8246
whisper-like.com

Windor Supply and Manufacturing
4237 S. 74th E. Ave.
Tulsa, OK 74145
Tel: 800-324-1947
www.windor.com

DUCT AND FAN NOISE CONTROL AND ACOUSTICAL LOUVERS AND DAMPERS

Acoustical Surfaces, Inc.
123 Columbia Court North, Suite 201
Chaska, MN 55318
Tel: 800-448-0737

Aeroacoustic Corporation
3300 Corporation Way
Darlington, SC 29532
Tel: 843-398-1006
www.aeroacoustic.com

Industrial Acoustics Company
1160 Commerce Avenue
Bronx, NY 10462
Tel: 718-931-8000
www.industrialacoustics.com

McGill Airflow Corporation
One Mission Park
Groveport, OH 43125
Tel: 614-836-9981
www.mcgillairflow.com

RMR Products
11011 Glenoaks Blvd. #1
Pacoima, CA 91331
Tel: 818-890-0896

DOOR SEALS AND WEATHERSTRIPPING

National Guard Products, Inc.
4985 East Raines Rd.
Memphis, TN 38118
Tel: 800-647-7874
www.ngpinc.com

Pemko Manufacturing Co.
5535 Distribution Drive
Memphis, TN 38141
Tel: 800-824-3018
www.pemko.com

Zero International, Inc.
415 Concord Avenue
Bronx, NY 10455
Tel: 800-635-5335
www.zerointernational.com

ACOUSTICALLY TESTED WINDOWS

Century Manufacturing, Inc.
4620 Andrews St.
North Las Vegas, NV 89031
Tel: 800-654-7027
www.windowtech.com

Devac
(see Mon-Ray, Inc.)

Graham Architectural Products
1551 Mt. Rose Avenue
York, PA 17403-2909
Tel: 800-755-6274
www.grahamarch.com

Harvey Industries Inc.
1400 Main Steret
Waltham, MA 02154
Tel: 800-942-7839
www.harveyind.com

Industrial Acoustics Company
1160 Commerce Avenue
Bronx, NY 10462
Tel: 718-931-8000
www.industrialacoustics.com

Jeld-wen
19618 Wildwood Drive
West Linn, OR 97068
Tel: 877-783-2057
www.jeld-wen.com

Loewen, Inc.
6465 East Johns Crossing, Suite 400
Duluth, GA 30097
Tel: 800-563-9367
www.loewen.com

Milgard Windows
965 54th Ave. East
Tacoma, WA 98424
Tel: 800-645-4273 (800-MIL-GARD)
www.milgard.com

Mon-Ray, Inc.
801 Boone Avenue North
Minneapolis, N 55427-4432
Tel: 800-544-3646
www.monray.com

ACOUSTICALLY TESTED WINDOWS - *Concluded*

NRG, Inc.
22520 Ecorse Rd.
Taylor, MI 48180
Tel: 312-295-4100

Peerless Products, Inc.
2403 S. Main Street
Fort Scott, KS 66701
Tel: 866-420-4000
www.peerlessproducts.com

Rehau Incorporated
P.O. Box 1706
Leesburg, VA 20177
Tel: 800-247-9445
www.rehau.com

Republic Windows and Doors
930 West Evergreen Ave.
Chicago, IL 60622
Tel: 800-248-1775
www.republicwindows.com

St. Cloud Window, Inc.
P.O. Box 1577
St. Cloud, MN 56302
Tel: 800-383-9311
www.stcloudwindow.com

Therm-o-lite
635 S. Lafayette Blvd.
South Bend, IN 46601

Torrance Aluminum
22850 Perry St.
Perris, CA 92570
Tel: 909-943-0430
www.torrancealuminum.com

Wausau Window and Wall Systems
1415 West Street
Wausau, WI 54401
Tel: 715-845-2161
www.wausauwindows.com

WALL AND CEILING TREATMENT

BRD Noise and Vibration Control Inc.
112 Fairview Ave., P.O. Box 127
Wind Gap, PA 18091
Tel: 610-863-6300
www.brd-nonoise.com

Kinetics Noise Control
6300 Irelan Place
Dublin, OH 43017
Tel: 877-457-2695
www.kineticsnoise.com

National Gypsum Company
2001 Rexford Road
Charlotte, NC 28211
Tel: 704-365-7300
www.nationalgypsum.com

PAC International Inc.
10680 S.W. Industrial Way
Tualatin, OR 97062-9502
Tel: 866-774-2100
www.pac-intl.com

Quiet Solution, Inc.
522 Almanor Ave.
Sunnyvale, CA 94085
Tel: 800-797-8438
www.quietsolution.com

USG
125 South Franklin
Chicago, IL 60606
Tel: 312-606-4000
www.usg.com

Appendix F

Testing Laboratories

Appendix F:

Testing Laboratories

This list represents a partial list of Certified Acoustical Testing Laboratories that have the capability to perform tests in accordance with ASTM E90. This standard is used to determine the tramission loss and STC ratings of building systems and components. The list below does not imply an endorsement or recommendation by Wyle Laboratories. The National Voluntary Laboratory Accreditation Program (NVLAP) maintains a Directory of Accredited Laboratories on their website:

http://ts.nist.gov/ts/htdocs/210/214/scopes/acots.htm

Acoustic Systems Acoustical
Research Facility
415 East St., Elmo Road
P.O. Box 3610
Austin, TX 78764
Tel: 512-444-1961
www.acousticsystems.com

Architectural Testing Inc.
130 Derry Ct.
York, PA 17402
717-764-7700
www.archtest.com

Intertek Testing Services
3933 US Route 11
Cortland, NY 13045
Tel: 607-758-6215
www.intertek.com

Johns Manville Technical Center
10100 West Ute Ave.
Littleton, CO 80162
Tel: 303-978-3611
www.jm.com/mtc/appliedtechnology

National Gypsum Co.
(NGC) Testing Services
1650 Military Road
Buffalo, NY 14217-1198
Tel: 716-873-9750
www.ngctestingservices.com

Orfield Laboratories, Inc.
2709 E. 25th Street
Minneapolis, MN 55406
Tel: 612-721-2455
www.orfieldlabs.com

Riverbank Acoustical Labs, Inc.
1512 S. Batavia Avenue
Geneva, IL 60134
Tel: 630-232-0104
www.riverbank.alionscience.com

Steelcase Acoustical Test Laboratory
P.O. Box 1967
Mail Stop CD2W06
Grand Rapids, MI 49501
Tel: 616-698-5527

Stork-Twin City Testing, Inc.
662 Cromwell Avenue
St. Paul, MN 55114-1776
Tel: 651-645-3601
www.storkct.com

United States Gypsum Co.
(USG) Research Construction
Systems Laboratory
700 N. Highway 45
Libertyville, IL 60048-1296
Tel: 847-970-5255
www.usg.com

Western Electro-Acoustic Lab., Inc.
25132 Rye Canyon Loop
Santa Clarita, CA 91355
Tel: 661-775-3741

Appendix G

Glossary of Acoustical Terms

Appendix G:
Glossary of Acoustical Terms

Absorption (or Sound Absorption: The ability of sound-absorbing materials to trap sound and convert it to heat. In a room, materials such as carpeting and upholstered furniture absorb some of the sound, giving a quieter room overall regardless of the source of the sound.

Absorption Coefficient: The sound-absorbing ability of a material, which is a function of the frequency of the sound in the space. The values of sound absorption coefficients usually range from about 0.01 (for hard, smooth surfaces that do not absorb much sound) to about 1.0 (for thick absorptive fiberglass).

Acoustical Treatment: Applying design principles in architectural acoustics to reduce noise or vibration and to correct acoustical problems.

Acoustics: The science of sound, including the generation, transmission, and effects of sound waves, both audible and inaudible.

Airborne Sound: Sound traveling through air rather than through solid materials or the structure of the building (as is the case with "structure-borne sound").

Ambient Noise Level: Sometimes called the "background" noise but actually slightly different (see the definition of background sound level, below), the level of noise that is all-encompassing within a given environment, whether indoors or outside. It is usually made up of many different sounds, some originating near to and others farther from the receiver. The ambient sound level typically varies throughout the day.

American National Standards Institute (ANSI): A voluntary federation of organizations concerned with developing standards covering a broad spectrum of topics. Website: www.ansi.org

American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE): A professional organization which identifies and publishes specifications and standard practices relating to all aspects of heating, ventilation, refrigeration, and air conditioning. Website: www.ashrae.org

American Society for Testing and Materials (ASTM): An organization that develops and publishes recommended practices and standards for a broad range of testing and material properties issues. Website: www.astm.org

Architectural Acoustics: The science of sound within buildings, including its production, transmission, control, and effects.

Attenuation: The reduction of sound.

A-Weighted Sound Level (dBA): Sound levels are denoted in decibels (see the definition of decibel, below). A-weighting of the decibel level reflects the heightened sensitivity of the human ear to sound frequencies between 1000 and 6000 Hz, and the relatively reduced sensitivity to sound below 1000 Hz or above 6000 Hz. The A-weighted sound level is used to predict the relative "noisiness" or "annoyance" of many common sounds.

Background Noise: That part of the ambient noise that is unrelated to any particular sound. Other, identifiable, sounds are heard against the background sound level. Some sounds that form the ambient level are not part of the background sound level because they are normally recognized as distinct sources.

Balanced Design: A noise control design in which all important noise paths transmit the same amount of acoustic energy into the space, avoiding any "weak links" so that the combined effect ensures an acceptable noise level.

Building Officials and Code Administrators International (BOCA): *See International Building Code.*

Composite Sound Transmission Loss: A measure of the ability of a construction assembly to reduce sound passing through it. A complex assembly contains two or more elements that exhibit different individual sound transmission loss properties. A window in a wall is an example of a composite assembly; the composite sound transmission loss of the assembly is not the same as the separate sound transmission losses of the parts.

Dampen: To cause a reduction, usually through dissipation, of the sound energy. For example, lead tends to dampen sound more than wood. This is part of the overall sound transmission loss of a material or assembly.

Day-Night Average Sound Level (DNL or Ldn): The day-night average sound level is a measure of the average noise environment over a 24-hour day. It is the 24-hour energy-averaged, A-weighted sound level with a 10 dB penalty applied to the nighttime noise between 10:00 p.m. to 7:00 a.m.

Decibel (dB): The term used to describe sound levels. The decibel is a logarithmic quantity so decibels do not add or subtract according to standard rules for arithmetic. For example, 60 dB + 60 dB = 63 dB (not 120 dB).

Design Criteria: Design goals used in acoustical and noise control design of buildings. Design criteria may be stated either as the maximum allowable noise levels inside buildings or as noise reduction values (from outside to inside) required for certain types of buildings or rooms.

DNL: *See Day-Night Average Sound Level.*

Environmental Noise: Unwanted sound from various outdoor noise sources. Environmental noise sources include aircraft, cars, trucks, buses, railways, industrial plants, construction activities, lawnmowers, etc.

Frequency: The number of oscillations per second of a vibrating object, measured in Hertz (Hz). Sounds with a high frequency have a high pitch, sounds with a low frequency have a lower, more bass sound.

Hertz: The unit used to designate frequency; specifically, the number of cycles per second.

International Building Code (IBC): A comprehensive building code published by the International Code Council (ICC) covering the fire, life, and structural safety aspects of all buildings and related structures. As of January 2003, the three largest building code organizations in America merged. Building Officials and Code Administrators International (BOCA), Southern Building Code Congress International (SBCCI), and the International Conference of Building Officials (ICBO) integrated to form the International Code Council (ICC). Municipalities may still reference earlier versions of BOCA, UBC, and SBC (as well as IBC). Also, states typically have their own building codes that may incorporate all or part of these codes.

Loudness: A perceptual attribute of sound intensity on a scale extending from very soft to very loud. Loudness depends most on the sound pressure or energy of the source, but it also depends upon the frequency and waveform of the source (because the human ear is more sensitive to some frequencies and forms than others).

Masking: The ability of one sound to block out the perception of another sound. For example, radio static may mask voices in a nearby room. Masking may involve the intentional use of an unobtrusive background noise to cover some other specific intruding sound.

Noise: Any sound that is undesirable because it interferes with speech and hearing, is intense enough to damage hearing, or is otherwise annoying.

Noise Contours: Lines or "footprints" of noise level usually drawn around a noise source (such as an airport, industrial plant or highway). The lines are generally drawn in 5-decibel increments, and they resemble elevation contours found in topographic maps.

Noise Exposure: The cumulative noise reaching the ear of a person over a specified period of time (e.g., a work shift, a day, a year, a working life, or a lifetime).

Noise Level Reduction (NLR): The difference between A-weighted sound levels indoors and outdoors. It is calculated, in part, based on the Noise Reduction values calculated at various frequencies.

Noise Reduction (NR): (1) The difference, in decibels, of the average sound levels in two adjacent areas or rooms. Noise reduction could be from outside to inside, or from one room to another. Noise reduction combines the effects of the building construction plus the effect of acoustic absorption present in the receiving room. By knowing the noise reduction values and the outdoor noise levels one can

determine the Noise Level Reduction (NLR). NR values are typically expressed at various frequencies while NLR relates to overall (A-weighted) sound levels; therefore, a single room has many NR values and only one A-weighted NLR value. (2) The reduction of noise levels within a space.

Octave: The interval between two sound frequencies having a ratio of 2. For example, if the center frequency of one octave is 125 Hz, the next octave up will be centered at 250 Hz, and the octave above that will be at 500 Hz.

Octave Band: A frequency range that is one octave wide. Standard octave bands are designated by their center frequency. For example, the octave band centered at 125 Hz includes all the frequencies between 89.1 and 178 Hz.

Octave Band Center Frequency: The average of the upper and lower frequencies of the octave. Standard octave band center frequencies in the audible range are 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000, and 16,000 hertz.

Receiver: The listener who hears a sound or the measuring microphone that detects the sound transmitted by the source. The receiving room is the room where the sound level is being assessed, with the source of the sound generally being outside the room.

Reverberation: The persistence of sound in an enclosed space as a result of multiple reflections after the sound source has stopped. The more absorptive the room is, the shorter the reverberation time will be. Generally, if the reverberation time is too short, people feel that the room is "dead" while if it is too long, there is confusion among sounds and the room is too reverberant (also see the definition of absorptions, above).

Shielding: The ability of hills or structures to physically block sound or create shadow zones where sound levels are reduced. For a house near an airport, the rooms on the side away from the airport will be "shielded" somewhat from the noise.

Sound Insulation: Reducing the sound level inside a building through the use of specific building construction materials, methods and component assemblies that provide noise reduction.

Sound Transmission Class (STC): A single-number rating derived from measured values of transmission loss, in accordance with ASTM Classification E413, "Determination of Sound Transmission Class". It provides an evaluation of the sound-insulting properties of built construction against sounds such as speech, radio, and television. STC ratings are available for many common building materials.

Sound Transmission Loss (TL): A measure of a built construction's ability to reduce sound passing through it, expressed in decibels.

Source: Something that generates sound. Common sound sources in a suburban community include factories, rock concerts, airplanes, cars, lawnmowers, stereo systems, TVs, and people talking.

Southern Building Code (SBC): *See International Building Code.*

Spectral Characteristics/Spectrum: The frequency content of the noise produced by the source. The spectral content of a sound influences how far it travels, how well it penetrates buildings, whether or not it makes things rattle, and how annoying people find it to be.

Structure-borne Sound: Sound energy transmitted through a solid medium such as the building structure. The building structure may radiate the sound as "airborne sound" in another room.

Thermal Insulation: A material or assembly of materials used primarily to provide resistance to heat flow. In a home, thermal insulation is provided by the basic building materials (brick, wood, and glass, for example), by the air spaces between things (such as the air gap in a "thermo-pane" window) and by thermal insulation materials such as fiberglass in walls and attics.

TL: *See Sound Transmission Loss.*

Uniform Building Code (UBC): *See International Building Code.*

Appendix H

Bibliography

Appendix H:
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Mahoney, W.D. (Editor-In-Chief), "Means Residential Cost Futa", Means Co., Inc., 8th Annual Edition, RS, 1989.

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U.S. Department of Housing and Urban Development (HUD), Office of Policy Development and Research, "American Housing Survey for the United States: 2001", HUD No. H150/01, and U.S. Department of Commerce, Economics and Statistics Administration, October 2002.

U.S. Department of Transportation (DOT), Federal Aviation Administration (FAA), " Guidelines for the Sound Insulation of Residences Exposed to Aircraft Operations," DOT/FAA/PP-92-5, October 1992

Typical Sound Insulation Costs

Sound insulation costs vary widely depending upon such factors as:

- Outdoor DNL zone,
- Selected indoor noise goal,
- Construction of the residence,
- Region of the country,
- Availability of contractors familiar with sound insulation construction, and
- Number of residences sound insulated at one time.

On average the cost to sound insulate an existing house to achieve 25 to 35 dB of attenuation can vary between $15,000 and $45,000.

Interior Noise Reduction Goals

Navy guidelines indicate that residential development is not compatible with locations impacted by noise levels above 65 dB DNL. The Navy also provides guidance that if local governments approve residential development in those areas, then as a minimum they should also require that new buildings reduce outdoor noise levels by at least 25 dB between the 65 and 70 dB DNL contours, and by at least 30 dB between the 70 and 75 dB DNL contours.

To get a copy of the full *Sound Insulation Guidelines for Residences Exposed to Aircraft Operations publication* or to obtain a free computer program to estimate the scope and cost to sound insulate a room in your house, contact the Naval Facilities Engineering Command (NAVFAC) regional office nearest you:

NAVFAC Headquarters, Washington DC
Contact: Alan Zusman
E-mail: Alan.Zusman@navy.mil
Telephone: (202) 685-9181

NAVFAC Atlantic, Norfolk, VA
Contact: Fred Pierson
E-mail: Fred.Pierson@navy.mil
Telephone: (757) 322-4935

NAVFAC Southwest Division, San Diego, CA
Contact: Robert Henderson
E-mail: Robert.K.Henderson@navy.mil
Telephone (619) 532-1622

NAVFAC Southern Division, Charleston, SC
Contact: Richard Jolly
E-mail: Richard.Jolly@navy.mil
Telephone: (843) 820-5889

Prepared by:
Wyle Acoustics Group
Wyle Laboratories, Inc.

Sound Insulation Guidelines for Residences Exposed to Aircraft Operations

April 2005

Prepared for:
NAVAL FACILITIES ENGINEERING COMMAND

Aircraft noise interferes with typical activities in homes such as watching television, talking on the telephone, and sleeping. Reducing the level of aircraft noise inside an existing home or planning a new home for improved noise reduction is referred to as sound insulation. This document provides an overview of sound insulation concepts and step-by-step guidelines for sound insulating a home. This guide was developed for homeowners, municipal planning departments and design professionals interested in sound insulating residences.

Sound Insulation Basics

Noise enters a house through all exterior elements, including walls, roofs, doors, windows, range exhaust ducts, chimneys, etc. Each of these paths must be addressed if significant noise reduction is desired.

Typical sound insulation modifications include:

Windows - the single most important modification is to use acoustical windows, or add acoustical storm windows over existing windows.

Doors - Acoustical doors or acoustical storm doors should be used. These products are heavier than typical doors and have a special type of weatherstripping.

Walls and Ceilings - For houses with lightweight walls and ceilings it is often necessary to add layers of gypsum board or other materials to walls and ceilings in order to meet the acoustical design goals.

Skylights - For skylights the recommended modifications are to add secondary interior glass panels, to replace the units with special acoustical skylights, or to remove the skylights.

Fireplaces - The recommended modifications for fireplaces are to either provide a special acoustical chimney-top damper, or to provide tight-fitting glass doors over the fireplace.

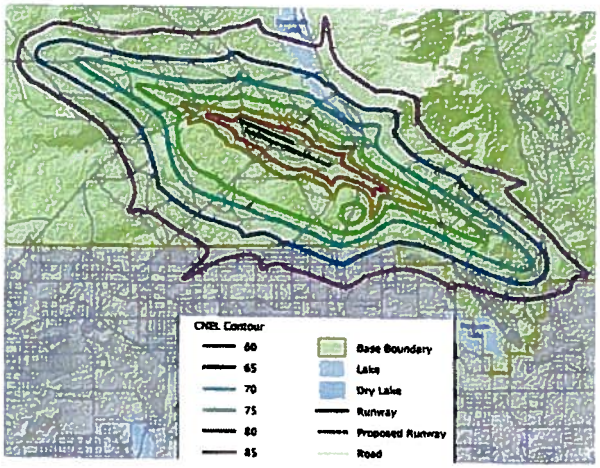
Air Conditioners - Through-window or through-wall air conditioners should be removed to achieve the noise reduction goal.

Exhaust Fans - Kitchen range hood or in-wall fans that duct to the exterior are a significant noise leak. In general, replacing them with ductless models is the best course of action.

Ventilation - When a house is sound insulated it is necessary to close windows to achieve the benefits of the modifications. To replace the cooling and ventilating effects of open windows air conditioning and/or ventilation systems should be provided.

Noise Contours Explained

The Department of the Navy and other federal agencies express noise levels around air installations using Day-Night Average Sound Level (DNL) contours. DNL represents the average noise exposure of all aircraft events that occur at the air installation and is calculated based



upon the type of aircraft operated, the number of operations, the runways used, the aircraft flight tracks, the time of day that the operations occur, and operational conditions such as the use of afterburners. In addition, a 10 dB penalty is added to the DNL calculation between 10 p.m. and 7 a.m. to account for the added intrusiveness of sounds that occur during normal sleeping hours, both because of increased sensitivity to noise during those hours and because ambient sound levels at night are typically lower than during the day. The DNL can be determined from an Air Installation Compatible Use Zone (AICUZ) study if one was completed for the air installation near your house.

For air installations in California, the Community Noise Equivalent Level (CNEL) is used in lieu of the DNL in the AICUZ study. CNEL is very similar to DNL except that it includes an additional 5 dB penalty for noise that occurs in the evening from 7 p.m. to 10 p.m.

Appendix C - Example Noise Disclosure Statement

To: _____

The property at ____(address)_____ is located within the airport environs of ____(airport)_____ . Santa Rosa County has determined that this is an area of airport operations. The County has placed certain restrictions on the development and use of property within airport environs zones in addition to the restrictions in Article Six of the Land Development Code (the zoning code). Before purchasing or leasing the above property, you should consult Article Eleven of the Santa Rosa County Land Development Code to determine the restrictions which have been placed on the subject property.

Certification

As the owner of the subject property, I hereby certify that I have informed_____ _____ , as a prospective purchaser/lessee, that the subject property is located in an Airport Environs Zone.

Dated this _____ day of _____ , 19___ .

_____ _____

Witness Owner

As a prospective purchaser/lessee of the subject property, I hereby certify that I have been informed that the subject property is in an Airport Environs Zone and I have consulted Article Eleven of the Santa Rosa County Land Development Code to determine the restrictions which have been placed on the subject property.

Dated this ____day of _____, 19 ___ .

_____ _____

Witness Purchaser/Lessee

Appendix D - Eglin JLUS Public Presentations and Workshops

APPENDIX D - ELGLIN JLUS PUBLIC PRESENTATIONS AND WORKSHOPS

Appendix Contents

Section No.	Title	Date
1.0	Planning Coordination Meeting	May 22, 2007
2.0	Public Meeting #2	Oct 3, 2007
3.0	Eglin Vision 2015 Vector Check	Nov 1, 2007
4.0	Technical Advisory Group Meeting	May 8, 2008
5.0	Public Meeting	May 18, 2008
6.0	Niceville/Valparaiso Chamber Meeting	May 22, 2008
7.0	Policy Committee Meeting	Jul 23, 2008
8.0	City of Destin Council Briefing	Sep 29, 2008
9.0	Policy Committee Update	Feb 5, 2009
10.0	Technical Advisory Group Update	Apr 9, 2009
11.0	Policy Committee Meeting	Apr 30, 2009

SECTION 1.0

Planning Coordination Meeting

Joint Land Use Study

Planning Coordination Meeting

Tuesday, May 22, 2007

6:00 p.m.

Niceville City Hall

TETRA TECH

SOLIN & ASSOC. inc.

Agenda

- Call to Order & Introductions
  - Jeff Fanto
    Growth Project Coordinator
- Welcome
  - Commissioner James Campbell
    Chair, JLUS Policy Committee
- JLUS Overview
  - Rich Tenga
    Project Manager, Office of Economic Adjustment

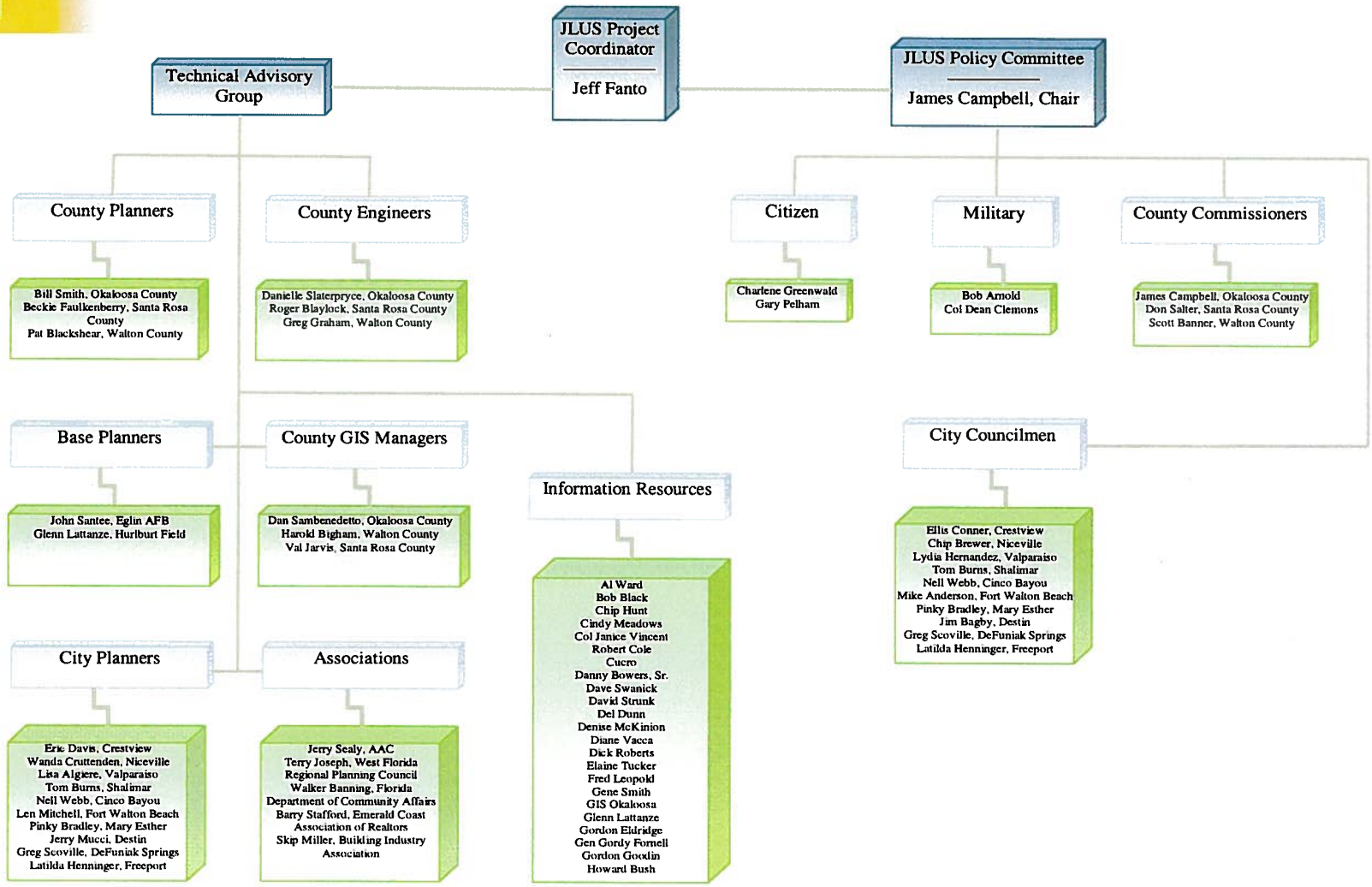
Agenda (continued)

- Eglin AFB Prospective
  - Colonel Dean Clemons
    Commander, 96th Air Base Wing
- JLUS Work Plan & Progress
  - Michael Bomar
    Vice President, Tetra Tech Inc.
- JLUS Lessons Learned
  - Marty Martin
    Aviation Community Planner, NAS Whiting Field

Agenda (continued)

- Comments From The Audience
- Closing Remarks
  - Chairman Campbell

Joint Land Use Study (JLUS)



Welcome!

Commissioner James Campbell
Chair, JLUS Policy Committee

JLUS Overview

Rich Tenga

Project Manager, Office of Economic Adjustment

OFFICE OF THE SECRETARY OF DEFENSE

OFFICE OF ECONOMIC ADJUSTMENT

JOINT LAND USE STUDY PROGRAM

Eglin AFB – 22 May 07

Rich Tenga/Dan Glasson - Project Managers
(703) 604-5160 www.oea.gov

A JLUS is:

- A cooperative land use planning effort between military installations and the surrounding communities.

- It promotes compatible community growth while supporting military training and operational missions.

Addresses 2 Primary Concerns

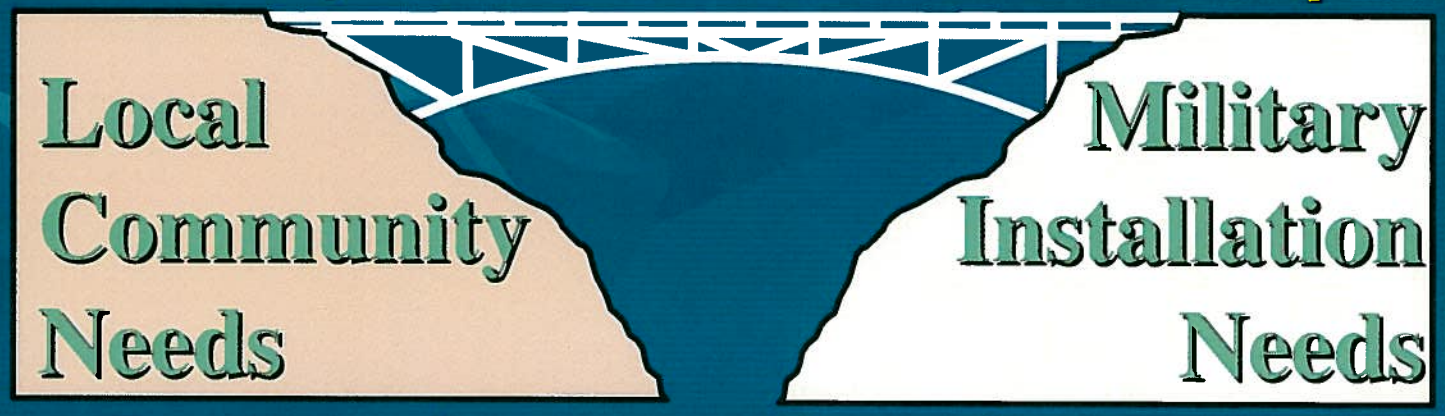
- First, to protect the health, safety and welfare of the local community with regard to military operations.

- Second, to address encroachment that is threatening or may threaten the mission and viability of an installation.

Creative Community Planning can Bridge the Encroachment Gap

JLUS* — Compatibility — *AICUZ

Joint Land Use Study — *Air Installation Compatible Use Zones*

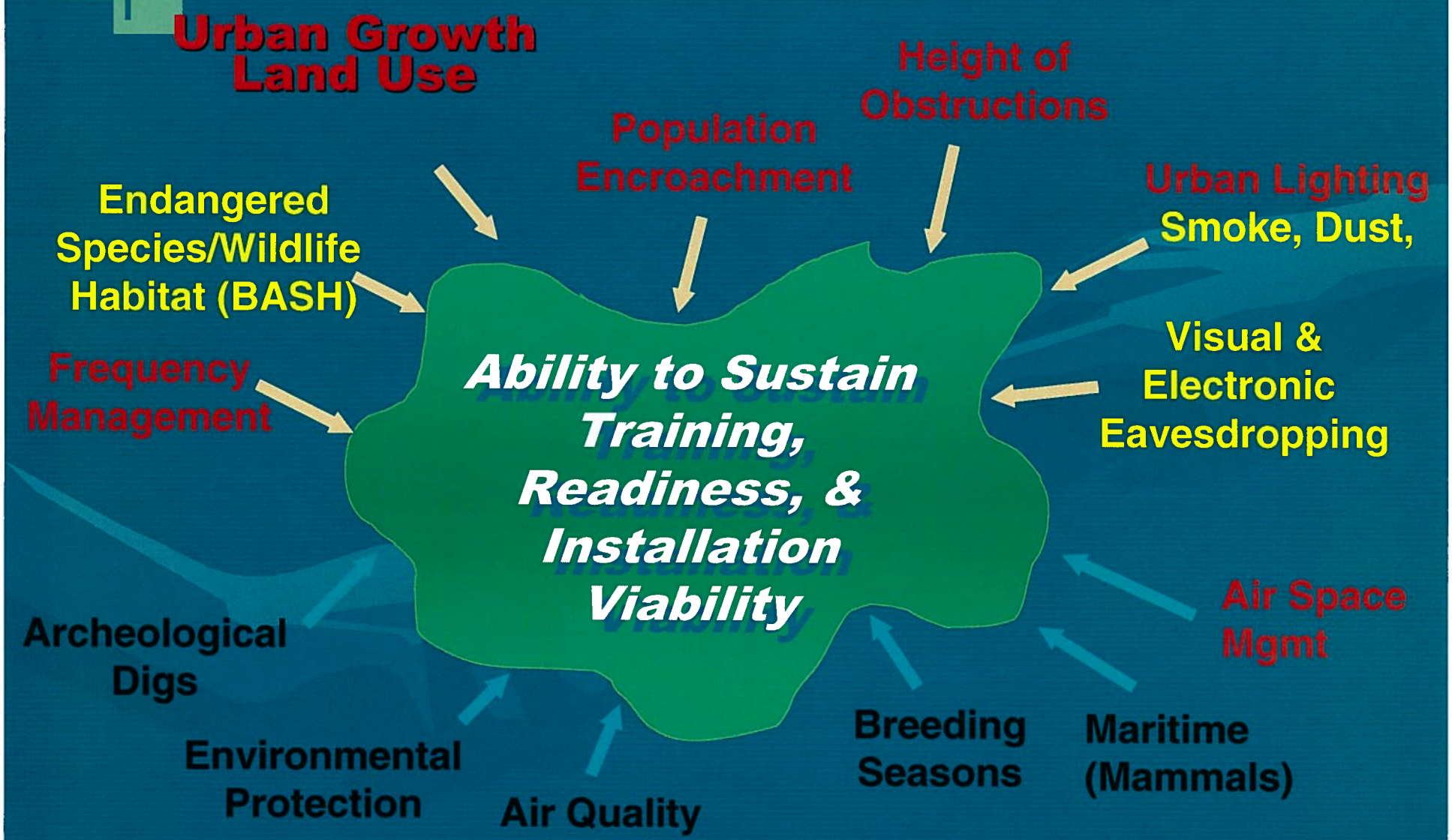


Partnering to Plan the Future

Eglin AFB JLUS Strategy

- Phase I, initiate JLUS based on current operations and AICUZ.
  - Initial planning needed for growth plan.
- Phase II, update with JSF data in revised AICUZ reports

Many Faces of Encroachment



JLUS Process

ORGANIZE

- √ Identify Community Sponsor (State/County)
- √ Appoint Community JLUS Committees.
- √ Develop a Scope of Work (SOW) .
- √ Apply for OEA Grant.

PLAN

- Review the Installation's operations and effect on Community.
- Identify community needs/concerns
- Identify Encroachment issues.
- Develop Strategies to address encroachment issues via JLUS recommendations.

IMPLEMENT

Implement Recommendations, such as:

- Revise community comprehensive planning/zoning
- Limit New Development in encroachment areas.
- Revise base operations to reduce community impact
- Revise Building Codes for Sound Attenuation.
- Implement/enforce Real Estate Disclosure Laws

JLUS ORGANIZATION

RESPONSIBILITIES		PARTICIPANTS
Coordination Accountability Grantee - Grant Management	STUDY SPONSOR	Okaloosa County
Policy Direction Study Design/Oversight Budget/Consultant Approval Report Adoption Implementation	JLUS POLICY COMMITTEE	County Official (Chair) City Managers Base Leadership (Vice Chair) Private Sector Leaders State Officials Citizen Representative
Technical Review Alternatives Report Development Recommendations	WORKING GROUP	Local & Base Planners/staff Business Representatives Consultant Residents

Technical Committees
As needed

Technical Committees
As needed

The Installation's Roles

- ✓ Identify need for JLUS
- ✓ Submit nomination via chain of command
- Provide AICUZ/operations data
- Identify issues, study area, opportunities
- Provide leadership (Vice Chair) & support
- Provide technical assistance
- Implement recommendations (Good faith)

OEA's Roles

- ✓ Respond to service nomination
- ✓ Provide guidance on organizing, planning & implementing a JLUS
- ✓ Facilitate communication between the installation & the community
- ✓ Provide technical assistance
- ✓ Provide funding support to community sponsor *(90%)*

The Community's Roles

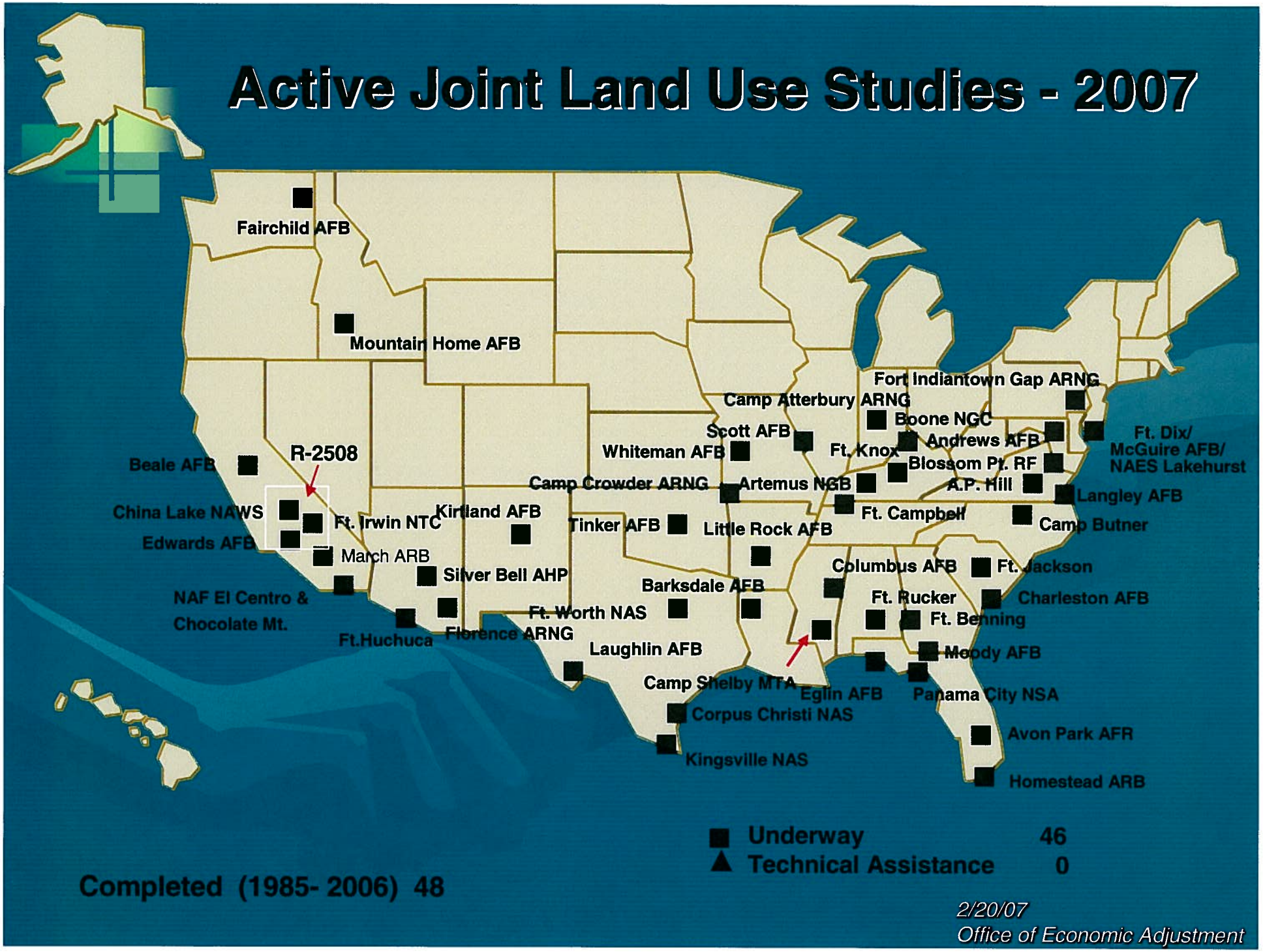
- ✓ Provide Sponsorship & Leadership
- Conduct study (It's not a DoD study)
- **Keep public informed (Buy-in)**
- ID issues, study area, opportunities
- Adopt the completed JLUS report
- Implement JLUS recommendations by:

Incorporation via local ordinance into community comprehensive plans, zoning ordinances, subdivision regulations and building codes.

Typical Recommendations

- Revise Land Use Plans - Compatibility
- Revise Zoning to be consistent with Plan
- Require Sound Attenuation to level of noise
- Require Real Estate Disclosure
- Consider acquisition of land, leases, transfer development rights, easements
  - Conservation Partnering Program
- Modify Base Operations
- Form post-JLUS implementation committee

Active Joint Land Use Studies - 2007



LESSONS LEARNED

- Obtain & Consider all inputs – open mind
- Keep the Public Informed on process & results
  - At least 3 Public Workshops – 1 Public Hearing
  - Advertise: website, press, written notice to each property owner in the affected area
  - Address concerns/try to accommodate
- MacDill AFB JLUS – Planners Comments
  - Policy Committee should stay involved, visible, and state direction/purpose through out process.
  - Limit military terminology

LESSONS LEARNED – cont.

Observations by Captain John Pruitt – CO NAS Pensacola

1) Your community leadership (both political and business) has to want to reach an accommodation on compatible land use. Their courage and perseverance will be required as threats of law suits over private property rights invariably enter the discussion,

2) I believe it is important for the military to be open and honest, answer all questions and only ask for what is needed in the form of zoning, disclosure, etc. This is an issue of credibility, something invaluable in this process,

3) We (the military) must stay the course and continue the process beyond the preparation of a study. We have to get the recommendations and policies that are determined to be in the best interests of the community (as a whole) into enforceable ordnances.

JLUS Summary

- OEA primarily provides planning assistance.
  - Limited implementation assistance
- A JLUS is not a DoD or Eglin AFB report
- JLUS recommendations are not legally binding, however, a good faith commitment is expected.
- Goal is full implementation of recommendations – JLUS oversight committee is recommended.

Eglin AFB Prospective

Colonel Dean Clemons

Commander, 96th Air Base Wing

JLUS Work Plan & Progress

Michael Bomar
Vice President, Tetra Tech Inc.

TETRA TECH

SOLIN & ASSOC. inc.

Okaloosa County JLUS Introductory Orientation Meeting

May 22, 2007

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

Introduction

- TetraTech/Solin & Associates Team
- Prior Successful Projects
- Over 70 Years Combined Team Experience
- Project Understanding
- Local Presence

TETRA TECH

SOLIN & ASSOC

OKALOOSA COUNTY

Project Team Leaders

- **Michael Bomar, PE,** Project Manager
- **Les Solin, FAICP**, Planning Lead
- **Craig Campbell, RA**, Eglin Facilities & Operating Procedures Lead

TETRA TECH

SOLIN & ASSOC

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

OKALOOSA COUNTY

Phased Work Plan

Phase I: Data Collection & Inventory & Mapping

↓

Phase II – Existing & Future Land Use

↓

Phase III – Compatibility Recommendations

↓

Phase IV – JLUS Report

↓

Phase V – Ongoing Support

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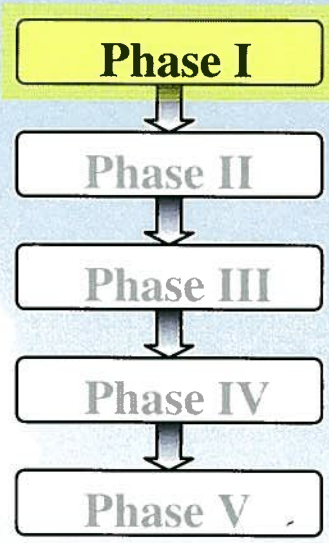
SOLIN & ASSOC INC

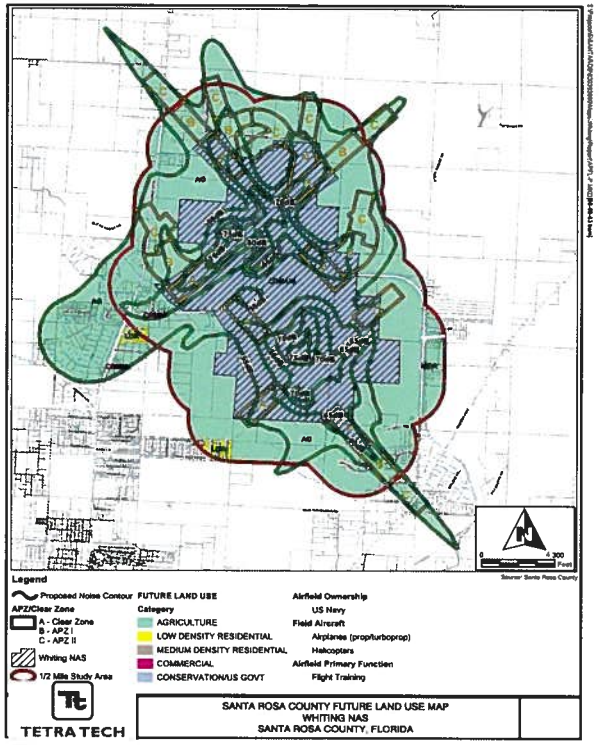
Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

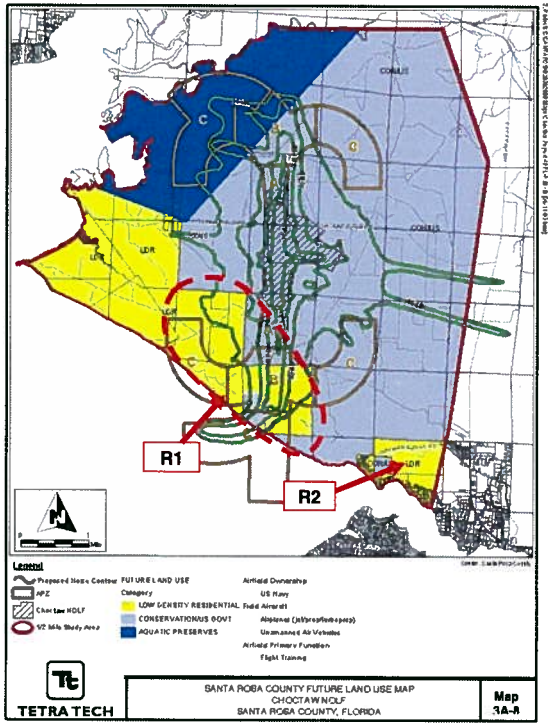
OKALOOSA COUNTY

Data Collection & Inventory

- Collect Existing Information
- Initiate Public Involvement
- Create GIS Maps
- Identify Local Codes, Ordinances and Regulations
- Create Study Area







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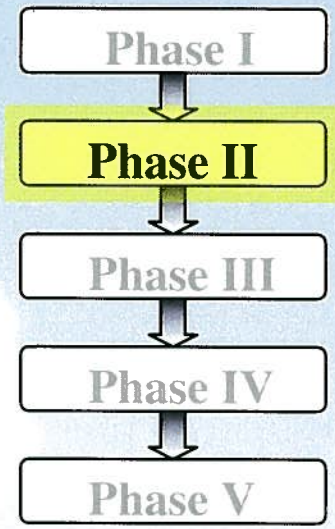
Analyze Existing & Future Land Use

- Evaluate Existing Land Use Within Study Area
- Evaluate Eglin Growth Objectives and Procedures
- Evaluate Infrastructure Expansion
- Evaluate Vacant Lands
- Evaluate Future Growth Potential
- Identify Compatible Land Uses
- Identify Natural Buffers



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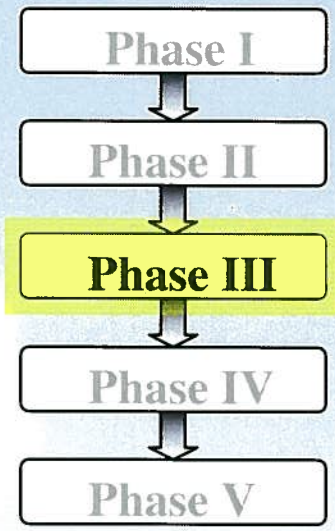
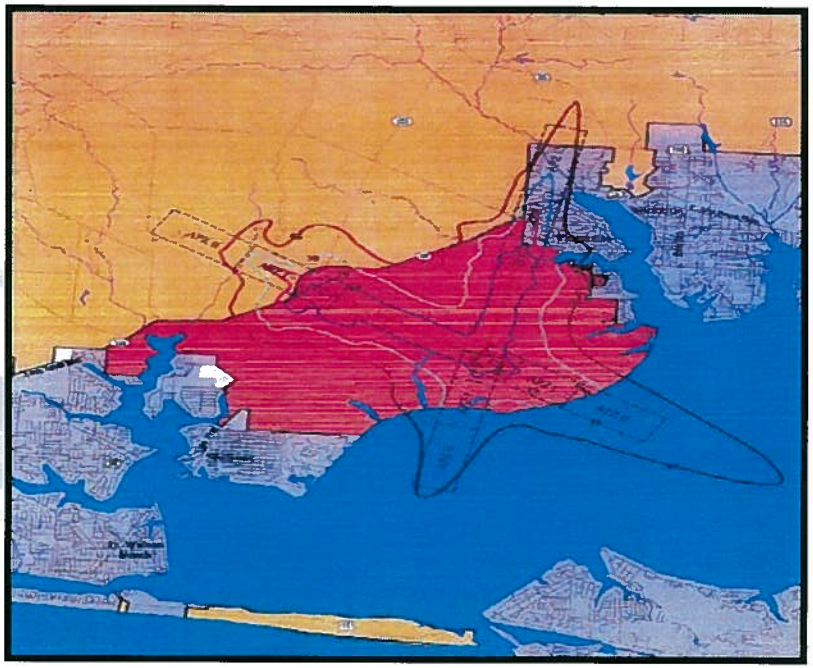
Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

OKALOOSA COUNTY

Land Use Compatibility Recommendations

- Identify Conflicts
- Develop Compatibility Maps
- Identify Regulatory and Non-Regulatory Measures
- Local Government Implementations Strategies
- Conduct Public Forum





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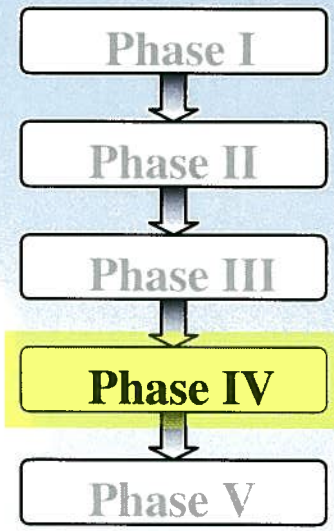
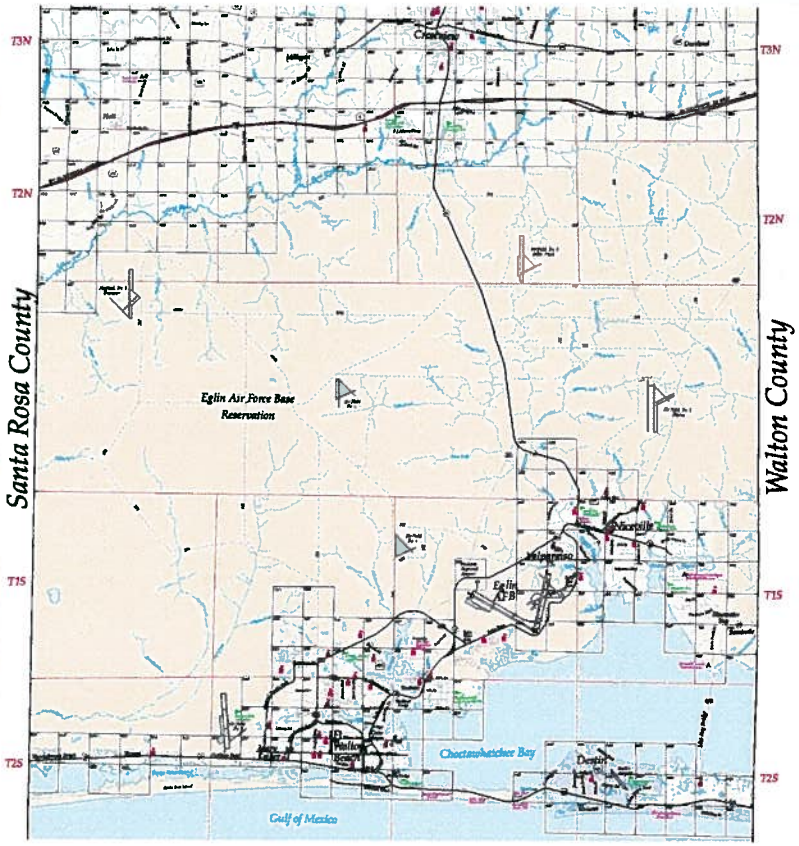
Prepare JLUS Report

- Submit Draft Initial Report
- Conduct Public Forums
- Revise Report
- Adopt Report
- Public Release





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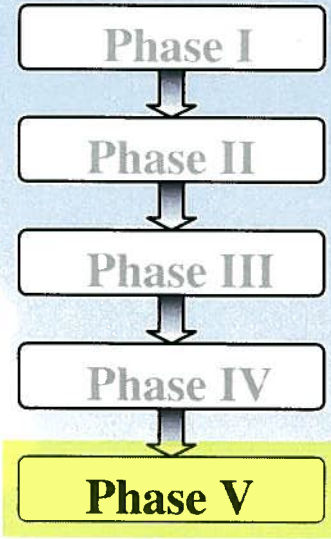
Ongoing Support

- Assist Jurisdictions With Implementation
- Develop Effectiveness Measurement Method
- Continued Monitoring and Planning



TETRA TECH

SOLIN & ASSOC INC

Project Schedule

Phase	Start	End
Phase I: Data Collection & Inventory & Mapping	April 2007	August 2007
Phase II – Existing & Future Land Use	May 2007	September 2007
Phase III – Compatibility Recommendations	June 2007	November 2007
Phase IV – JLUS Report	December 2007	March 2008
Phase V – Ongoing Support	Ongoing	Ongoing

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Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

OKALOOSA COUNTY

Contact Information

Michael Bomar, PE
12815 Emerald Coast Pkwy, Suite 110
Destin, Florida 32550
850.837.9278 (office)

Jeff Fanto
Growth Project Coordinator
1804 Lewis Turner Blvd, Suite 200
Fort Walton Beach, FL 32547
850.609.3014

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Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

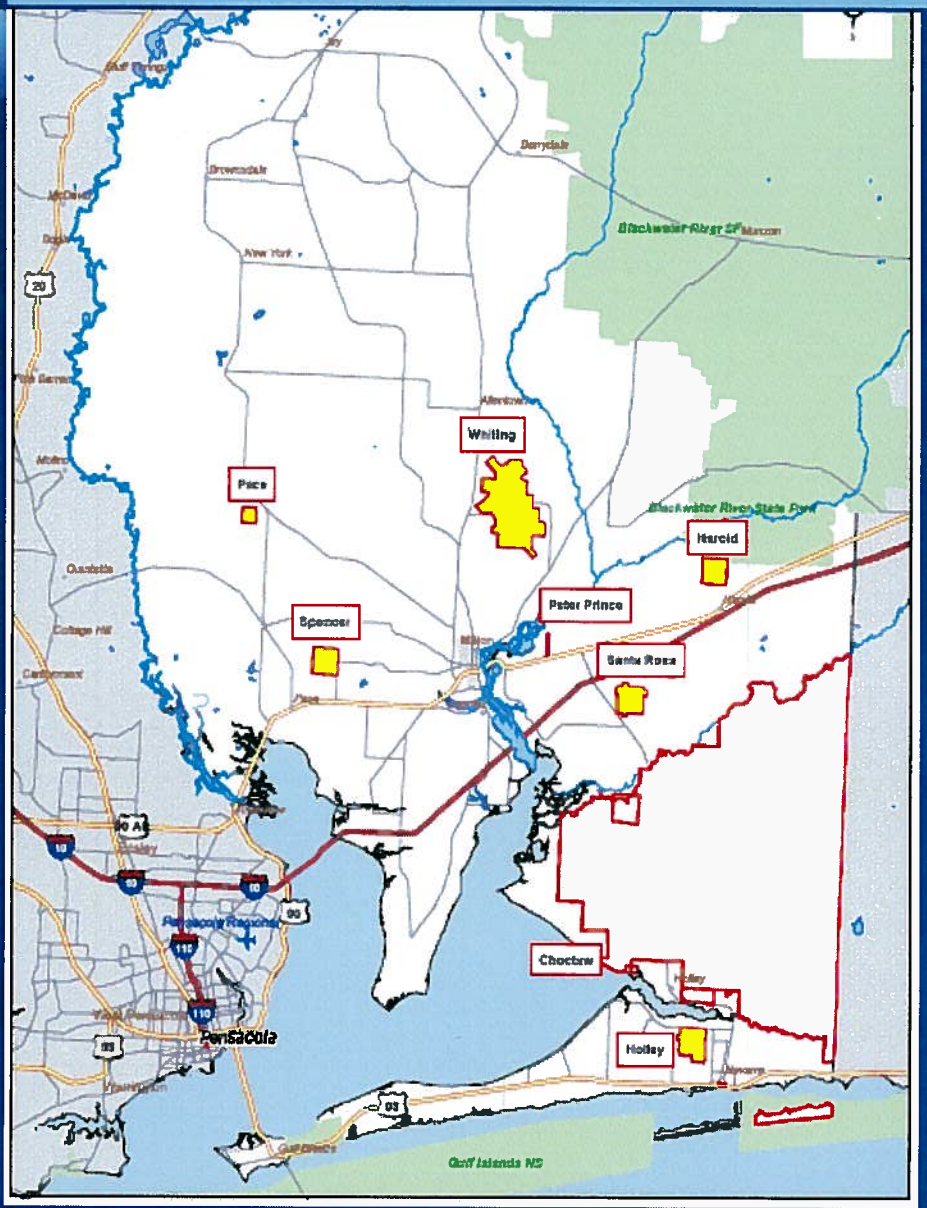
JLUS Lessons Learned

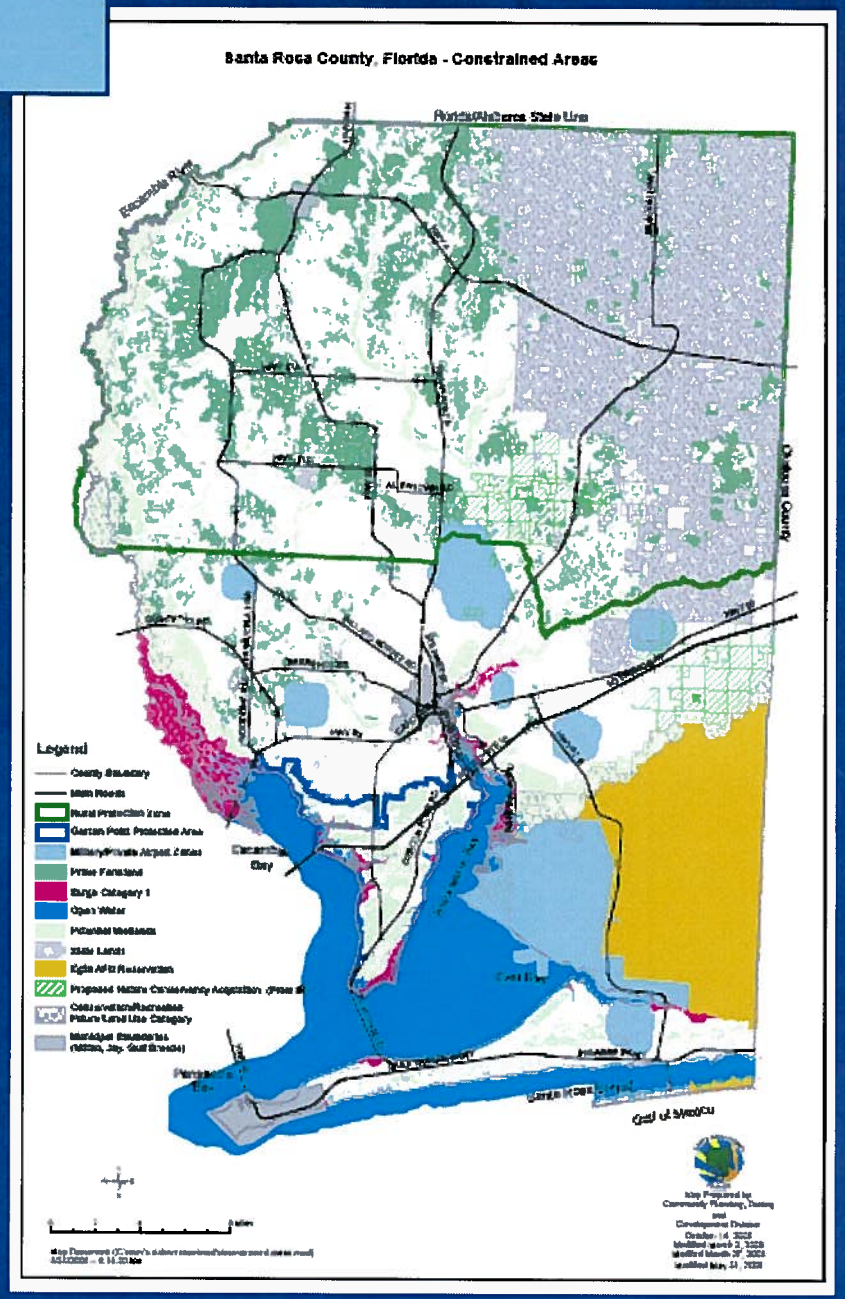
Marty Martin
Aviation Community Planner
NAS Whiting Field

JLUS:
The Santa Rosa County Experience

Geographic Context –

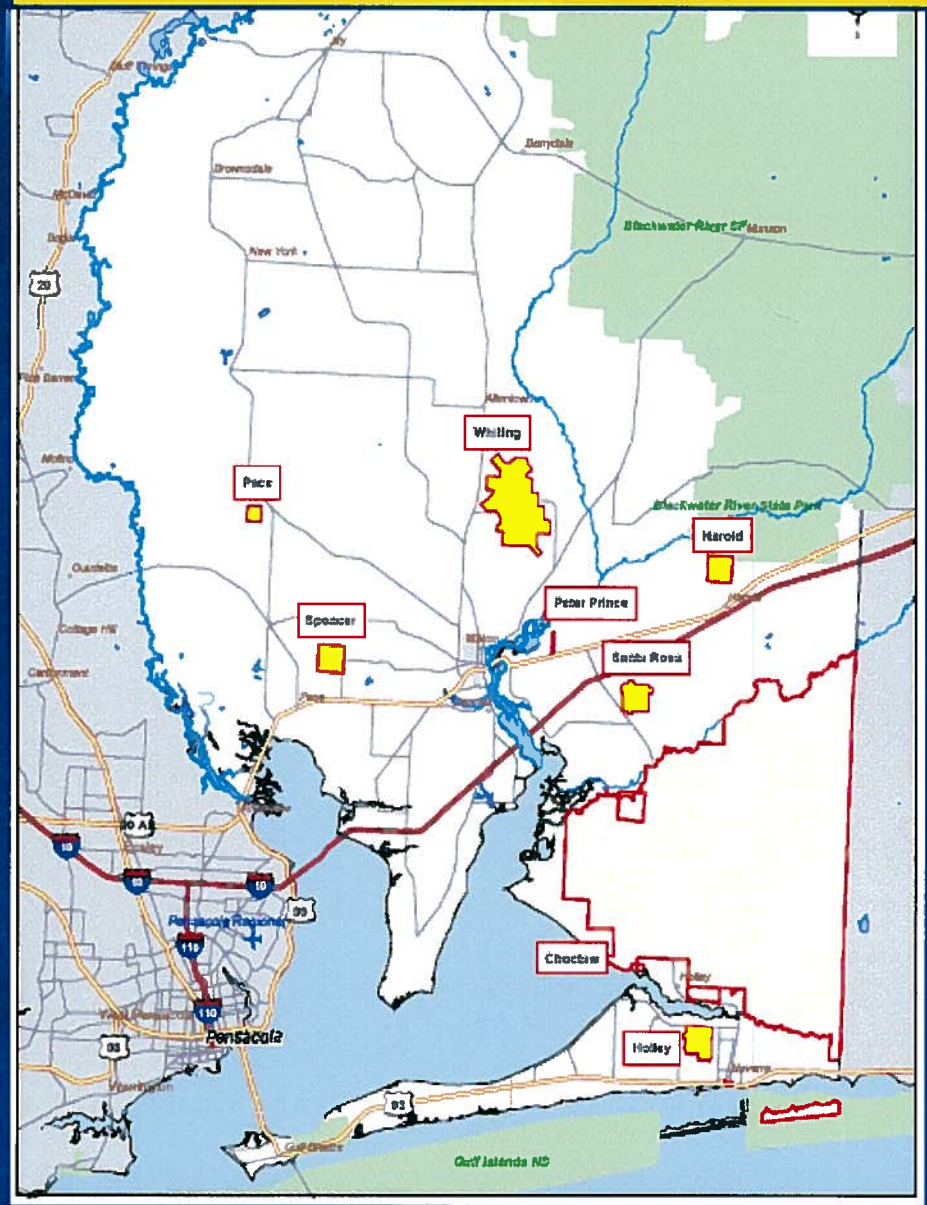
Why we needed a Joint Land Use Study

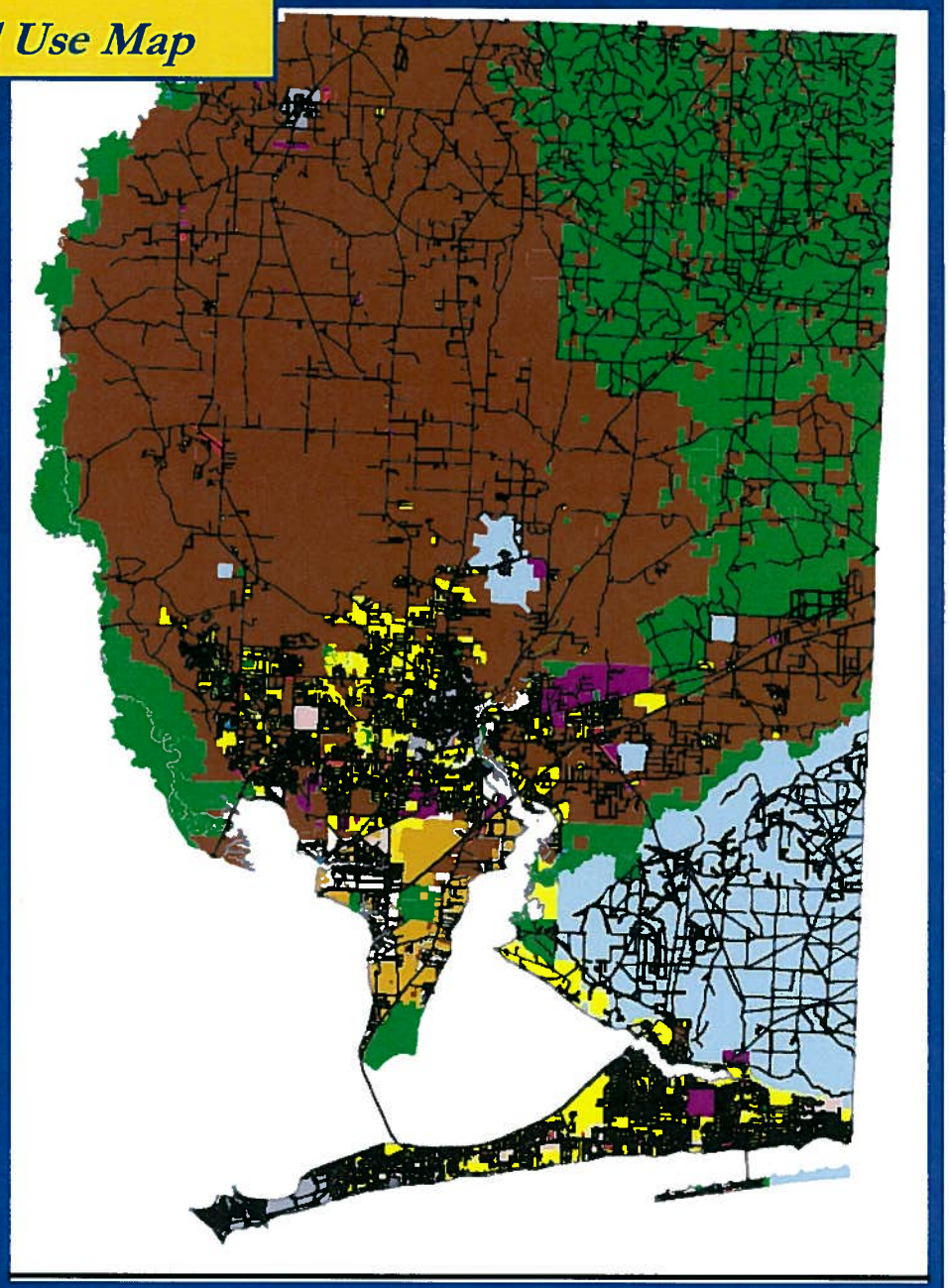




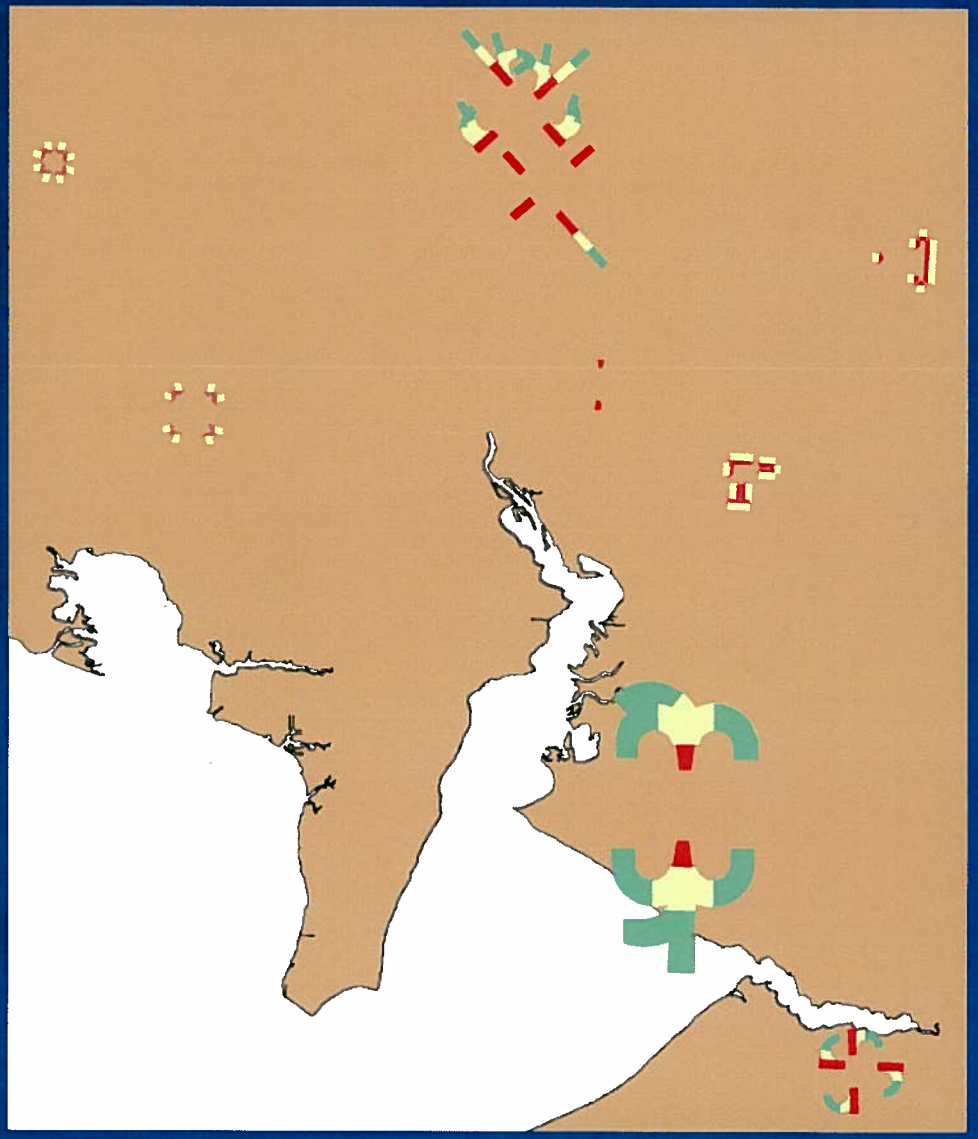
Geographic Context –

Location of Airfields Relative to Future Land Use Map





Pre-2003 Encroachment Protection – AICUZ Zones

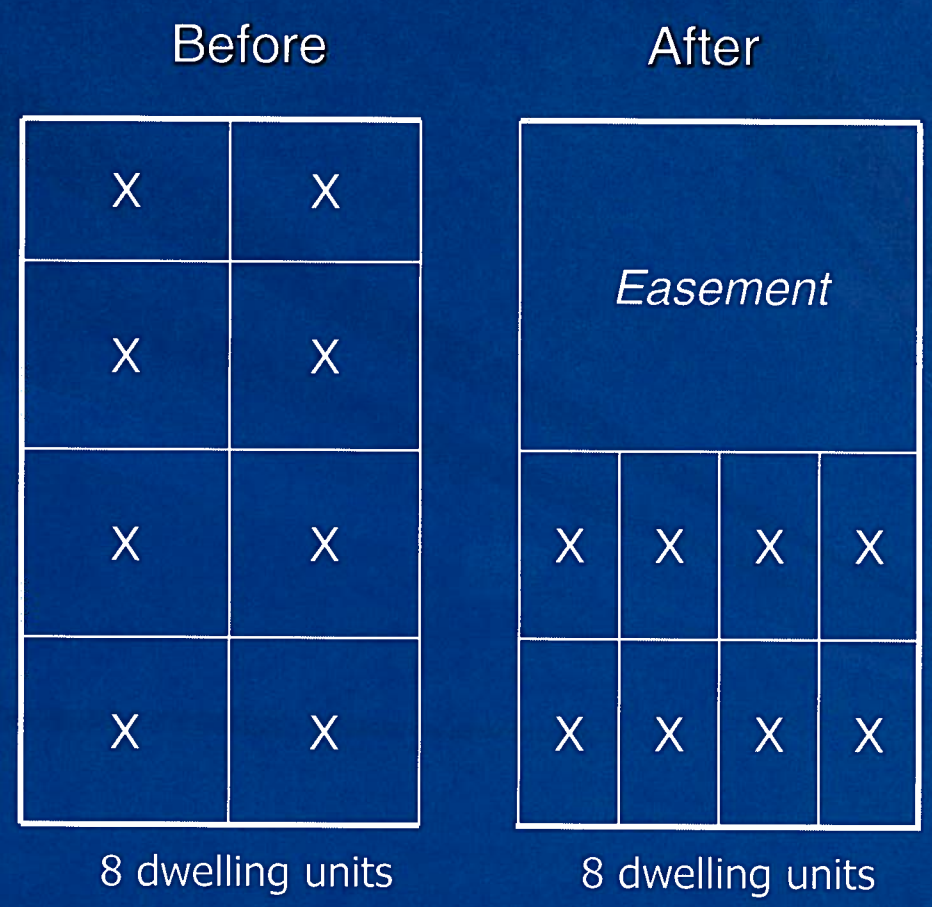


- **Joint Land Use Study, 2003**
  - $50,000 study funded in part through an OEA grant.
  - Eight Navy airfields and one public airport in Santa Rosa County evaluated and recommendations made for limiting encroachment of incompatible development.
- Recommendations included:
  - Regulatory Changes
  - Land Acquisition; Conservation and Agriculture Easements
  - Notification requirements

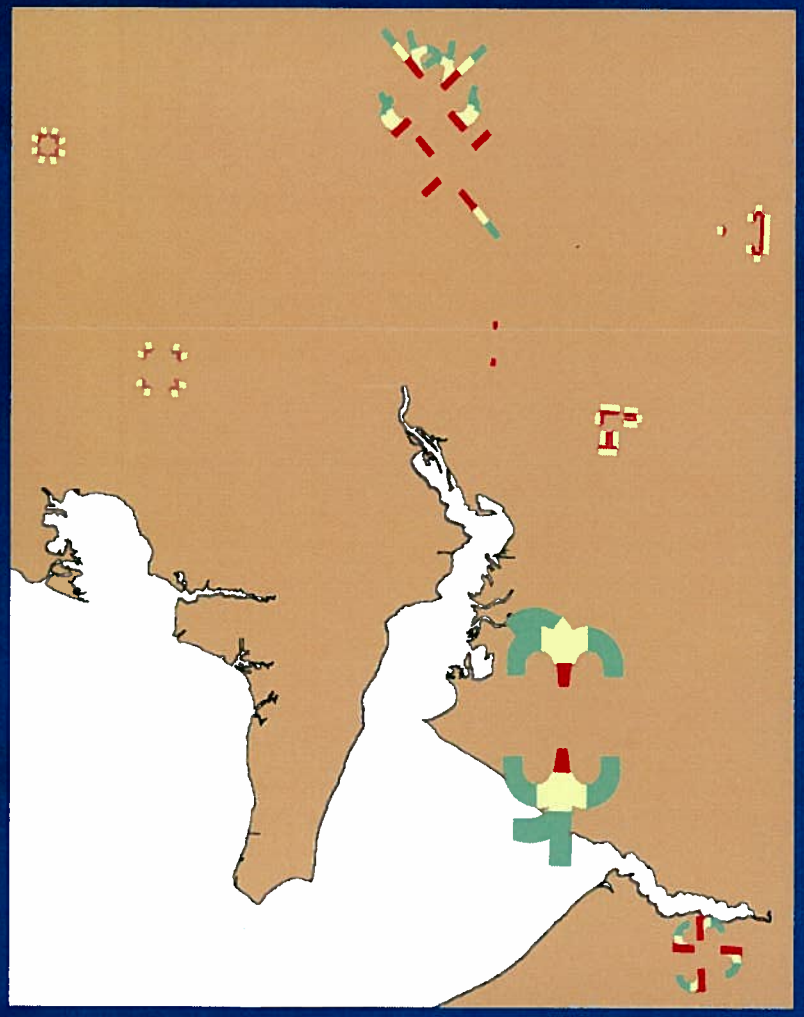
Key Regulatory Changes

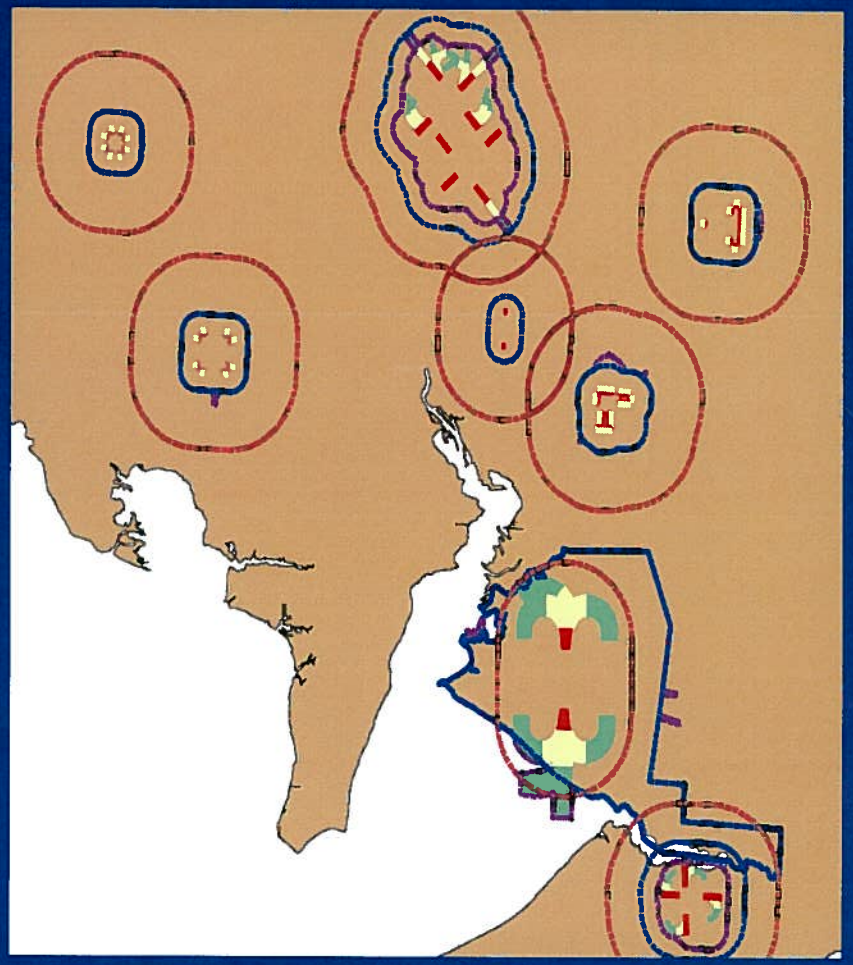
- Zones of Regulation:
  - Military Airport Zones,
  - Military Airport Influence Areas, and
  - Notification Zones
- Residential Rezoning – upzoning prohibited in MAZ
- Permitted Uses – limited by zone
- Height Limits
- Lighting

- Subdivision of Land in MAZ



Zones of Land Use Regulation – Before and After





Land Acquisition - Economic Development

- **Aviation/Commerce Park**
  - 263 acres adjacent to NAS Whiting Field, protects clear zone and prevents residential encroachment.
  - Master Plan funded through Community Defense Grants and DOD Advance Planning Grants.

- **Florida Defense Infrastructure Projects**
  - Examples include:
    - $1.09 million in approved Defense Infrastructure Grants funded the 2003 Land Acquisition Study and the direct purchase of approximately 263 acres adjacent to NAS Whiting Field for an Aviation Commerce Park, and an additional 130 acres for protection of AICUZ zones.
    - Land Acquisition Grants for implementation of the Land Acquisition Study.
    - Aviation Commerce Park Grants for preparation of the Master Plan and associated PD&E for the Aviation Commerce Park.

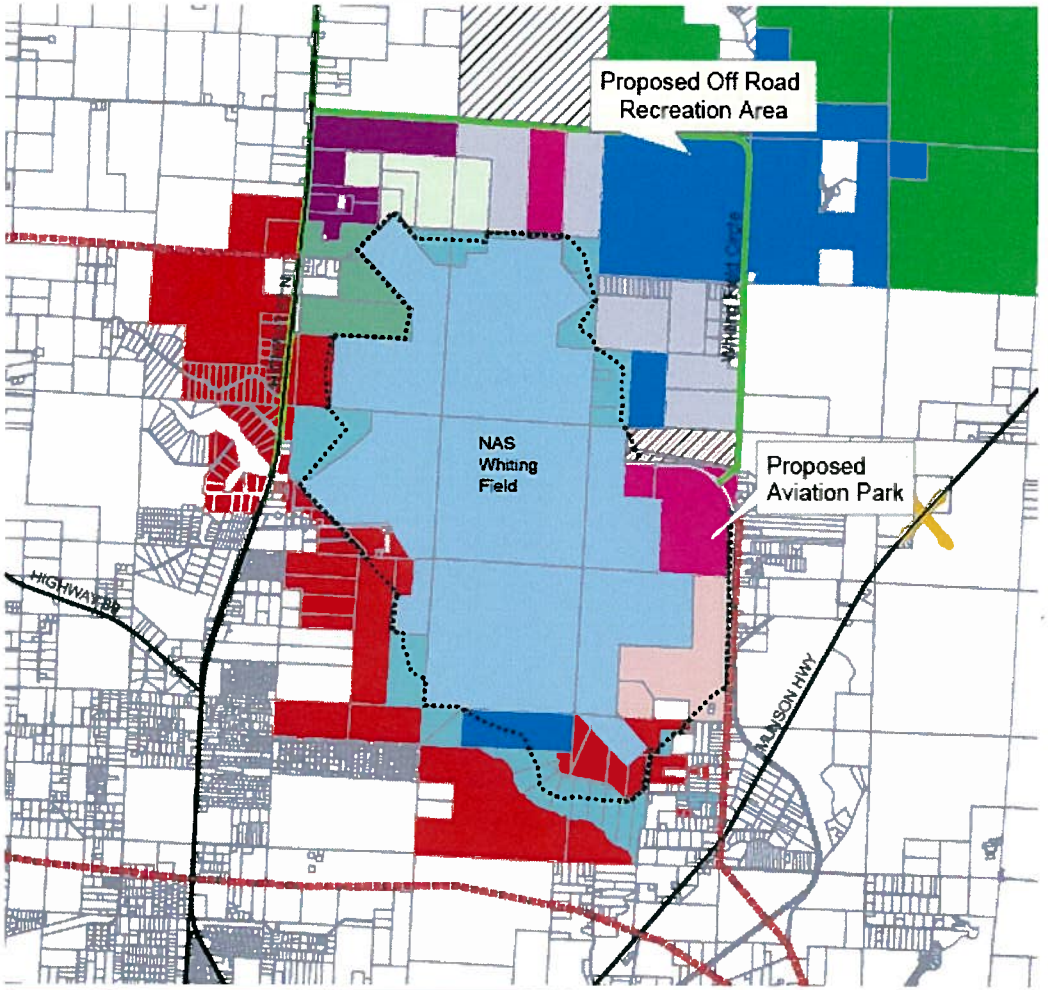
Land Acquisition – Conservation, Recreation and Farmland Protection

- **USDA/NRCS Farmland Preservation Easement Program, June 2004**
  - $477,500 grant award for the purchase of farmland preservation easements around Pace NOLF.

- **Florida Forever Projects**
  - Yellow River Ravine Project – Acquisition and protection of 16,000 acres on two sides of NOLF Harold.
  - Escribano Project – Acquisition and protection of 2,900 acres underlying the flight tracts for NOLF Choctaw, a Field Carrier Landing Practice facility utilized by both East and West coast fleet squadrons.
  - Clear Creek Project – Acquisition and protection of 5,026 acres surrounding NAS Whiting Field. In Progress.
  - Greenways and Trails – Acquisition and protection of 1,143 acres surround NAS Whiting Field.

Land Acquisition & Other Planning Efforts Around NAS Whiting Field

WORKING DOCUMENT



Legend

Better Santa Rosa Plan Goal

- 4 Lane
- Repair Bridge
- Multiple Use Trail
- Possible Bypass Road
- Main Roads

Land Acquisition Projects

- Targeted for Nature Conservancy Acquisition
- Acquired - Of Florida Conservation Forestry
- Acquired - Nature Conservancy
- Clear Creek I Approved "B" List
- Clear Creek II Approved "A" List
- Greenways & Trails Approved 100% Funding
- NAS Whiting Field Encroachment Project
- NAS Whiting Field Encroachment Project II (In Progress)
- Santa Rosa County Desired Purchase Area
- Santa Rosa County Desired Purchase and NAS Whiting Field Encroachment Project III
- Santa Rosa County Ownership
- Targeted for AG Easements Farmland Grant Submittal
- NAS Whiting Field

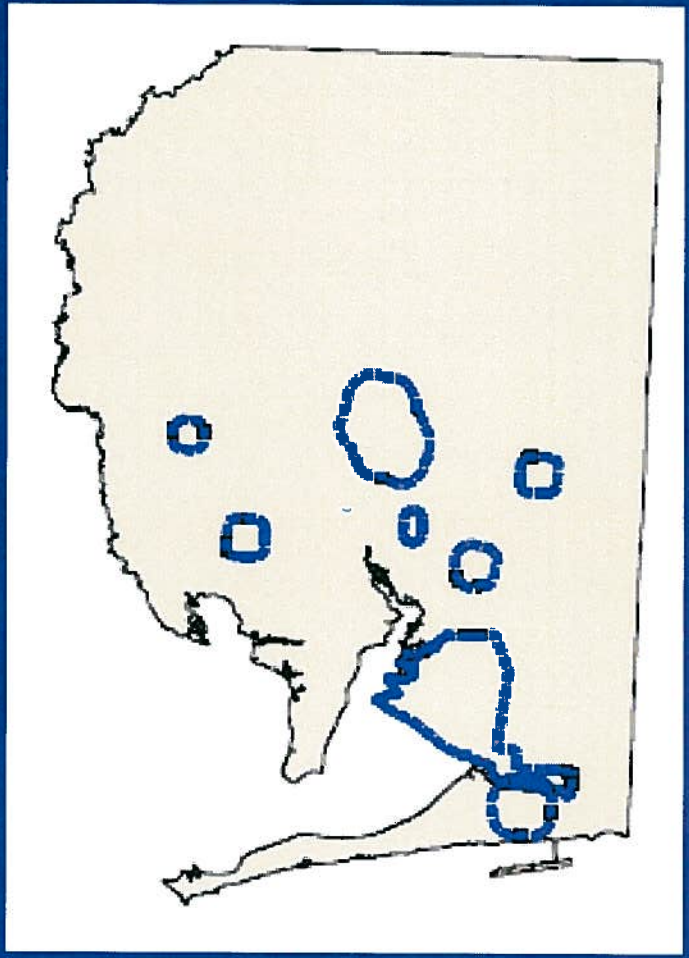
Maps Prepared by Planning, Zoning and Development Division January 11, 2006

Intergovernmental Coordination

- NAS Whiting Field and Eglin AFB representatives appointed as non-voting members of the Local Planning Board.
- Cell towers and radio towers required to get a "no objection" letter from the Navy *(pre-JLUS)*
- Provide Navy opportunity to review and comment on proposed development
- Navy receives copy of Real Estate Disclosure

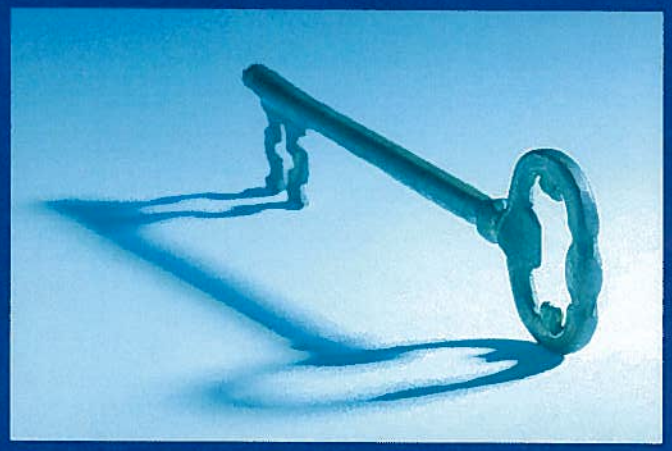
Real Estate Disclosure

- Disclosure at time of advertisement for Sale or Lease Contract within 1 mile for fixed wing airfields, and ½ mile for helicopter fields. Copies of signed disclosure statements to be forwarded to Whiting Field.
- Realty Sales Offices and Marketing Materials required to provide airfield location information.
- Covenants and Restrictions with residential plats.



Keys to Success

- Notify affected property owners.
  - Santa Rosa mailed notices to 4,740 property owners
- Respect existing property rights.
- Know the problem you're trying to solve.
- Develop partnerships.



Comments From The Audience

Closing Remarks

Commissioner James Campbell
Chair, JLUS Policy Committee

SECTION 2.0

Public Meeting #2

BLANK

Eglin Joint Land Use Study (JLUS)
Public Meeting #2
October 3, 2007

TETRA TECH

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

Introduction

- TetraTech/Solin & Associates Team
- Responsible Parties
- Project Understanding
- Local Presence
- Purpose of Today's Meeting

TETRA TECH

SOLIN & ASSOC inc

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

A JLUS is…

- A cooperative land use planning effort between military installations and the surrounding communities.

- It promotes compatible community growth while supporting military training and operational missions.

TETRA TECH

SOLIN & ASSOC inc

Two Primary Concerns

- First, to protect the health, safety and welfare of the local community with regard to military operations.

- Second, to address encroachment that is threatening or may threaten the mission and viability of an installation.

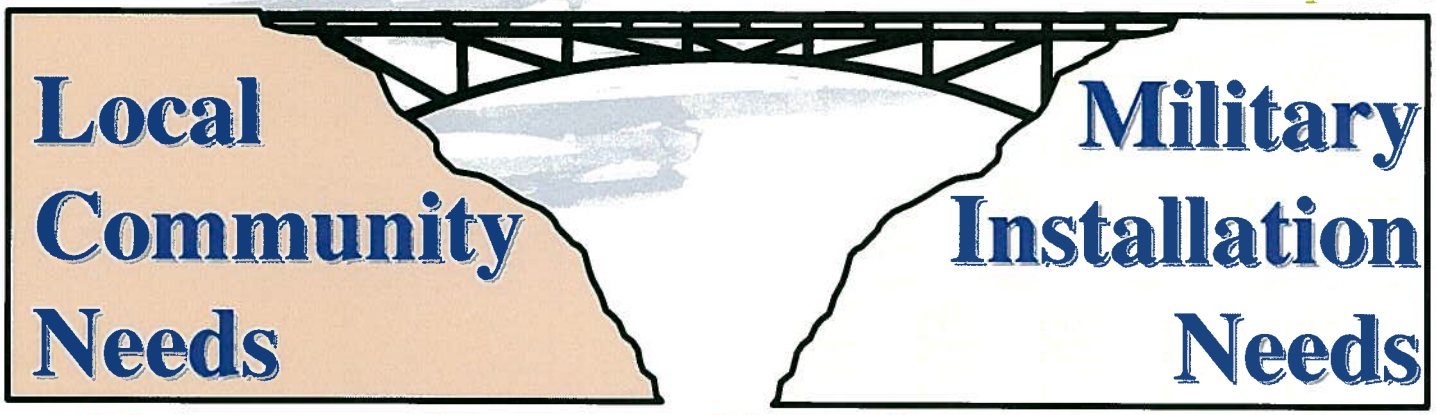
TETRA TECH

SOLIN & ASSOC INC

Creative Community Planning Can Bridge the Encroachment Gap

JLUS — Compatibility — AICUZ

Joint Land Use Study — *Air Installation Compatible Use Zones*



Partnering to Plan the Future

TETRA TECH

SOLIN & ASSOC. INC

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

Phased Work Plan

Phase I: Data Collection & Inventory & Mapping

↓

Phase II – Existing & Future Land Use

↓

Phase III – Compatibility Recommendations

↓

Phase IV – JLUS Report

↓

Phase V – Ongoing Support

TETRA TECH

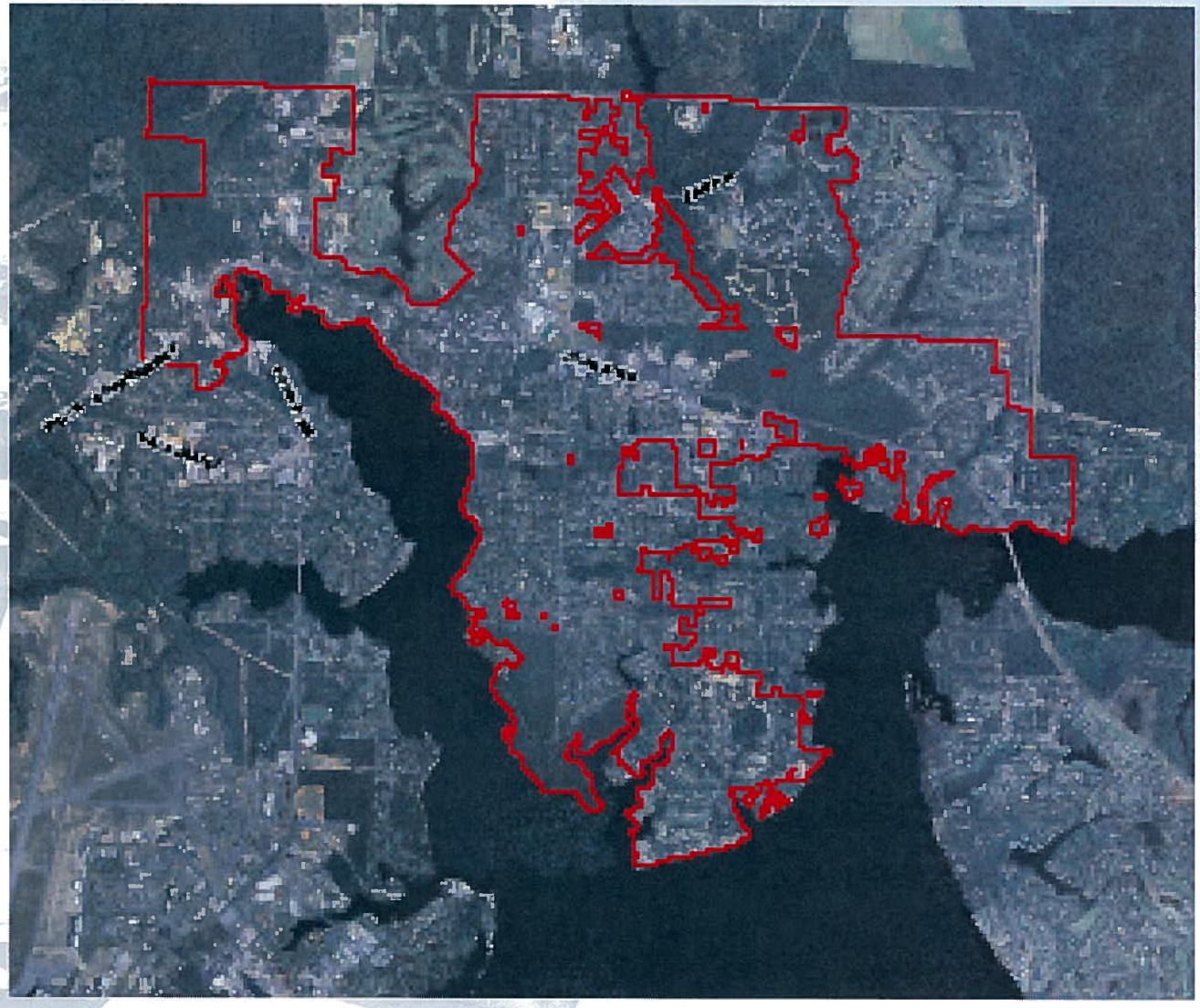
SOLIN & ASSOC

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

TETRA TECH

SOLIN & ASSOC INC

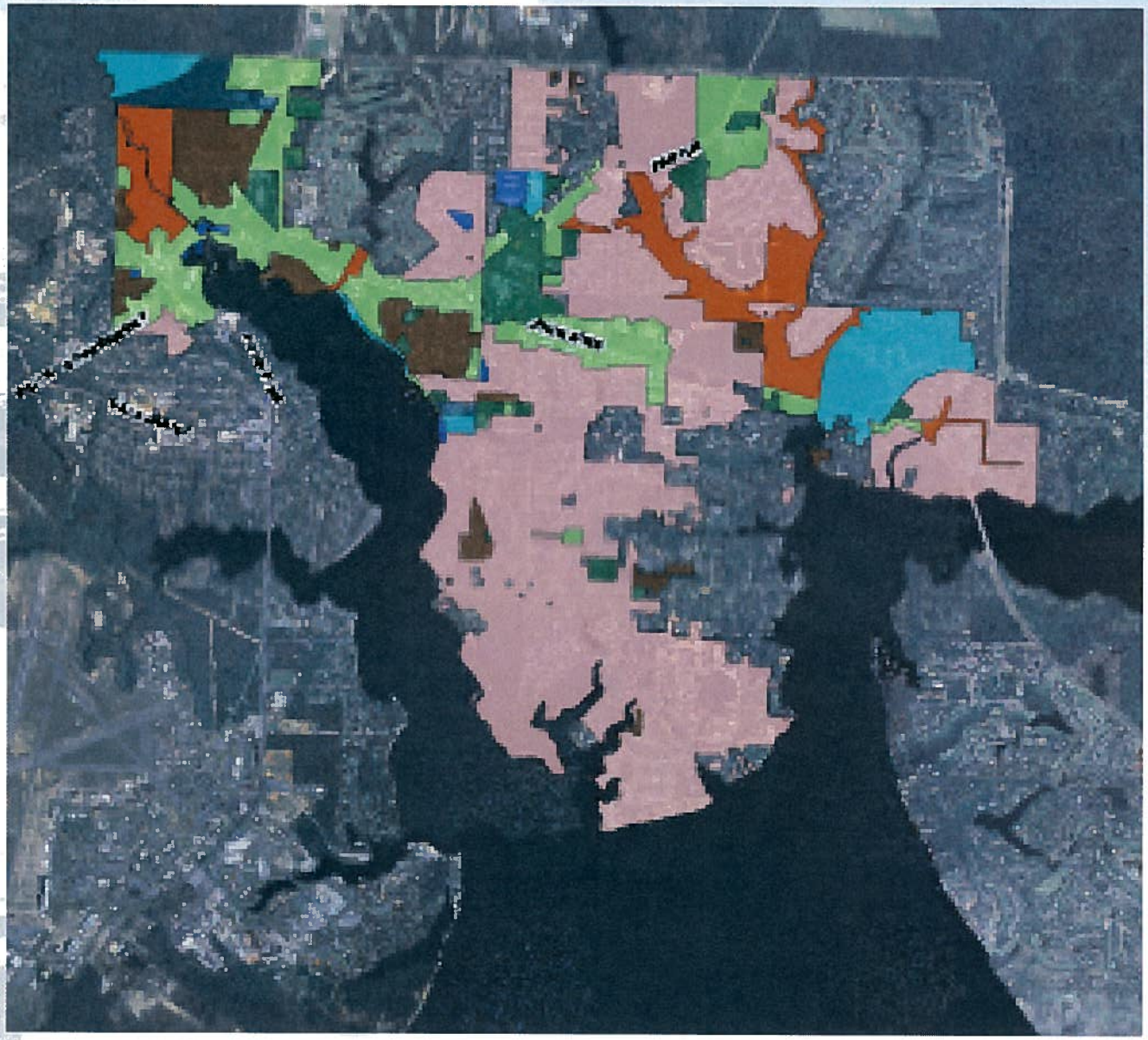
Methodology Example 1



TETRA TECH

SOLIN & ASSOC INC

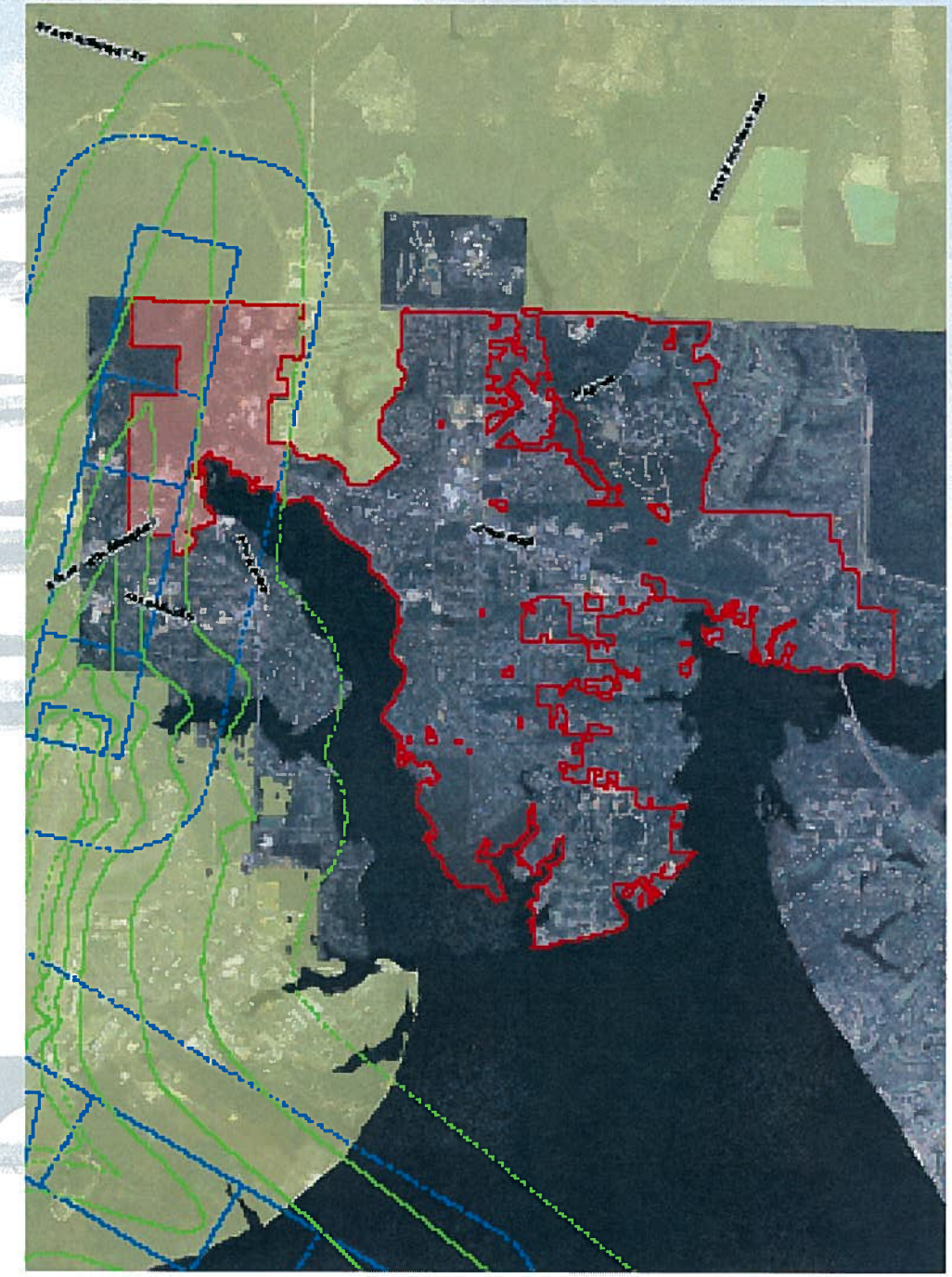
Methodology Example 1



TETRA TECH

SOLIN & ASSOC INC

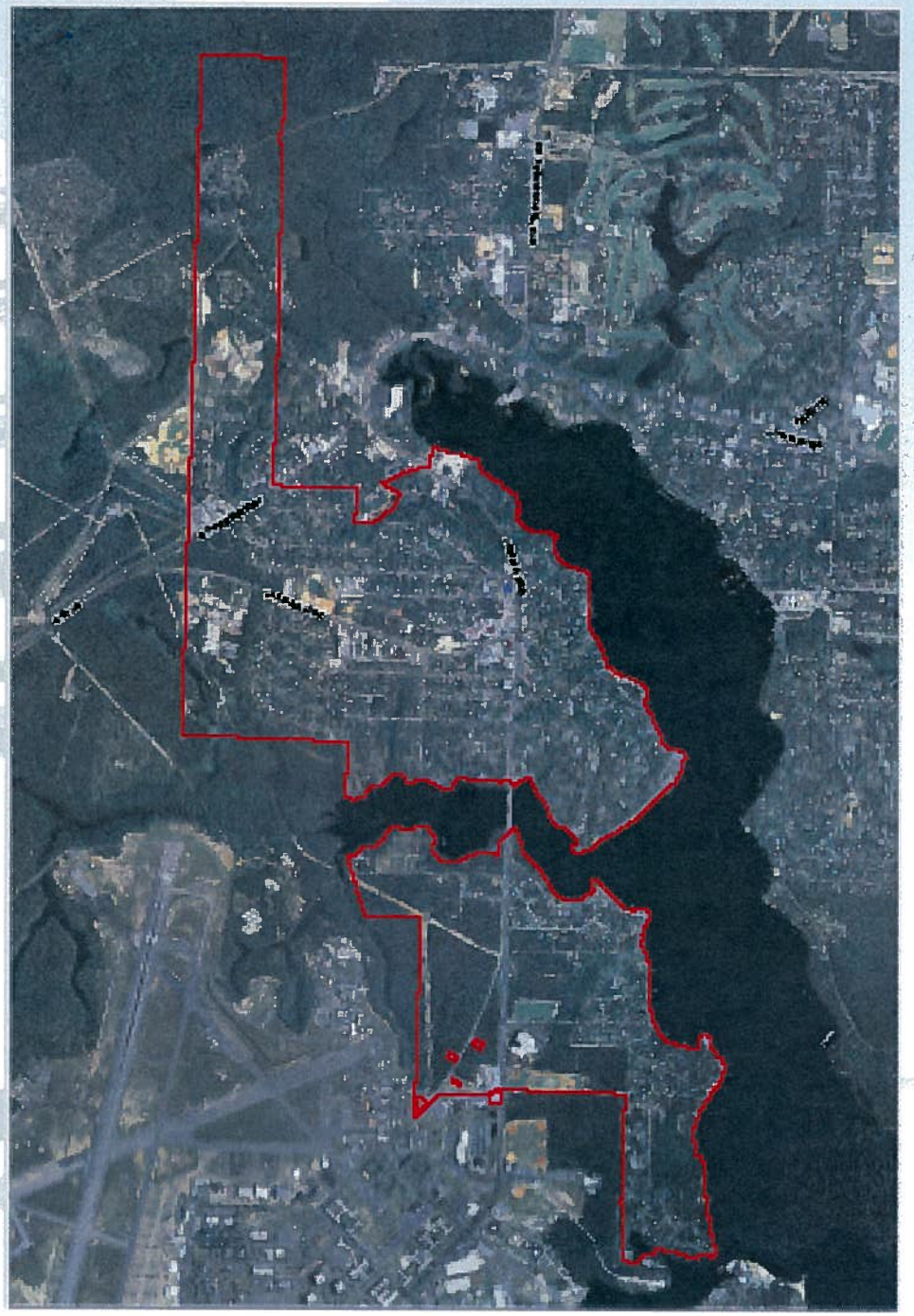
Methodology Example 1



TETRA TECH

SOLIN & ASSOC. INC.

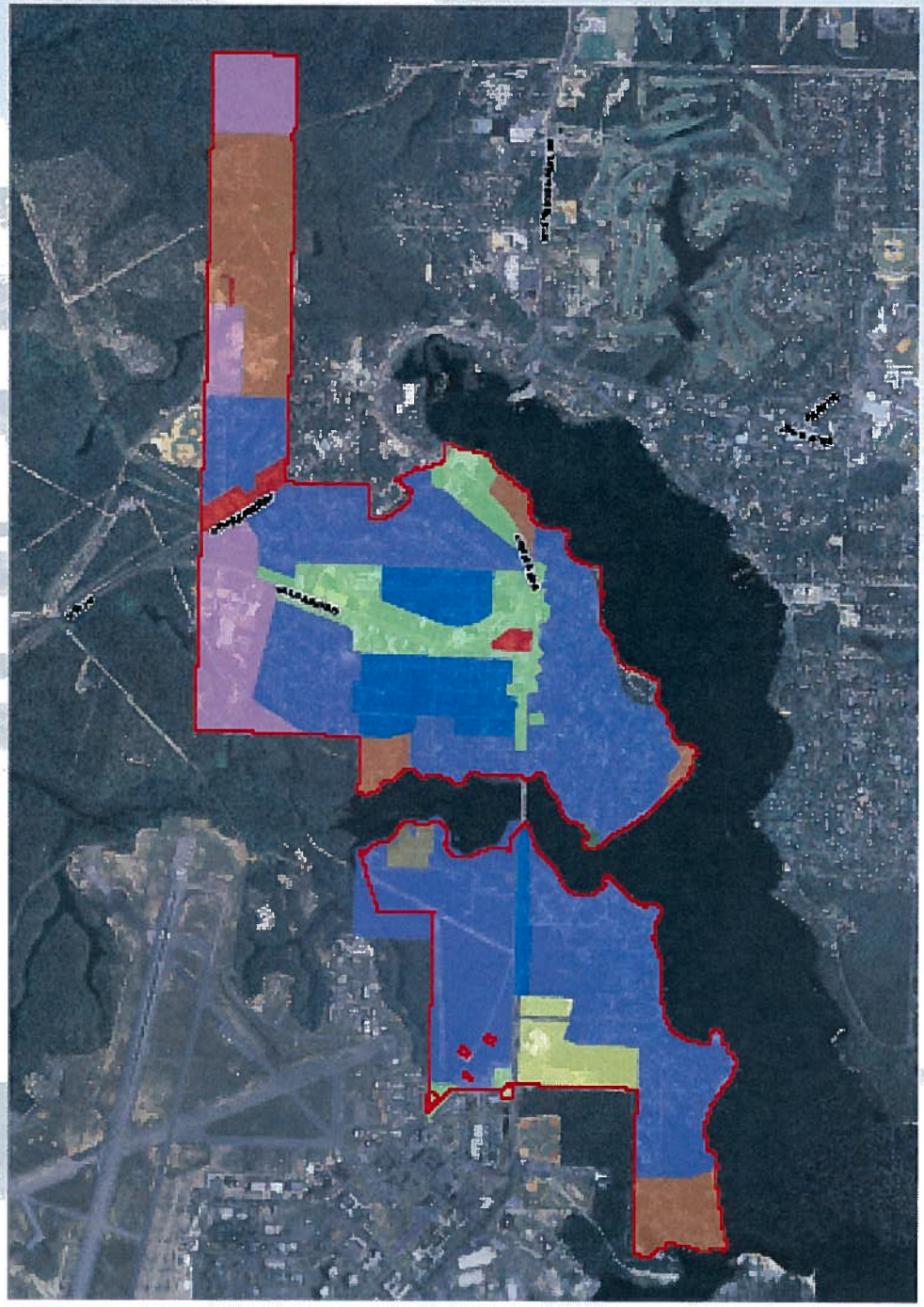
Methodology Example 2



TETRA TECH

SOLIN & ASSOC

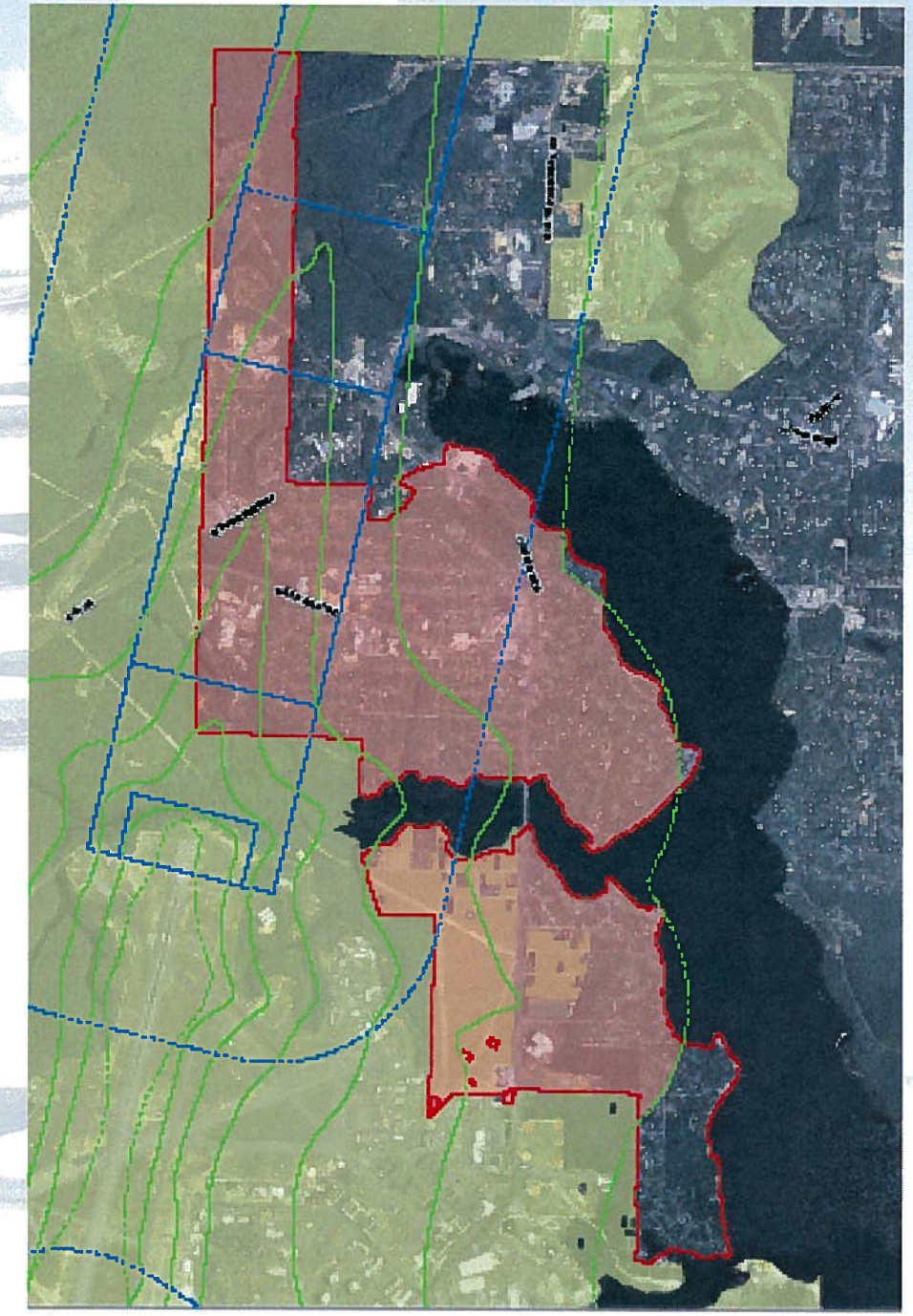
Methodology Example 2



TETRA TECH

SOLIN & ASSOC

Methodology Example 2



TETRA TECH

SOLIN & ASSOC

Other Variables

- Height Limits
- Electromatic Waves
- Nighttime Aesthetics
- Supersonic Flight
- Air Compression "Booms"
- …and more

TETRA TECH

SOLIN & ASSOC INC

Project Schedule

Phase	Start	End
Phase I: Data Collection & Inventory & Mapping	April 2007	August 2007
Phase II – Existing & Future Land Use	July 2007	October 2007
Phase III – Compatibility Recommendations	October 2007	February 2008
Phase IV – JLUS Report	January 2008	June 2008
Phase V – Ongoing Support	Ongoing	Ongoing

TETRA TECH

SOLIN & ASSOC INC

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

Contact Information

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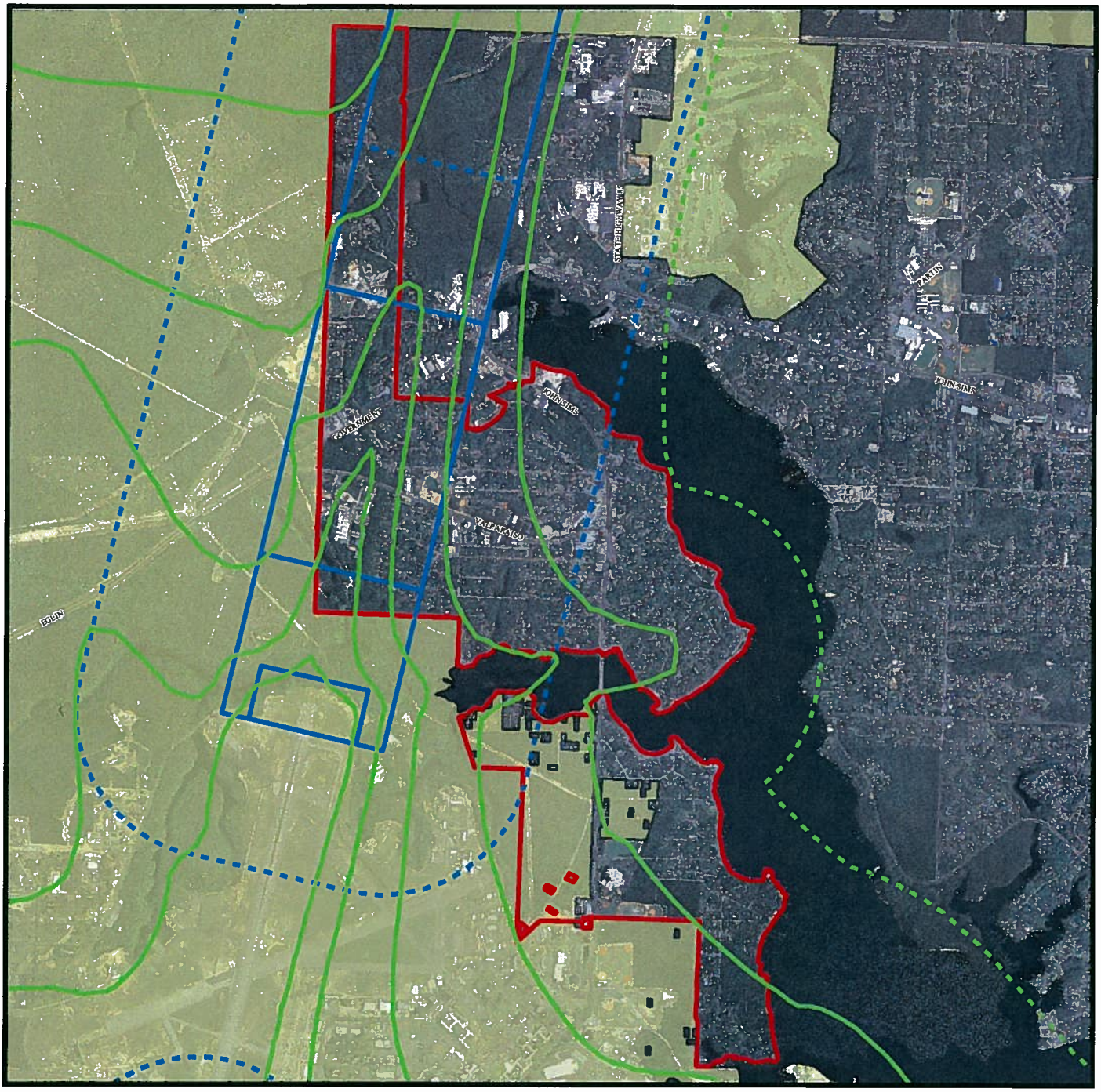
Destin, Florida 32550
850.837.9278 (office)

Jeff Fanto
Growth Project Coordinator
1804 Lewis Turner Blvd, Suite 200
Fort Walton Beach, FL 32547
850.609.3014

TETRA TECH

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast



Noise Contours
Accident Potential Zones (APZ)
Noise 0.5 Mile Buffer
APZ 0.5 Mile Buffer
Valparaiso
Eglin Air Force Base
2005 Aerial Photo

N
W E
S
0 0.25 0.5
Miles
1 inch equals 0.5 miles

Data Source:
Okaloosa County

TETRA TECH, INC.

VALPARAISO (APZ & NOISE BUFFER)
OKALOOSA COUNTY JOINT LAND USE STUDY

FIGURE X-X

P:\2007\07180 Okaloosa County JLUS\Deliverables\GIS\MXDs\

For Informational Purposes Only.

Noise Contours

Accident Potential Zones (APZ)

Noise 0.5 Mile Buffer

APZ 0.5 Mile Buffer

Cinco Bayou

Eglin Air Force Base

2005 Aerial Photo

N
W E
S

0 0.75 1.5

Miles

1 inch equals 1.5 miles

Data Source:
Okaloosa County

TETRA TECH, INC.

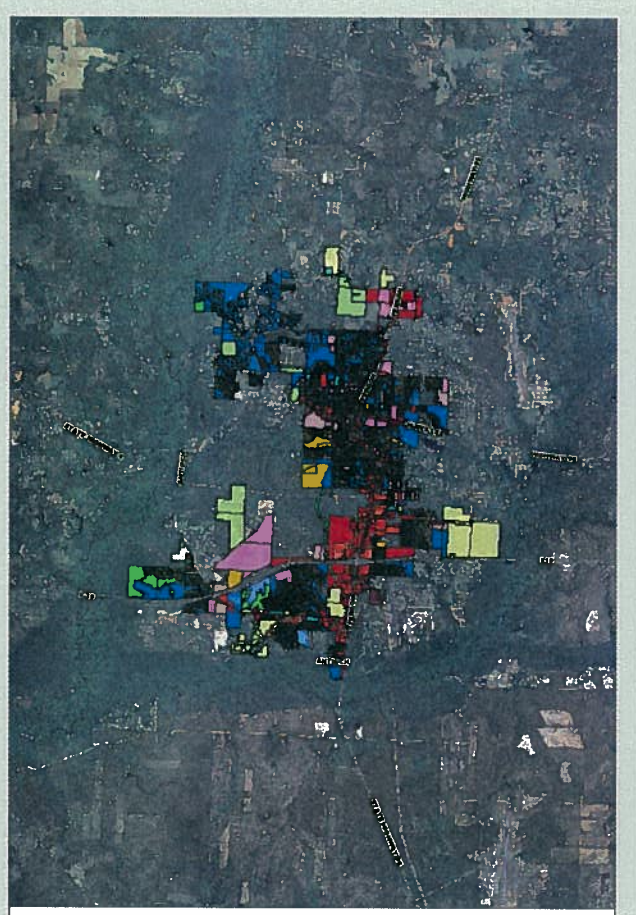
CINCO BAYOU (APZ & NOISE BUFFER)

OKALOOSA COUNTY JOINT LAND USE STUDY

FIGURE X-X

P:\2007\07180 Okaloosa County JLUS\Deliverables\GIS\MXDs\

For Informational Purposes Only.



FUTURE LAND USE

Legend

2005 Aerial Photo

Future Land Use Description

- C
- CON
- HDR
- IN
- LDR
- MDR
- MDR-10
- MU
- PL
- NOT ASSIGNED
- CYCLE 07-1

1 inch equals 1 miles

ZONING

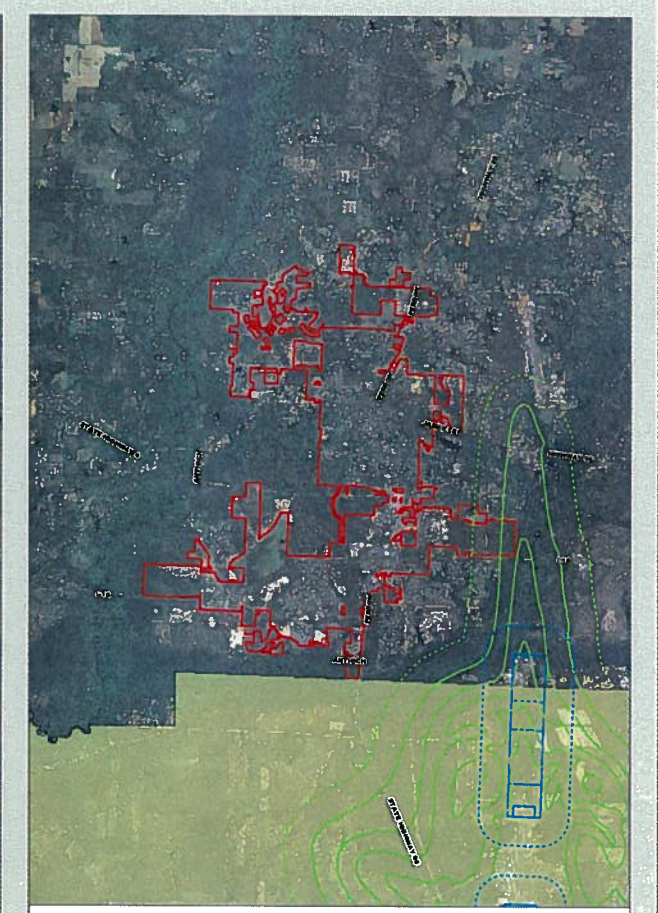
Legend

2005 Aerial Photo

Zoning Description

- A
- C-1
- CYCLE 07-1
- M-1
- PUD
- R-1
- R-1A
- R-2
- R-3
- NOT ASSIGNED

1 inch equals 1 miles



ACCIDENT POTENTIAL ZONE & NOISE BUFFERING

Legend

- Noise Contours
- Noise 1/2 Mile Buffer (65 dB)
- Accident Potential Zones (APZ)
- APZ 1/2 Mile Buffer
- Municipality Boundary
- Eglin Air Force Base
- 2005 Aerial Photo

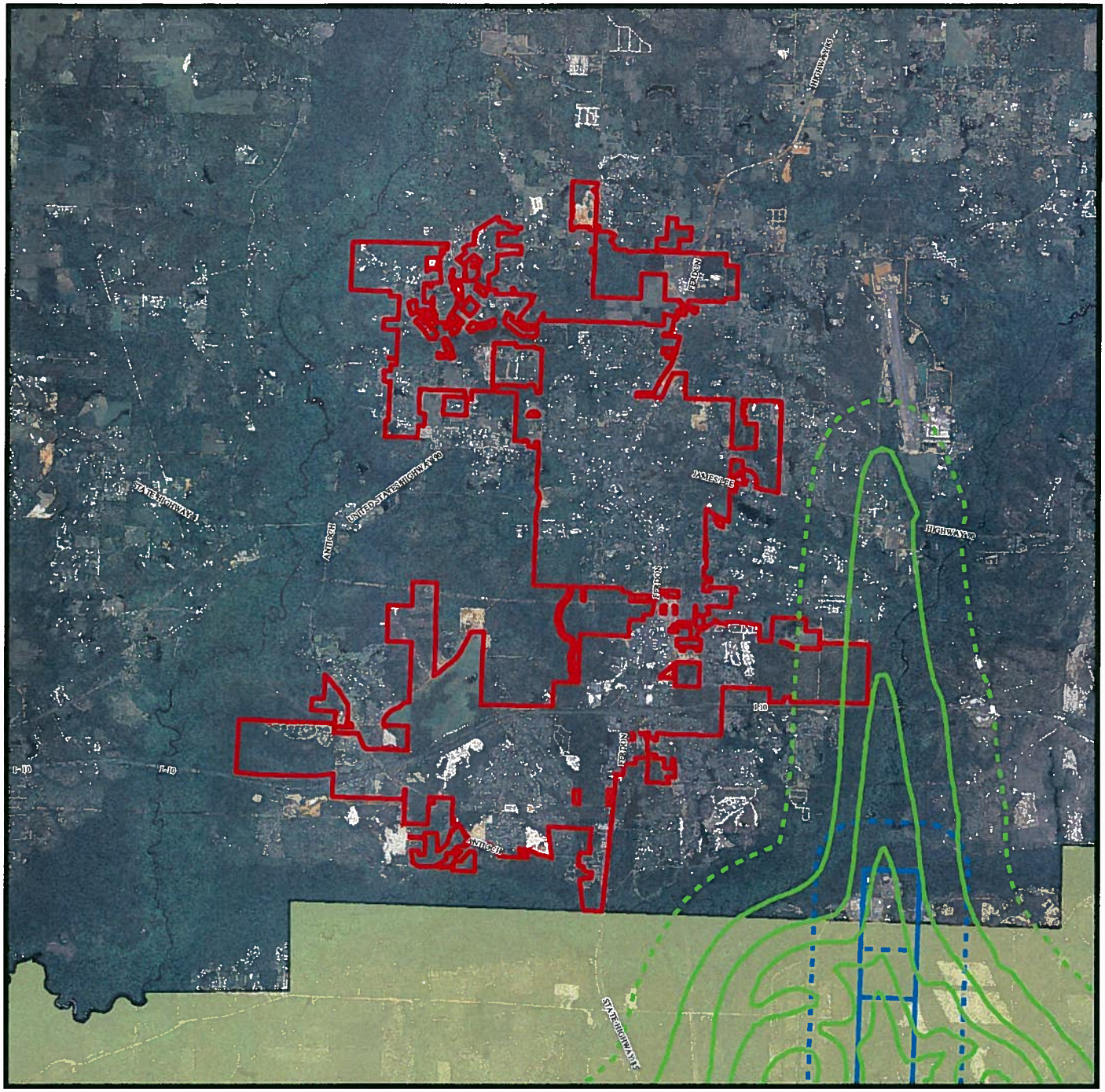
1 inch equals 1 miles

TETRA TECH, INC.

CITY OF CRESTVIEW

OKALOOSA COUNTY JOINT LAND USE STUDY

Data Source: Okaloosa County



Noise Contours
Accident Potential Zones (APZ)
Noise 0.5 Mile Buffer
APZ 0.5 Mile Buffer
Crestview
Eglin Air Force Base
2005 Aerial Photo

N
W E
S
0 0.75 1.5
Miles
1 inch equals 1.5 miles

Data Source:
Okaloosa County

TETRA TECH, INC.

CRESTVIEW (APZ & NOISE BUFFER)
OKALOOSA COUNTY JOINT LAND USE STUDY

FIGURE X-X

P:\2007\07180 Okaloosa County JLUS\Deliverables\GIS\MXDs\

For Informational Purposes Only.

FUTURE LAND USE

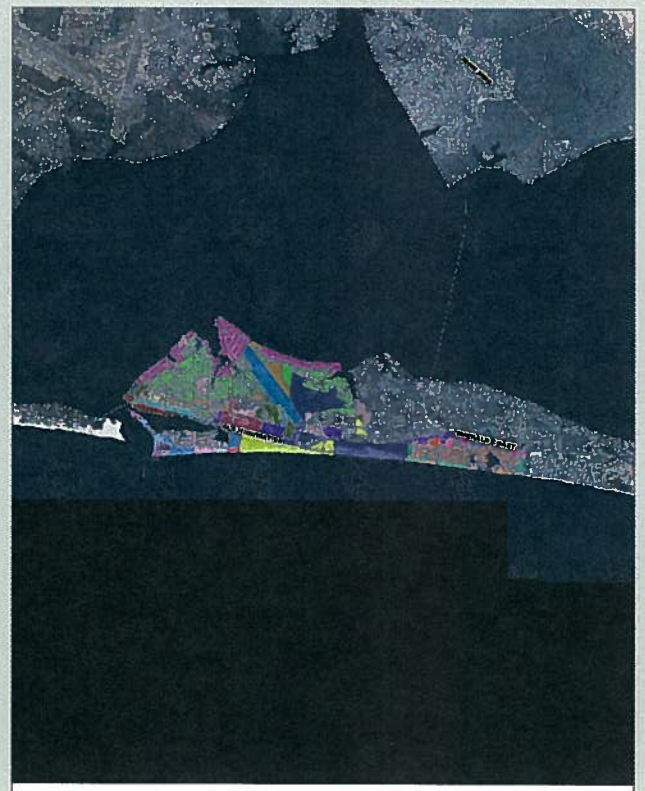
Legend

- 2005 Aerial Photo

Future Land Use Description

- Airport
- Bay Estates
- Calhoun Mixed Use
- Commercial General
- Commercial Limited
- Commercial Trades and Services
- Conservation
- Crystal Beach Neighborhood
- Crystal Beach Resort
- Gulf Resort Mixed Use
- High Density Residential
- Holiday Isle Mixed Use
- Industrial
- Institutional
- Low Density Residential
- Medium Density Residential
- North Harbor Mixed Use
- Recreational
- Residential, Office and Institutional
- South Harbor Mixed Use
- Town Center Mixed Use

1 inch equals 1 miles



ZONING

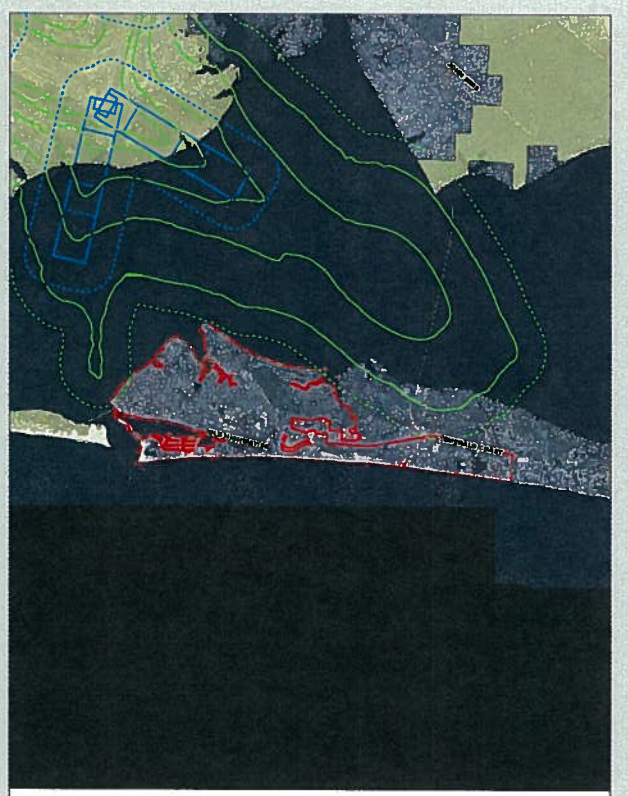
Legend

- 2005 Aerial Photo

Zoning Description

- Airport
- Bay Estates
- Calhoun Mixed Use
- Commercial General
- Commercial Limited
- Commercial Trades and Service
- Conservation
- Crystal Beach Neighborhood
- Crystal Beach Resort
- Gulf Resort Mixed Use
- High Density Residential
- Holiday Isle Mixed Use
- Industrial
- Institutional
- Low Density Residential - Harbor
- Low Density Residential - Holiday Isle
- Low Density Residential - Village
- Medium Density Residential - Holiday Isle
- Medium Density Residential - Village
- North Harbor Mixed Use
- Recreational
- Residential, Office & Institutional Village Residential
- Residential, Office, Institutional - General Development
- Residential, Office, Institutional - Tourist Development
- Residential, Office, Institutional - Village Residential
- South Harbor Mixed Use
- Town Center Mixed Use

1 inch equals 1 miles



ACCIDENT POTENTIAL ZONE & NOISE BUFFERING

Legend

- Noise Contours
- Noise 1/2 Mile Buffer (65 dB)
- Accident Potential Zones (APZ)
- APZ 1/2 Mile Buffer
- Municipality Boundary
- Eglin Air Force Base
- 2005 Aerial Photo

1 inch equals 1 miles

TETRA TECH, INC.

CITY OF DESTIN

OKALOOSA COUNTY JOINT LAND USE STUDY

Data Source: Okaloosa County

Noise Contours
Accident Potential Zones (APZ)
Noise 0.5 Mile Buffer
APZ 0.5 Mile Buffer
Destin
Eglin Air Force Base
2005 Aerial Photo

N
W E
S
0 0.75 1.5
Miles
1 inch equals 1.5 miles

Data Source:
Okaloosa County

TETRA TECH, INC.

DESTIN (APZ & NOISE BUFFER)
OKALOOSA COUNTY JOINT LAND USE STUDY

FIGURE X-X

P:\2007\07180 Okaloosa County JLUS\Deliverables\GIS\MXDs\

For Informational Purposes Only.

FUTURE LAND USE

Legend

- Fort Walton Beach City Limits
- 2005 Aerial Photo

Future Land Use Description

- CON
- ED
- GC
- HC
- IP
- LDR
- LI
- MDR
- MUCC
- MUMS
- MUW12
- MUW18
- MUW24
- PC
- PL
- RC
- REC

1 inch equals 0.5 miles

ZONING

Legend

- Fort Walton Beach City Limits
- 2005 Aerial Photo

Zoning Description

- C-1
- C-2
- CF
- DC-3
- DR-3
- EF
- HC
- M-1
- M-2
- MUCC-1
- MUCC-2
- MUMS
- MUW-12
- MUW-18
- MUW-24
- OS
- P-1
- P-2
- R-1
- R-1A
- R-1E
- R-2
- R-2A
- R-NC
- YC

1 inch equals 0.5 miles

ACCIDENT POTENTIAL ZONE & NOISE BUFFERING

Legend

- Noise 1/2 Mile Buffer (65 dB)
- APZ 1/2 Mile Buffer
- Noise Contours
- Accident Potential Zones (APZ)
- Fort Walton Beach City Limits
- Eglin Air Force Base
- 2005 Aerial Photo

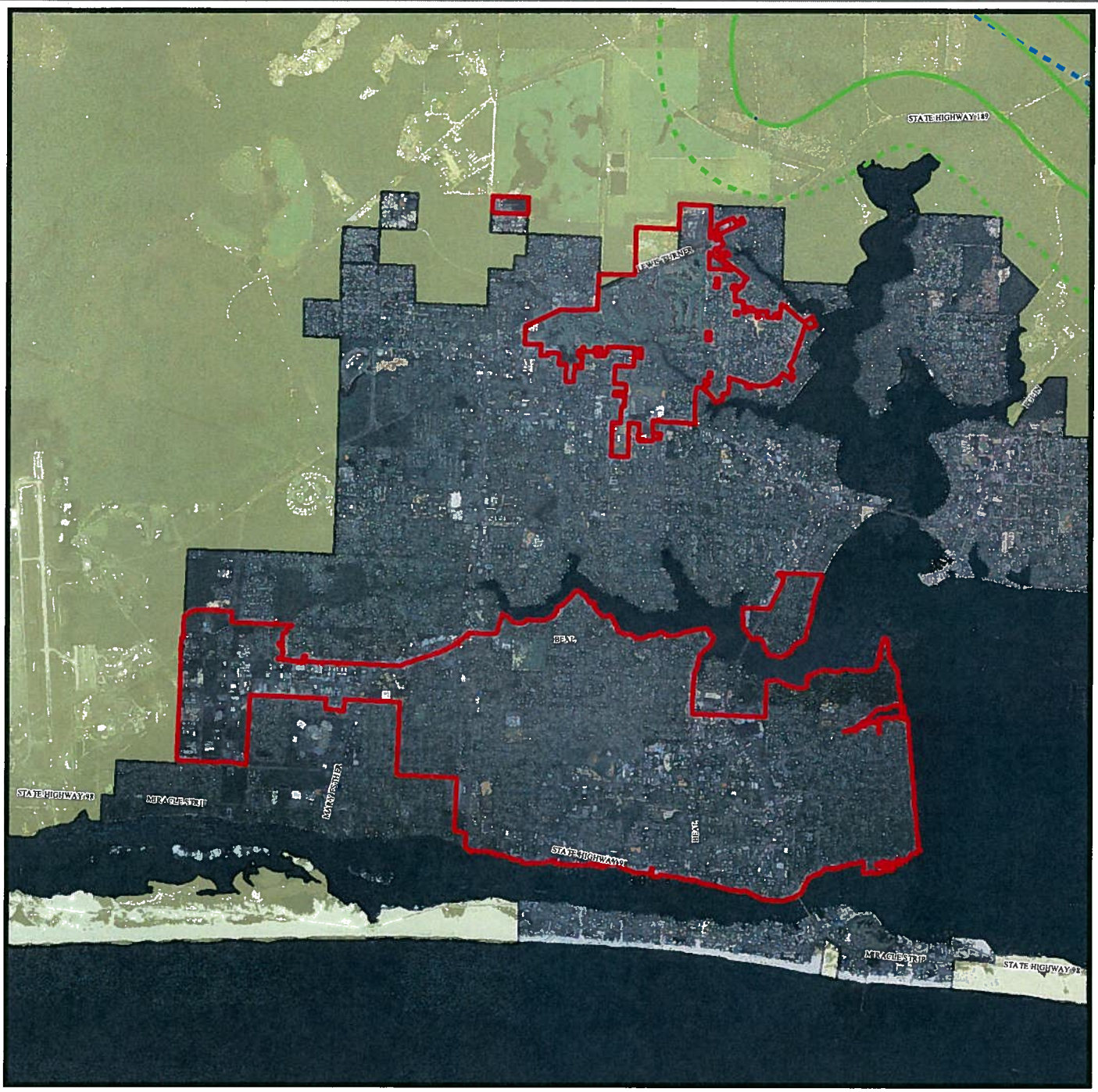
1 inch equals 1 miles

TETRA TECH, INC.

CITY OF FORT WALTON BEACH

OKALOOSA COUNTY JOINT LAND USE STUDY

Data Source: Okaloosa County



Noise Contours
Accident Potential Zones (APZ)
Noise 1/2 Mile Buffer (65 dB)
APZ 0.5 Mile Buffer
Fort Walton Beach
Eglin Air Force Base
2005 Aerial Photo

N
W E
S
0 0.5 1
Miles
1 inch equals 1 miles

Data Source:
Okaloosa County

TETRA TECH, INC.

FORT WALTON BEACH (APZ & NOISE BUFFER)
OKALOOSA COUNTY JOINT LAND USE STUDY

FIGURE X-X

P:\2007\07180 Okaloosa County JLUS\Deliverables\GIS\MXDs\

For Informational Purposes Only.

Legend

- Municipality Boundary
- Noise Contours
- Accident Potential Zones (APZ)
- Eglin Air Force Base
- 2005 Aerial Photo

CITY OF GULF BREEZE

OKALOOSA COUNTY JOINT LAND USE STUDY

Data Source: Okaloosa County

1 inch equals 1 miles

TETRA TECH, INC.

Noise Contours
Accident Potential Zones (APZ)
Gulf Breeze
Eglin Air Force Base
2005 Aerial Photo

N
W E
S
0 1.5 3
Miles
1 inch equals 3 miles

Data Source:
Okaloosa County

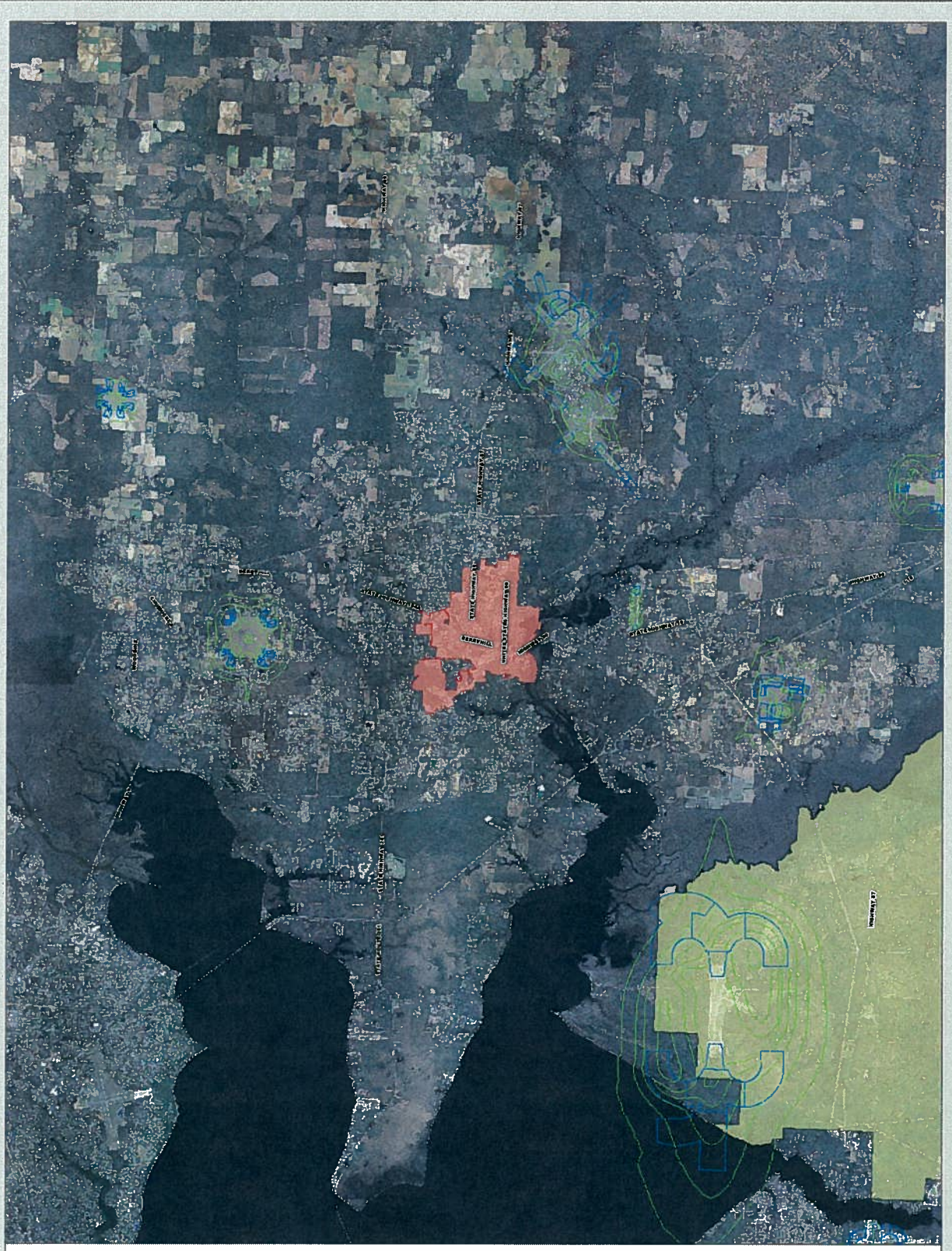
TETRA TECH, INC.

GULF BREEZE (APZ & NOISE BUFFER)
OKALOOSA COUNTY JOINT LAND USE STUDY

FIGURE X-X

P:\2007\07180 Okaloosa County JLUS\Deliverables\GIS\MXDs\

For Informational Purposes Only.



Legend

- Municipality Boundary
- Noise Contours
- Accident Potential Zones (APZ)
- Eglin Air Force Base
- 2005 Aerial Photo

CITY OF MILTON

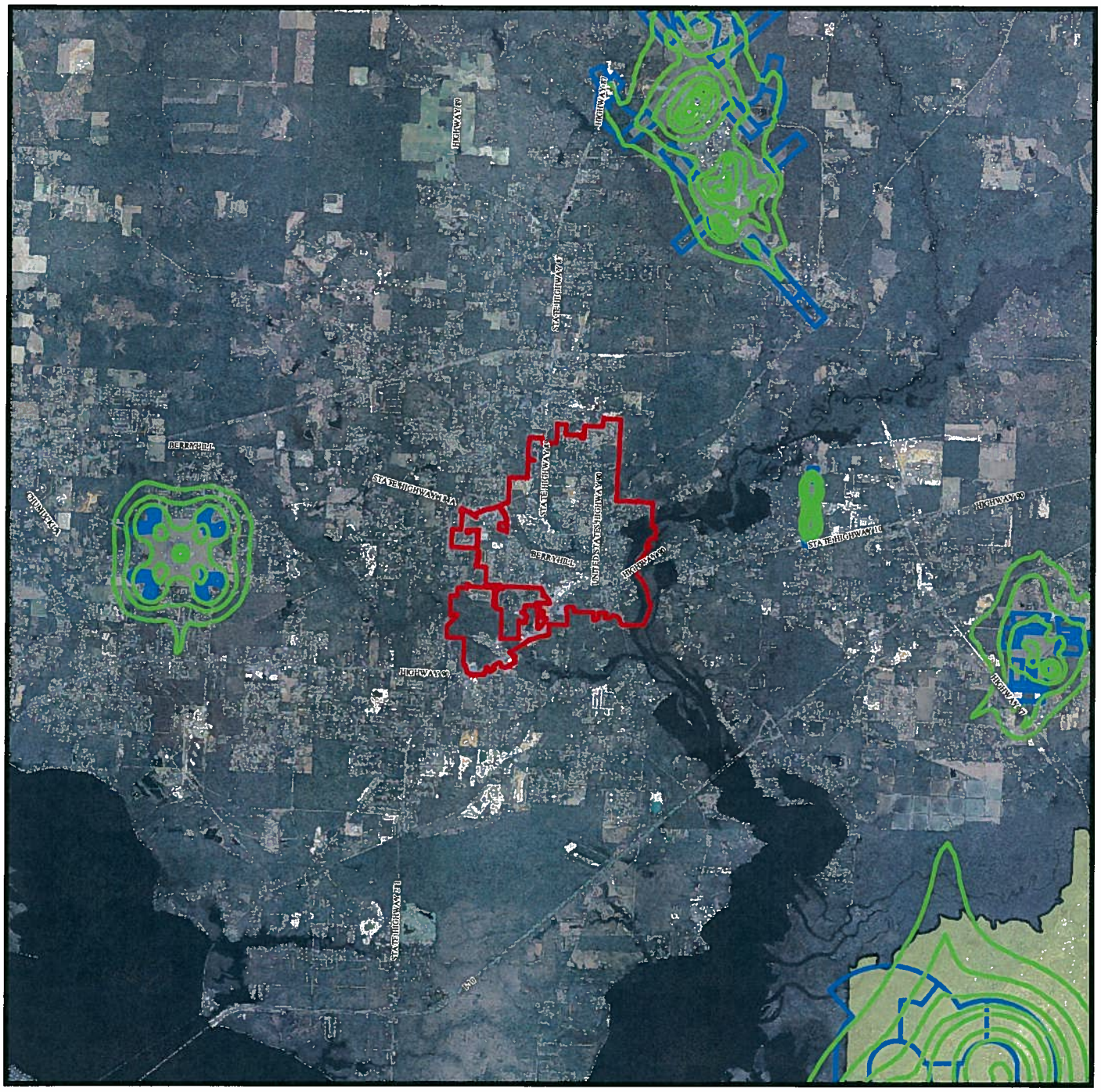
OKALOOSA COUNTY JOINT LAND USE STUDY

Data Source: Okaloosa County

N

1 inch equals 1 miles

TETRA TECH, INC.



Noise Contours
Accident Potential Zones (APZ)
Milton
Eglin Air Force Base
2005 Aerial Photo

N
W E
S
0 1 2
Miles
1 inch equals 2 miles

Data Source:
Okaloosa County

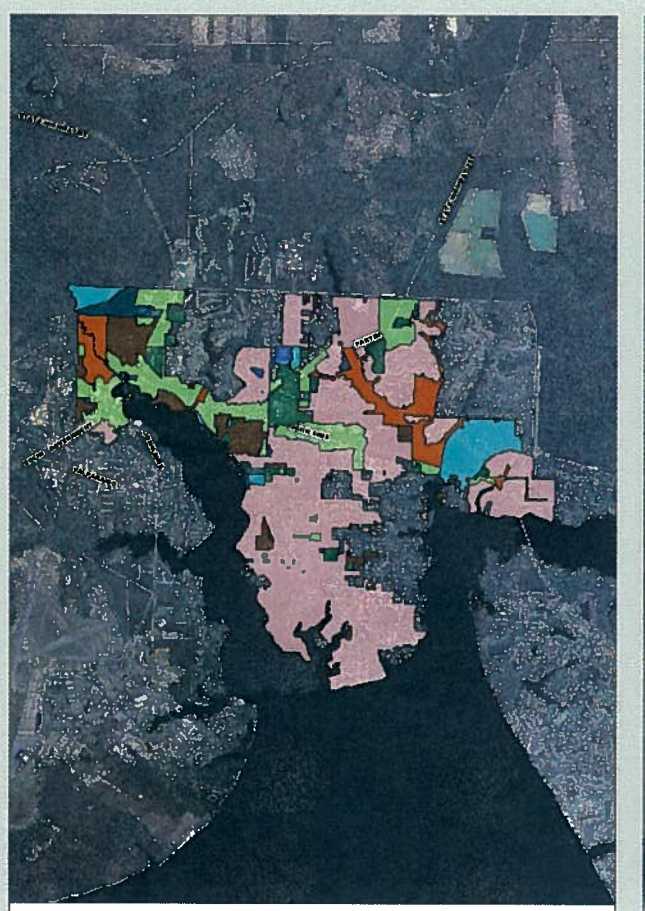
TETRA TECH, INC.

MILTON (APZ & NOISE BUFFER)
OKALOOSA COUNTY JOINT LAND USE STUDY

FIGURE X-X

P:\2007\07180 Okaloosa County JLUS\Deliverables\GIS\MXDs\

For Informational Purposes Only.



FUTURE LAND USE

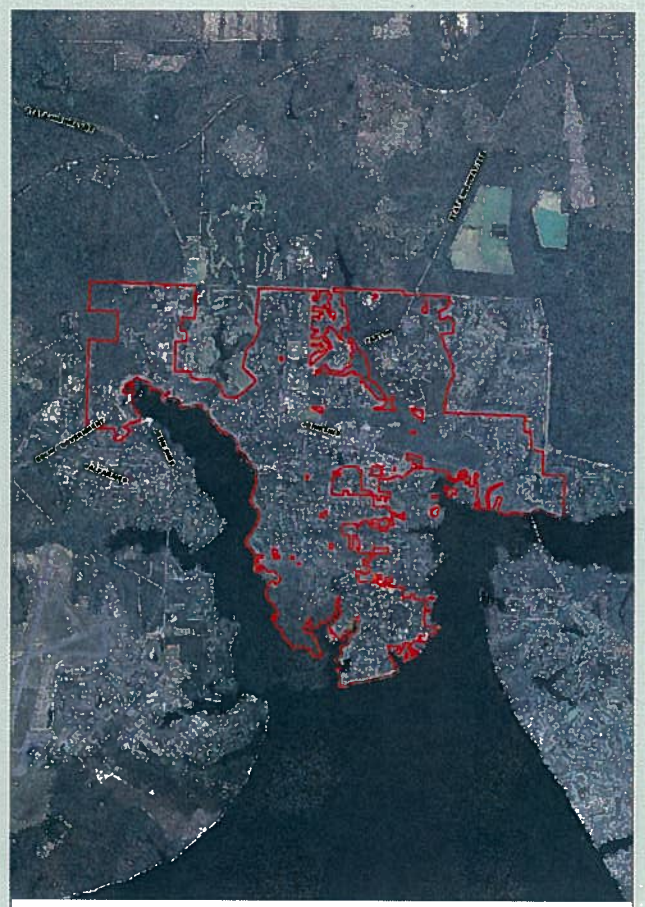
Legend

2005 Aerial Photo

Future Land Use Description

C, CITY, CON, IN, LDR, MDR, MU, PL, REC

1 inch equals 0.5 miles



ZONING

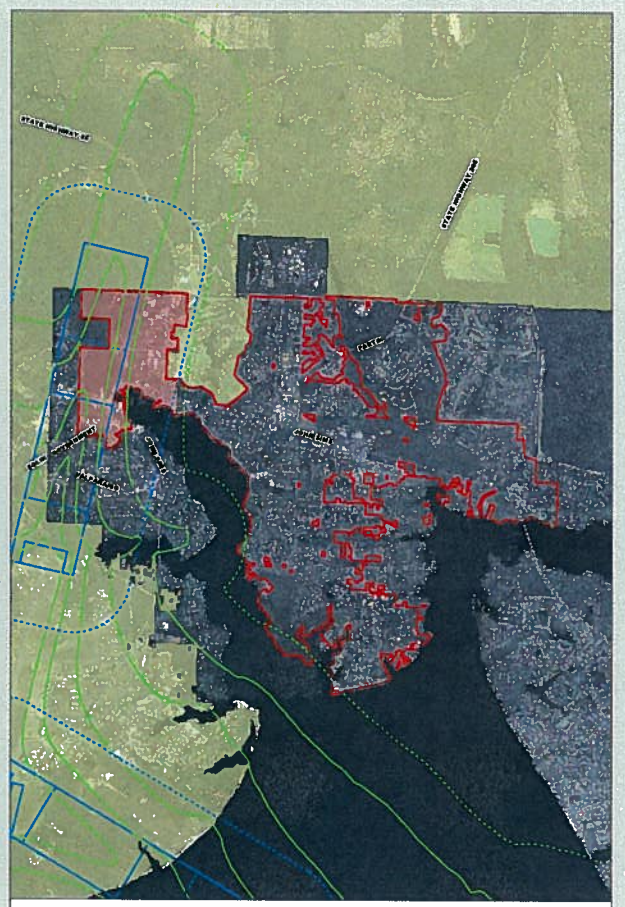
DATA UNAVAILABLE
AT THIS TIME

Legend

Municipality Boundary

2005 Aerial Photo

1 inch equals 0.5 miles



ACCIDENT POTENTIAL ZONE & NOISE BUFFERING

Legend

Noise Contours

Noise 1/2 Mile Buffer (65 dB)

Accident Potential Zones (APZ)

APZ 1/2 Mile Buffer

Municipality Boundary

Area of Study

Eglin Air Force Base

2005 Aerial Photo

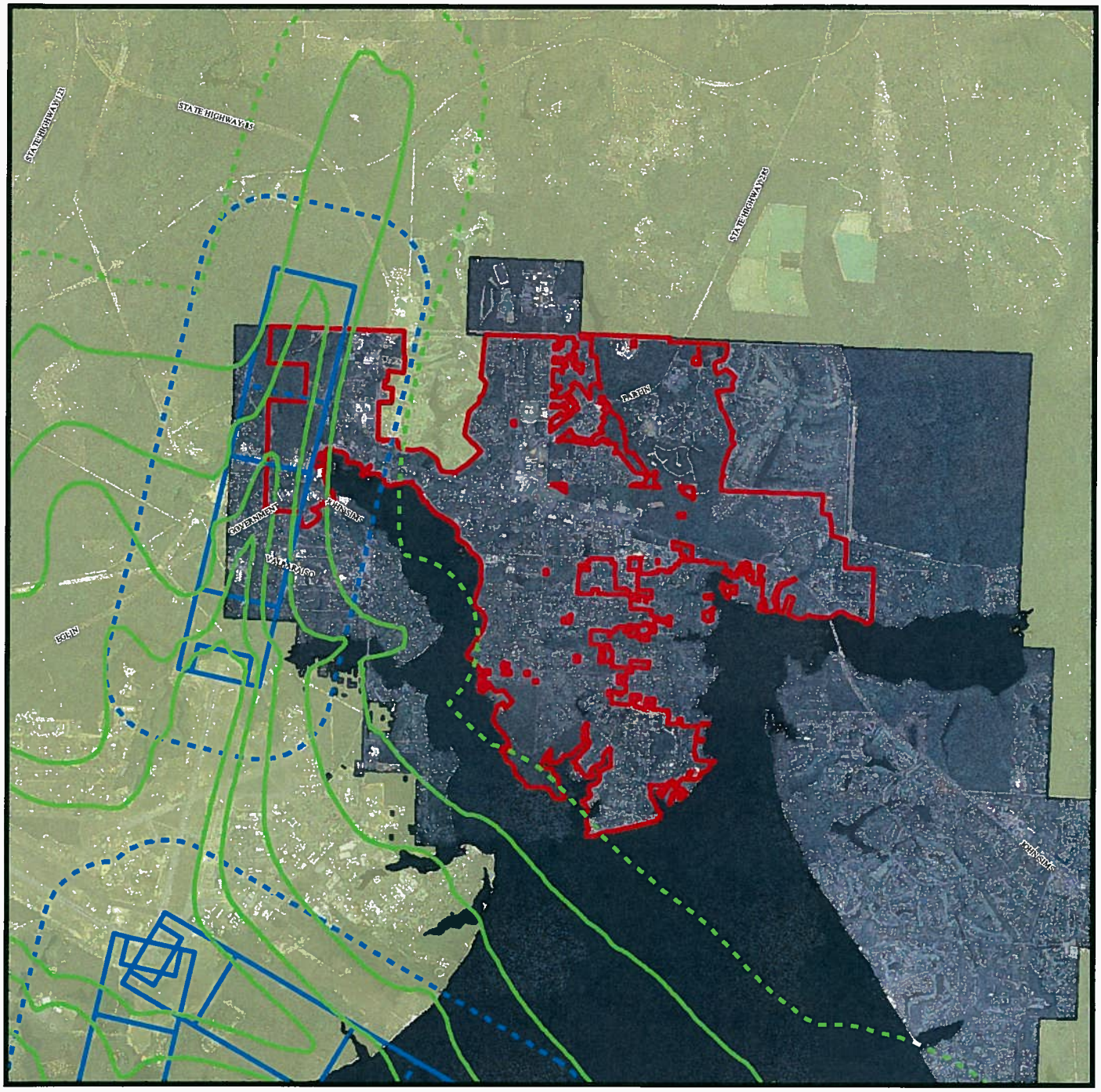
1 inch equals 0.5 miles

TETRA TECH, INC.

CITY OF NICEVILLE

OKALOOSA COUNTY JOINT LAND USE STUDY

Data Source: Okaloosa County



Niceville

Noise Contours

Accident Potential Zones (APZ)

APZ 0.5 Mile Buffer

Noise 0.5 Mile Buffer

Eglin Air Force Base

2005 Aerial Photo

Data Source:
Okaloosa County

N
W E
S

0 0.5 1
Miles

1 inch equals 1 miles

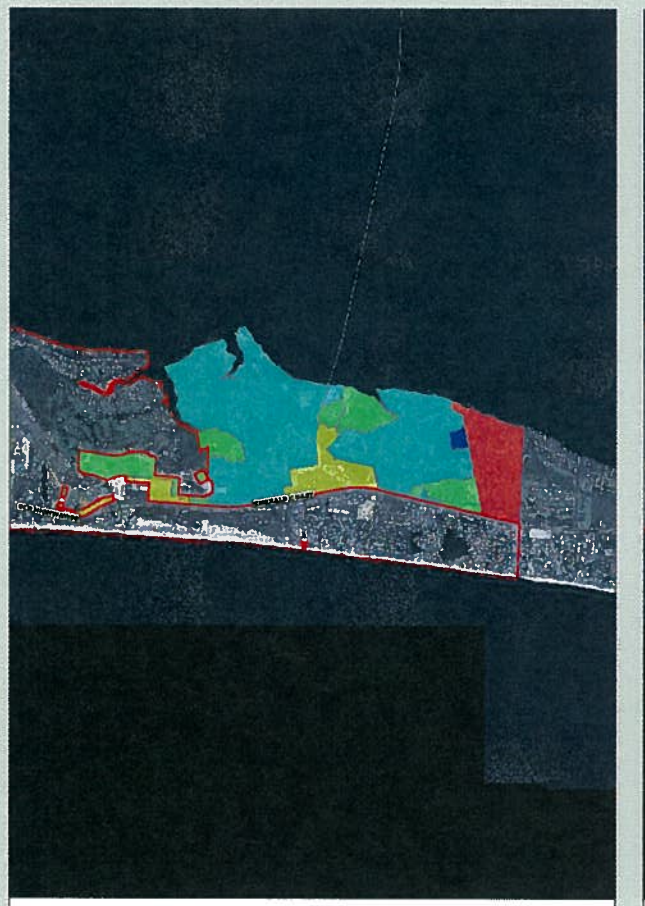
TETRA TECH, INC.

NICEVILLE (APZ & NOISE BUFFER)
OKALOOSA COUNTY JOINT LAND USE STUDY

FIGURE X-X

P:\2007\07180 Okaloosa County JLUS\Deliverables\GIS\MXDs\

For Informational Purposes Only.



FUTURE LAND USE

Legend

- Destin City Limits
- Eglin Air Force Base
- 2005 Aerial Photo

Future Land Use Description

- C
- MDR
- MU-1
- MU-2
- UMU

1 inch equals 0.5 miles

ZONING

Legend

- Destin City Limits
- Eglin Air Force Base
- 2005 Aerial Photo

Zoning Description

- HG
- BT
- IP
- PUD
- RGD
- RSS
- RUA

1 inch equals 0.5 miles

ACCIDENT POTENTIAL ZONE & NOISE BUFFERING

Legend

- Noise 1/2 Mile Buffer (65 dB)
- APZ 1/2 Mile Buffer
- Noise Contours
- Accident Potential Zones (APZ)
- Destin City Limits
- Eglin Air Force Base
- 2005 Aerial Photo

1 inch equals 0.5 miles

TETRA TECH, INC.

OKALOOSA COUNTY (DESTIN AREA)

OKALOOSA COUNTY JOINT LAND USE STUDY

Data Source: Okaloosa County

FUTURE LAND USE

Legend

- Crestview City Limits
- Eglin Air Force Base
- 2005 Aerial Photo

Future Land Use Description

- AG
- I
- INST
- LDR
- RR
- UMU

1 inch equals 0.5 miles

ZONING

Legend

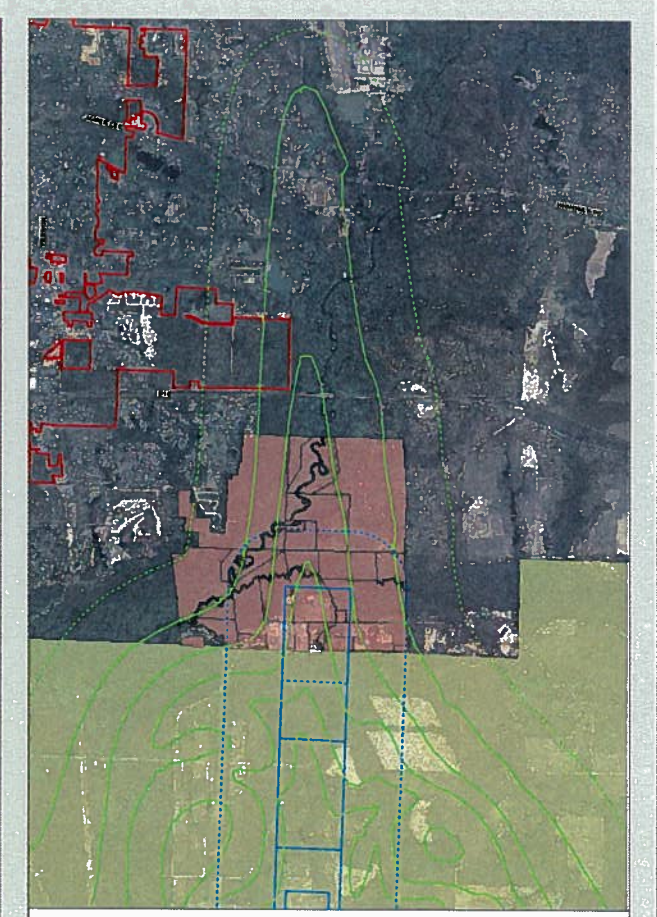
- Crestview City Limits
- Eglin Air Force Base
- 2005 Aerial Photo

Zoning Description

ZNGPY_ZONE

- AA
- AIP
- BG
- BR
- BT
- IP
- RGD
- RIA
- RRS-1A
- RRS-2
- RSS
- RUA
- RUD
- RUS

1 inch equals 0.5 miles



ACCIDENT POTENTIAL ZONE & NOISE BUFFERING

Legend

- Noise 1/2 Mile Buffer (65 dB)
- APZ 1/2 Mile Buffer
- Noise Contours
- Accident Potential Zones (APZ)
- Crestview City Limits
- Area of Study
- Eglin Air Force Base
- 2005 Aerial Photo

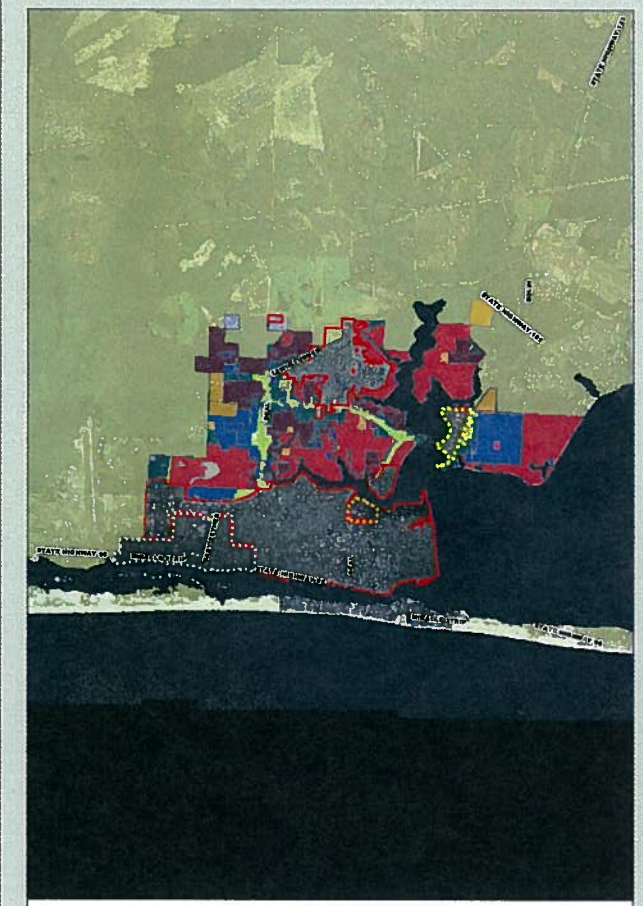
1 inch equals 0.5 miles

TETRA TECH, INC.

OKALOOSA COUNTY (DUKE FIELD)

OKALOOSA COUNTY JOINT LAND USE STUDY

Data Source: Okaloosa County



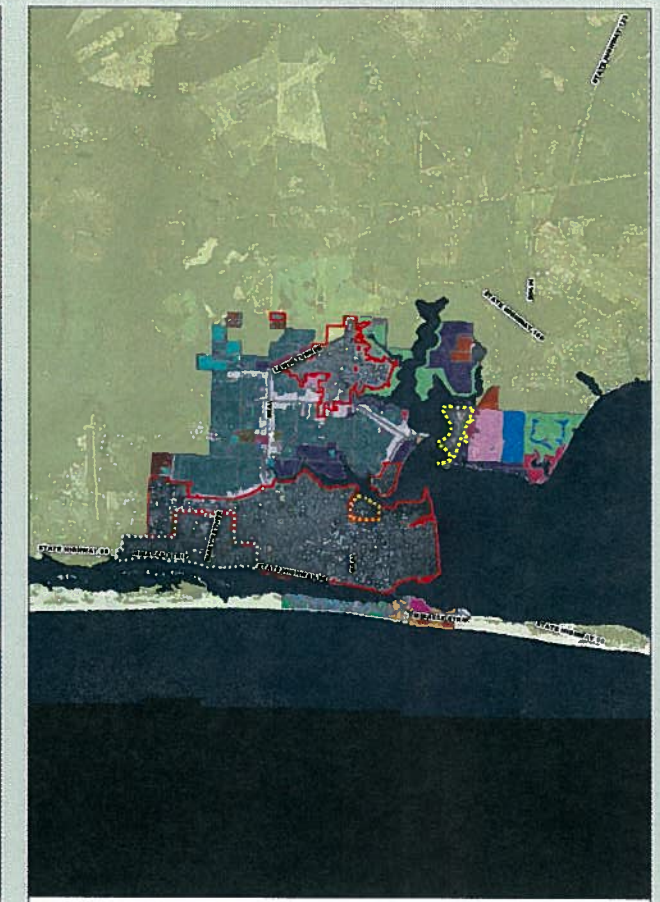
FUTURE LAND USE

Legend

- Fort Walton Beach City Limits
- Mary Esther City Limits
- Shalimar City Limits
- Cinco Bayou Town Limits
- Eglin Air Force Base
- 2005 Aerial Photo

Future Land Use Description: C, CON, HDR, I, INST, LDR, MDR, REC, SR, UMU

1 inch equals 1 miles



ZONING

Legend

- Fort Walton Beach City Limits
- Mary Esther City Limits
- Shalimar City Limits
- Cinco Bayou Town Limits
- Eglin Air Force Base
- 2005 Aerial Photo

Zoning Description: AA, B-1, B-2, B-3, B-4, BG, BR, BT, IP, PL, PUD, RGD, RIA, RMHP, RSS, RUA, RUD, RUS, RUS-1

1 inch equals 1 miles

ACCIDENT POTENTIAL ZONE & NOISE BUFFERING

Legend

- Noise 1/2 Mile Buffer (65 dB)
- APZ 1/2 Mile Buffer
- Noise Contours
- Accident Potential Zones (APZ)
- Fort Walton Beach City Limits
- Mary Esther City Limits
- Shalimar City Limits
- Cinco Bayou Town Limits
- Eglin Air Force Base
- 2005 Aerial Photo

1 inch equals 1 miles

TETRA TECH, INC.

OKALOOSA COUNTY (FORT WALTON BEACH AREA)

OKALOOSA COUNTY JOINT LAND USE STUDY

Data Source: Okaloosa County

FUTURE LAND USE

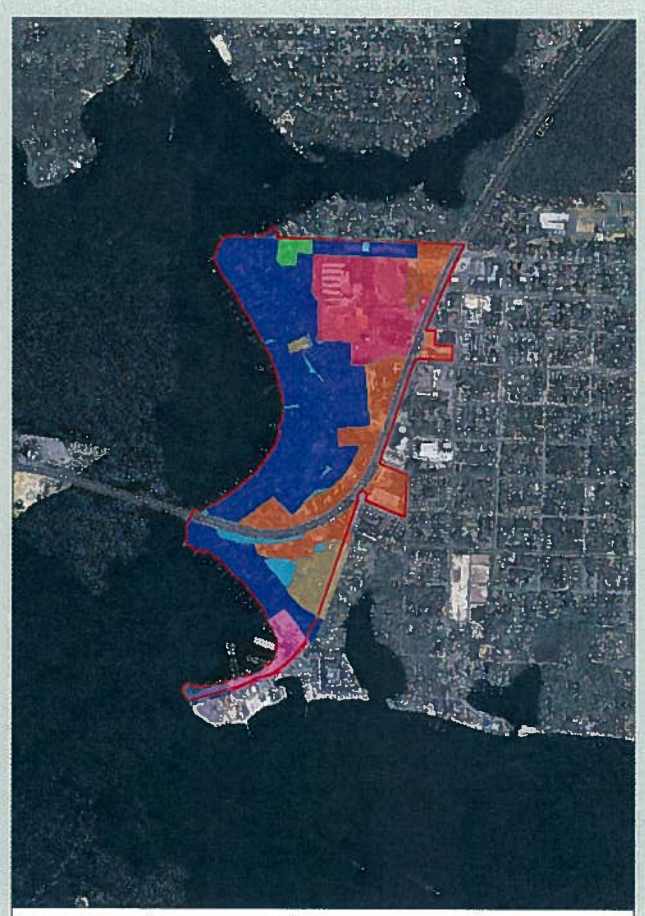
Legend

- Shalimar City Limits
- 2005 Aerial Photo

Future Land Use Description

- C
- CON
- LDR
- MDR
- MU
- MU-L
- PL

1 inch equals 0.13 miles



ZONING

Legend

- Shalimar City Limits
- 2005 Aerial Photo

Zoning Description

- C
- I-1
- P
- PDP
- PL
- R-1
- R-1-A
- R-3

1 inch equals 0.13 miles

ACCIDENT POTENTIAL ZONE & NOISE BUFFERING

Legend

- Noise 1/2 Mile Buffer (65 dB)
- APZ 1/2 Mile Buffer
- Noise Contours
- Accident Potential Zones (APZ)
- Shalimar City Limits
- Eglin Air Force Base
- 2005 Aerial Photo

1 inch equals 0.25 miles

TETRA TECH, INC.

CITY OF SHALIMAR

OKALOOSA COUNTY JOINT LAND USE STUDY

Data Source: Okaloosa County

Noise Contours
Accident Potential Zones (APZ)
Noise 0.5 Mile Buffer
APZ 0.5 Mile Buffer
Shalimar

Eglin Air Force Base
2005 Aerial Photo

N
W E
S
0 0.5 1
Miles
1 inch equals 1 miles

Data Source:
Okaloosa County

TETRA TECH, INC.

SHALIMAR (APZ & NOISE BUFFER)
OKALOOSA COUNTY JOINT LAND USE STUDY

FIGURE X-X

P:\2007\07180 Okaloosa County JLUS\Deliverables\GIS\MXDs\

For Informational Purposes Only.

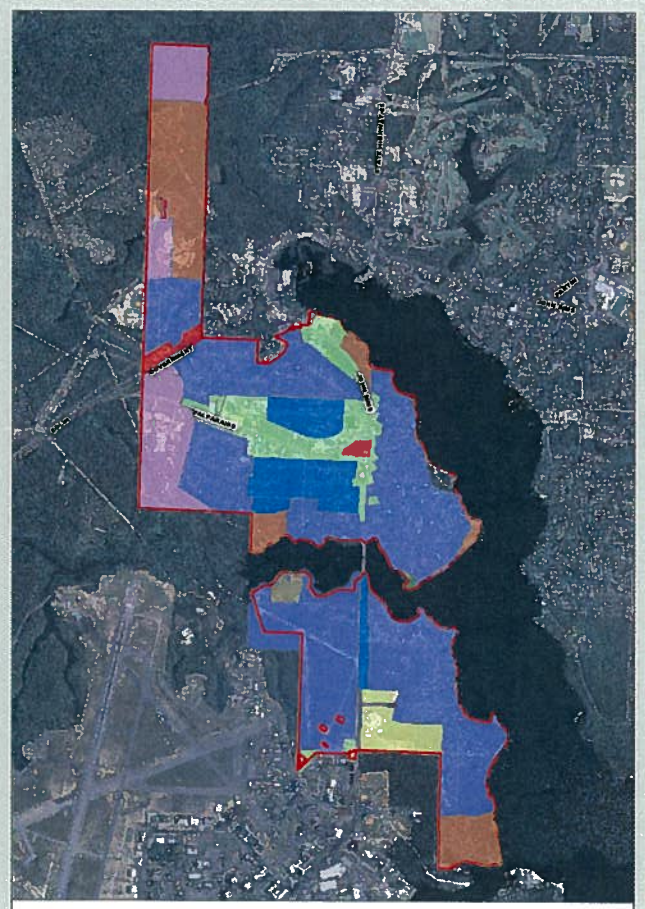
FUTURE LAND USE

DATA UNAVAILABLE
AT THIS TIME

Legend

- Municipality Boundary
- 2005 Aerial Photo

1 inch equals 0.25 miles



ZONING

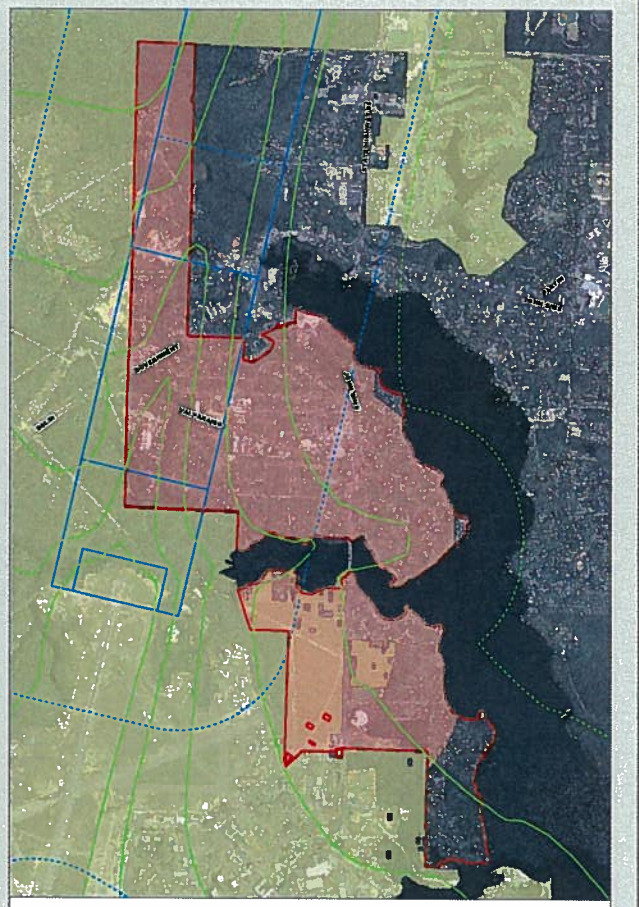
Legend

- Municipality Boundary
- 2005 Aerial Photo

Zoning Description

- C-1
- C-2
- CITY
- HP
- I-1
- I-2
- R-1
- R-1A
- R-2
- SCHOOL

1 inch equals 0.25 miles



ACCIDENT POTENTIAL ZONE & NOISE BUFFERING

Legend

- Noise Contours
- Noise 1/2 Mile Buffer (65 dB)
- Accident Potential Zones (APZ)
- APZ 1/2 Mile Buffer
- Municipality Boundary
- Area of Study
- Eglin Air Force Base
- 2005 Aerial Photo

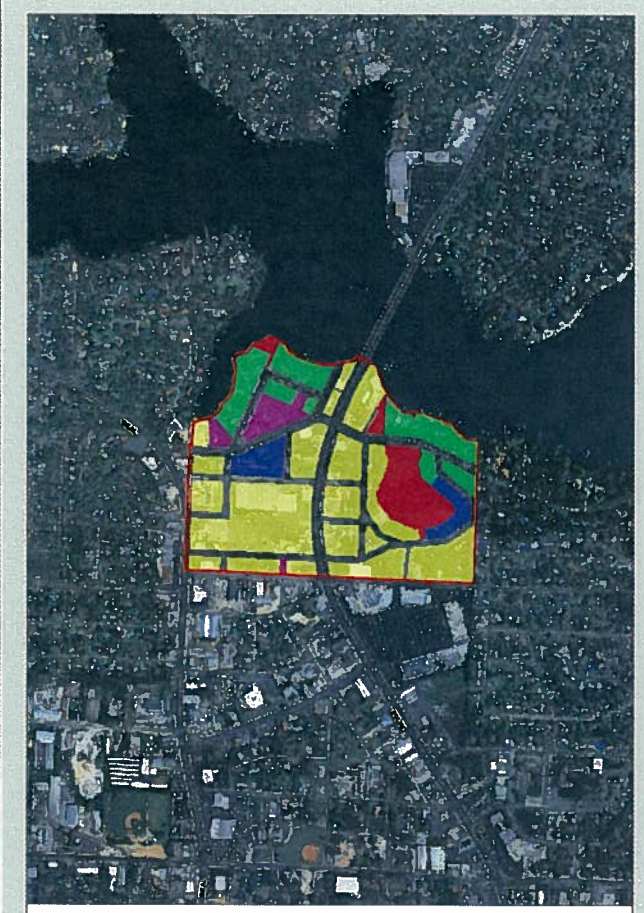
1 inch equals 0.25 miles

TETRA TECH, INC.

CITY OF VALPARAISO

OKALOOSA COUNTY JOINT LAND USE STUDY

Data Source: Okaloosa County



FUTURE LAND USE

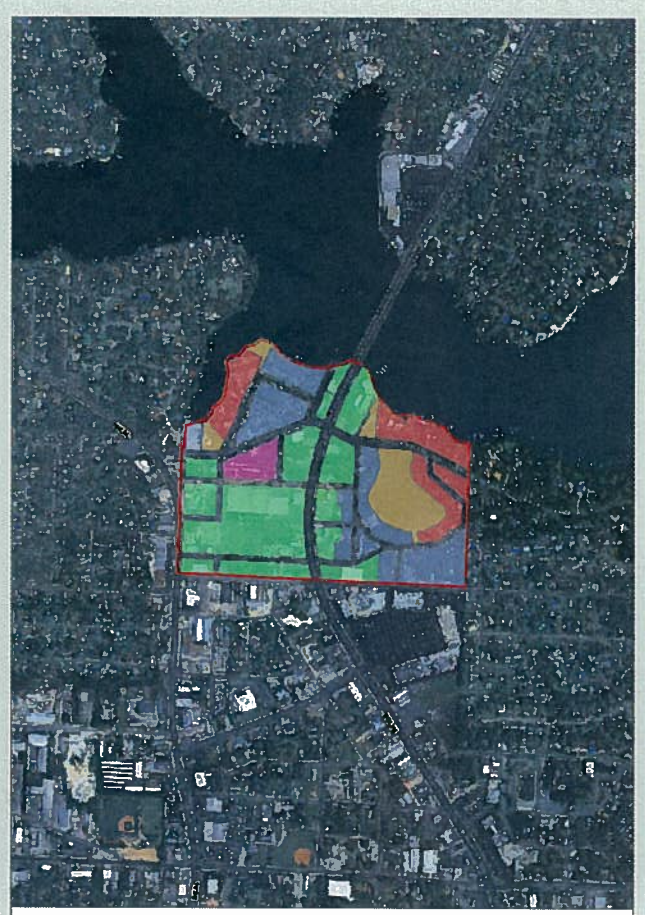
Legend

- Municipality Boundary
- 2005 Aerial Photo

Future Land Use Description

- C
- MDR
- MUR
- PU
- REC

1 inch equals 0.1 miles



ZONING

Legend

- Municipality Boundary
- 2005 Aerial Photo

Zoning Description

- C-1
- C-2
- MR-1
- PL
- R-1

1 inch equals 0.1 miles

ACCIDENT POTENTIAL ZONE & NOISE BUFFERING

Legend

- Noise 1/2 Mile Buffer (65 dB)
- APZ 1/2 Mile Buffer
- Noise Contours
- Accident Potential Zones (APZ)
- Municipality Boundary
- Eglin Air Force Base
- 2005 Aerial Photo

1 inch equals 1 miles

TETRA TECH, INC.

TOWN OF CINCO BAYOU

OKALOOSA COUNTY JOINT LAND USE STUDY

Data Source: Okaloosa County

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SECTION 3.0

Eglin Vision 2015 Vector Check

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Eglin Joint Land Use Study (JLUS)
Eglin Vision 2015 Vector Check
November 1, 2007

TETRA TECH

SOLIN & ASSOC. INC.

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

Introduction

- TetraTech Team
- Responsible Parties
- Project Understanding
- Local Presence

TETRA TECH

SOLIN & ASSOC inc

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

A JLUS is…

- A cooperative land use planning effort between military installations and the surrounding communities.

- It promotes compatible community growth while supporting military training and operational missions.

TETRA TECH

SOLIN & ASSOC

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

Two Primary Concerns

- First, to protect the health, safety and welfare of the local community with regard to military operations.

- Second, to address encroachment that is threatening or may threaten the mission and viability of an installation.

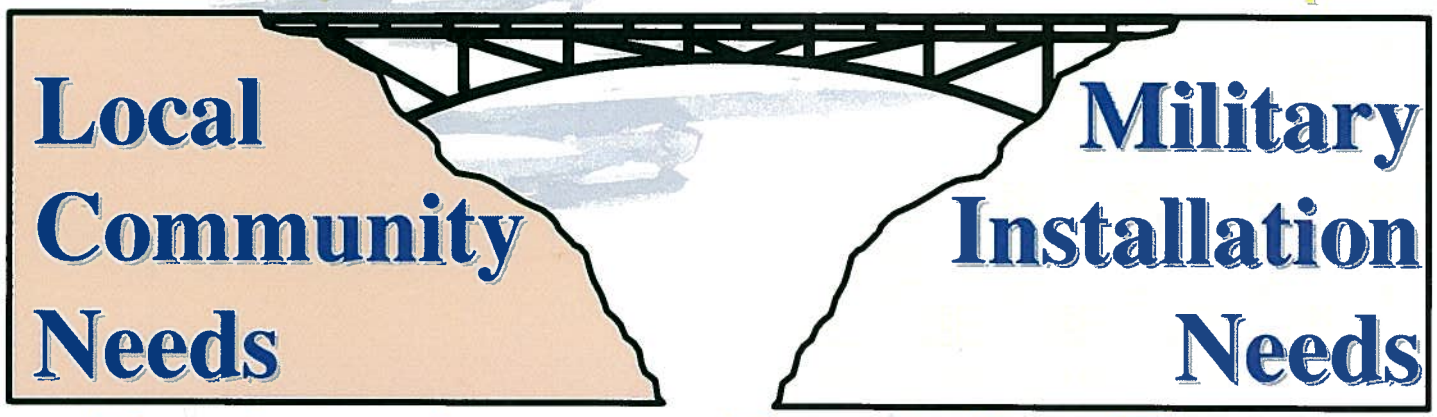
TETRA TECH

SOLIN & ASSOC inc

Creative Community Planning Can Bridge the Encroachment Gap

JLUS — Compatibility — AICUZ

Joint Land Use Study — *Air Installation Compatible Use Zones*



Partnering to Plan the Future

TETRA TECH

SOLIN & ASSOC. INC

OKALOOSA COUNTY · SANTA ROSA COUNTY FLORIDA · WALTON COUNTY, FLORIDA · OEA · Florida Enterprise Florida

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

Phased Work Plan

Phase I: Data Collection & Inventory & Mapping

↓

Phase II – Existing & Future Land Use

↓

Phase III – Compatibility Recommendations

↓

Phase IV – JLUS Report

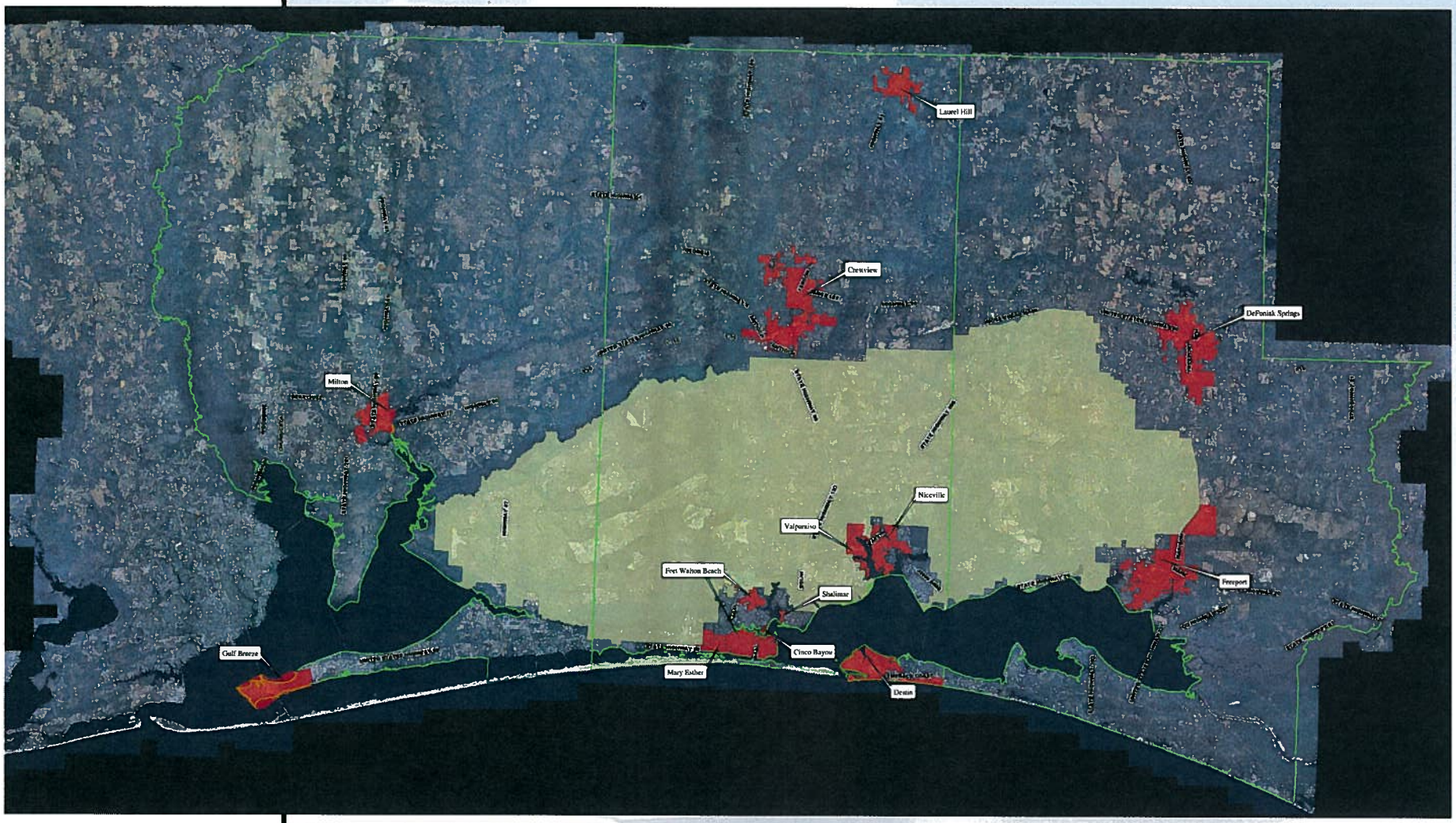
↓

Phase V – Ongoing Support

TETRA TECH

SOLIN & ASSOC

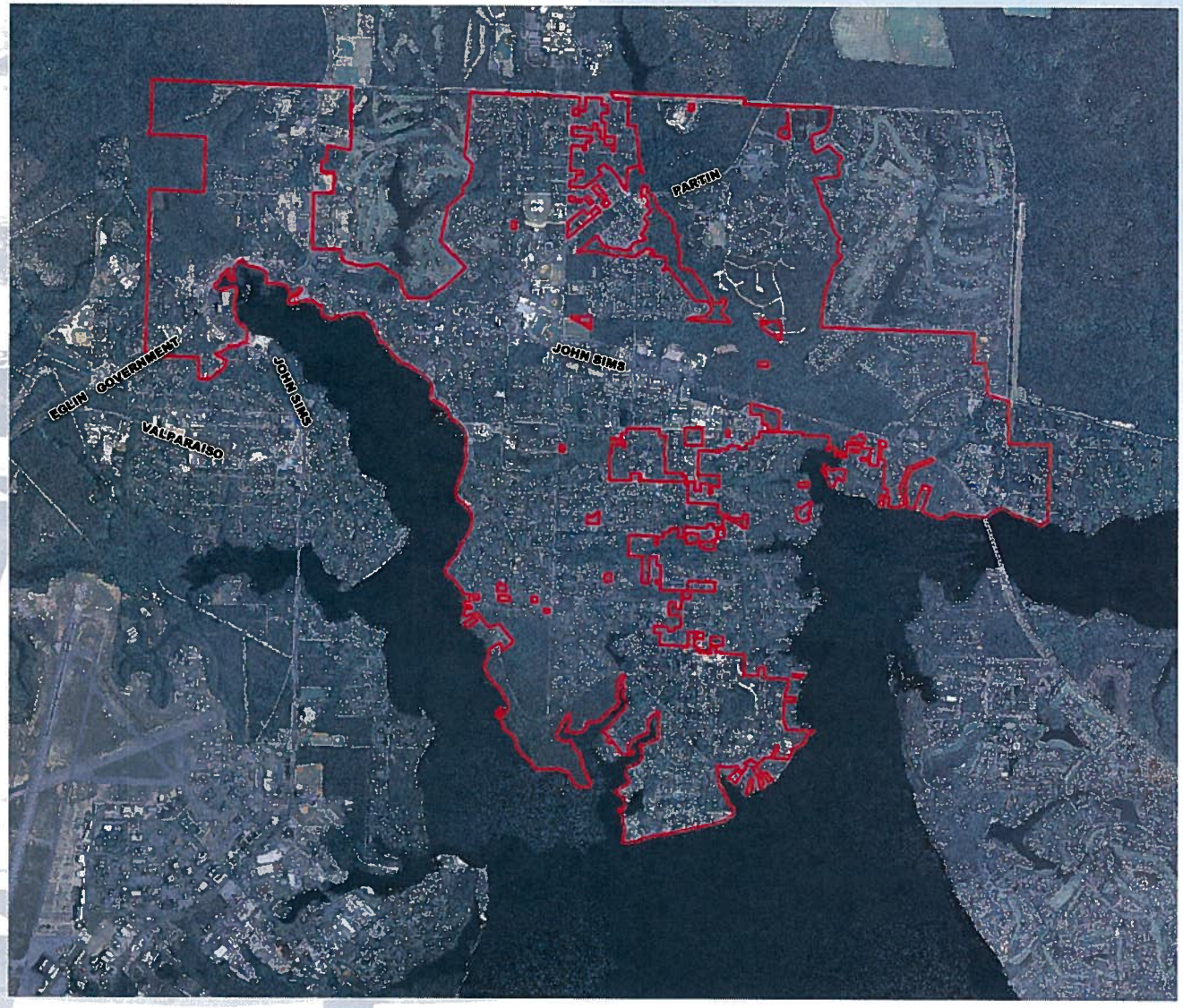
Compatible Land Use Protecting Eglin's Mission on the Emerald Coast



TETRA TECH

SOLIN & ASSOC

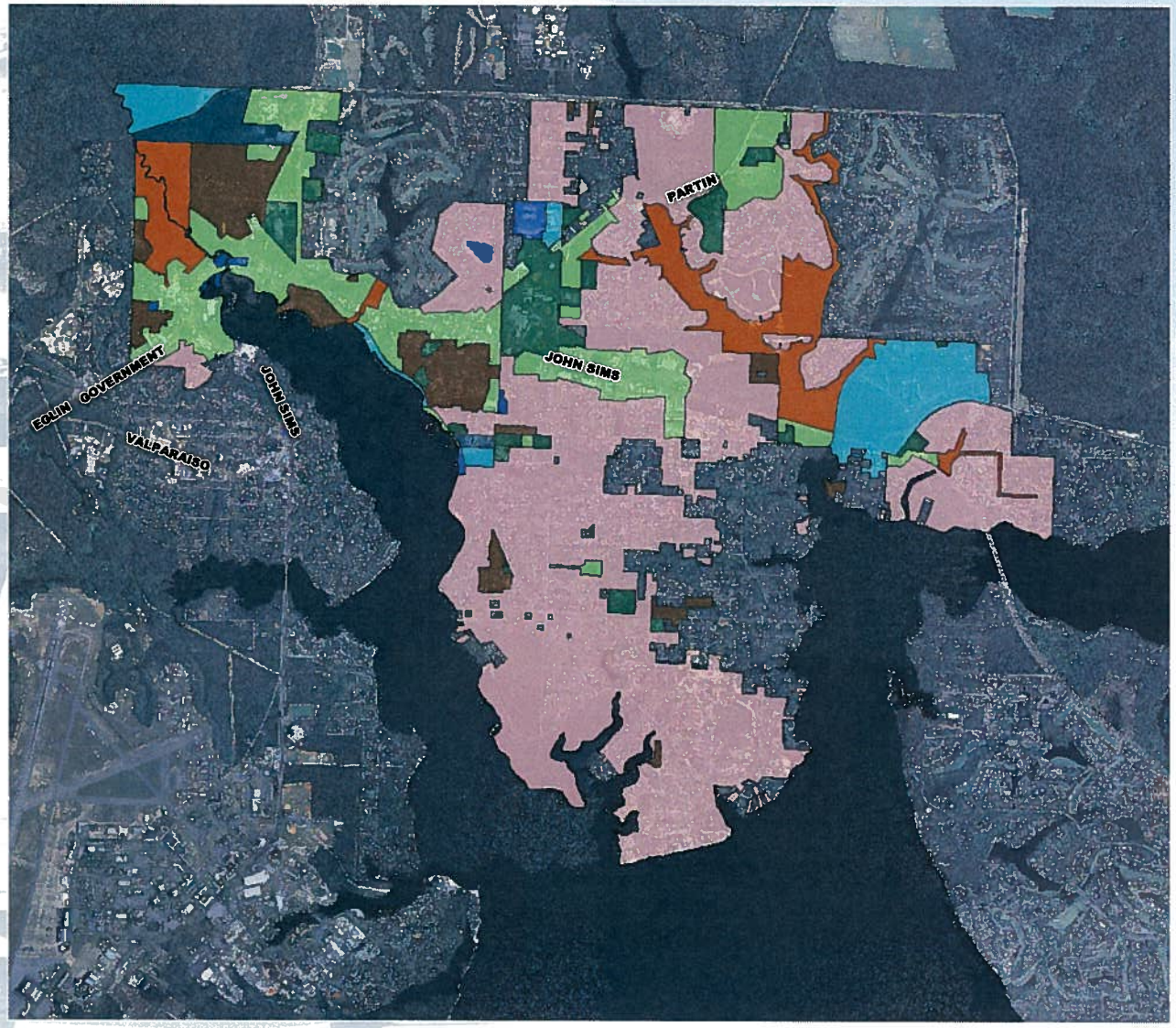
Methodology Example 1



TETRA TECH

SOLIN & ASSOC INC

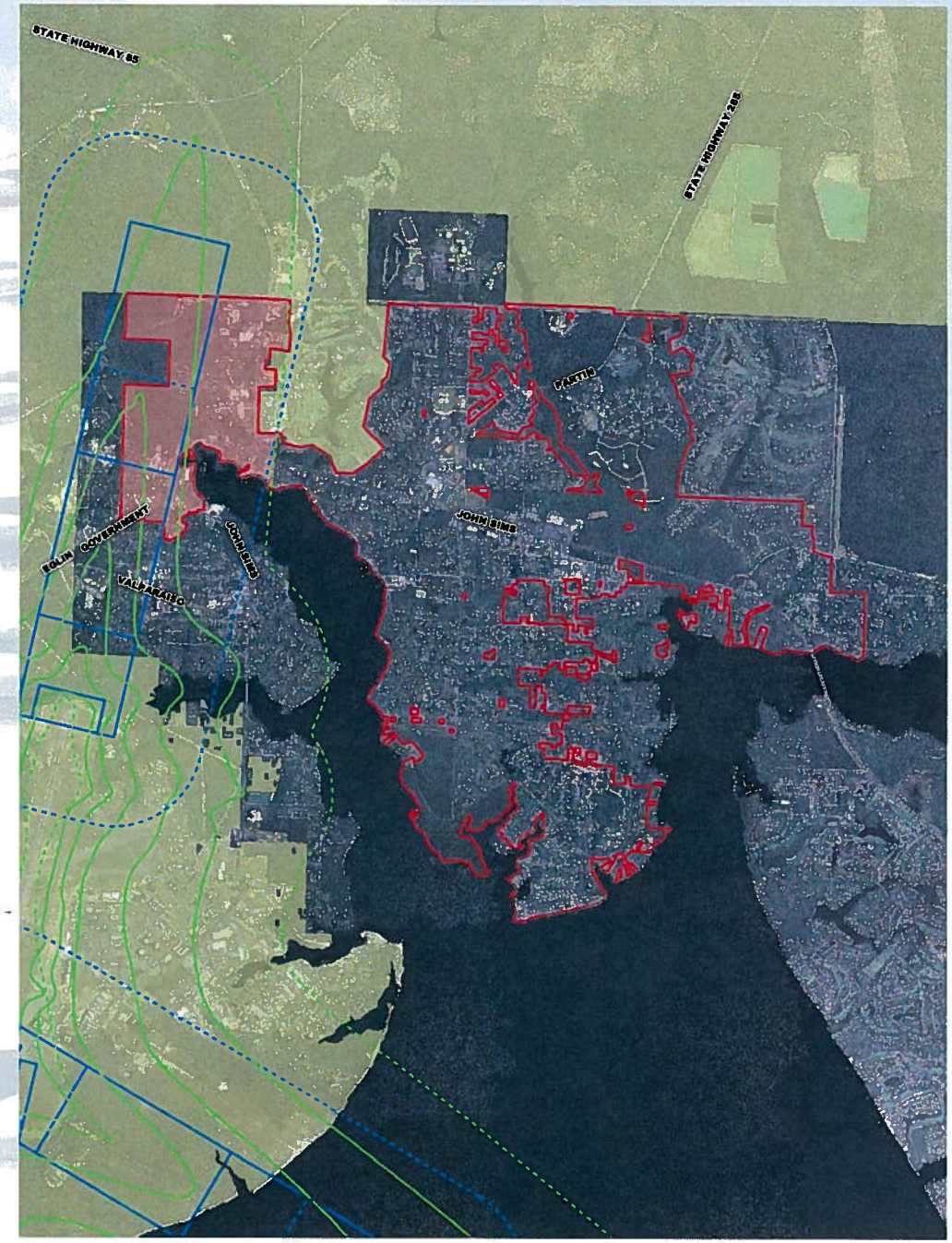
Methodology Example 1



TETRA TECH

SOLIN & ASSOC. inc

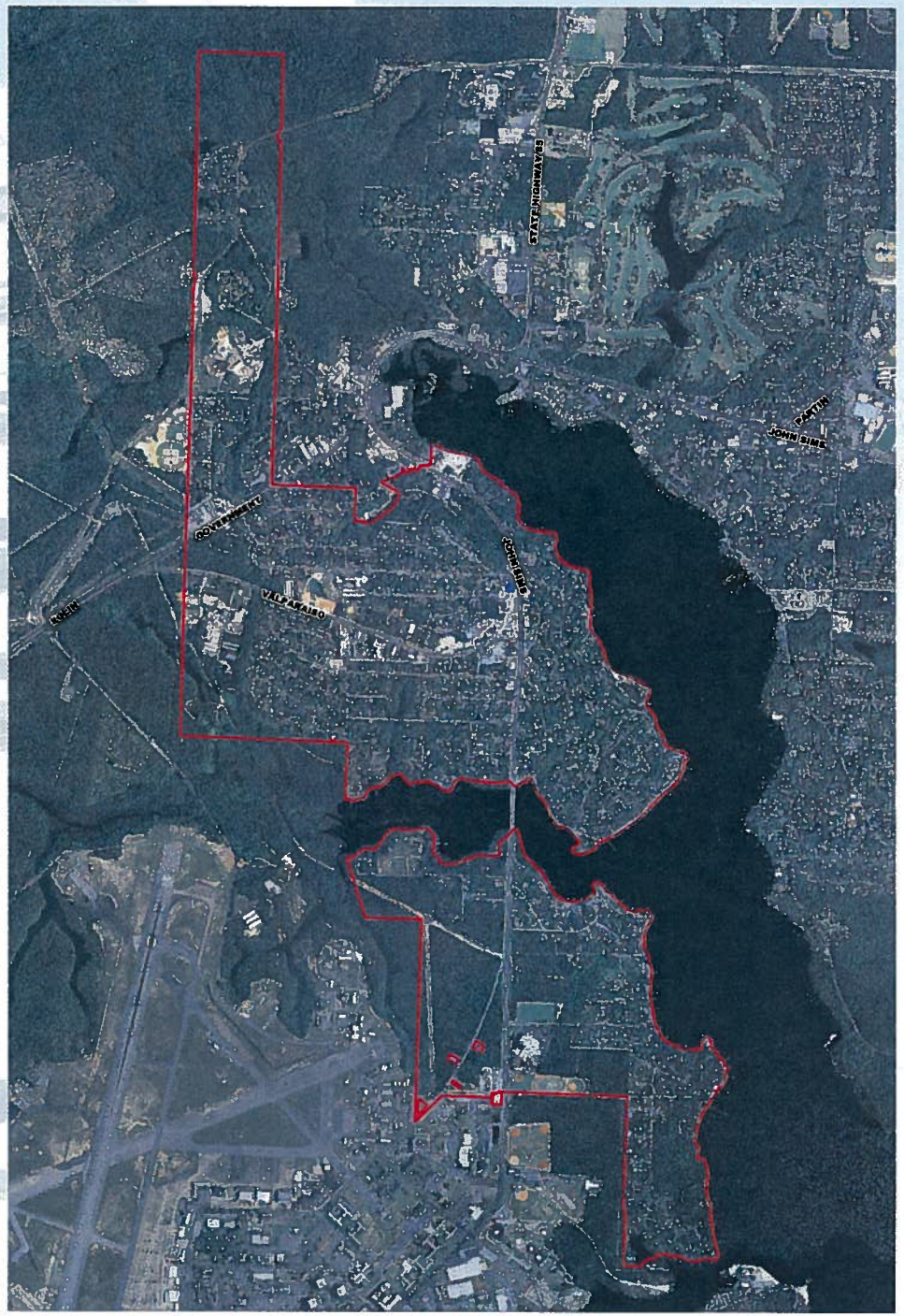
Methodology Example 1



TETRA TECH

SOLIN & ASSOC

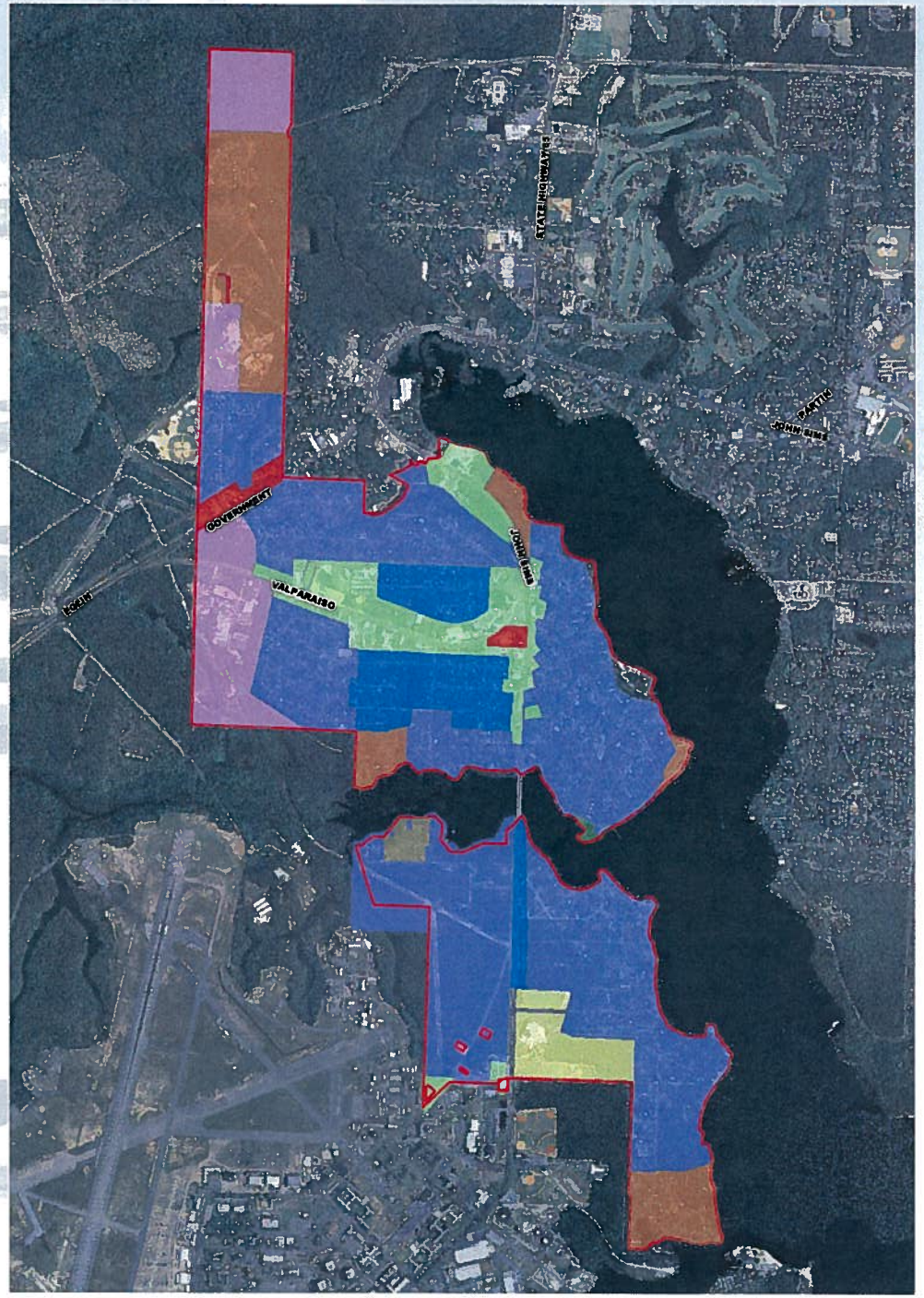
Methodology Example 2



TETRA TECH

SOLIN & ASSOC INC

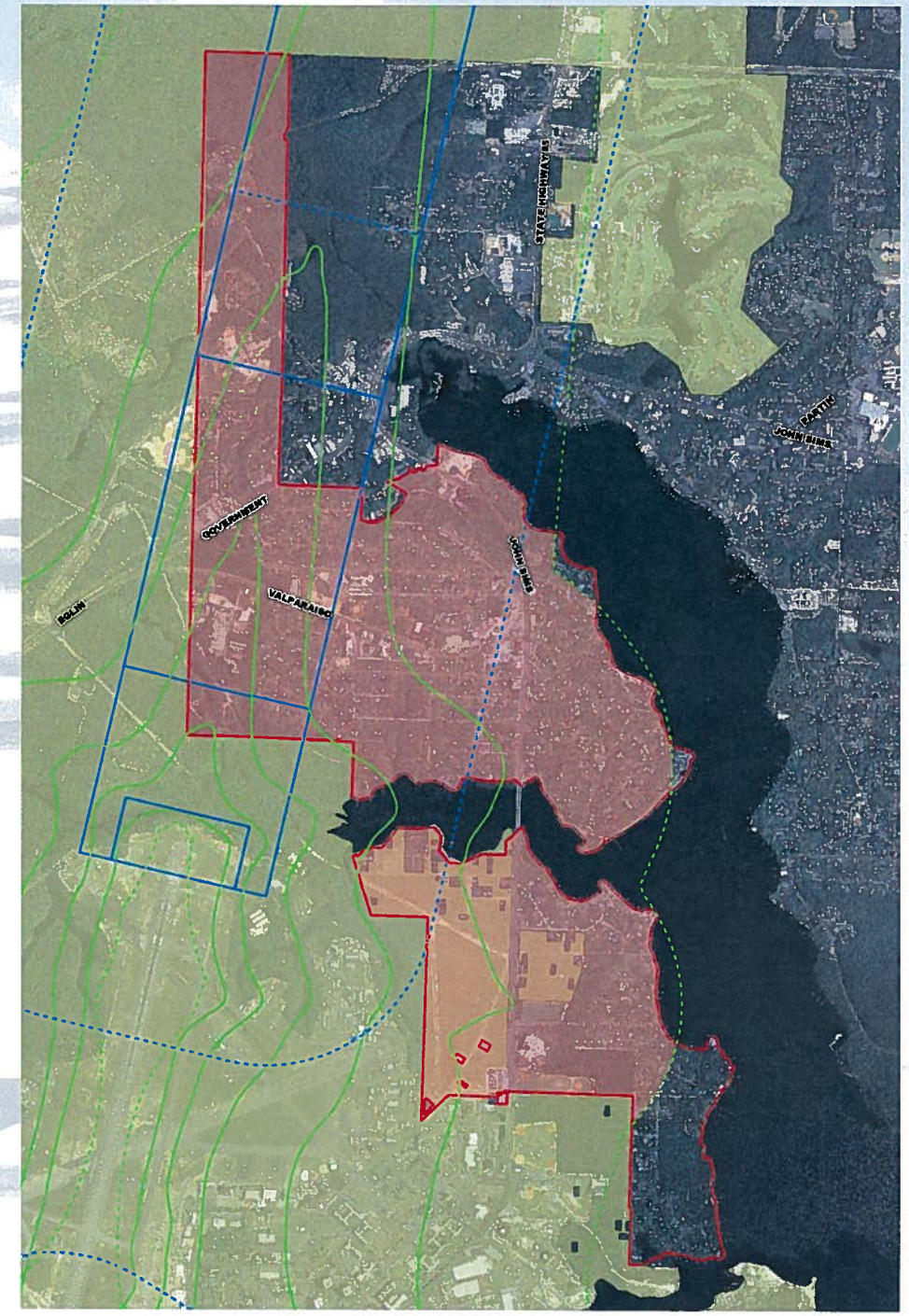
Methodology Example 2



TETRA TECH

SOLIN & ASSOC INC

Methodology Example 2



TETRA TECH

SOLIN & ASSOC

Other Variables

- Height Limits
- Electromatic Waves
- Nighttime Aesthetics
- Supersonic Flight
- Air Compression "Booms"
- …and more

TETRA TECH

SOLIN & ASSOC

Project Schedule

Phase	Start	End
Phase I: Data Collection & Inventory & Mapping	April 2007	August 2007
Phase II – Existing & Future Land Use	July 2007	October 2007
Phase III – Compatibility Recommendations	October 2007	February 2008
Phase IV – JLUS Report	January 2008	June 2008
Phase V – Ongoing Support	Ongoing	Ongoing

TETRA TECH

SOLIN & ASSOC

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

Contact Information

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Tetra Tech, Inc.
12815 Emerald Coast Pkwy, Suite 110
Destin, Florida 32550
850.837.9278 (office)

Jeff Fanto
Okaloosa County
Growth Project Coordinator
1804 Lewis Turner Blvd, Suite 200
Fort Walton Beach, FL 32547
850.609.3014

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Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

SECTION 4.0

Technical Advisory Group Meeting

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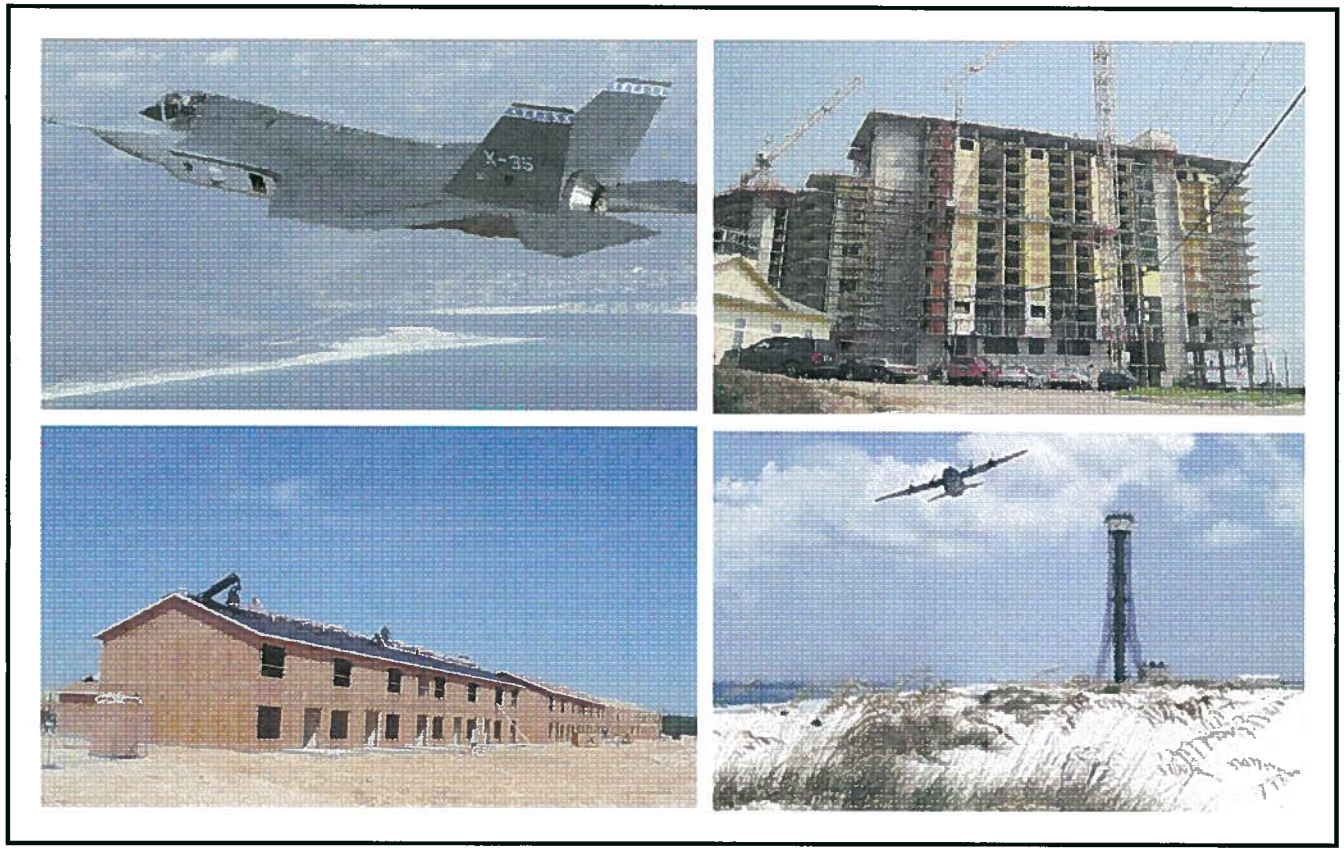
Eglin Joint Land Use Study (JLUS) Technical Advisory Group



TETRA TECH

SOLIN & ASSOC INC.

May 8, 2008

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

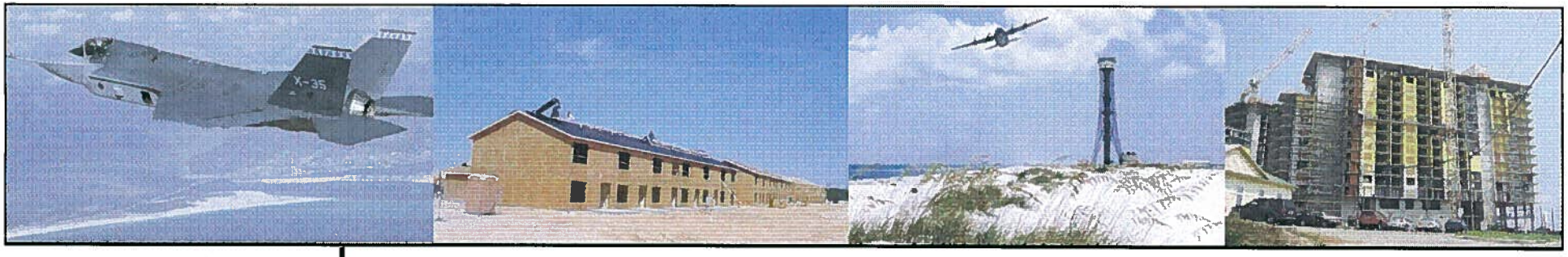
Introduction

- Tetra Tech Team
- Responsible Parties
- Issues
- Potential Strategies
- Moving Forward

TETRA TECH

SOLIN & ASSOC INC

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast



A JLUS is...

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- It promotes compatible community growth while supporting military training and operational missions.

TETRA TECH

OLIN & ASSOC

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

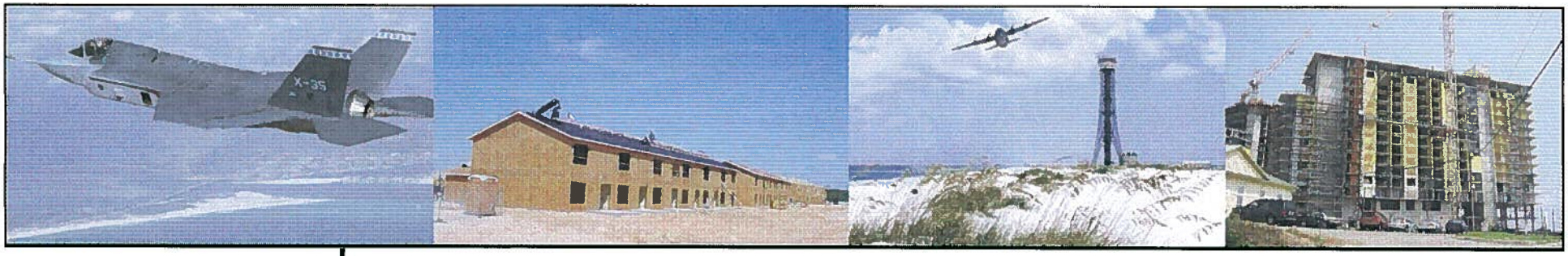
Two Primary Concerns

- First, to protect the health, safety and welfare of the local community with regard to military operations.

- Second, to address encroachment that is threatening or may threaten the mission and viability of an installation.

TETRA TECH

SOLIN & ASSOC



Phased Work Plan

Phase I: Data Collection & Inventory & Mapping

↓

Phase II – Existing & Future Land Use

↓

Phase III – Compatibility Recommendations

↓ ← **We Are Here**

Phase IV – JLUS Report

↓

Phase V – Ongoing Support

TETRA TECH

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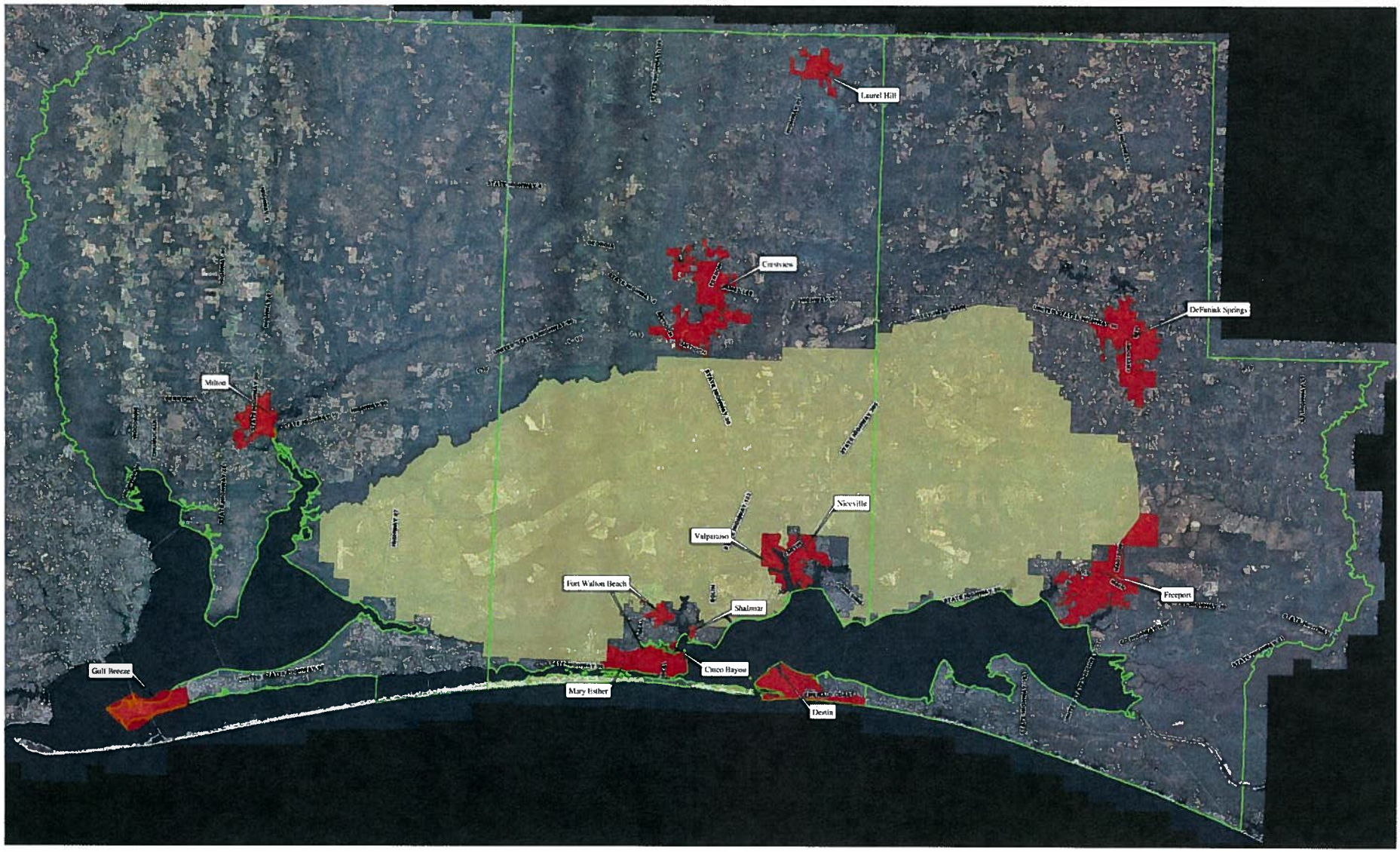
Compatible Land Use Protecting Eglin's Mission on the Emerald Coast



TETRA TECH

SOLIN & ASSOC INC

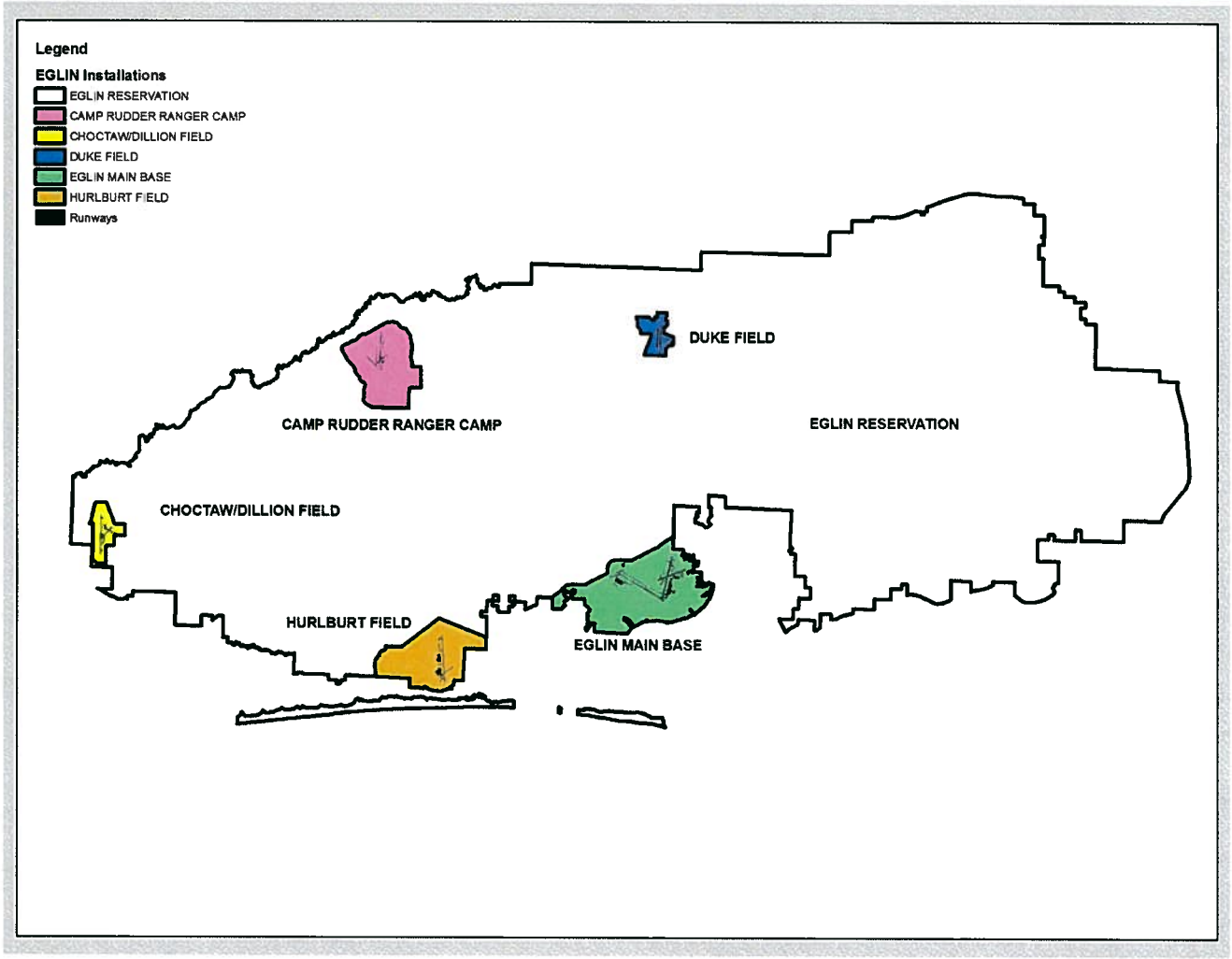
Where Have We Been?

- Expanded Scope & Grant with OEA
- Waiting On EIS
- Revising GIS Maps & Data Analysis
- Identifying Issues
- Recognizing Potential Strategies

TETRA TECH

SOLIN & ASSOC INC

Potential Military Influence Areas



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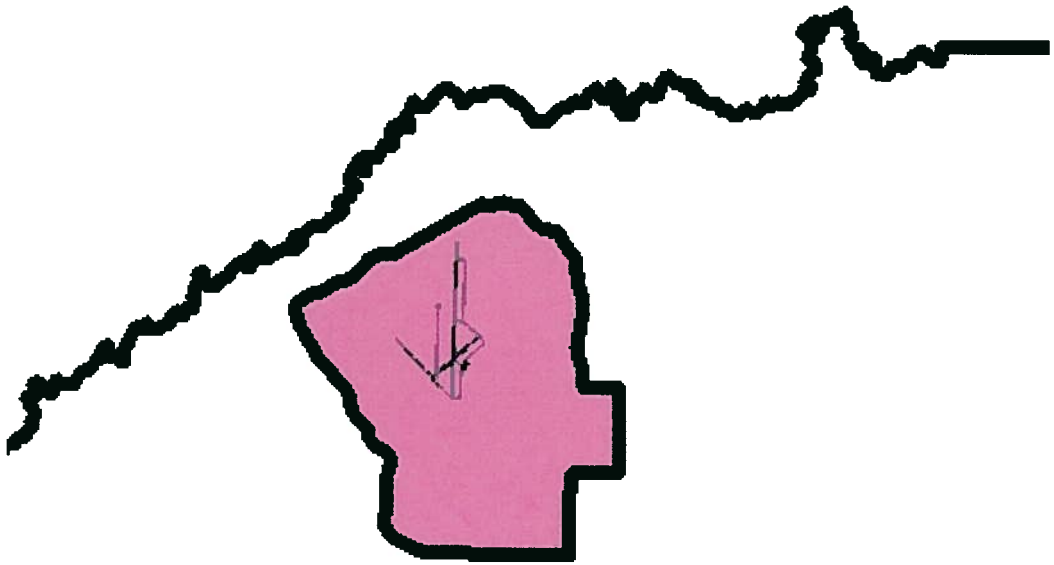
Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

Camp Rudder



CAMP RUDDER RANGER CAMP

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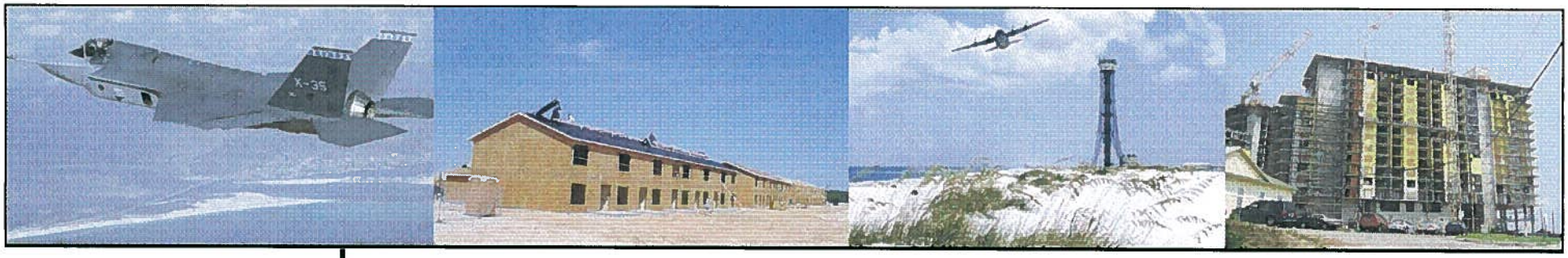
SOLIN & ASSOC inc

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast



Choctaw Field

CHOCTAW/DILLION FIELD

TETRA TECH

SOLIN & ASSOC INC

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

Duke Field

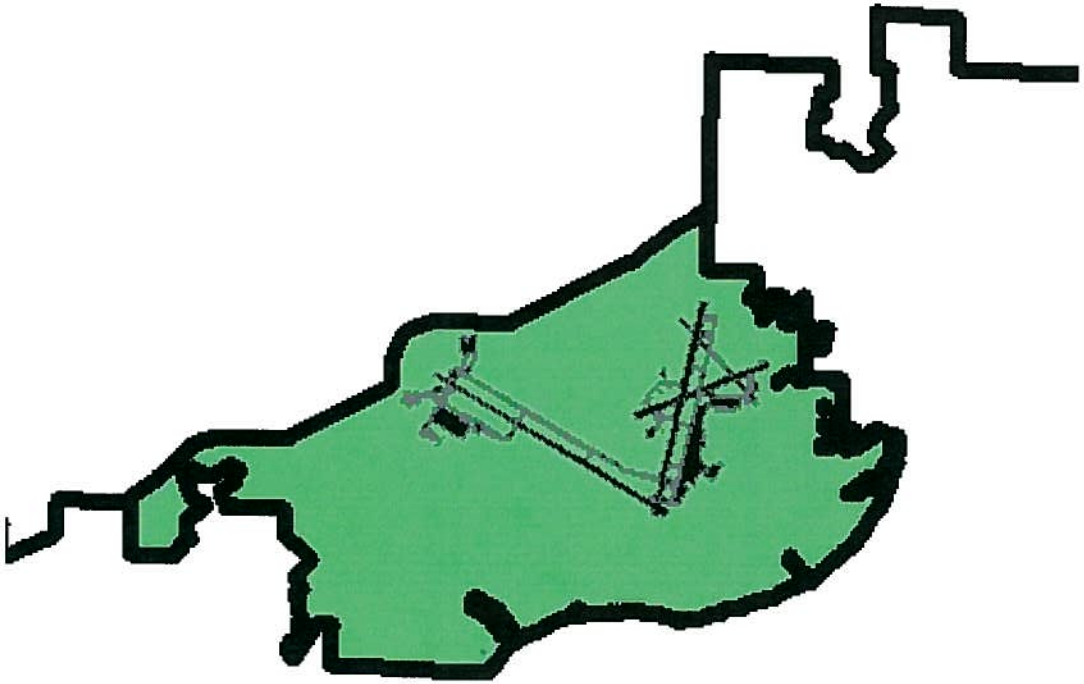
DUKE FIELD

TETRA TECH

SOLIN & ASSOC

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

Eglin Main



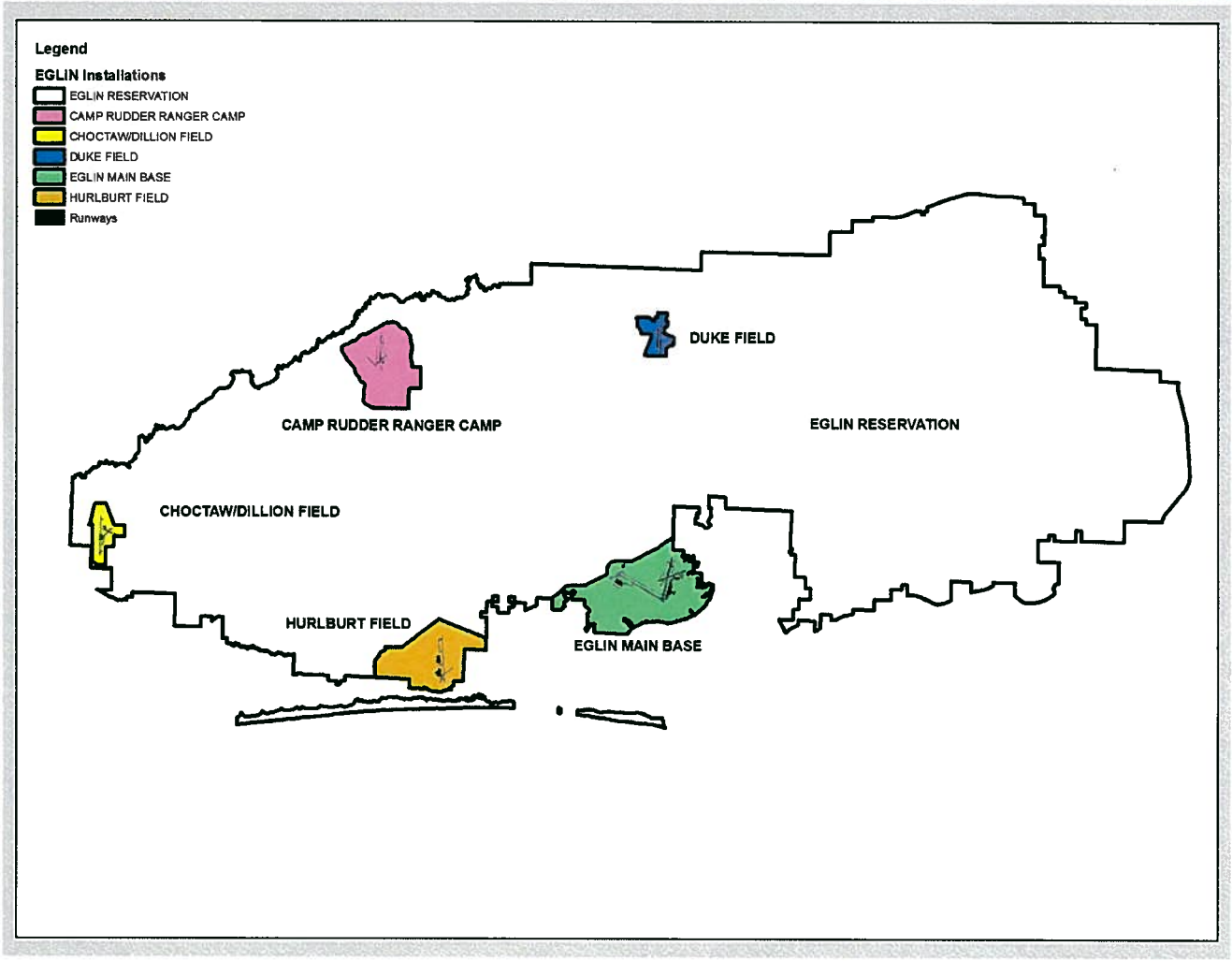
EGLIN MAIN BASE

TETRA TECH

SOLIN & ASSOC

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

Eglin Reservation

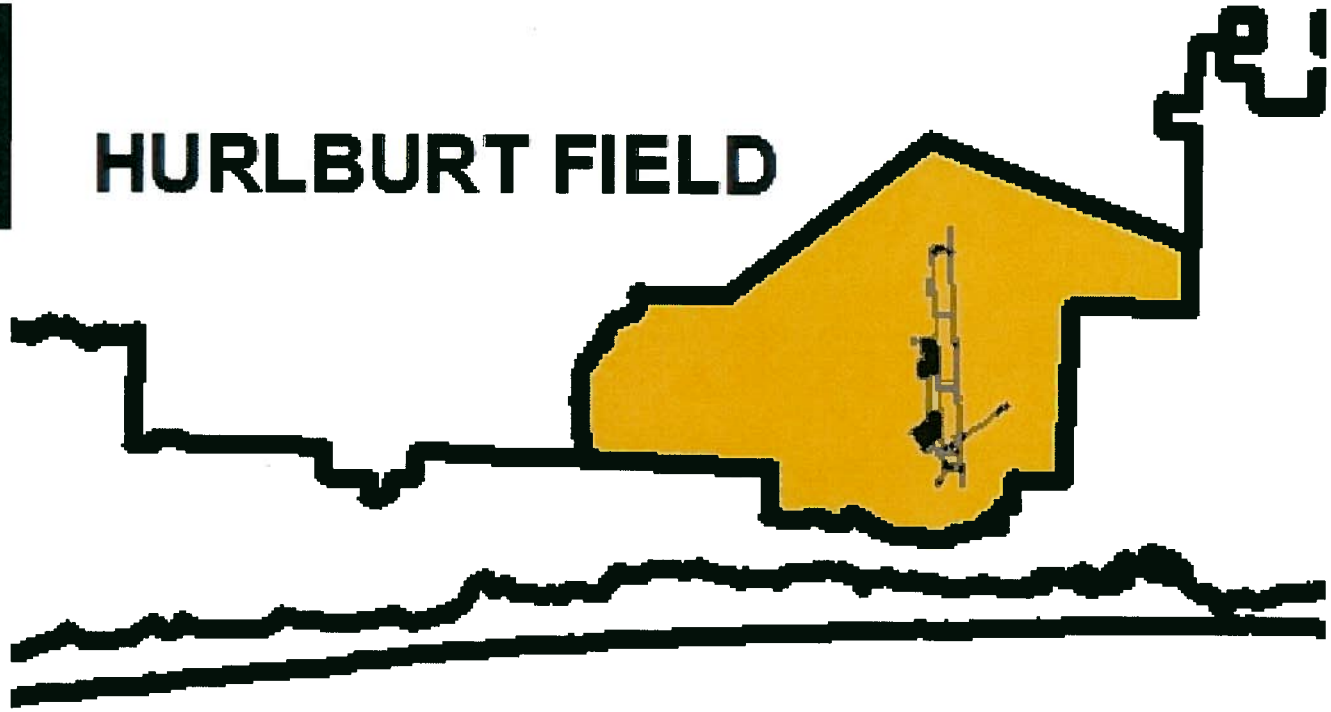


TETRA TECH

SOLIN & ASSOC INC

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

Hurlburt Field



TETRA TECH

SOLIN & ASSOC

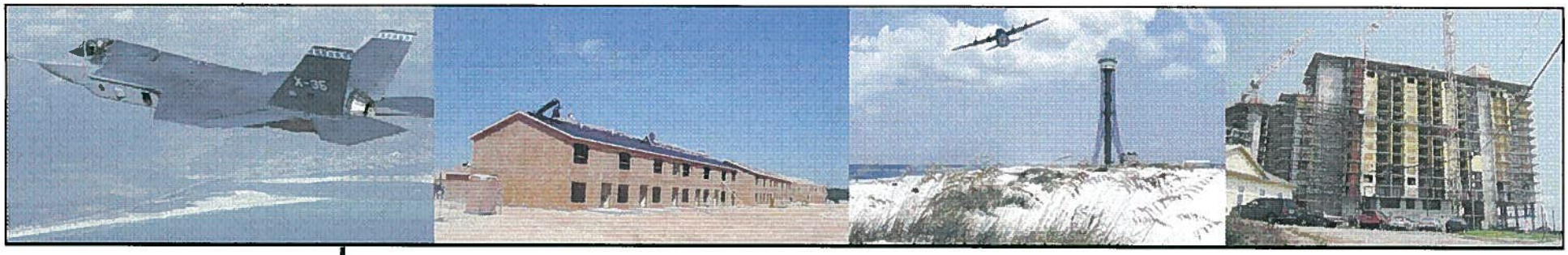
Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

Issues Matrix

TETRA TECH

SOLIN & ASSOC inc

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast



Potential Strategies - General

- Land Use & Construction Regulations
- Communication Techniques
- Land Acquisition Program
- Military Operations

TETRA TECH

SOLIN & ASSOC inc

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

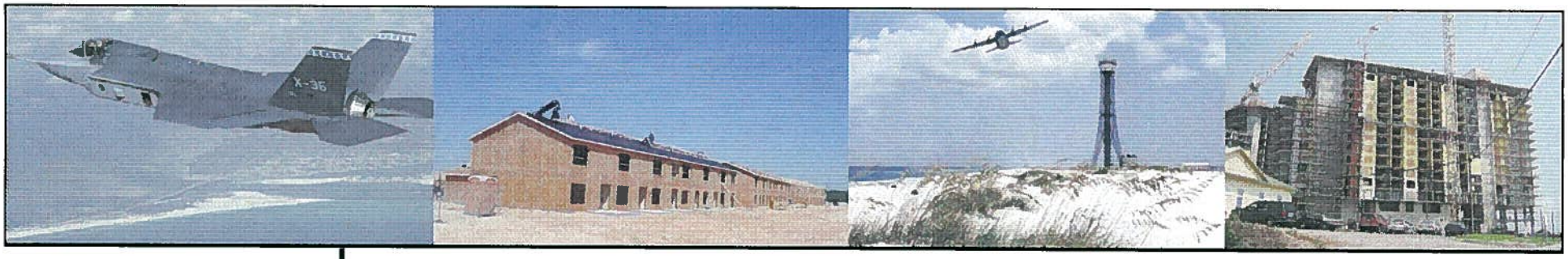
Land Use & Construction Regulations

- Military Environs Ordinance
- Height Regulations
- Noise Insulation Standards
- Future Land Use Map Revisions
- Rezoning
- Lighting Standards
- Site Plan, Development Order, & Building Code
- Military Participation in Local Government Review Process
- Small Area Land Use Studies
- Comprehensive Plan & Land Development Code Update

TETRA TECH

SOLIN & ASSOC. inc

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast



Communication Techniques

- Additional Disclosure Requirements
- Web-Site Public Awareness
- Additional Development Review Coordination
- Public Signage
- Public Announcements/Notifications of Military Activities

TETRA TECH

SOLIN & ASSOC. inc

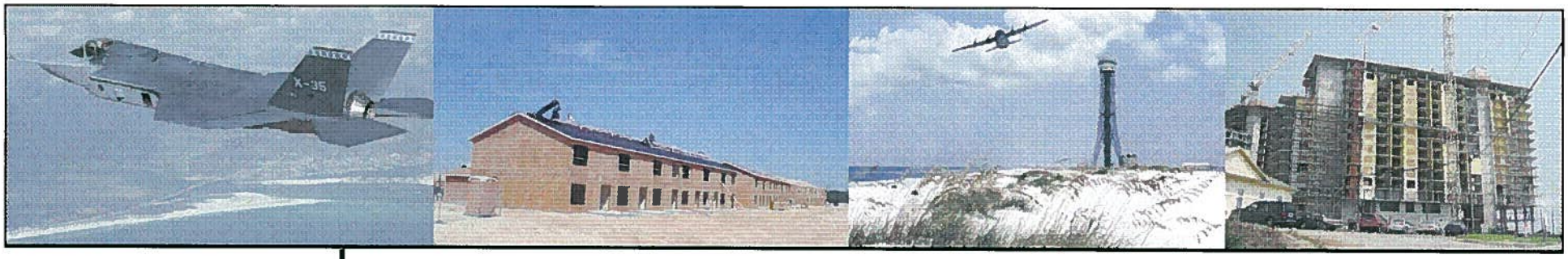
Land Acquisition Program

- Clear Zone and APZ I
- Environmental Conservation Lands
-
-
-
-

TETRA TECH

SOLIN & ASSOC

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast



Military

- Aircraft Runups, Maintenance, Tests, etc. Protocols
- Alternate ILS Runway
- Environmental Stewardship

TETRA TECH

SOLIN & ASSOC INC

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

Potential Strategies Matrix

TETRA TECH

SOLIN & ASSOC. INC

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

Contact Information

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TETRA TECH

Compatible Land Use Protecting Eglin's Mission on the Emerald Coast

SECTION 5.0
Public Meeting

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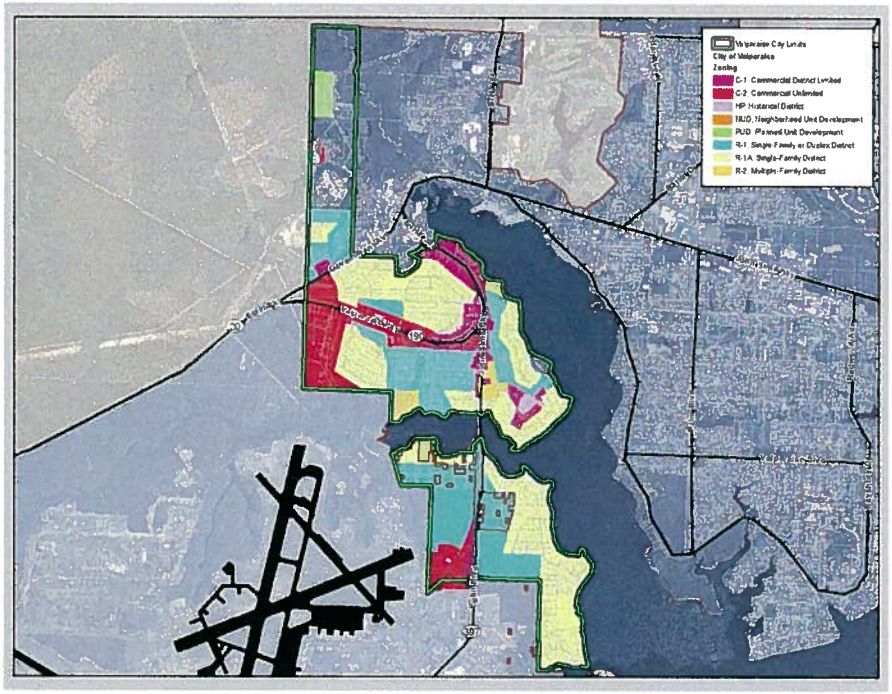
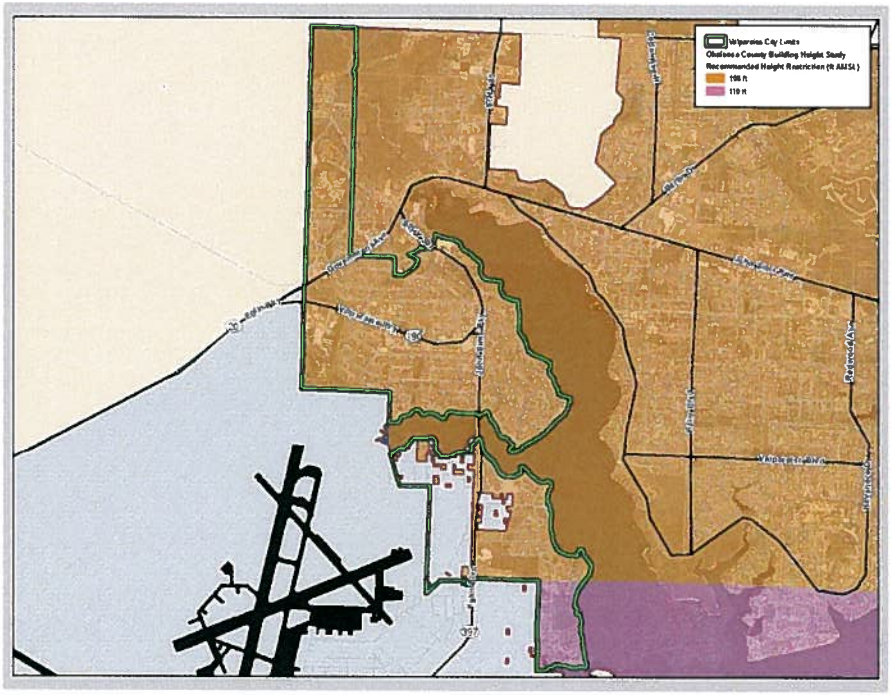
CITY OF VALPARAISO

TETRA TECH



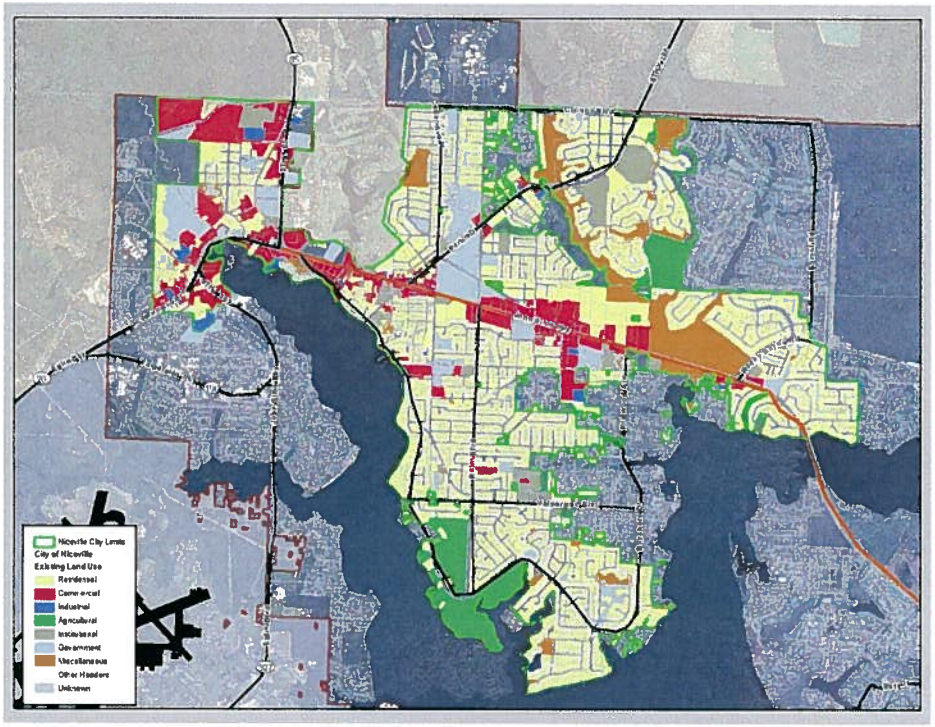
EXISTING ZONING



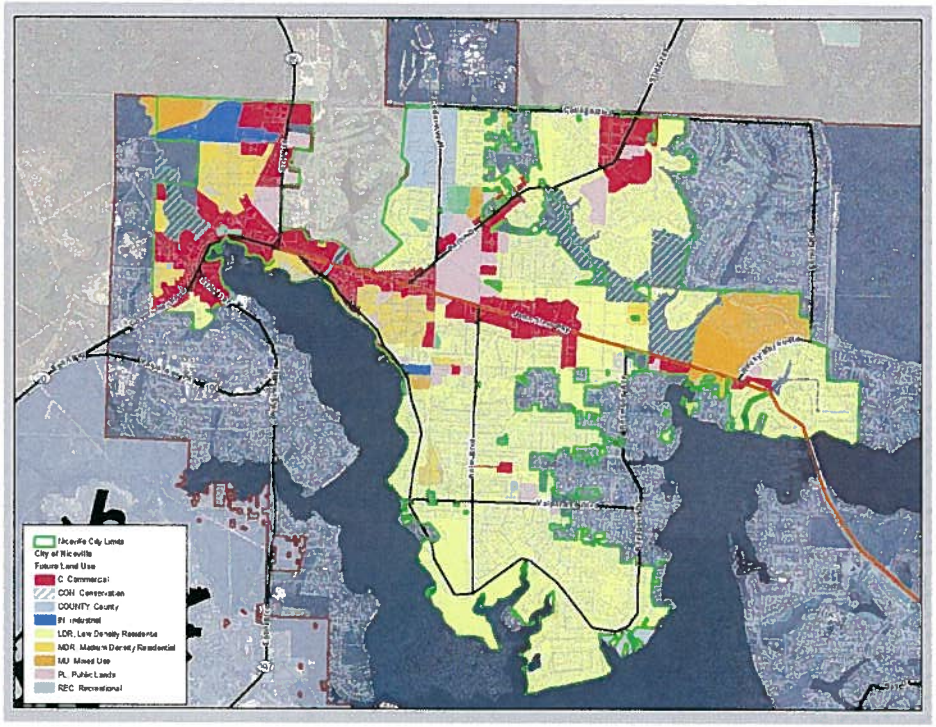
HEIGHT LIMITATIONS

Eglin Air Force Base Joint Land Use Study (JLUS)

CITY OF NICEVILLE

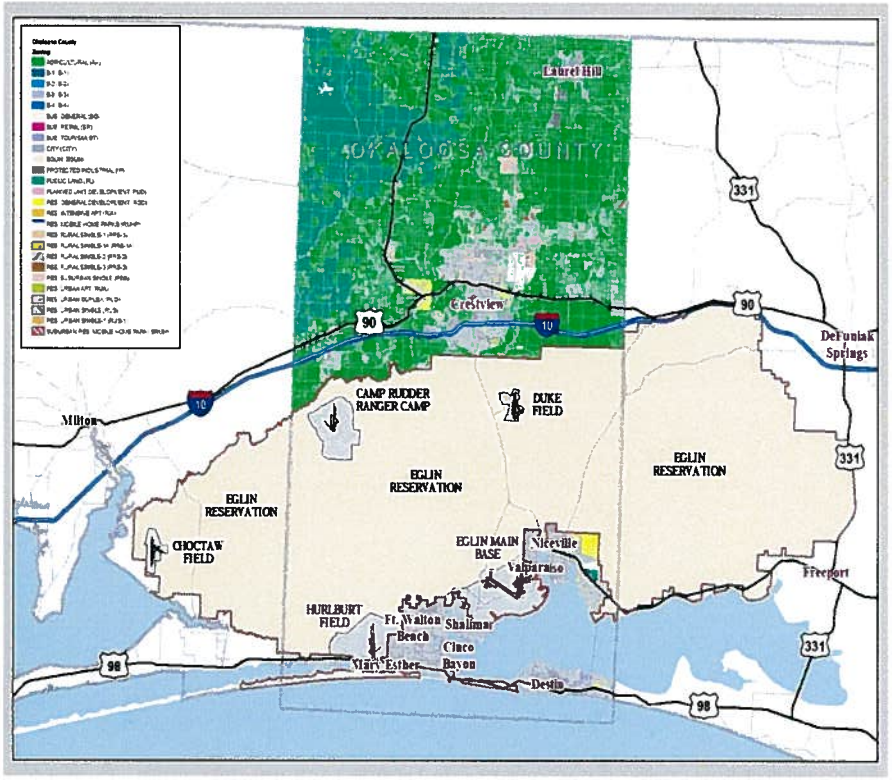


EXISTING ZONING

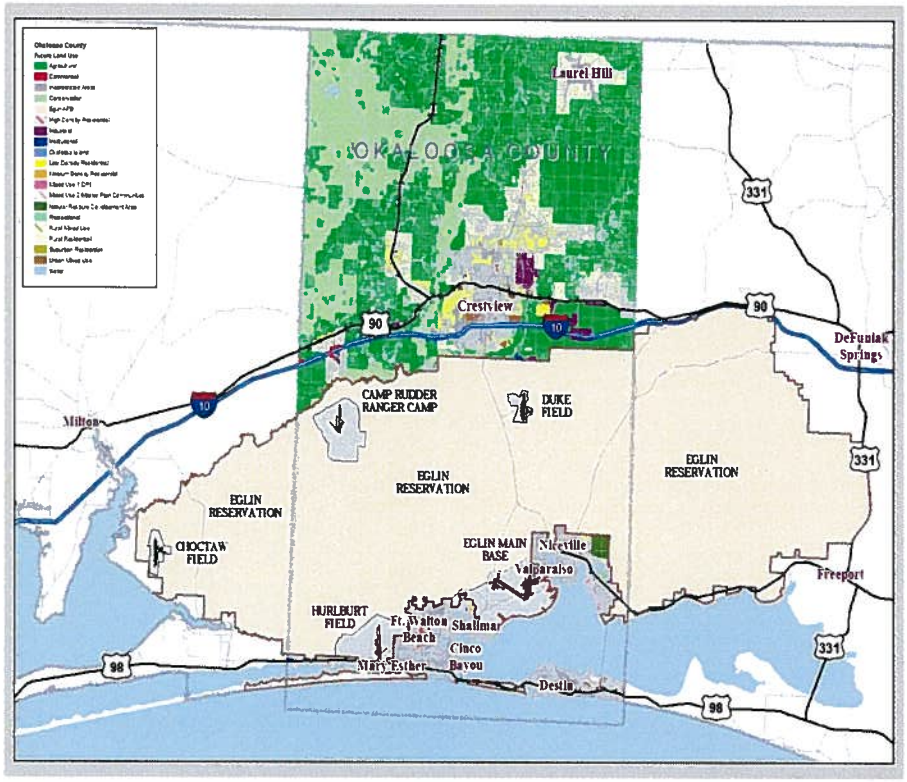


FUTURE LAND USE

OKALOOSA COUNTY (UNINCORPORATED AREAS)

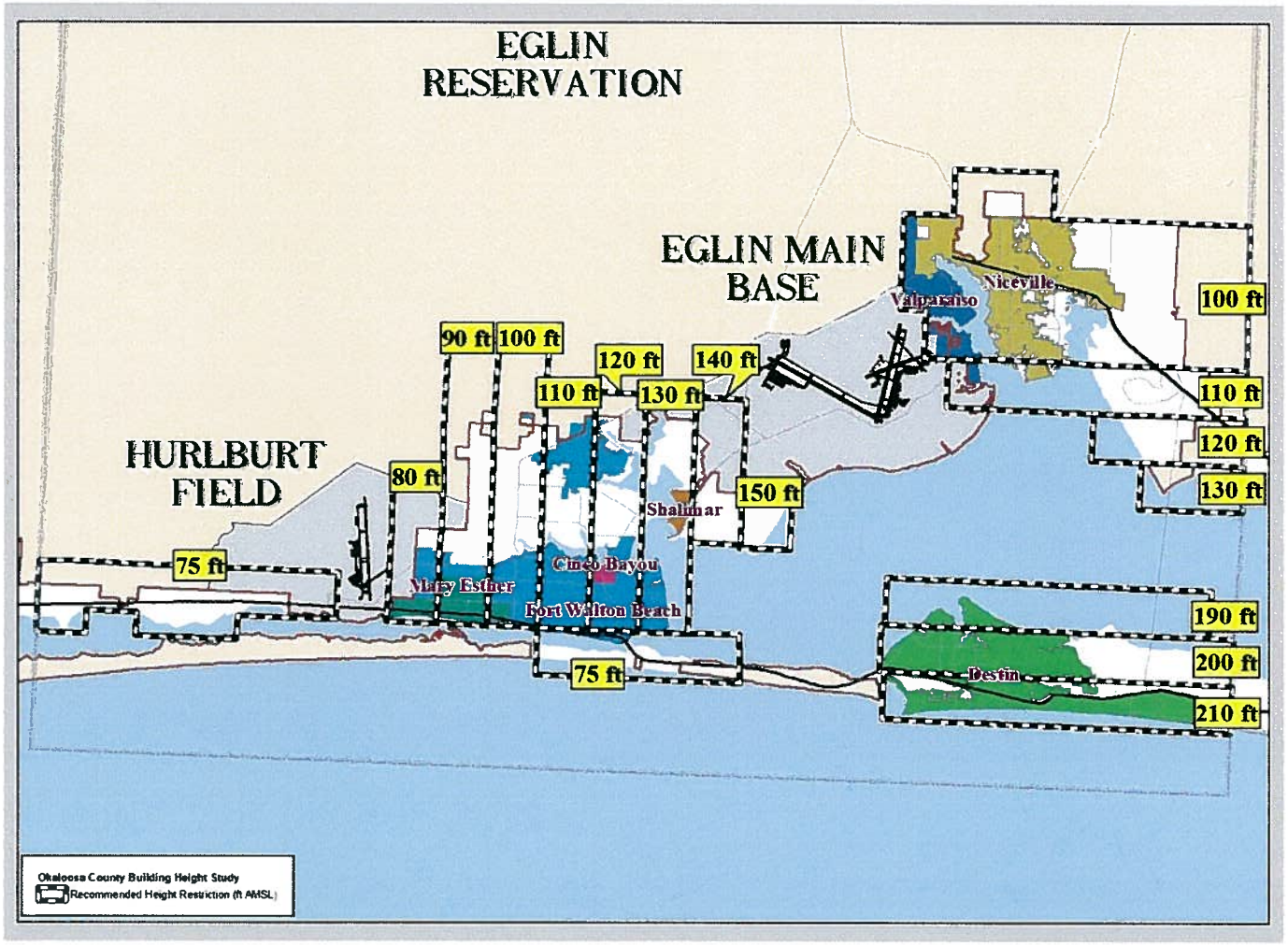


EXISTING ZONING



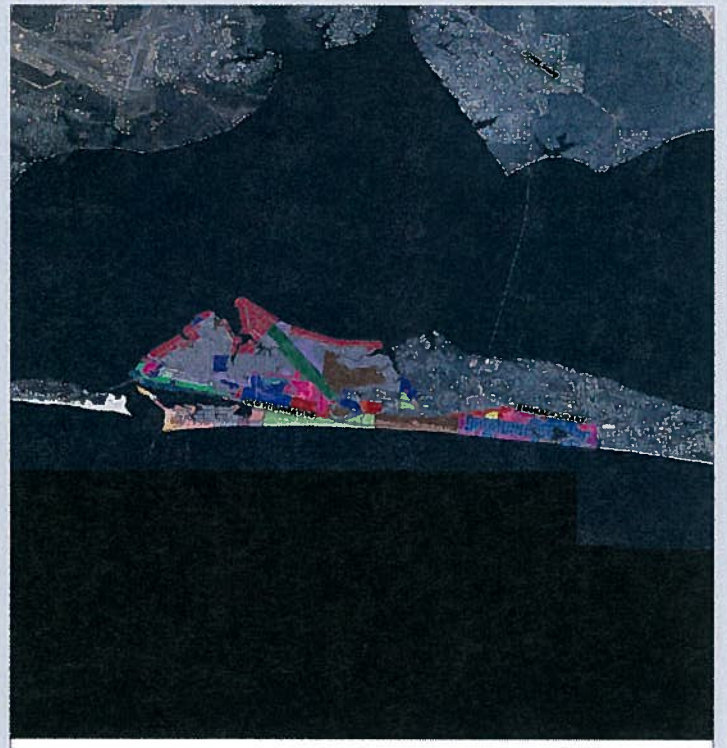
FUTURE LAND USE

OKALOOSA COUNTY BUILDING HEIGHTS



CITY OF DESTIN

TETRA TECH



FUTURE LAND USE

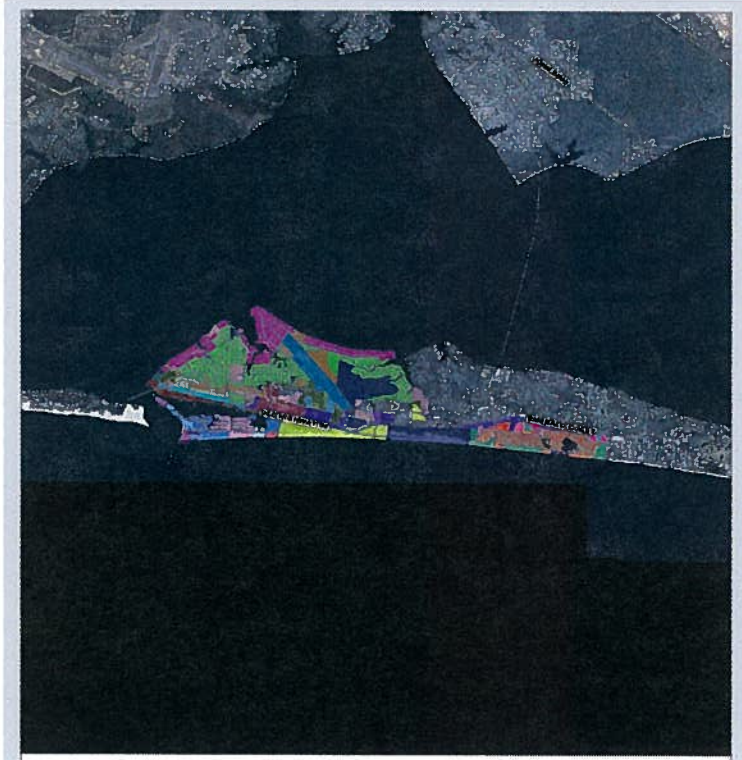
Legend

- 2005 Aerial Photo

Future Land Use Description

- Airport
- Bay Estates
- Calhoun Mixed Use
- Commercial General
- Commercial Limited
- Commercial Trades and Services
- Conservation
- Crystal Beach Neighborhood
- Crystal Beach Resort
- Gulf Resort Mixed Use
- High Density Residential
- Holiday Isle Mixed Use
- Industrial
- Institutional
- Low Density Residential
- Medium Density Residential
- North Harbor Mixed Use
- Recreational
- Residential, Office and Institutional
- South Harbor Mixed Use
- Town Center Mixed Use

1 inch equals 1 miles



ZONING

Legend

- 2005 Aerial Photo

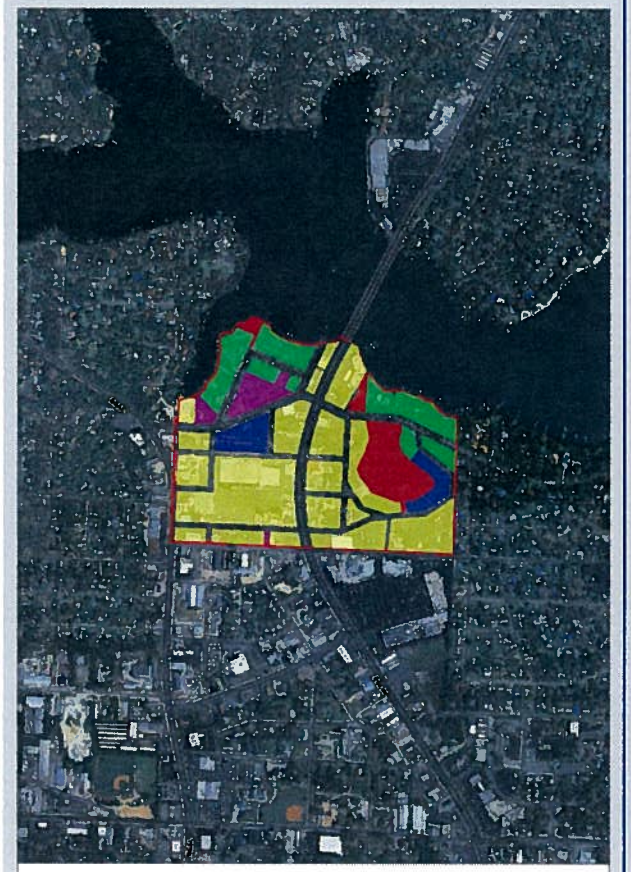
Zoning Description

- Airport
- Bay Estates
- Calhoun Mixed Use
- Commercial General
- Commercial Limited
- Commercial Trades and Service
- Conservation
- Crystal Beach Neighborhood
- Crystal Beach Resort
- Gulf Resort Mixed Use
- High Density Residential
- Holiday Isle Mixed Use
- Industrial
- Institutional
- Low Density Residential - Harbor
- Low Density Residential - Holiday Isle
- Low Density Residential - Village
- Medium Density Residential - Holiday Isle
- Medium Density Residential - Village
- North Harbor Mixed Use
- Recreational
- Residential, Office & Institutional Village Residential
- Residential, Office, Institutional - General Development
- Residential, Office, Institutional - Tourist Development
- Residential, Office, Institutional - Village Residential
- South Harbor Mixed Use
- Town Center Mixed Use

1 inch equals 1 miles

TOWN OF CINCO BAYOU

TETRA TECH



FUTURE LAND USE

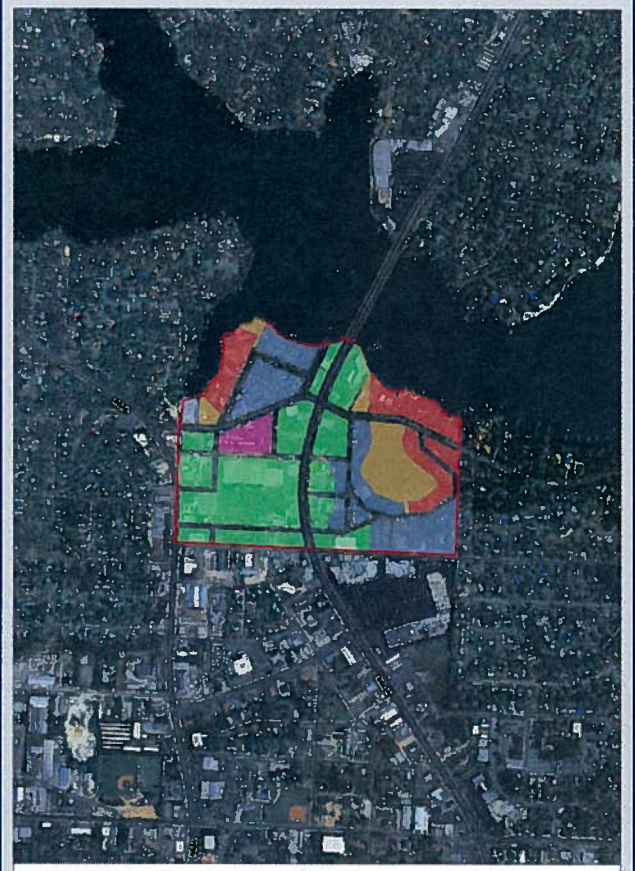
Legend

- Municipality Boundary
- 2005 Aerial Photo

Future Land Use Description

- C
- MDR
- MUR
- PU
- REC

1 inch equals 0.1 miles



ZONING

Legend

- Municipality Boundary
- 2005 Aerial Photo

Zoning Description

- C-1
- C-2
- MR-1
- PL
- R-1

1 inch equals 0.1 miles

ACCIDENT POTENTIAL ZONE & NOISE BUFFERING

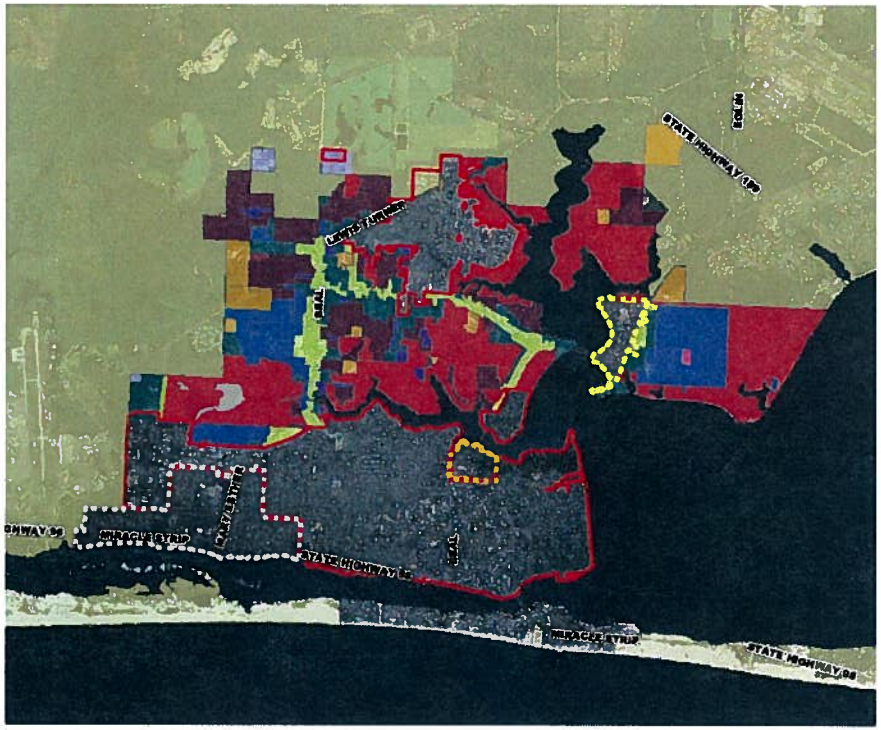
Legend

- Noise Contours
- Noise 1/2 Mile Buffer (65 dB)
- Accident Potential Zones (APZ)
- APZ 1/2 Mile Buffer
- Municipality Boundary
- Eglin Air Force Base
- 2005 Aerial Photo

1 inch equals 1 miles

OKALOOSA COUNTY (FORT WALTON BEACH AREA)

TETRA TECH



FUTURE LAND USE

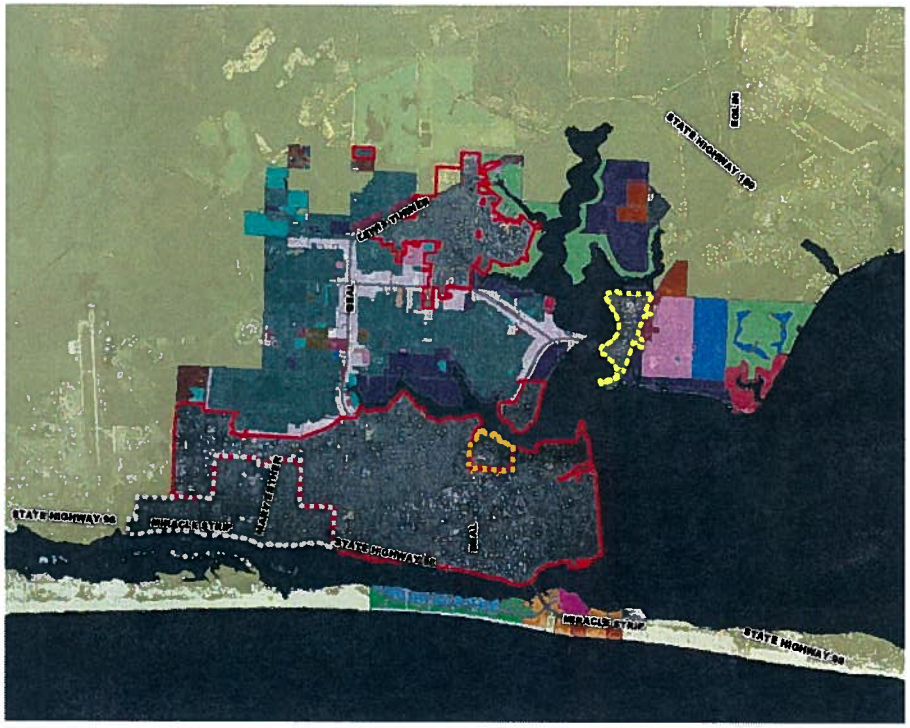
Legend

- Fort Walton Beach City Limits
- Mary Esther City Limits
- Shalimar City Limits
- Cinco Bayou Town Limits
- Eglin Air Force Base
- 2005 Aerial Photo

Future Land Use Description

- C
- CON
- HDR
- I
- INST
- LDR
- MDR
- REC
- SR
- UMU

1 inch equals 1 miles



ZONING

Legend

- Fort Walton Beach City Limits
- Mary Esther City Limits
- Shalimar City Limits
- Cinco Bayou Town Limits
- Eglin Air Force Base
- 2005 Aerial Photo

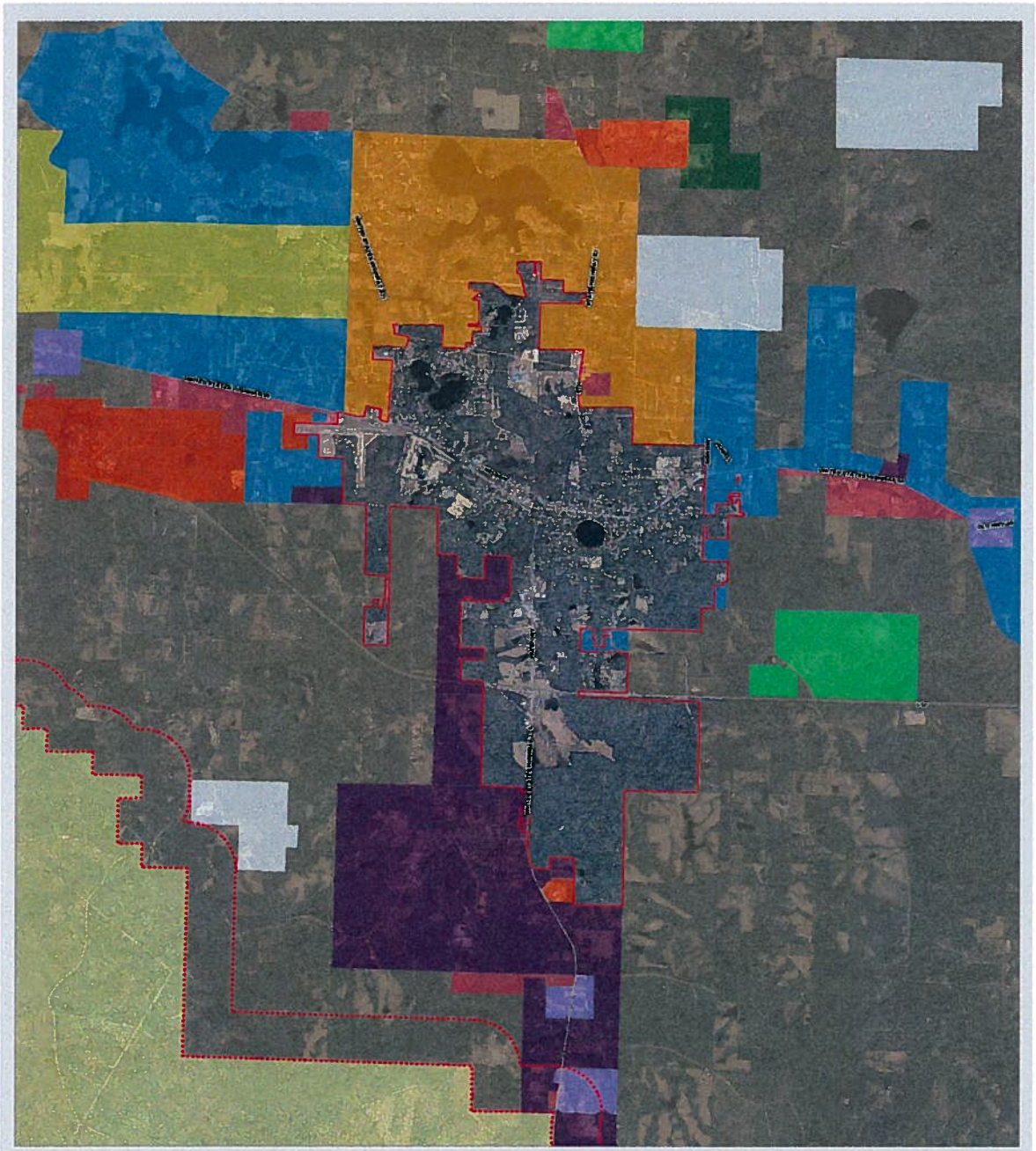
Zoning Description

- AA
- B-1
- B-2
- B-3
- B-4
- BG
- BR
- BT
- IP
- PL
- PUD
- RGD
- RIA
- RMHP
- RSS
- RUA
- RUD
- RUS
- RUS-1

1 inch equals 1 miles

WALTON COUNTY (DEFUNIAK SPRINGS AREA)

TETRA TECH



WALTON COUNTY (DEFUNIAK SPRINGS)

OKALOOSA COUNTY JOINT LAND USE STUDY

Data Source: Okaloosa County

Legend

- DeFuniak Springs City Limits
- Eglin Air Force Base
- 2005 Aerial Photo

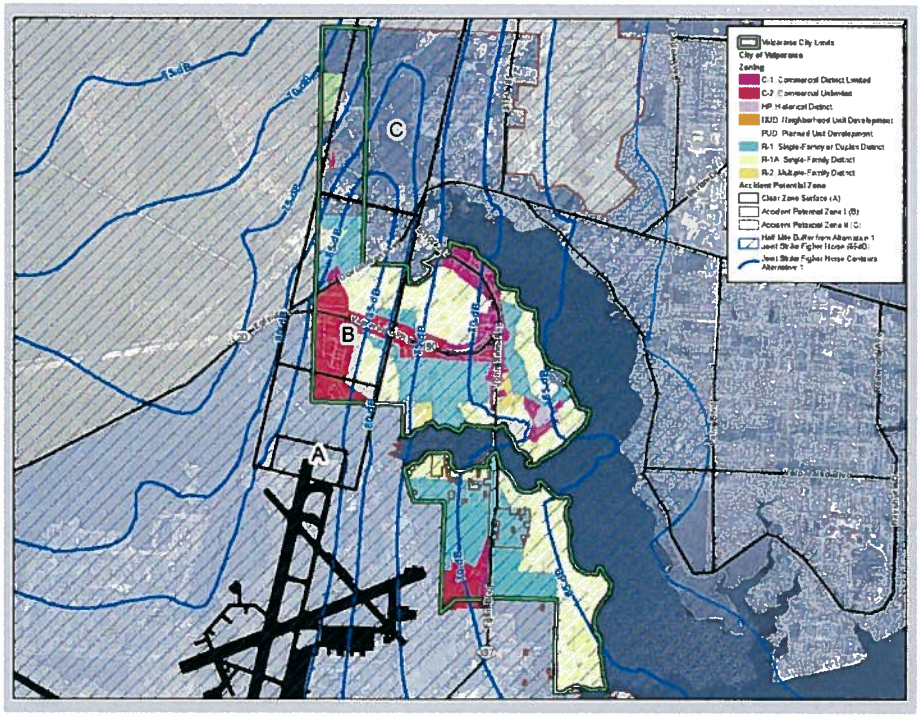
Future Land Use Description

- C
- CM
- ER
- GA
- I
- IS
- LSA
- PF
- RLD
- RR
- RTC
- RV
- UR

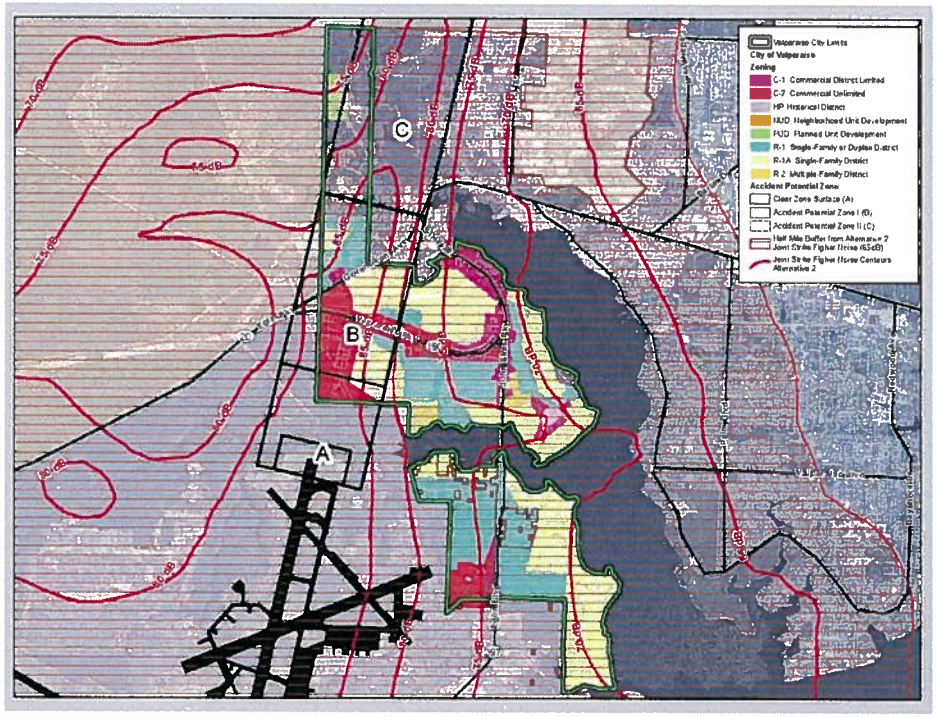
1 inch equals 0.5 miles

FUTURE LAND USE

CITY OF VALPARAISO



ZONING ALTERNATE 1



ZONING ALTERNATE 2

CITY OF DESTIN

TETRA TECH

ISSUES

- Airfield Noise
- Low Level Training Routes
- Terminal Instrument Procedures (TERPs)
- Radio Frequency
- Height of Objects
- Lighting
- Impulse Noise

STRATEGIES & RECOMMENDATIONS

- Height Regulations
- Property Sales & Lease Disclosure
- Outdoor Lighting Standards
- Construction Standards
- Radio Frequency Restrictions
- Public Awareness Measures
- Military Environs Ordinances

FUTURE LAND USE

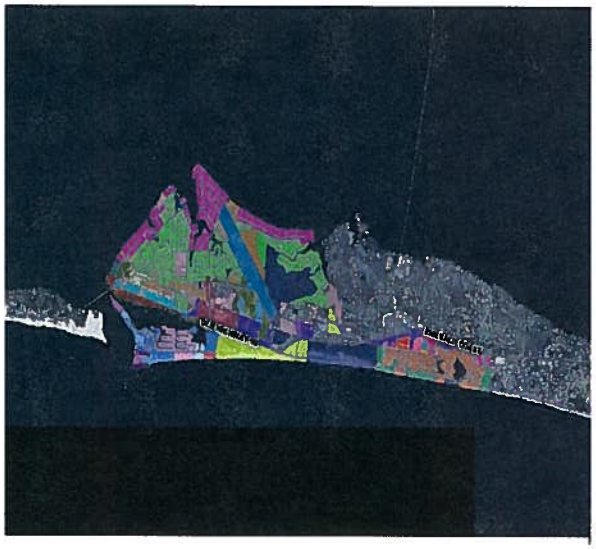
Legend

2005 Aerial Photo

Future Land Use Description

- Airport
- Bay Estates
- Calhoun Mixed Use
- Commercial General
- Commercial Limited
- Commercial Trades and Services
- Conservation
- Crystal Beach Neighborhood
- Crystal Beach Resort
- Gulf Resort Mixed Use
- High Density Residential
- Holiday Isle Mixed Use
- Industrial
- Institutional
- Low Density Residential
- Medium Density Residential
- North Harbor Mixed Use
- Recreational
- Residential, Office and Institutional
- South Harbor Mixed Use
- Town Center Mixed Use

1 inch equals 1 miles



ZONING

Legend

2005 Aerial Photo

Zoning Description

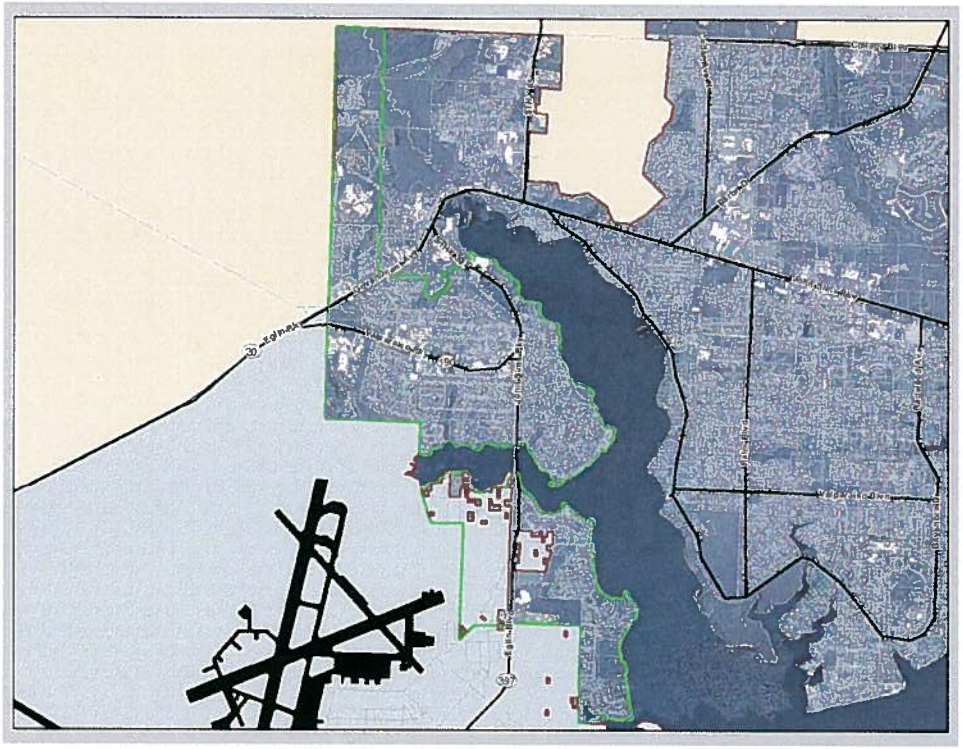
- Airport
- Bay Estates
- Calhoun Mixed Use
- Commercial General
- Commercial Limited
- Commercial Trades and Service
- Conservation
- Crystal Beach Neighborhood
- Crystal Beach Resort
- Gulf Resort Mixed Use
- High Density Residential
- Holiday Isle Mixed Use
- Industrial
- Institutional
- Low Density Residential - Harbor
- Low Density Residential - Holiday Isle
- Low Density Residential - Village
- Medium Density Residential - Holiday Isle
- Medium Density Residential - Village
- North Harbor Mixed Use
- Recreational
- Residential, Office & Institutional Village Residential
- Residential, Office, Institutional - General Development
- Residential, Office, Institutional - Tourist Development
- Residential, Office, Institutional - Village Residential
- South Harbor Mixed Use
- Town Center Mixed Use

1 inch equals 1 miles

CITY OF VALPARAISO

ISSUES

- Development at Eglin AFB Boundary
- Runways I and II
- Airfield Noise
- Low Level Training Routes
- Terminal Instrument Procedures (TERPs)
- Radio Frequency
- Height of Objects
- Lighting



STRATEGIES & RECOMMENDATIONS

- Height Regulations
- Property Sales & Lease Disclosure
- Outdoor Lighting Standards
- Construction Standards
- Radio Frequency Restrictions
- Public Awareness Measures
- Land Acquisition Program
- Redevelopment Program and Plan
- Military Influence Area Ordinance

CITY OF SHALIMAR

TETRA TECH

FUTURE LAND USE

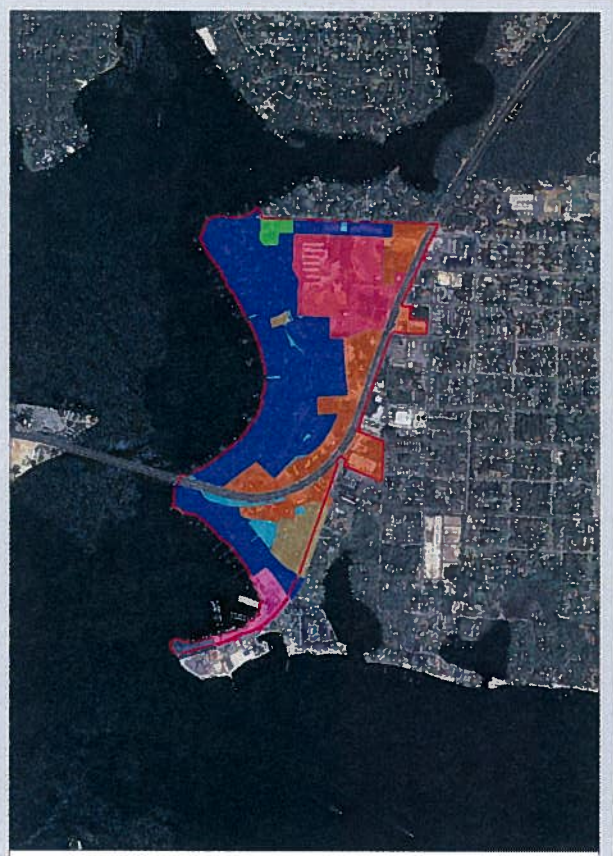
Legend

- Shalimar City Limits
- 2005 Aerial Photo

Future Land Use Description

- C
- CON
- LDR
- MDR
- MU
- MU-L
- PL

1 inch equals 0.13 miles



ZONING

Legend

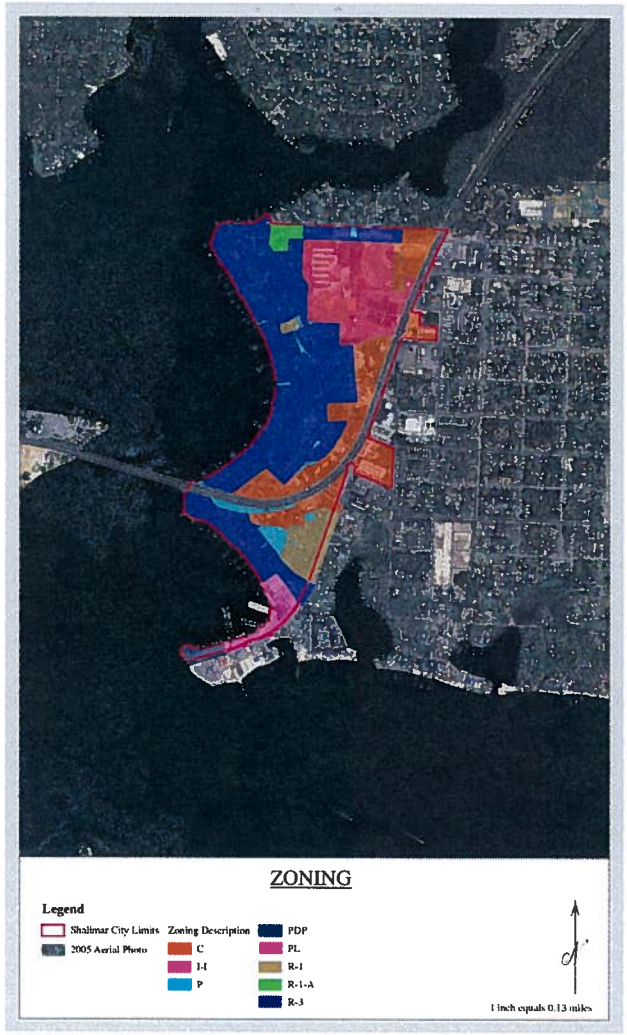
- Shalimar City Limits
- 2005 Aerial Photo

Zoning Description

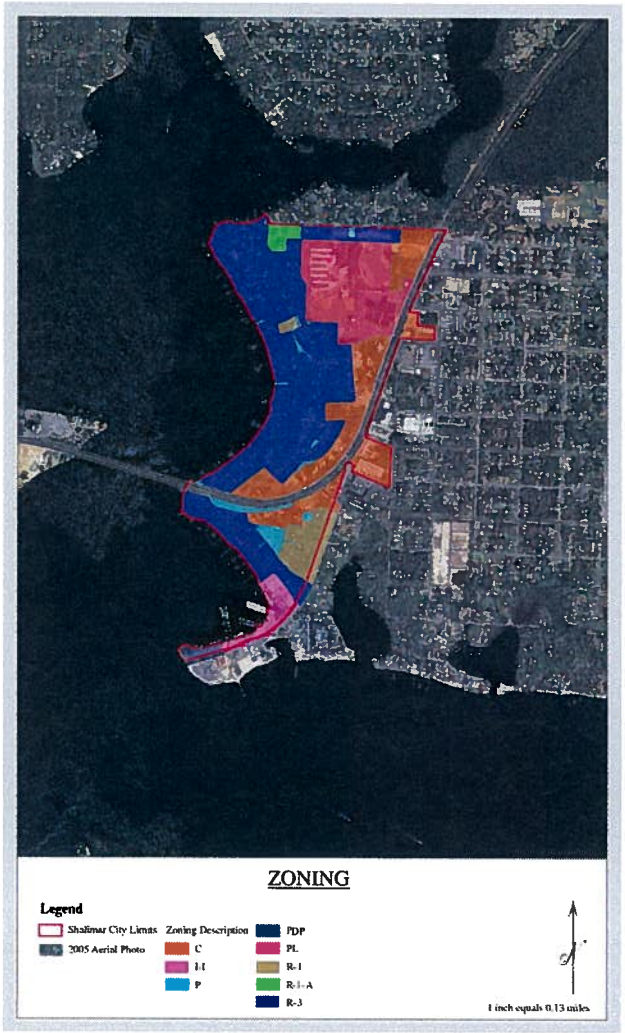
- C
- I-1
- P
- PDP
- PL
- R-1
- R-1-A
- R-3

1 inch equals 0.13 miles

CITY OF SHALIMAR

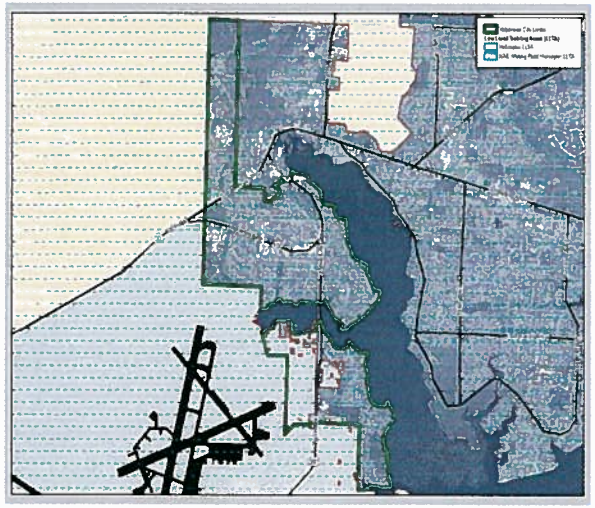


CITY OF SHALIMAR

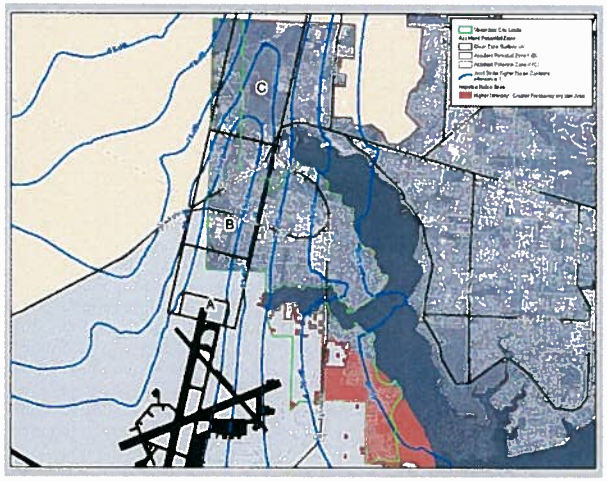


CITY OF VALPARAISO

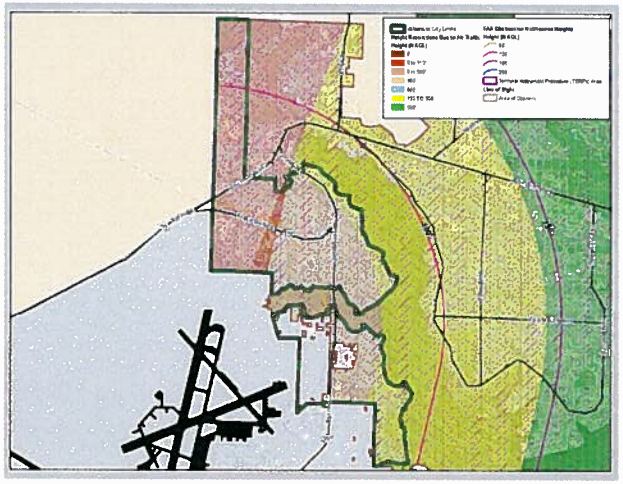
TETRA TECH



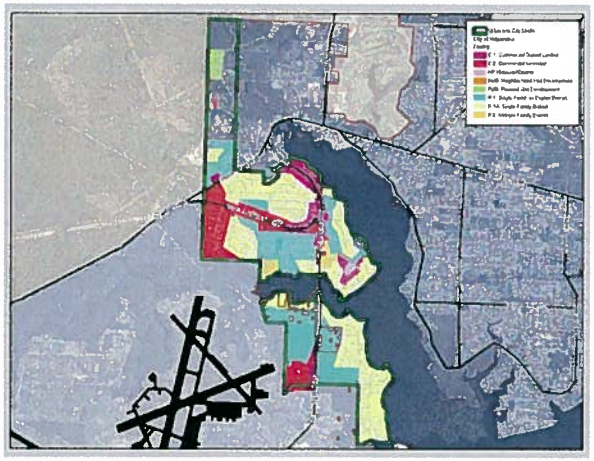
AIRSPACE



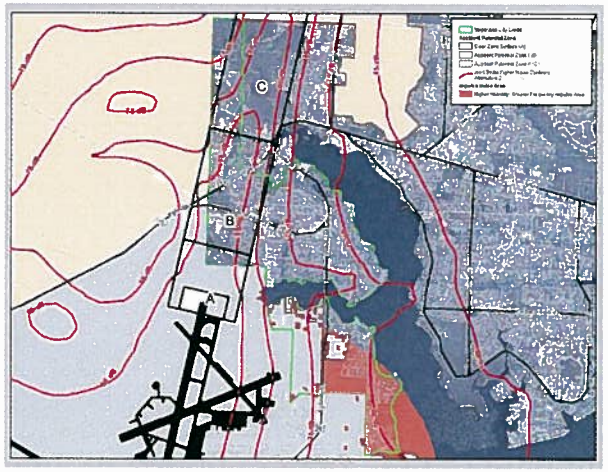
NOISE 1



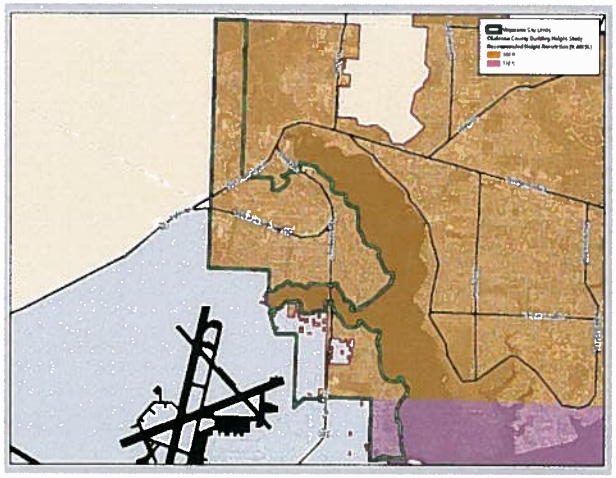
HEIGHT 1



ZONING

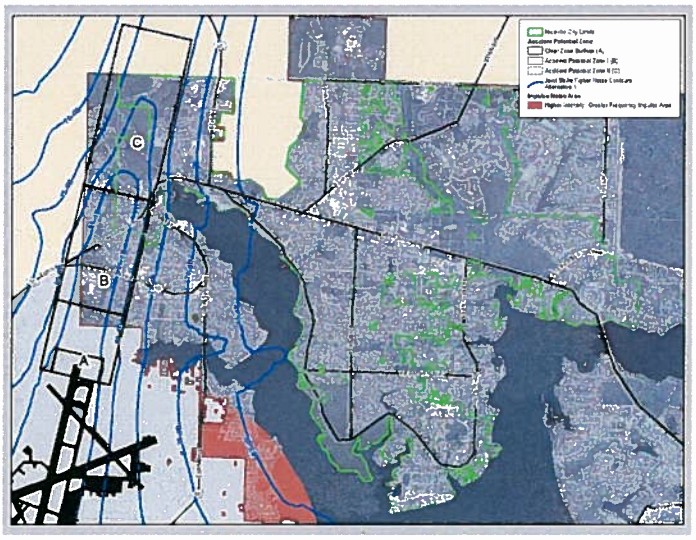


NOISE 2

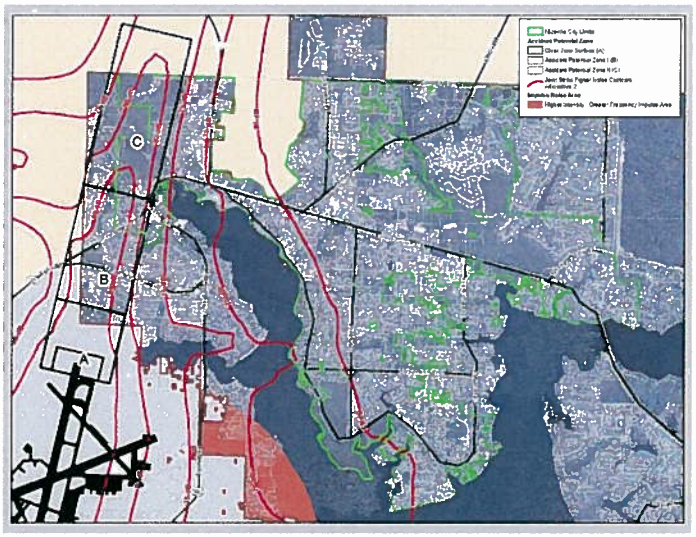


HEIGHT 2

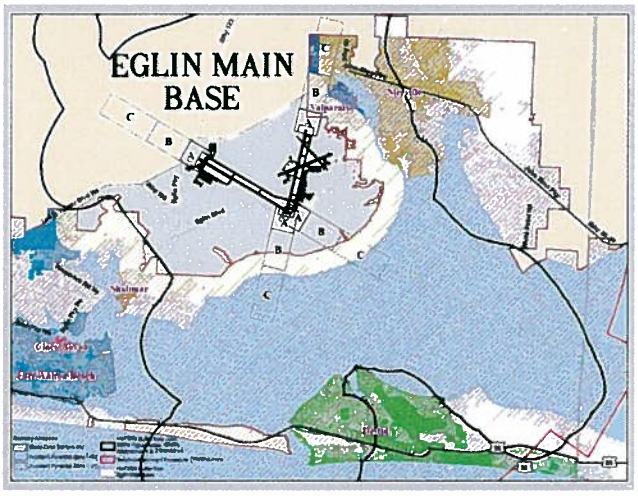
CITY OF NICEVILLE



JSF NOISE CONTOURS EIS ALTERNATE 1

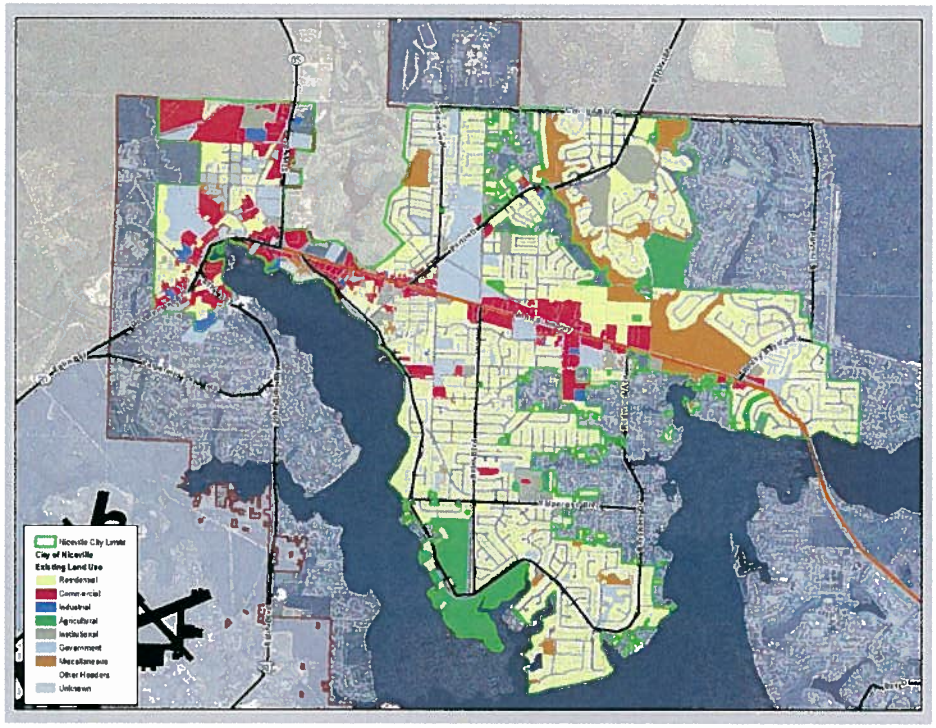


JSF NOISE CONTOURS EIS ALTERNATE 2

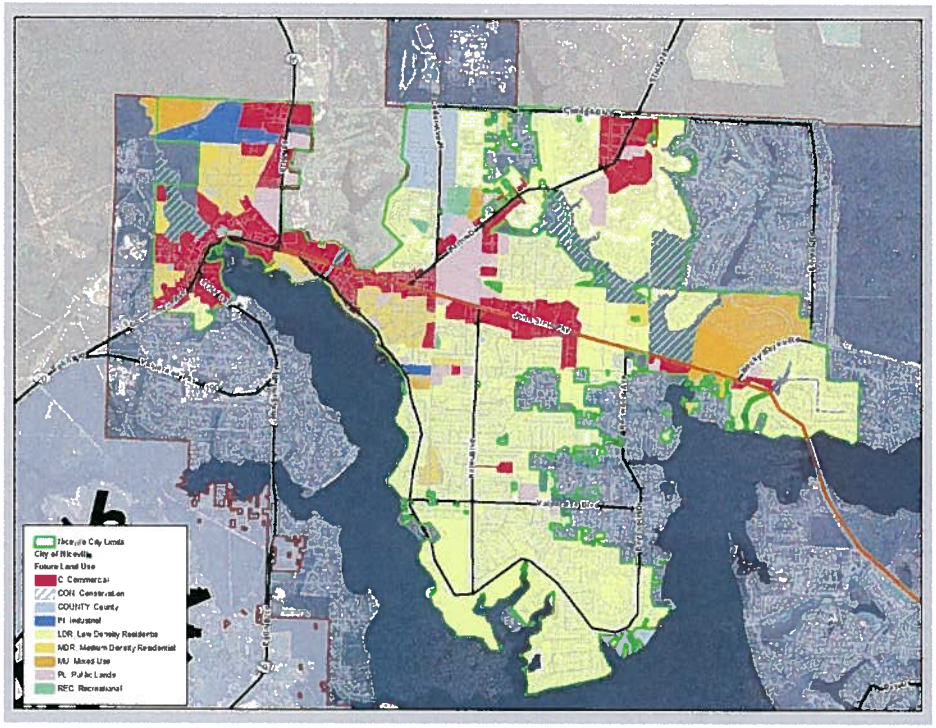


BOTH ALTERNATES WITH 1/2-MILE OFFSET STUDY AREA

CITY OF NICEVILLE



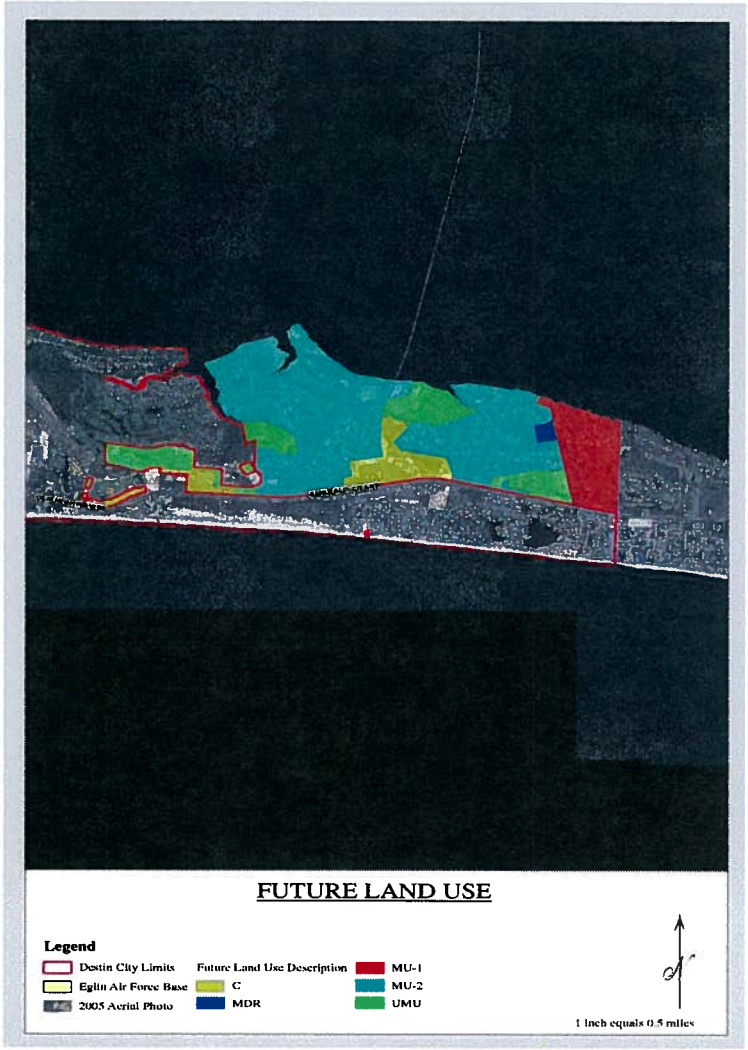
EXISTING ZONING



FUTURE LAND USE

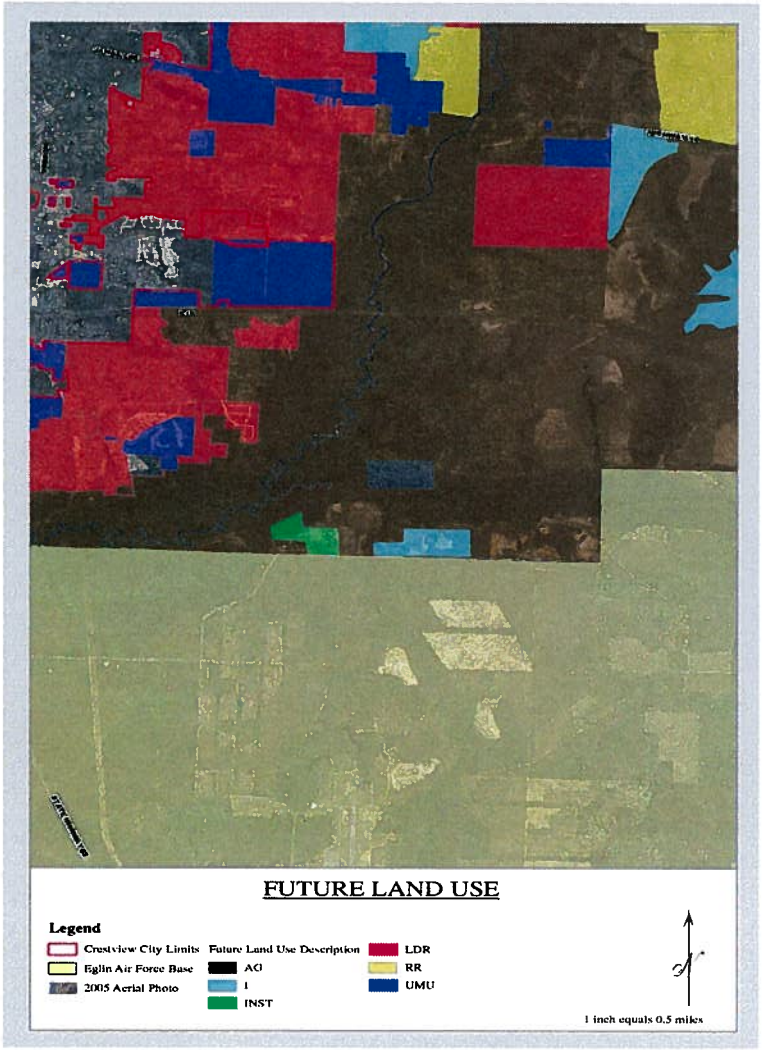
OKALOOSA COUNTY (DESTIN AREA)

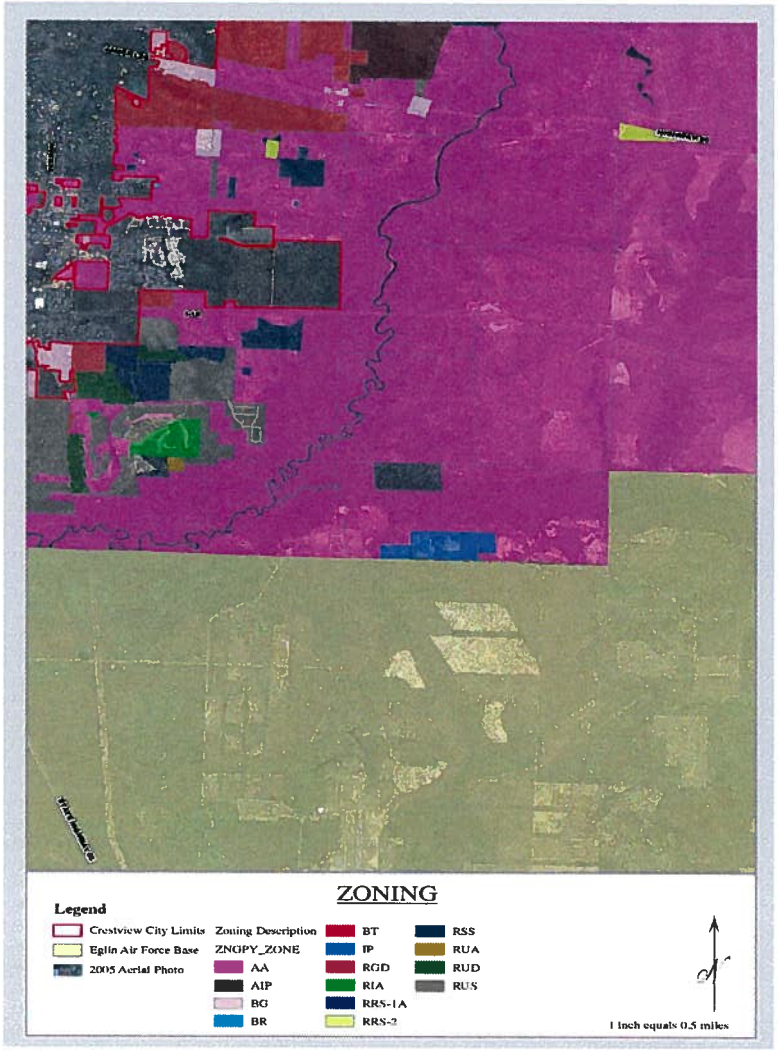
TETRA TECH



OKALOOSA COUNTY (DUKE FIELD AREA)

TETRA TECH





WALTON COUNTY (Unincorporated Areas)

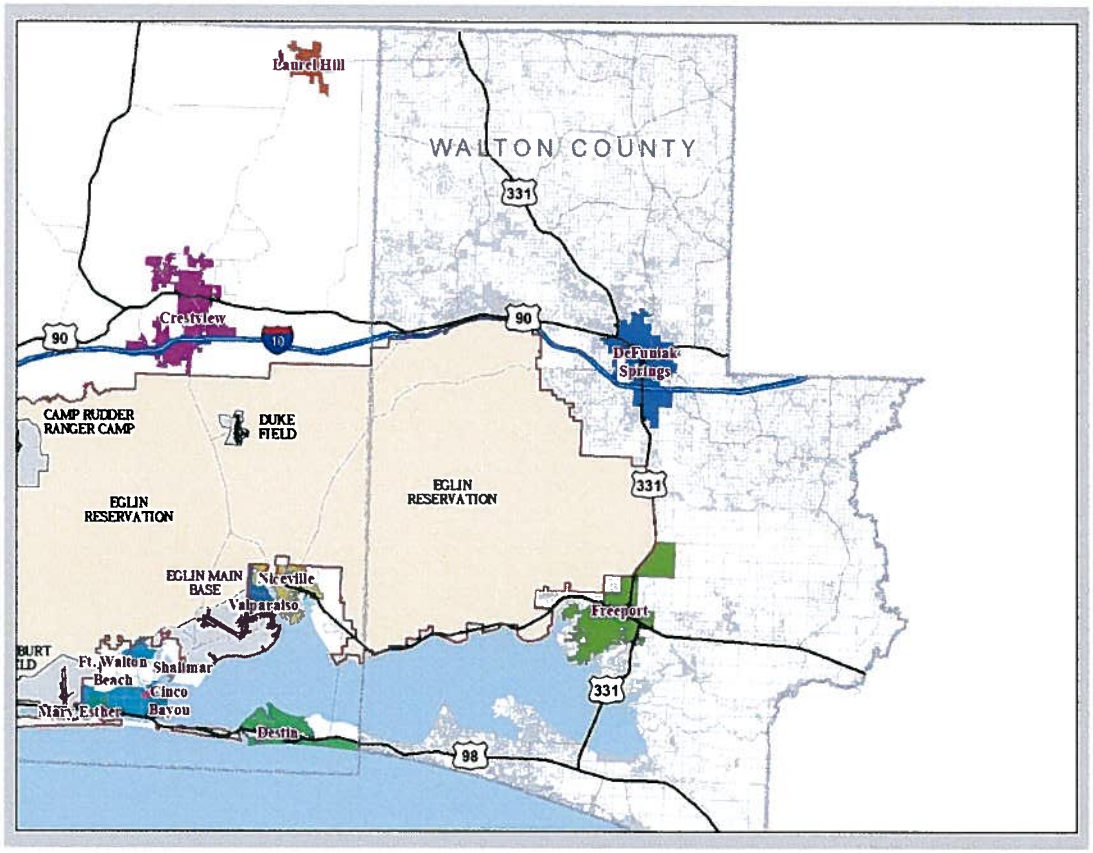
TETRA TECH

ISSUES

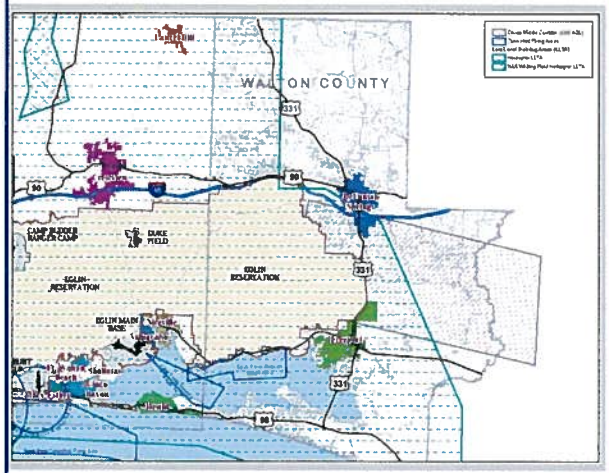
- Development at Eglin AFB Boundary
- Cruise Missile Corridor
- Low Level Training Routes
- Terminal Instrument Procedures (TERPs)
- Radio Frequency
- Height of Objects
- Lighting
- Controlled Firing Areas
- Impulse Noise

STRATEGIES & RECOMMENDATIONS

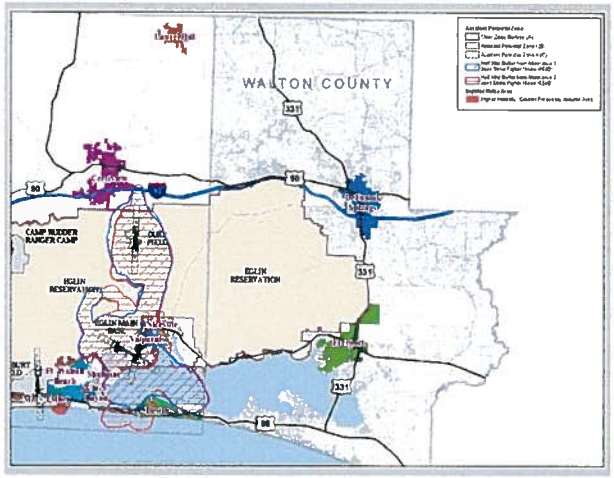
- Height Regulations
- Property Sales & Lease Disclosure
- Outdoor Lighting Standards
- Construction Standards
- Radio Frequency Restrictions
- Public Awareness Measures
- Update Military Environs Ordinances



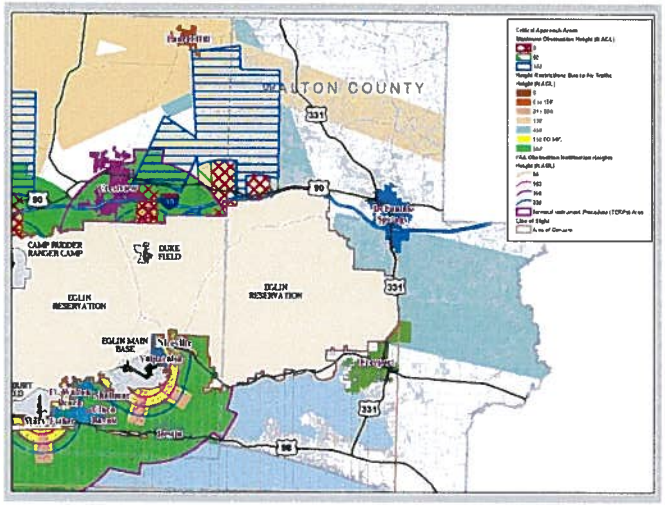
WALTON COUNTY (Unincorporated Areas)



AIRSPACE USES

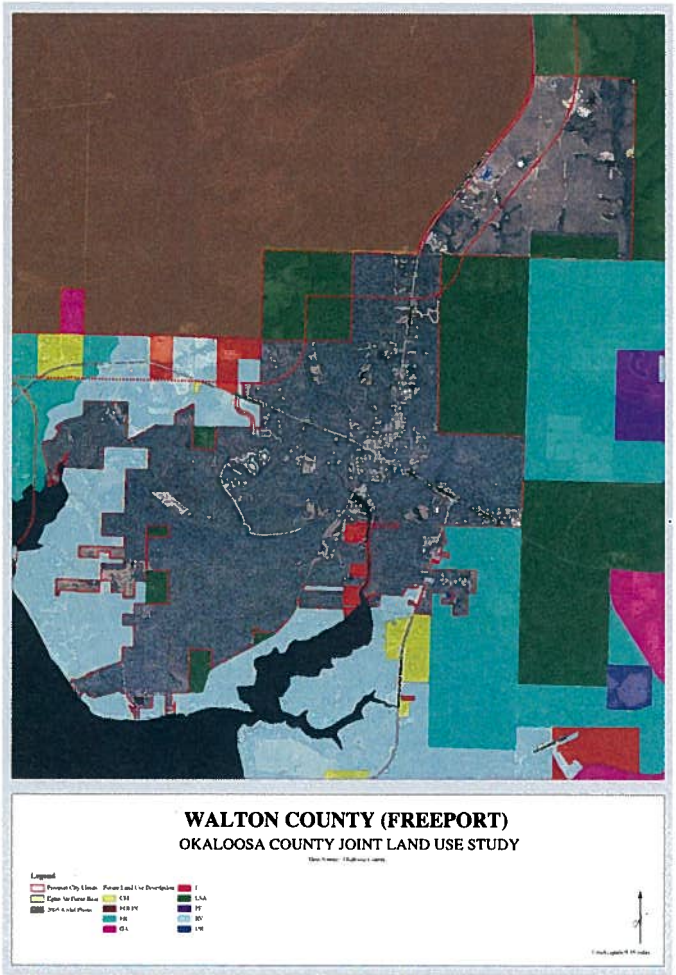


NOISE

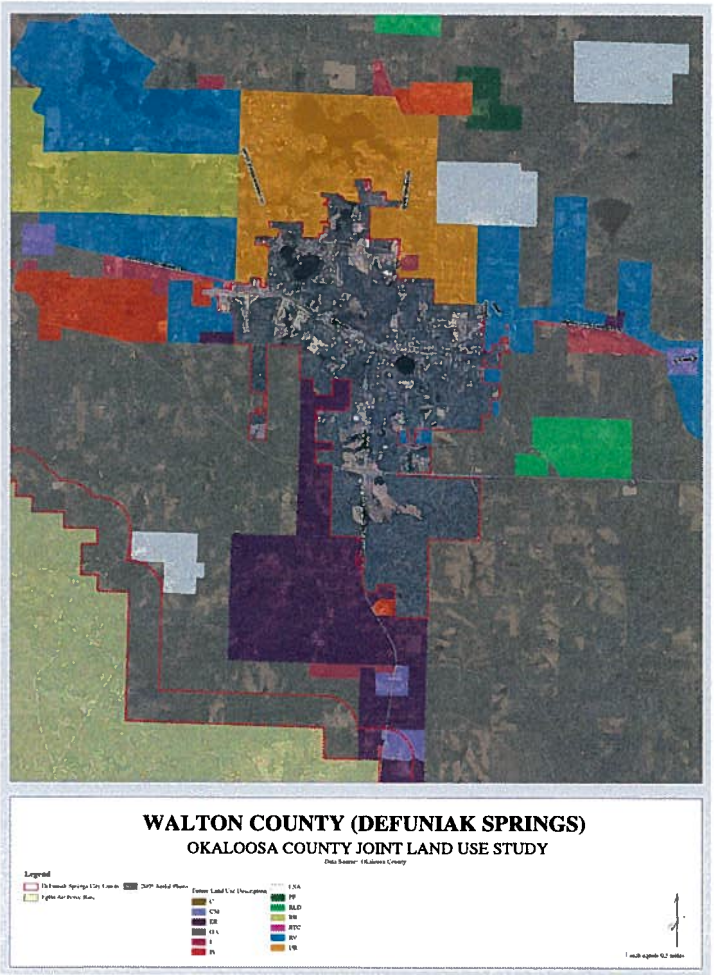


HEIGHT

WALTON COUNTY (Unincorporated Areas)

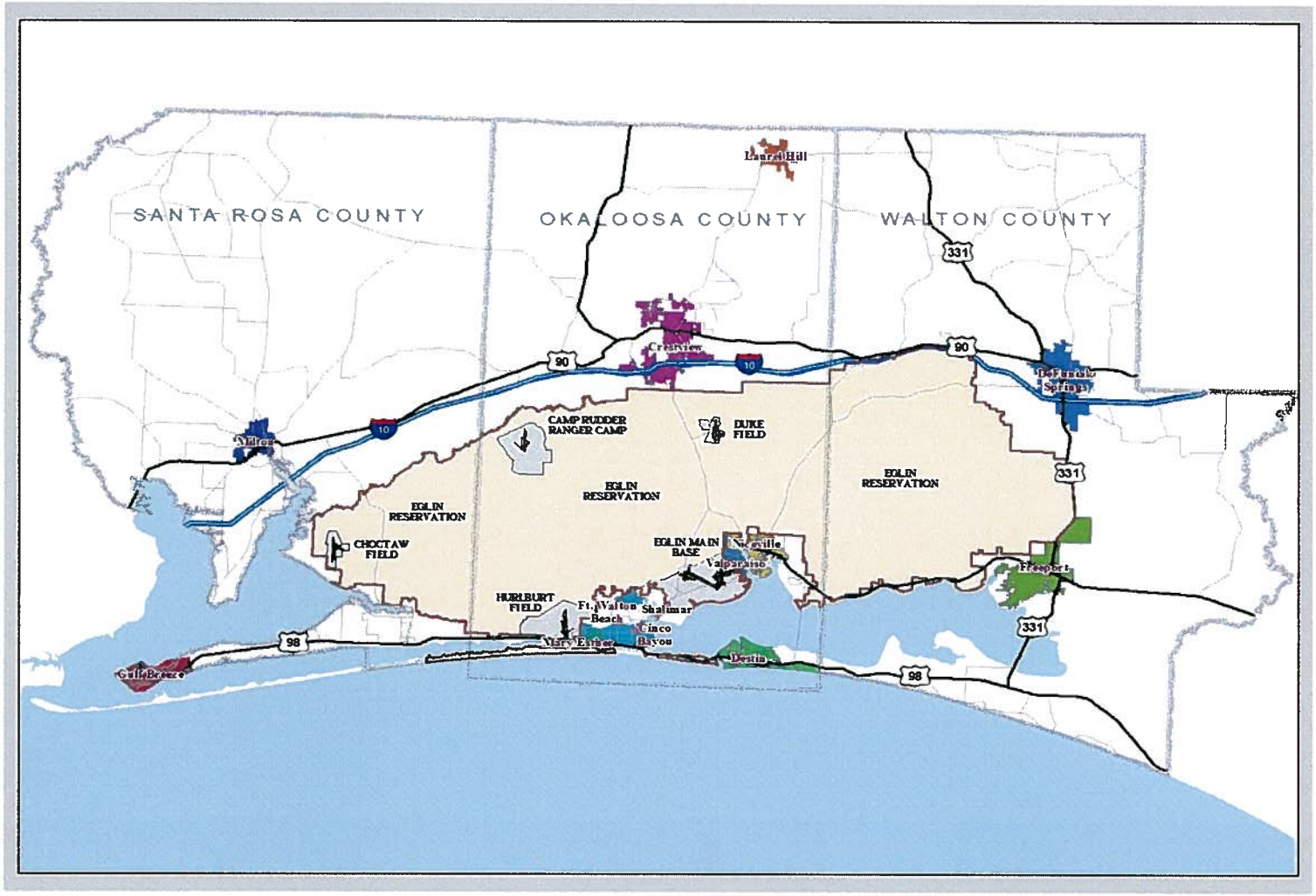


FUTURE LAND USE

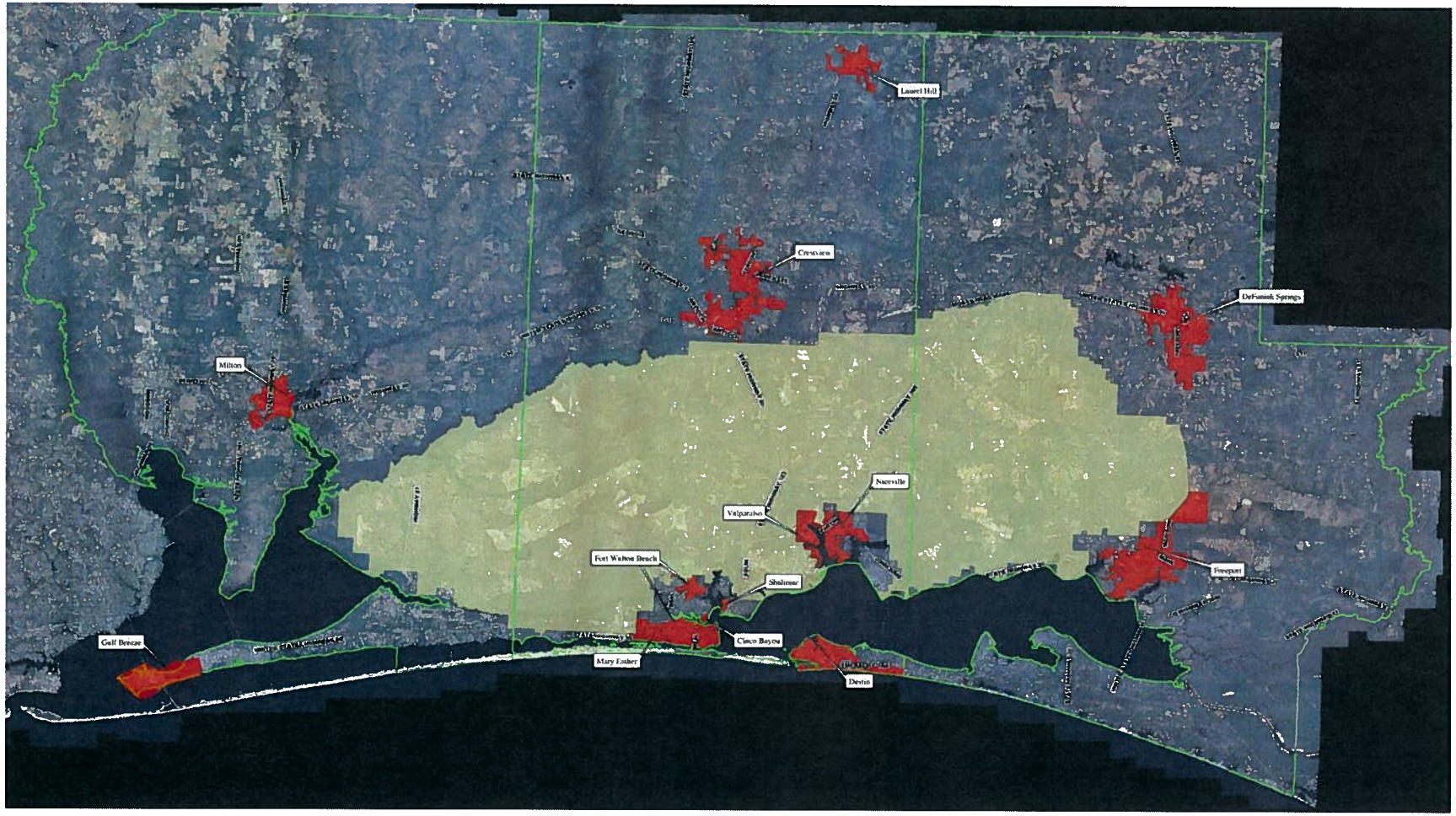


FUTURE LAND USE

STUDY AREA

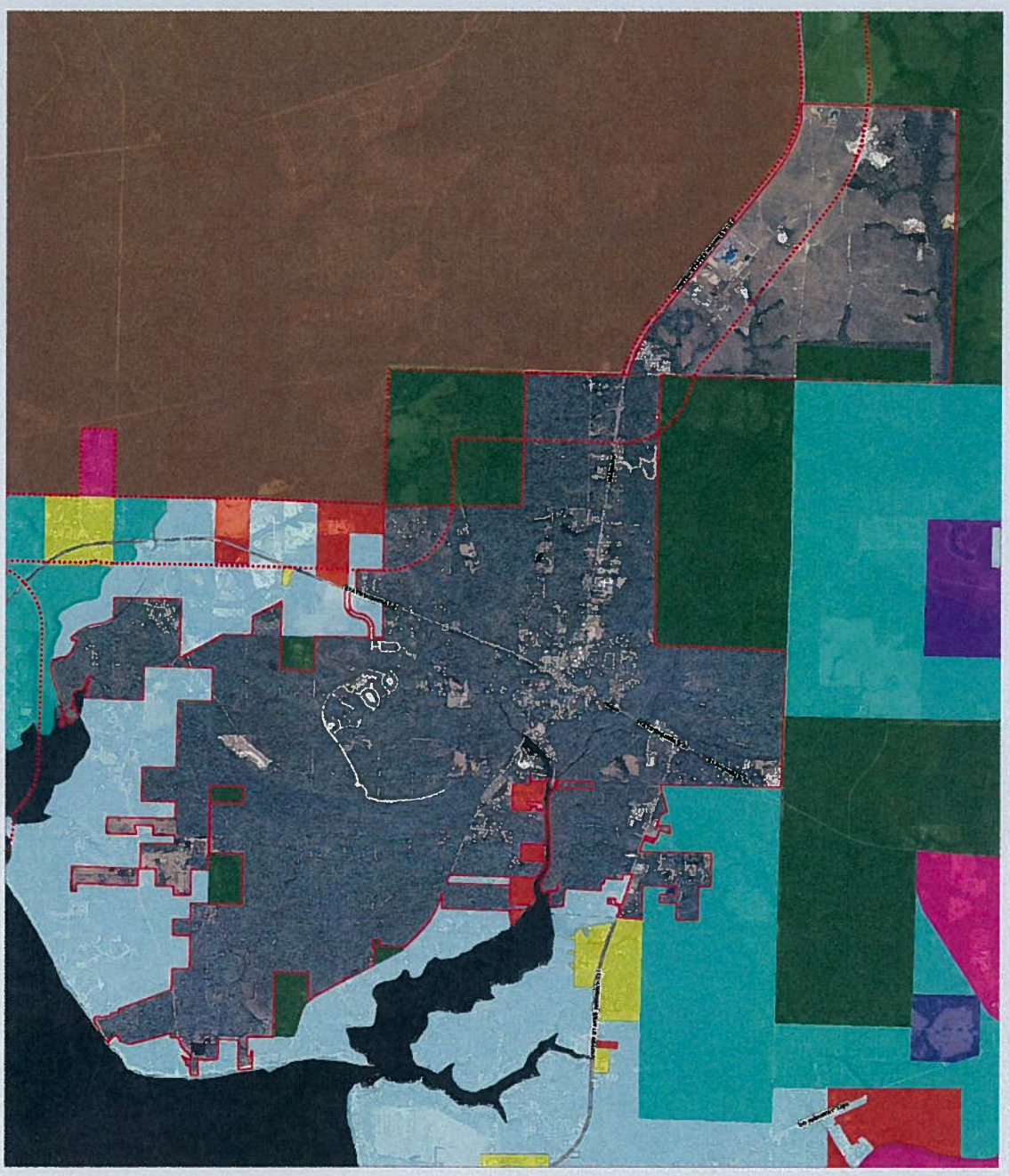

SANTA ROSA COUNTY
OKALOOSA COUNTY
WALTON COUNTY
Laurel Hill
Crestview
DeFuniak Springs
Milton
CAMP RUDDER RANGER CAMP
DUKE FIELD
EGLIN RESERVATION
EGLIN RESERVATION
EGLIN RESERVATION
CHOCTAW FIELD
EGLIN MAIN BASE
Niceville
Valparaiso
Freeport
HURLBURT FIELD
Ft. Walton Beach
Shalimar
Cinco Bayou
Mary Esther
Destin
Gulf Breeze
10
90
331
98

STUDY AREA


Laurel Hill
Crestview
DeFuniak Springs
Milton
Niceville
Valparaiso
Fort Walton Beach
Shalimar
Freeport
Gulf Breeze
Cinco Bayou
Mary Esther
Destin

WALTON COUNTY (FREEPORT AREA)

TETRA TECH



WALTON COUNTY (FREEPORT)

OKALOOSA COUNTY JOINT LAND USE STUDY

Data Source: Okaloosa County

Legend

- Freeport City Limits
- Eglin Air Force Base
- 2005 Aerial Photo

Future Land Use Description

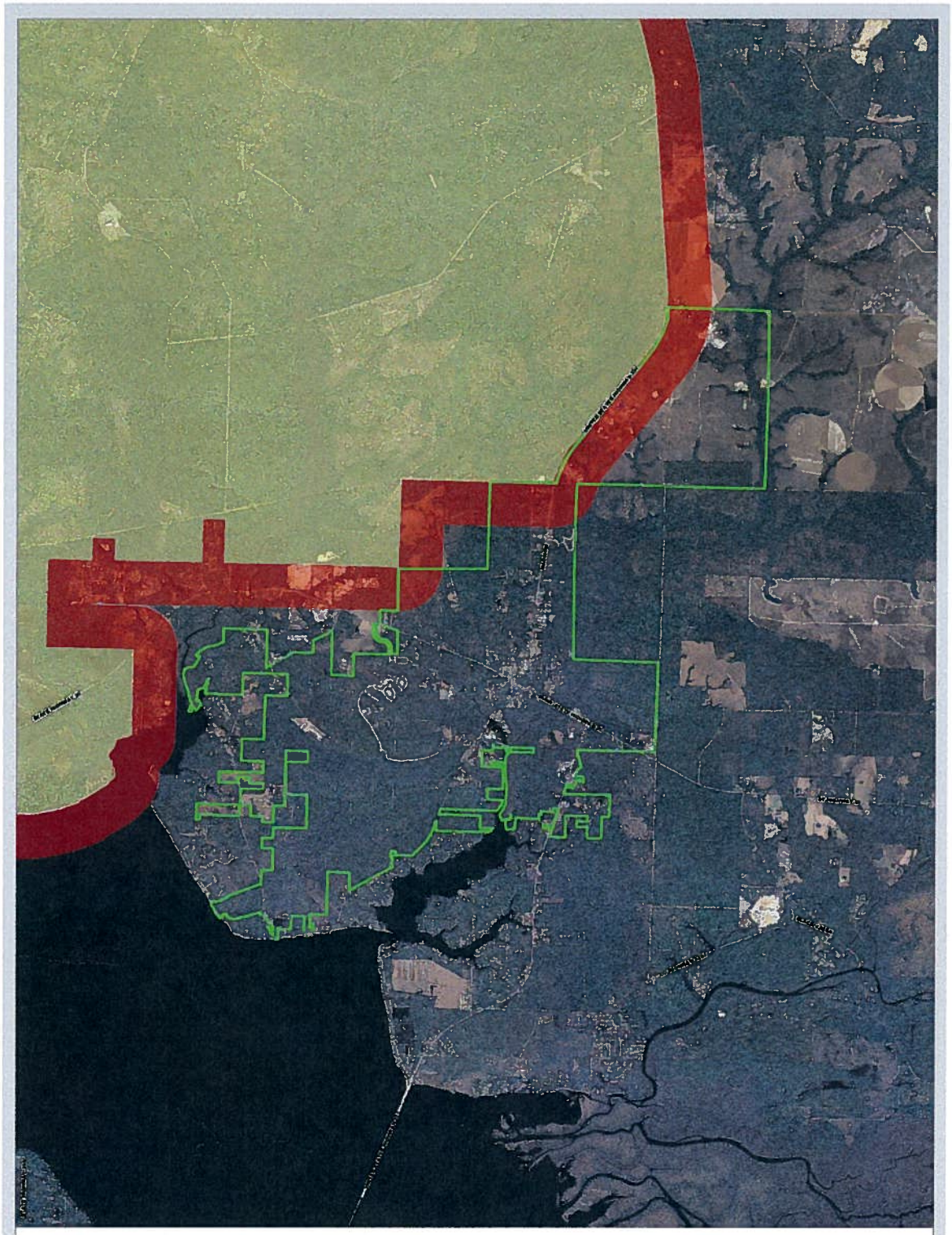
- CM
- EGLIN
- ER
- GA
- I
- LSA
- PF
- RV
- UR

1 inch equals 0.35 miles

FUTURE LAND USE

CITY OF FREEPORT

TETRA TECH



Legend

- Municipality Boundary
- Eglin AFB 1/2 Mile Buffer
- Eglin Air Force Base
- 2005 Aerial Photo

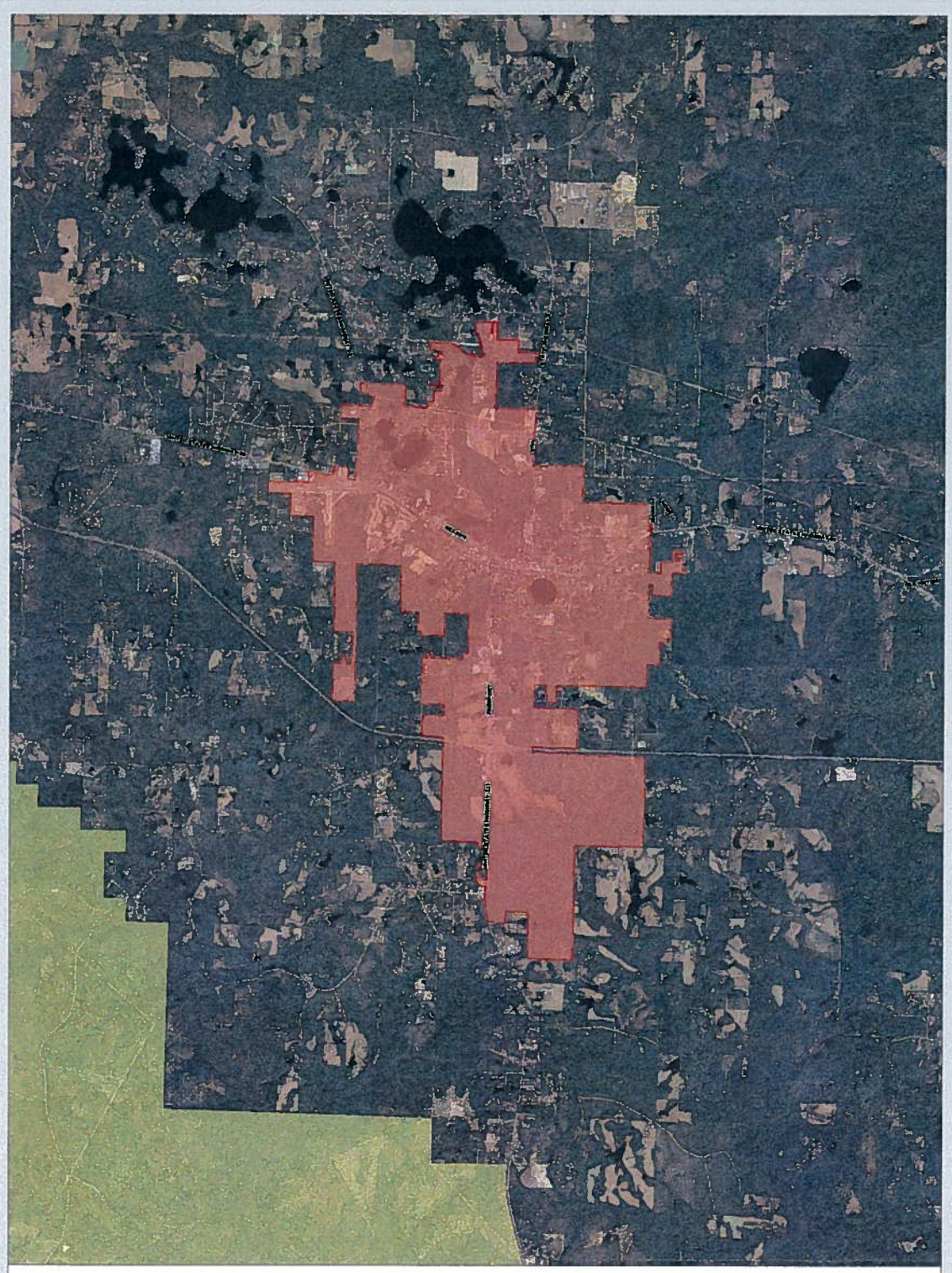
CITY OF FREEPORT

OKALOOSA COUNTY JOINT LAND USE STUDY

Data Source: Okaloosa County

1 inch equals 0.5 miles

CITY OF DEFUNIAK SPRINGS



Legend

- Municipality Boundary
- Eglin Air Force Base
- 2005 Aerial Photo

CITY OF DEFUNIAK SPRINGS

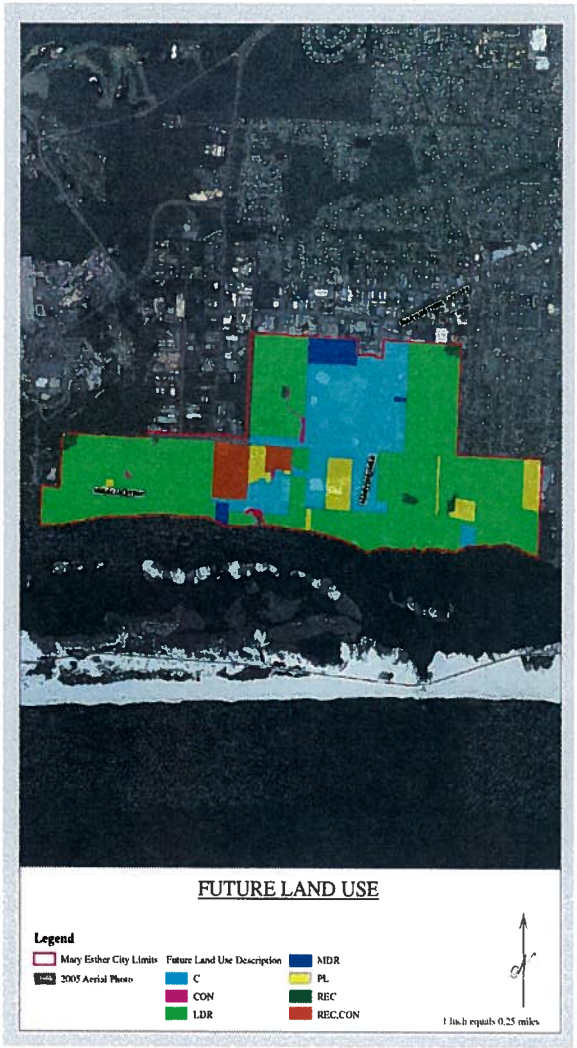
OKALOOSA COUNTY JOINT LAND USE STUDY

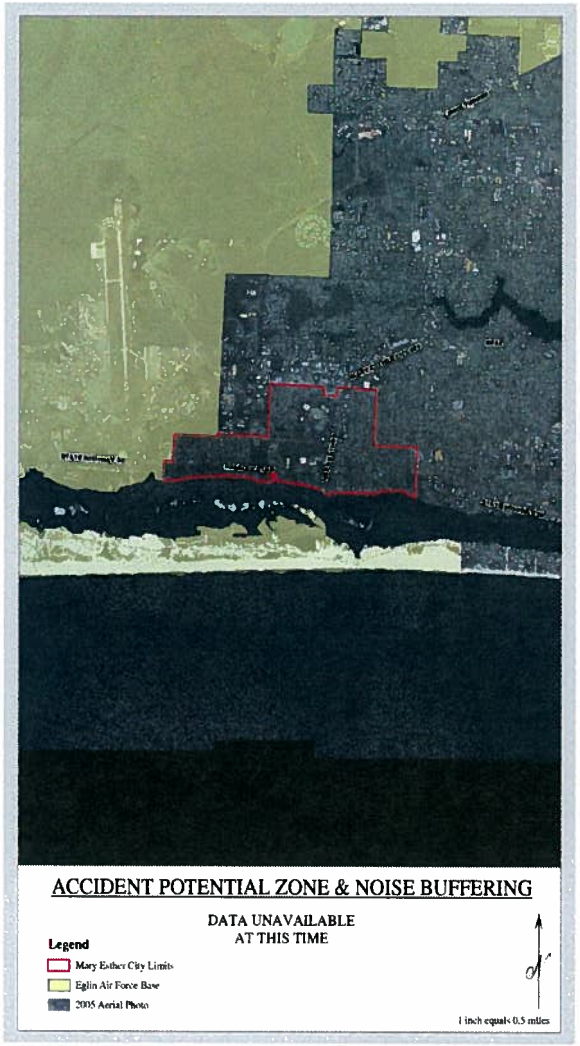
Data Source: Okaloosa County

1 inch equals 0.5 miles

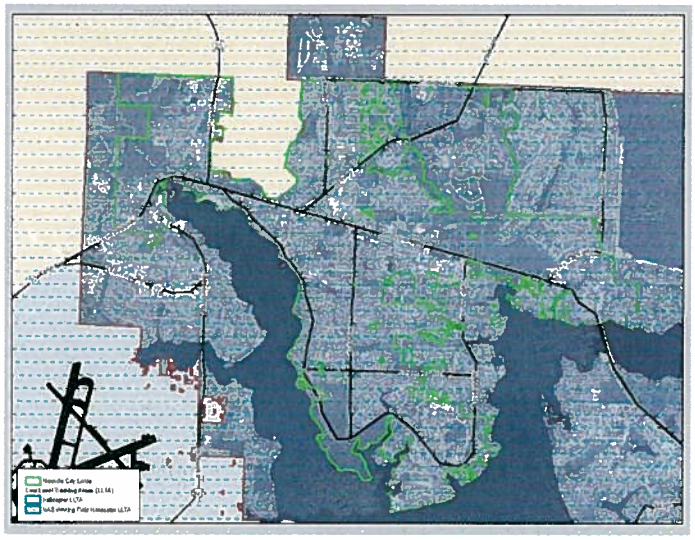
CITY OF MARY ESHTER

TETRA TECH

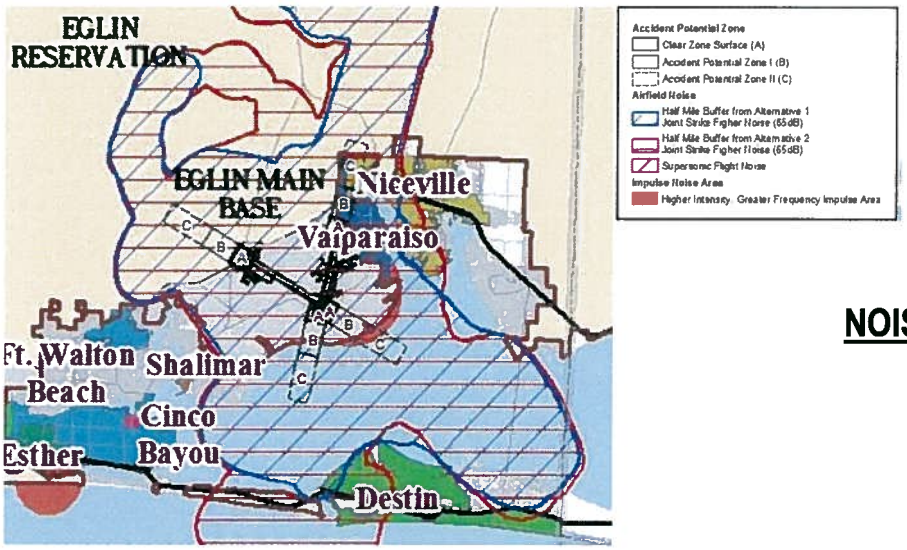




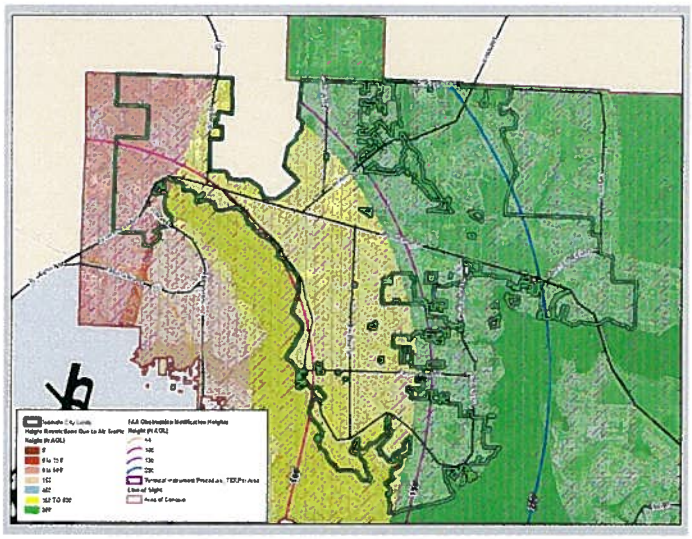
CITY OF NICEVILLE



AIRSPACE



NOISE



HEIGHT

SANTA ROSA COUNTY (Unincorporated Areas)

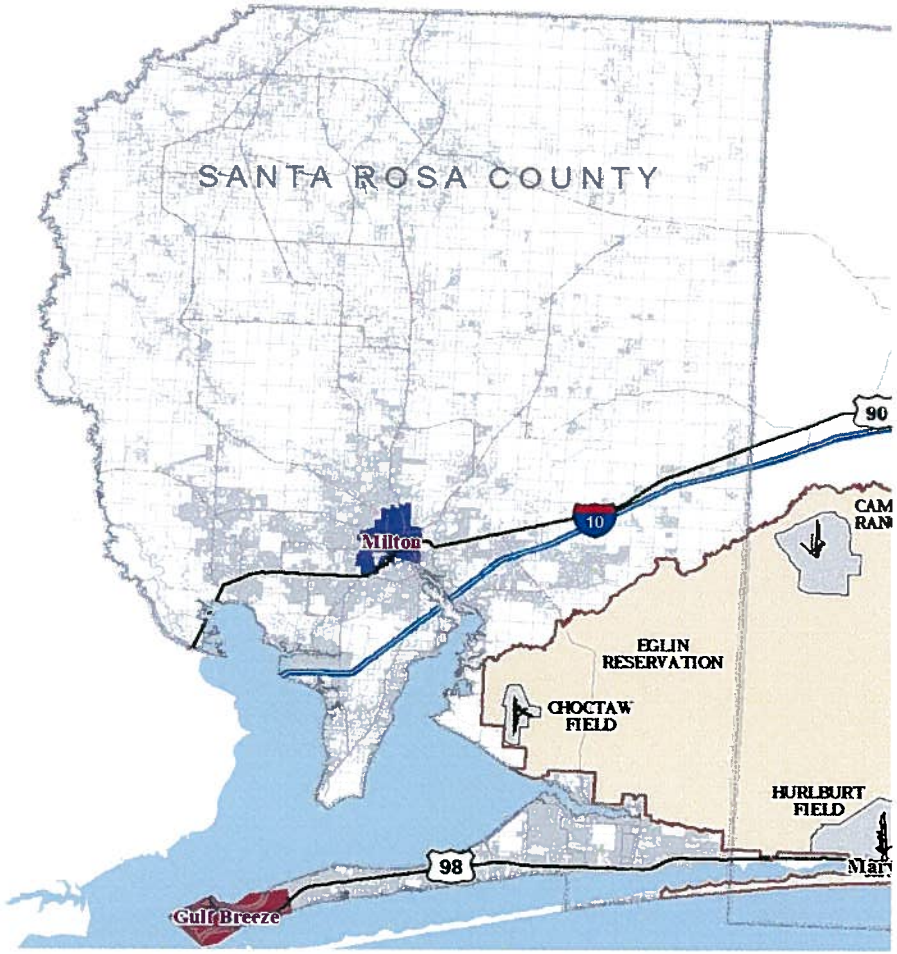
TETRA TECH

ISSUES

- Development at Eglin AFB Boundary
- Runway Clear Zones & APZs
- Airfield Noise
- Low Level Training Routes
- Terminal Instrument Procedures (TERPs)
- Radio Frequency
- Height of Objects
- Lighting
- Controlled Firing Areas
- High Intensity Impulse Noise
- Supersonic Noise

STRATEGIES & RECOMMENDATIONS

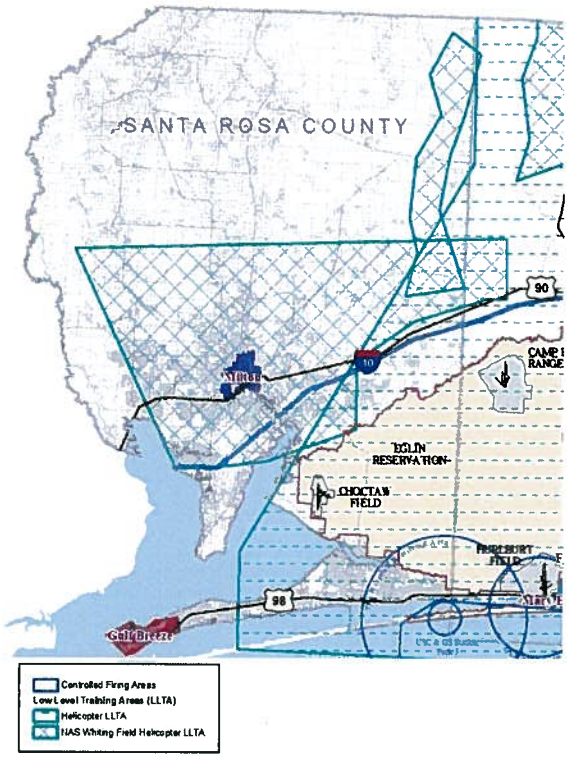
- Height Regulations
- Property Sales & Lease Disclosure
- Outdoor Lighting Standards
- Construction Standards
- Radio Frequency Restrictions
- Public Awareness Measures
- Land Acquisition Program
- Expand Military Environs Ordinance



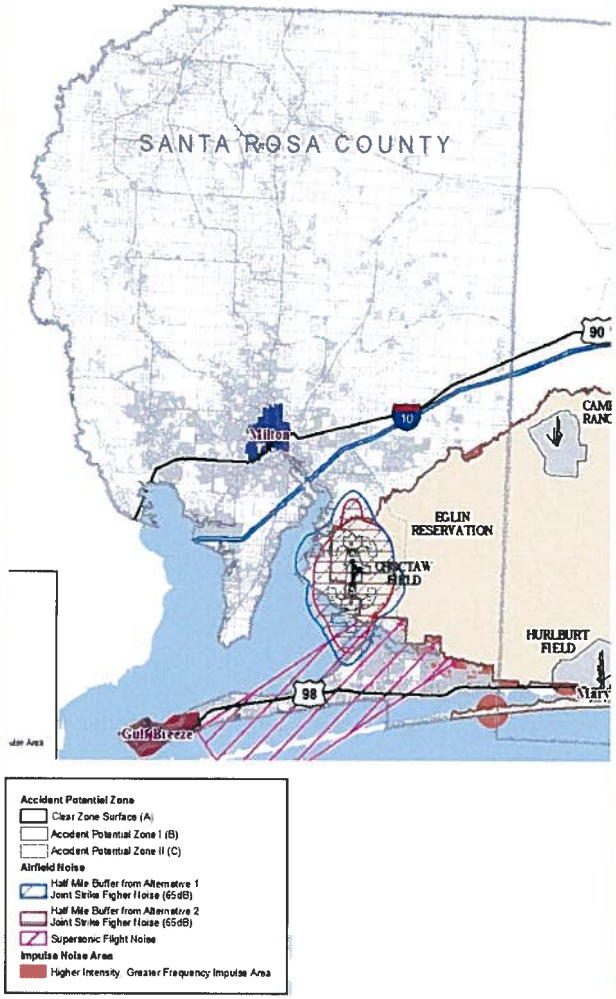
SANTA ROSA COUNTY FLORIDA

SANTA ROSA COUNTY (Unincorporated Areas)

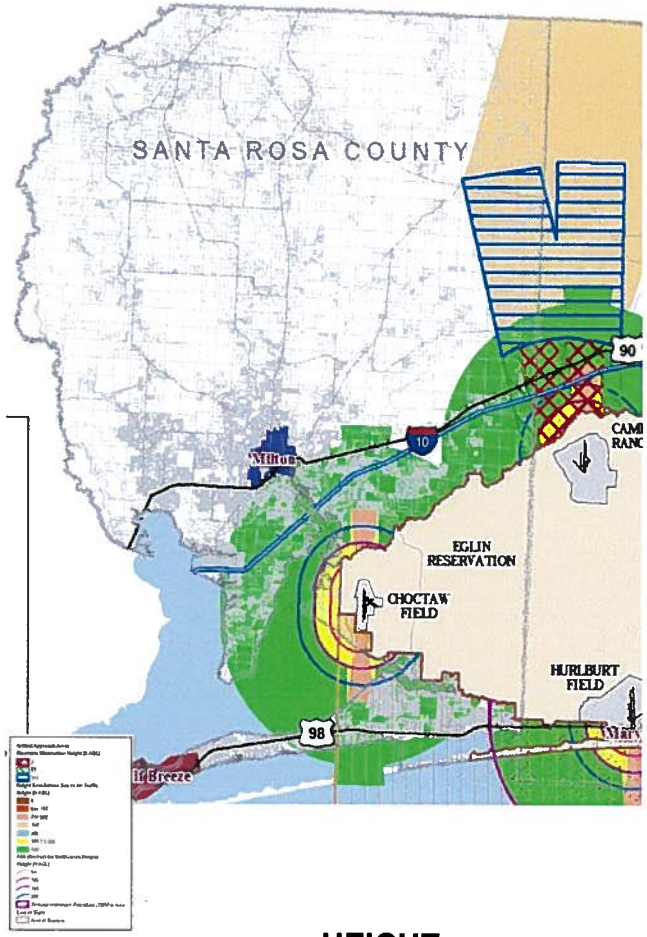
TETRA TECH



AIRSPACE USES



NOISE



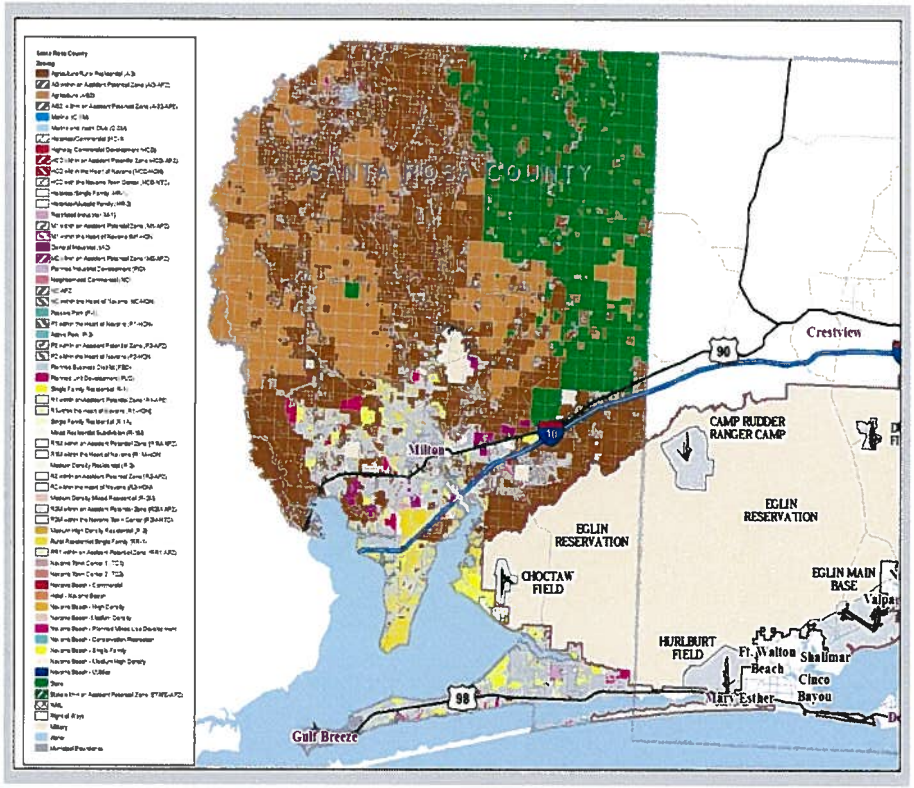
HEIGHT

SANTA ROSA COUNTY FLORIDA

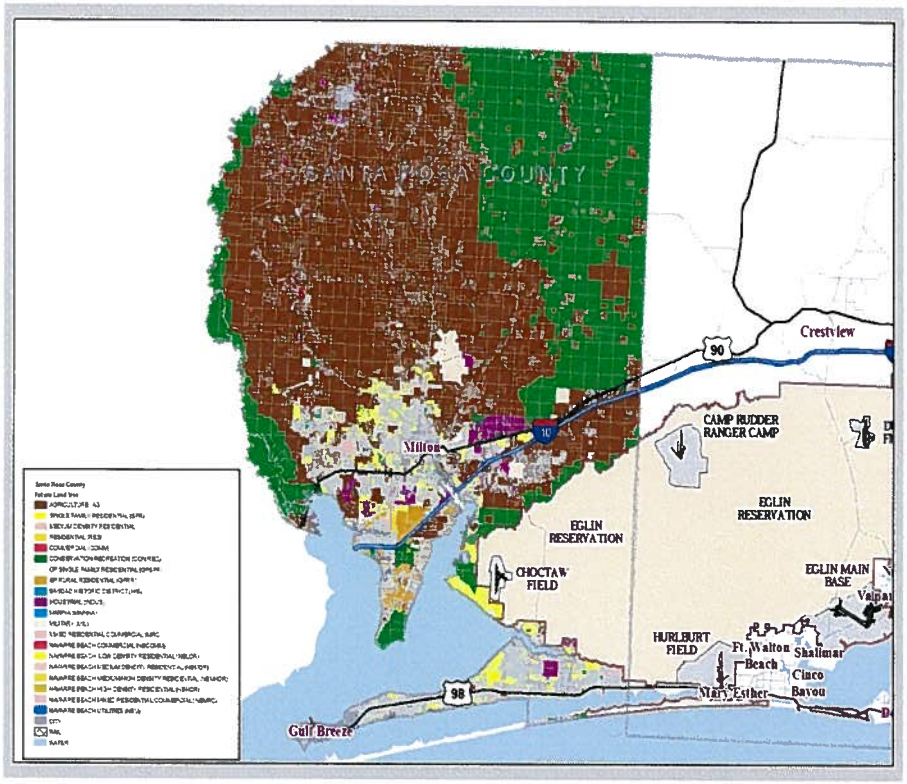
Eglin Air Force Base Joint Land Use Study (JLUS)

SANTA ROSA COUNTY (Unincorporated Areas)

TETRA TECH



EXISTING ZONING



FUTURE LAND USE

SANTA ROSA COUNTY FLORIDA

Eglin Air Force Base Joint Land Use Study (JLUS)

SECTION 6.0

Niceville/Valparaiso Chamber Meeting

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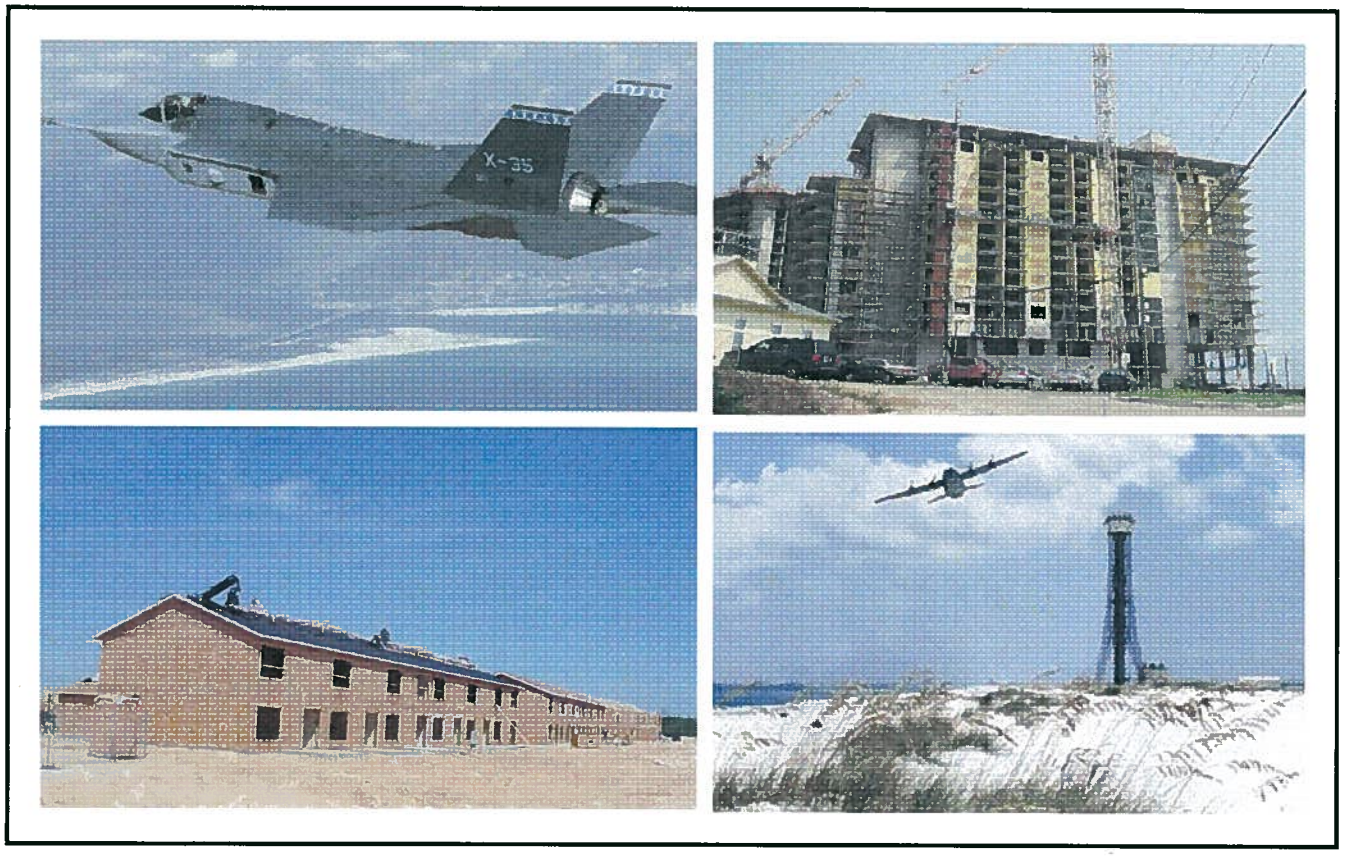
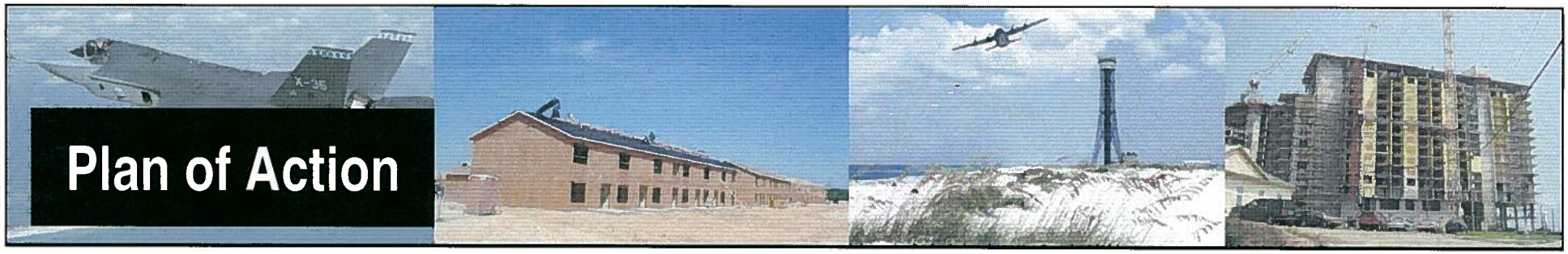
Eglin Joint Land Use Study (JLUS)
Niceville/Valparaiso Chamber



TETRA TECH

SOLIN & ASSOC INC.

July 15, 2008



Plan of Action

July 7 ⟷ Public Comment Period ⟷ Aug 28

Interim Draft → **Draft** → **Final** → **Accepted Report**

July 30

Aug 20

TAG – July 10

PC – July 23

Public Hearing – Aug 6

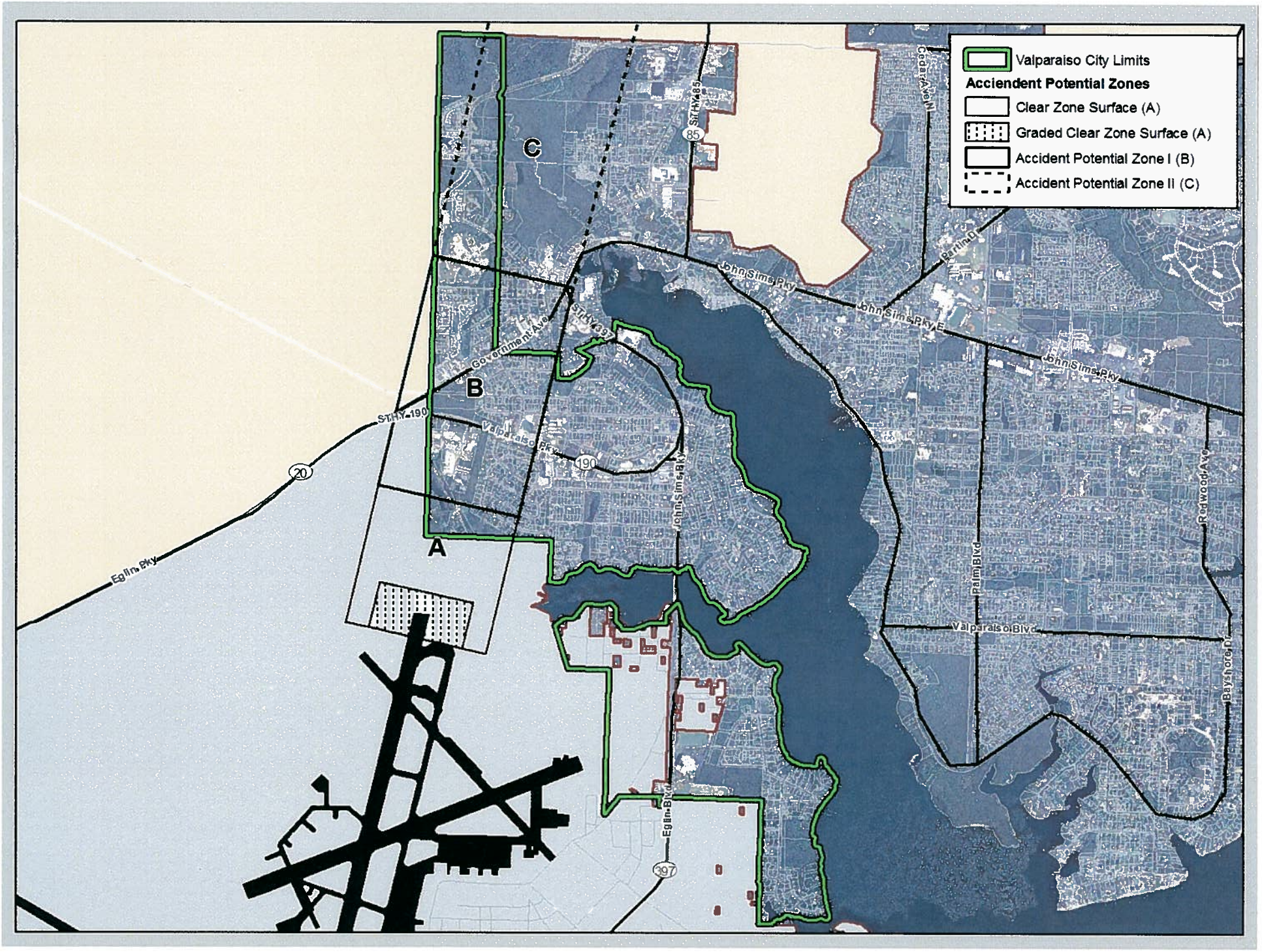
PC – Aug 28

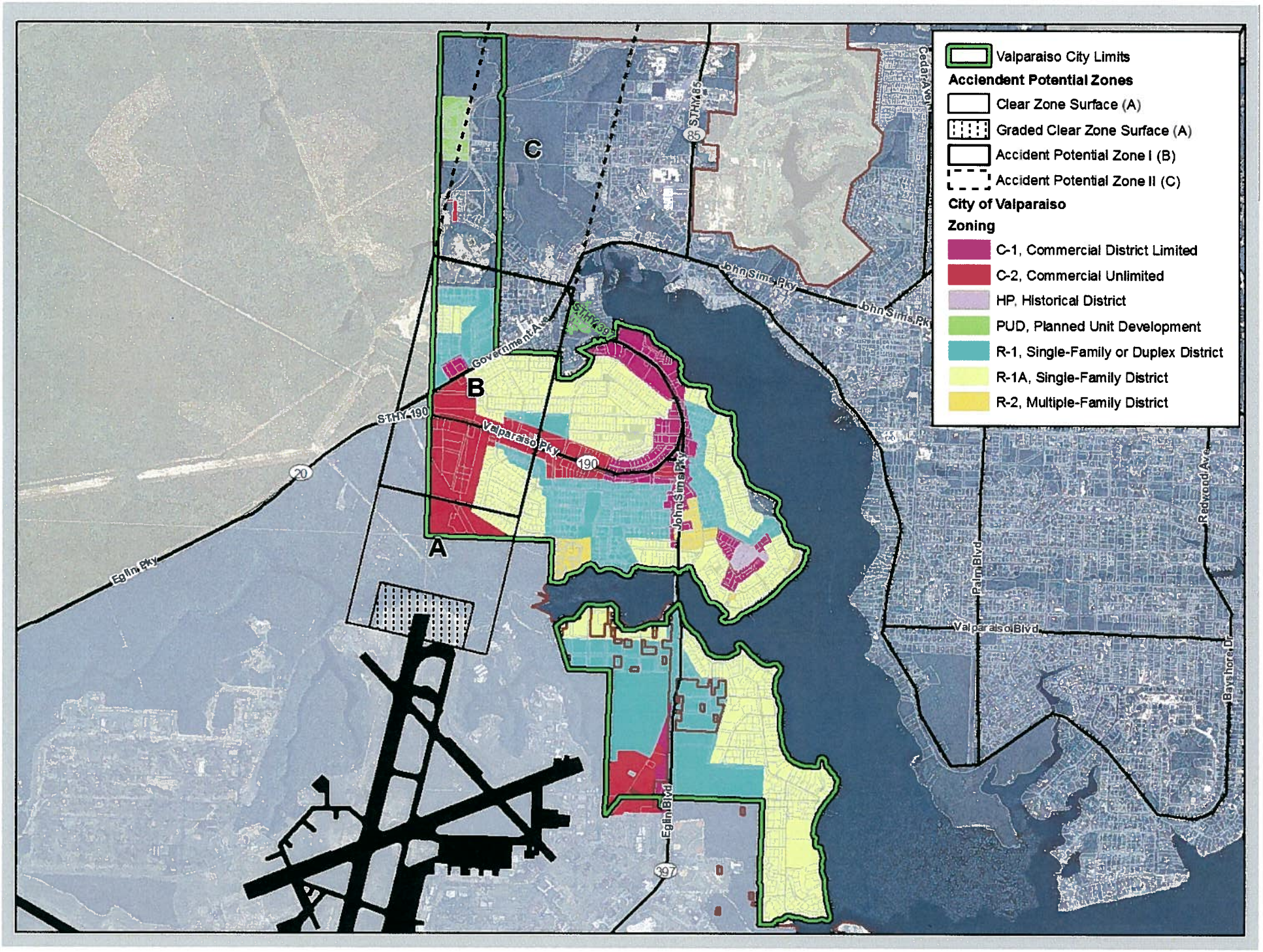
Scheduled Meetings

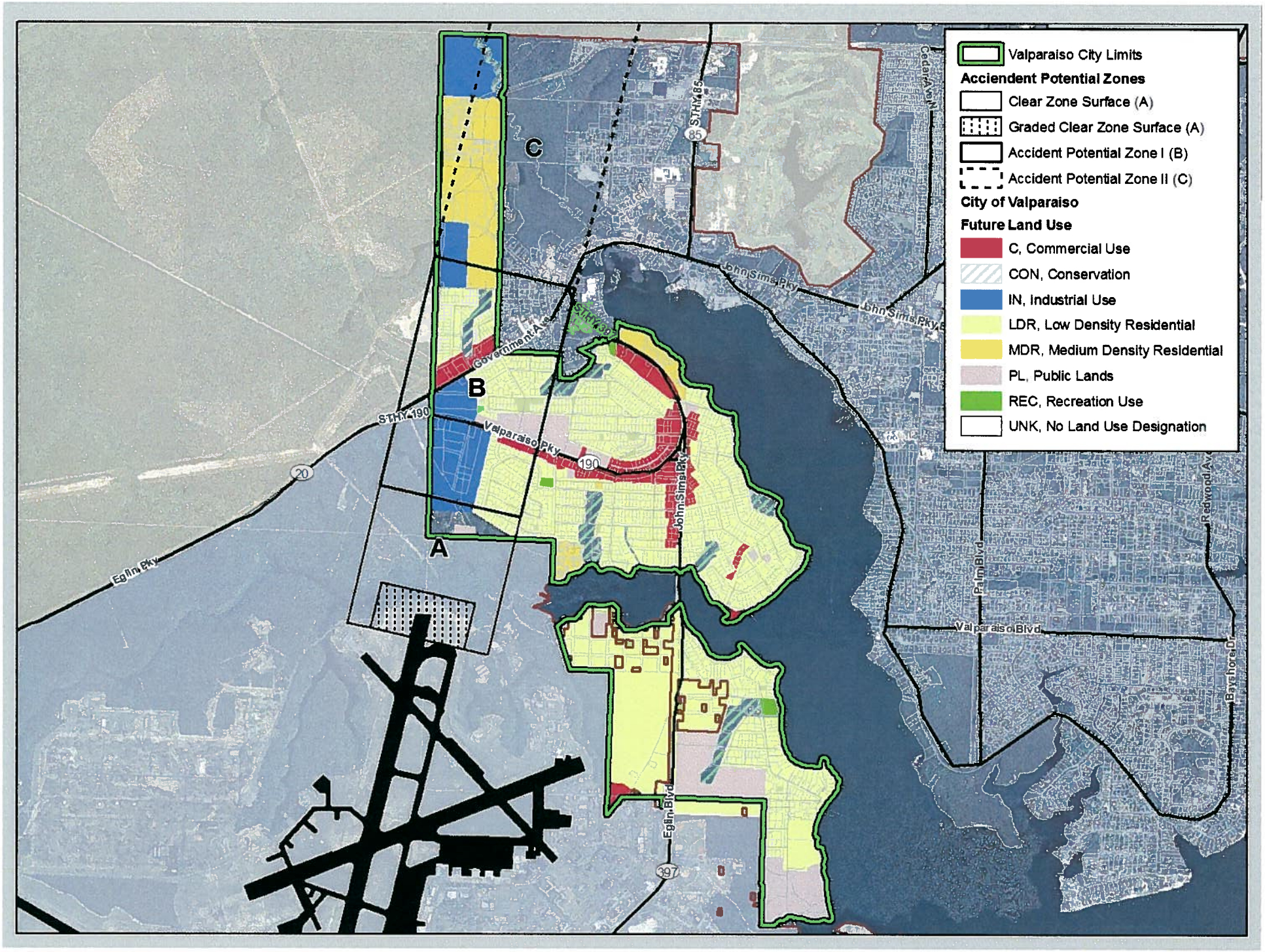
TETRA TECH

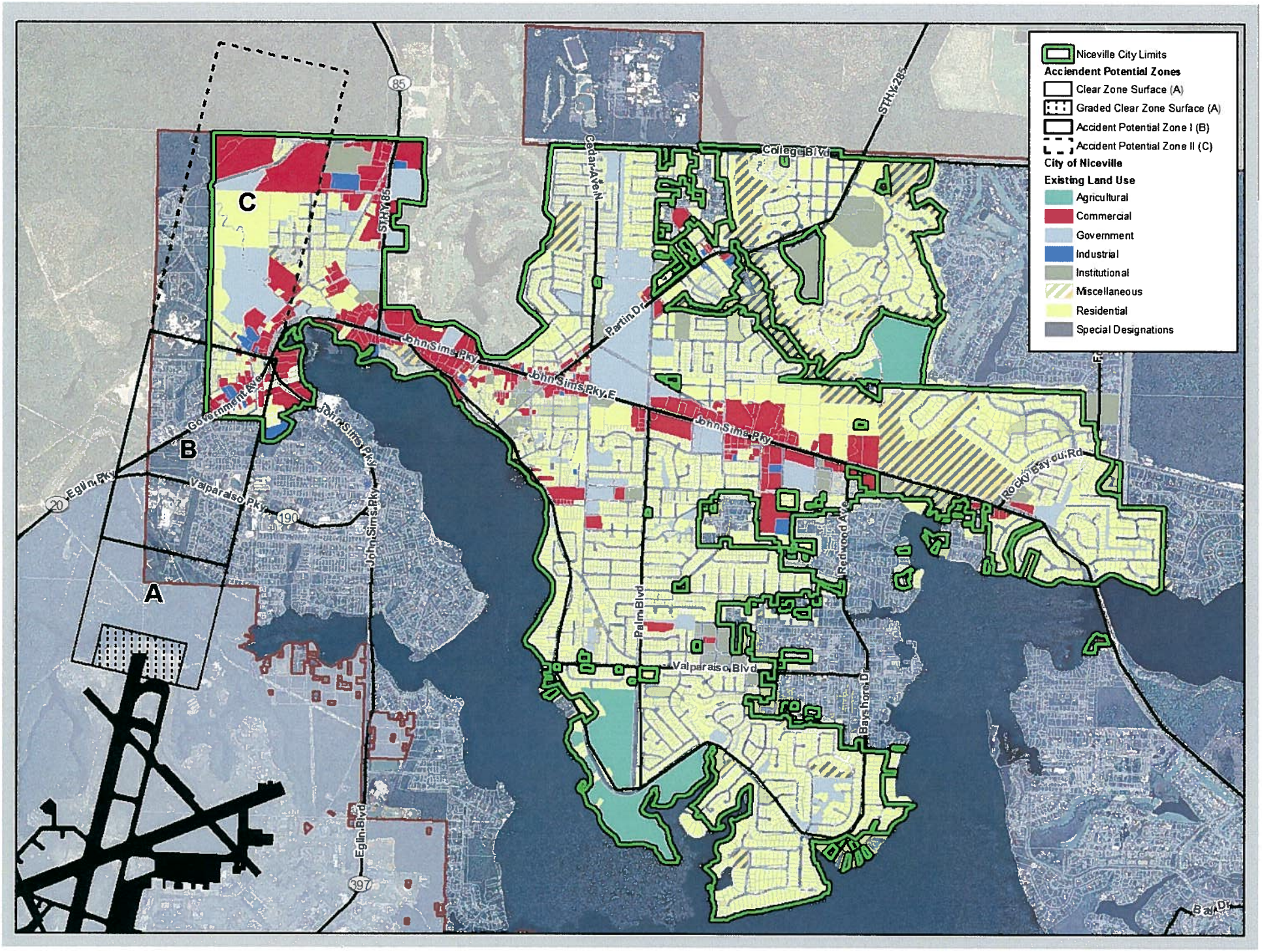
SOLIN & ASSOC. INC

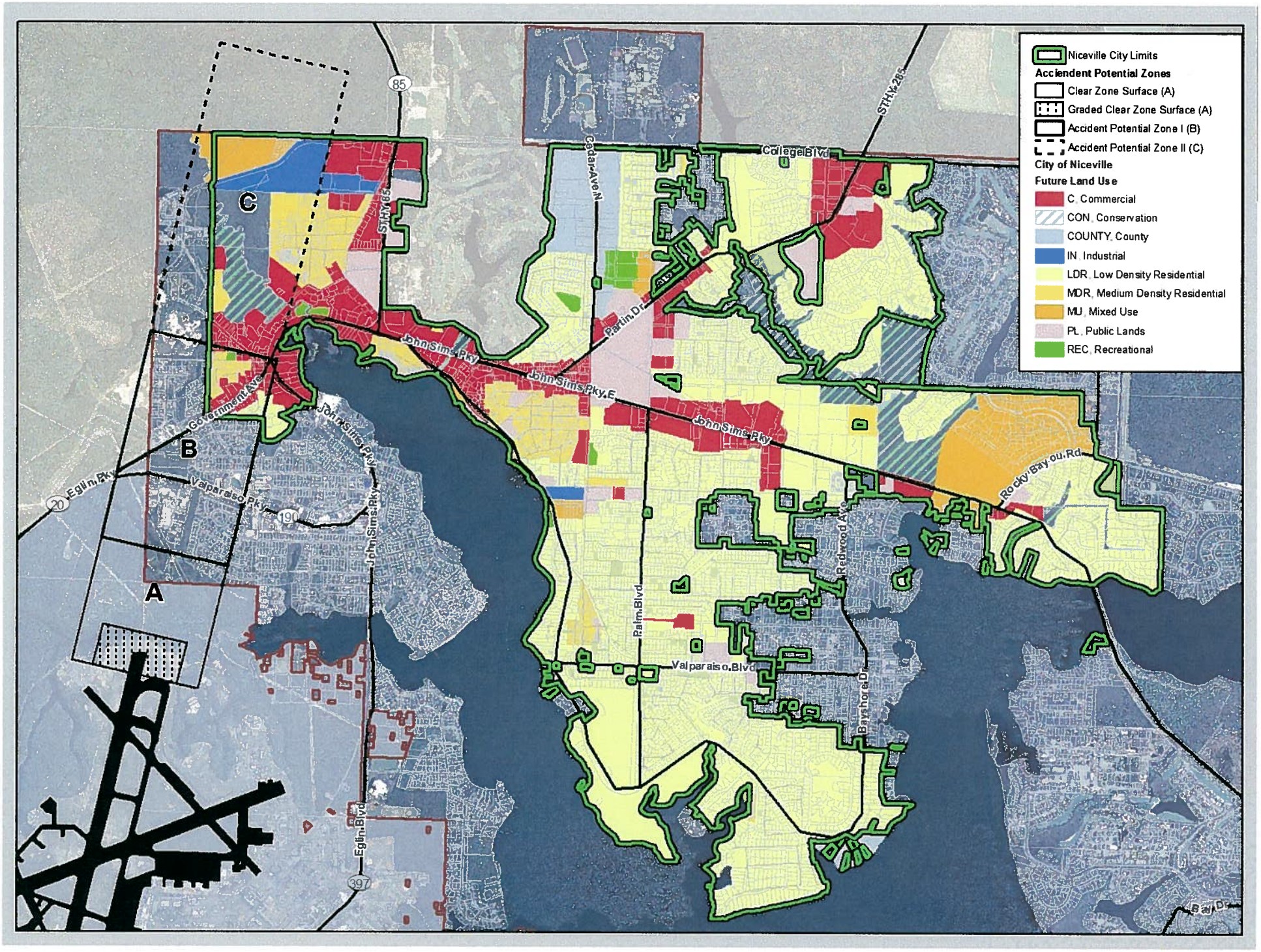
Legend:
TAG: JLUS Technical Advisory Group
PC: JLUS Policy Committee

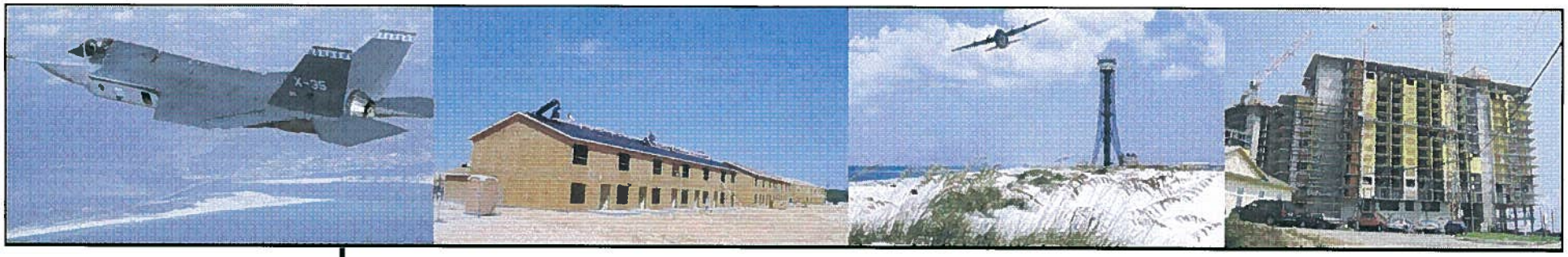

Valparaiso City Limits
Acciendent Potential Zones
Clear Zone Surface (A)
Graded Clear Zone Surface (A)
Accident Potential Zone I (B)
Accident Potential Zone II (C)
A
B
C
Eglin Pky
ST HY 190
Government Ave
Valparaiso Pky
ST HY 397
ST HY 85
John Sims Pky
John Sims Pky E
Cedar Ave N
Barlow Dr
Palm Blvd
Valparaiso Blvd
Rosewood Dr
Bayshore Dr
Eglin Blvd
20
190
397
85


Valparaiso City Limits
Acciendent Potential Zones
Clear Zone Surface (A)
Graded Clear Zone Surface (A)
Accident Potential Zone I (B)
Accident Potential Zone II (C)
City of Valparaiso
Zoning
C-1, Commercial District Limited
C-2, Commercial Unlimited
HP, Historical District
PUD, Planned Unit Development
R-1, Single-Family or Duplex District
R-1A, Single-Family District
R-2, Multiple-Family District
A
B
C
Egln Pky
STHY 190
Government
Valparaiso Pky
190
John Sims Pky
STHY 65
85
Cedar Ave
Palm Blvd
Valparaiso Blvd
Redwood Ave
Bayshore Dr
Egln Blvd
397
20


Valparaiso City Limits
Acciendent Potential Zones
Clear Zone Surface (A)
Graded Clear Zone Surface (A)
Accident Potential Zone I (B)
Accident Potential Zone II (C)
City of Valparaiso
Future Land Use
C, Commercial Use
CON, Conservation
IN, Industrial Use
LDR, Low Density Residential
MDR, Medium Density Residential
PL, Public Lands
REC, Recreation Use
UNK, No Land Use Designation
A
B
C
STHY 190
Valparaiso Pky
Government Ave
John Sims Pky
STHY 85
Cedar Ave N
Eglin Pky
Eglin Blvd
Palm Blvd
Valparaiso Blvd
Redwood Ave
Bayshore Dr
20
190
85
397

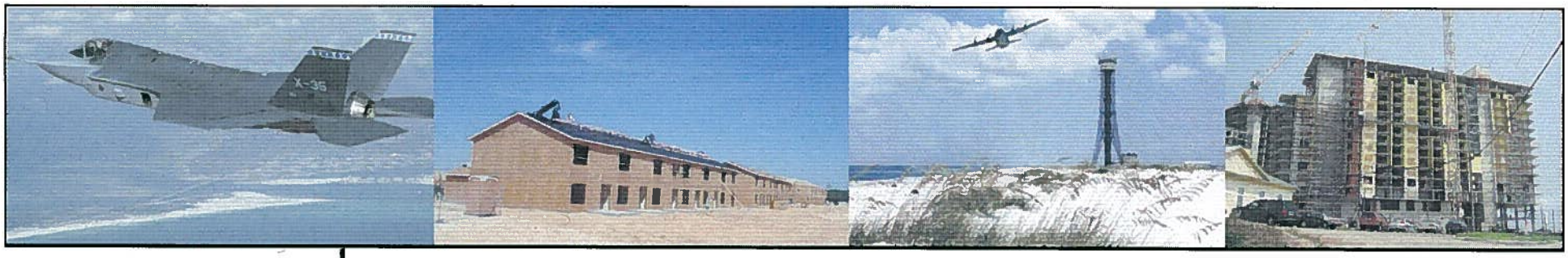

Niceville City Limits
Acciendent Potential Zones
Clear Zone Surface (A)
Graded Clear Zone Surface (A)
Accident Potential Zone I (B)
Accident Potential Zone II (C)
City of Niceville
Existing Land Use
Agricultural
Commercial
Government
Industrial
Institutional
Miscellaneous
Residential
Special Designations
A
B
C
85
STH 85
STH 285
College Blvd
Cedar Ave N
Partin Dr
John Sims Pky
John Sims Pky E
Government Ave
Eglin Pky
Valparaiso Pky
190
20
Rocky Bayou Rd
Redwood Ave
Palm Blvd
Valparaiso Blvd
Bayshore Dr
Eglin Blvd
397
Bal Dr


Niceville City Limits
Accidendent Potential Zones
Clear Zone Surface (A)
Graded Clear Zone Surface (A)
Accident Potential Zone I (B)
Accident Potential Zone II (C)
City of Niceville
Future Land Use
C, Commercial
CON, Conservation
COUNTY, County
IN, Industrial
LDR, Low Density Residential
MDR, Medium Density Residential
MU, Mixed Use
PL, Public Lands
REC, Recreational
A
B
C
85
20
190
397
STH 85
STH 285
College Blvd
Cedar Ave N
Partin Dr
John Sims Pky
John Sims Pky E
Government Ave
Eglin Pky
Valparaiso Pky
Rocky Bayou Rd
Redwood Ave
Palm Blvd
Valparaiso Blvd
Bayshore Dr
Eglin Blvd
Bay Dr



Valparaiso Clear Zone

- 4 Commercial Parcels
- 14 Single-Family Residential
- Single Family Population Estimated to be Approximately 40 Residents

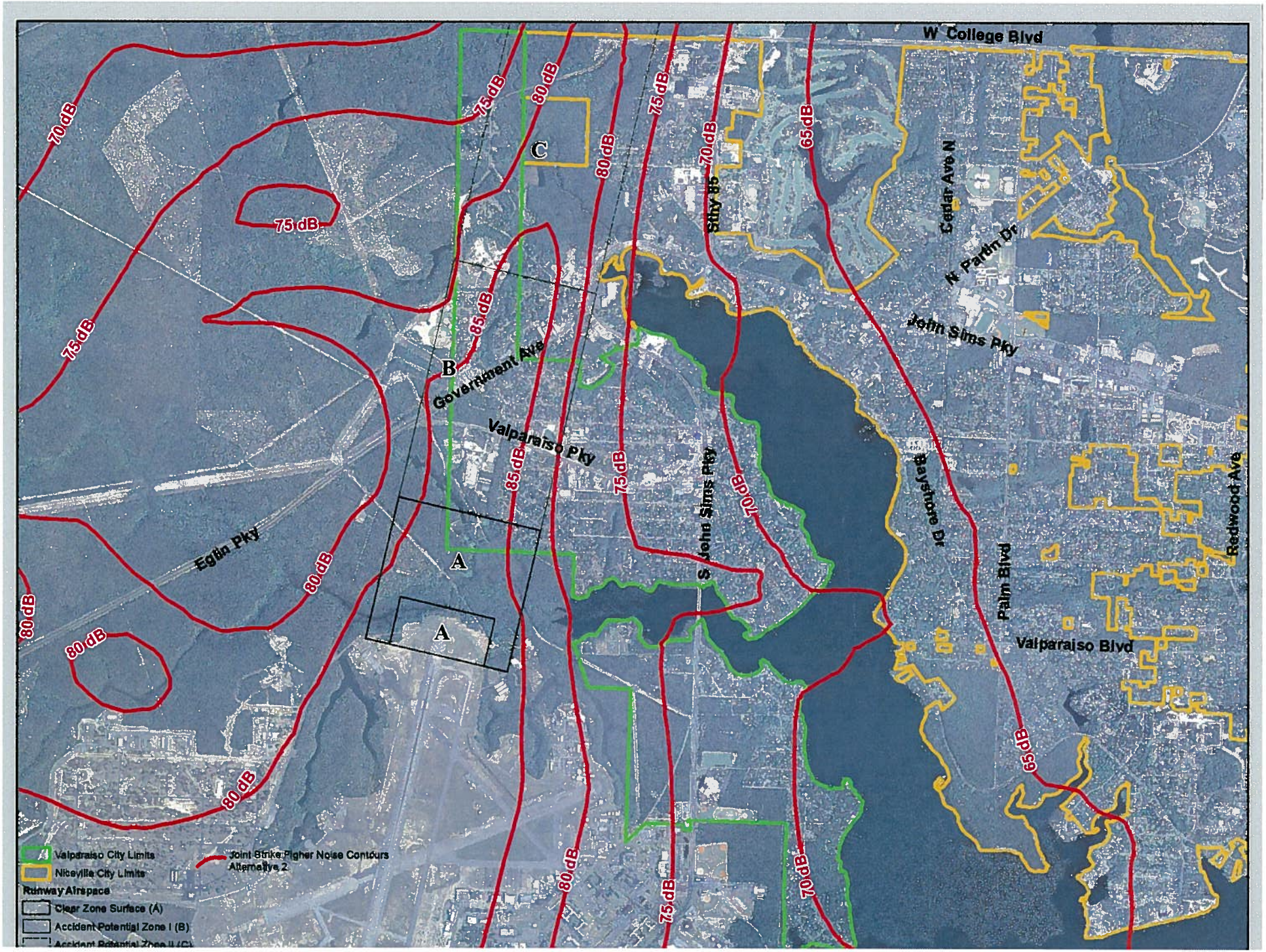


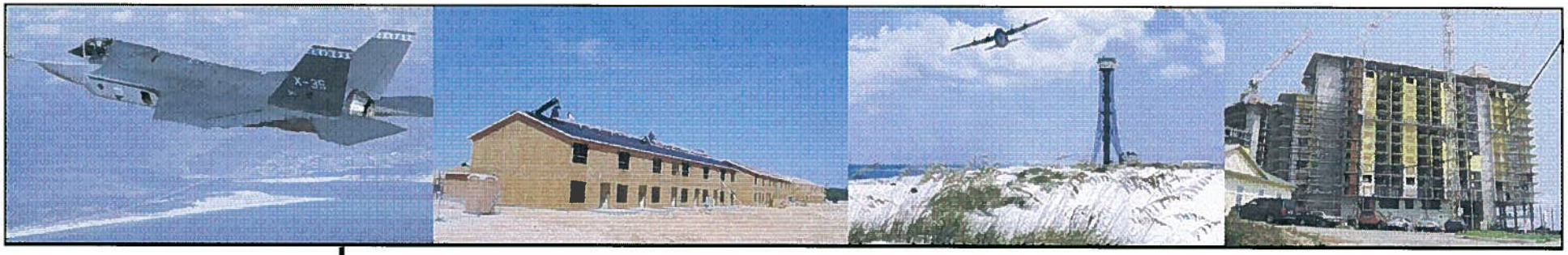
Valparaiso Accident Potential Zones

- 364 Single Family or Multi-plex Residences
- Approximately 1,045 Residents
  - Approximately 824 (79%) in APZ I
- Incompatible Development:
  - Medium Density Residential and Two Churches in the APZ I
  - Residential Areas with Densities (>1 unit/acre)

Niceville Accident Potential Zones

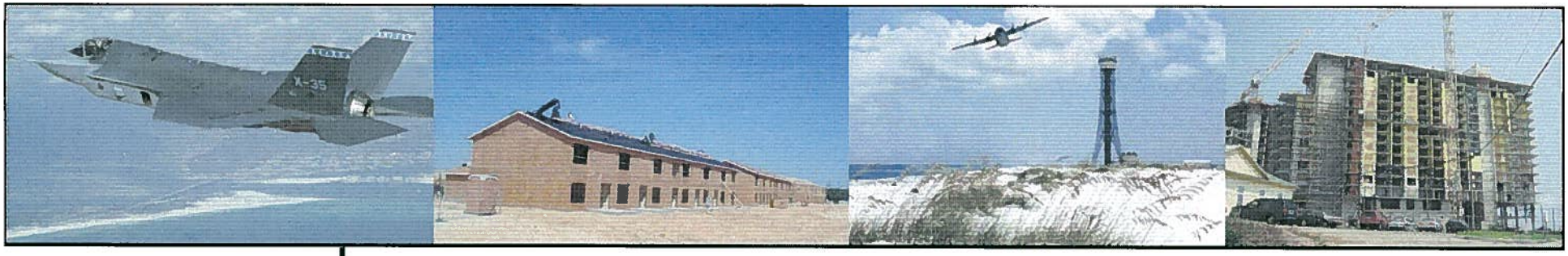
- No Clear Zone Incompatibilities
- 167 Single Family or Multi-plex Residences
- Approximately 416 Residents
  - Approximately 166 (40%) in APZ I
- Incompatible Development:
  - Residential Areas with Densities (>1 unit/acre)


W College Blvd
Cedar Ave N
N Partin Dr
John Sims Pky
Hwy 85
S John Sims Pky
Bayshore Dr
Palm Blvd
Valparaiso Blvd
Redwood Ave
Government Ave
Valparaiso Pky
Eglin Pky
A
B
C
65 dB
70 dB
75 dB
80 dB
85 dB
Valparaiso City Limits
Niceville City Limits
Joint Strike Fighter Noise Contours Alternative 2
Runway Airspace
Clear Zone Surface (A)
Accident Potential Zone I (B)
Accident Potential Zone II (C)



Valparaiso High Noise Level Areas

- 1,625 Single Family or Multi-plex Residences
- 8 Churches
- 2 Public Schools (Lewis Middle and Valparaiso Elementary)
- 4 Public Buildings (City Hall, Library, Police Station, and Community Center)
- Approximately 6,300 Persons (Entire City Population)

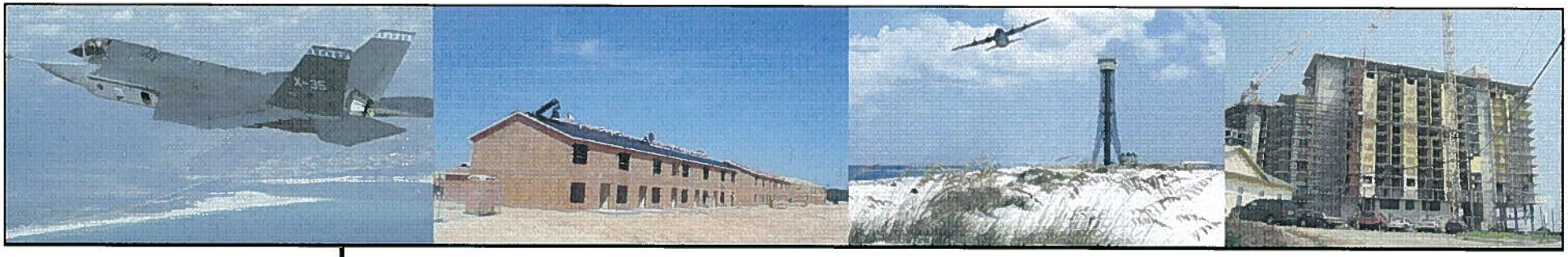


Niceville High Noise Level Areas

- 958 Single Family or Multi-plex Residences
- 6 Churches
- 1 Public Schools (Edge Elementary)
- 1 Public Building (Okaloosa School District)
- 1 Hospital (Twin Cities)
- Approximately 2,383 Persons

Recommendations: Niceville & Valparaiso

- Implement Construction Standards for New Construction to Decrease Noise Levels Inside Structures Within High Noise Areas (>65 dB)
- Retrofit Existing Public Buildings Within the High Noise Level Areas (>65dB) with Sound Attenuation
- Develop and Implement Assistance Program for Sound Reduction Program for Private Property Owners
- Implement Property Sales and Lease Disclosures
- Develop and Implement Land Acquisition Program
- Limit Object Heights
- Implement Outdoor Lighting Standards
- Educate Developers and Builders on Radio Frequency Interference Through Education Handouts
- Implement Public Awareness Measures
- Implement Military Influence Area (MIA) Ordinance



Recommendations: Valparaiso ONLY

- Jointly Develop and Execute Letter of Special Use Agreement With Eglin AFB

LETTER OF AGREEMENT (LOA) BETWEEN
ALBUQUERQUE INTERNATIONAL SUNPORT AIR TRAFFIC CONTROL TOWER, CITY OF ALBUQUERQUE AVIATION DEPARTMENT
AND
KIRTLAND AIRFORCE BASE 58TH SPECIAL OPERATIONS WING(SOW), AND 150TH FIGHTER WING

EFFECTIVE: January 30. 2004

SUBJECT: Noise Abatement

PURPOSE: This agreement describes procedures to be used to aid in reducing Aircraft noise over the City of Albuquerque.

CANCELLATION: This agreement cancels previous Letter of Agreement, Subject: Noise Abatement, dated 30 January 2003

1. RESPONSIBILITIES.

   a. Albuquerque International Sunport Air Traffic Control Tower shall:

      (1) Apply the runway use provisions of this agreement.

      (2) Request aircrew compliance with the in-flight procedures in this agreement.

      (3) Circulate a Letter to Airmen detailing informal noise abatement procedures.

   b. Aviation Department shall:

      (1) Serve as the focal point for citizens' comments concerning aircraft noise. Noise comments concerning military aircraft will be logged into the airport's database; however, all comments will be forwarded to the respective wing(s).

      (2) Inform all commercial and tenant FBOs of the procedures contained herein.

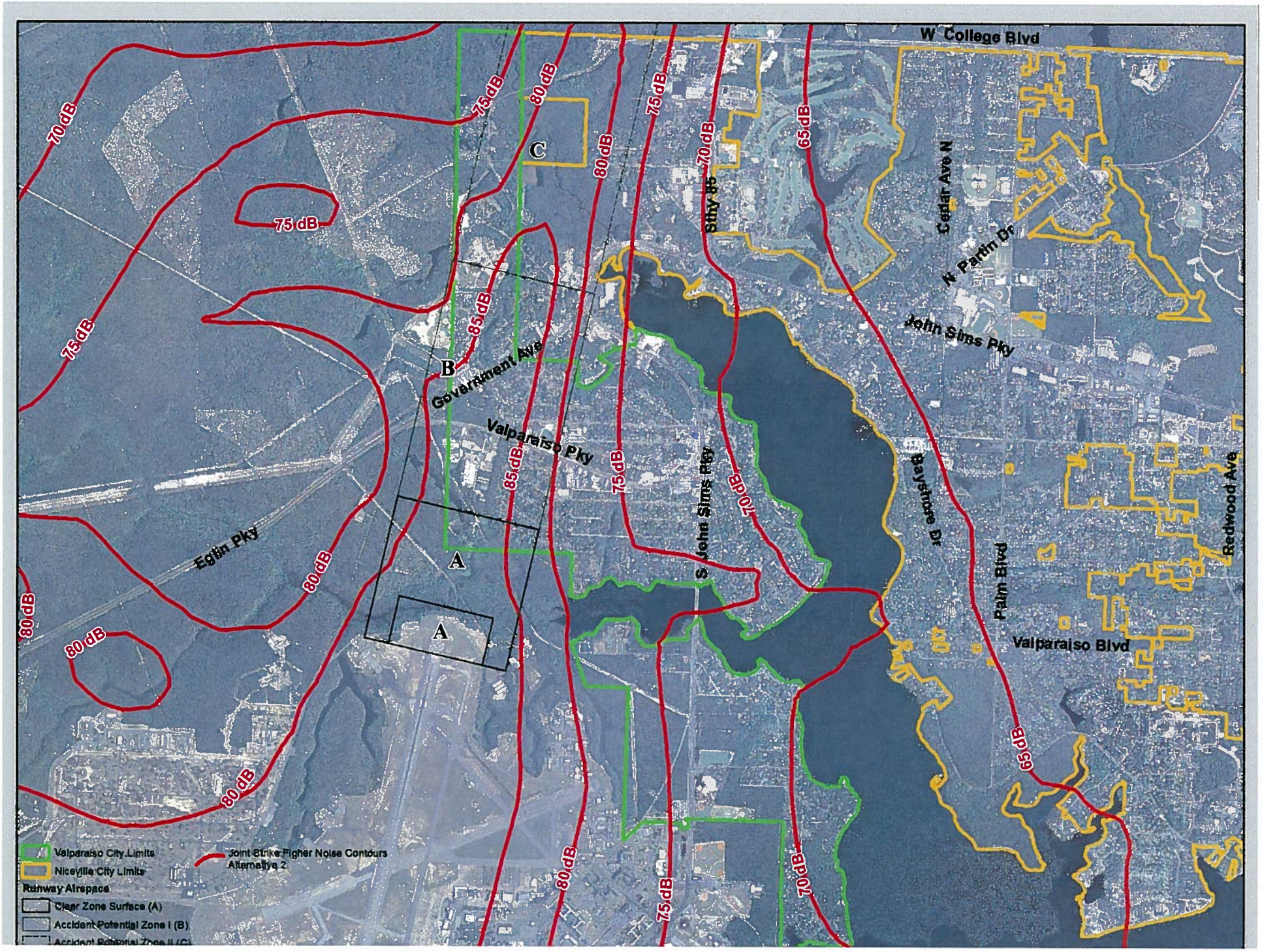
2. RUNWAY USE RESTRICTIONS: Turbojet and turboprop aircraft shall not use runway17/35 for departure unless the crosswind component on other available runways exceeds 20 knots (runway dry), or 15 knots (runway wet), and runway 17 for arrival unless the crosswind component on other available runways exceeds 15 knots. If other runways are not available or an emergency

Page 1

July 15, 2008 – Chamber

- Study Feasibility of Redevelopment Plan and Program

Recommendations: Valparaiso ONLY


W College Blvd
Cedar Ave N
N Partin Dr
John Sims Pky
Hwy 85
S John Sims Pky
Baystone Dr
Palm Blvd
Valparaiso Blvd
Redwood Ave
Government Ave
Valparaiso Pky
Eglin Pky
A
B
C
70 dB
75 dB
80 dB
85 dB
65 dB
Valparaiso City Limits
Niceville City Limits
Joint Strike Fighter Noise Contours Alternative 2
Runway Airspace
Clear Zone Surface (A)
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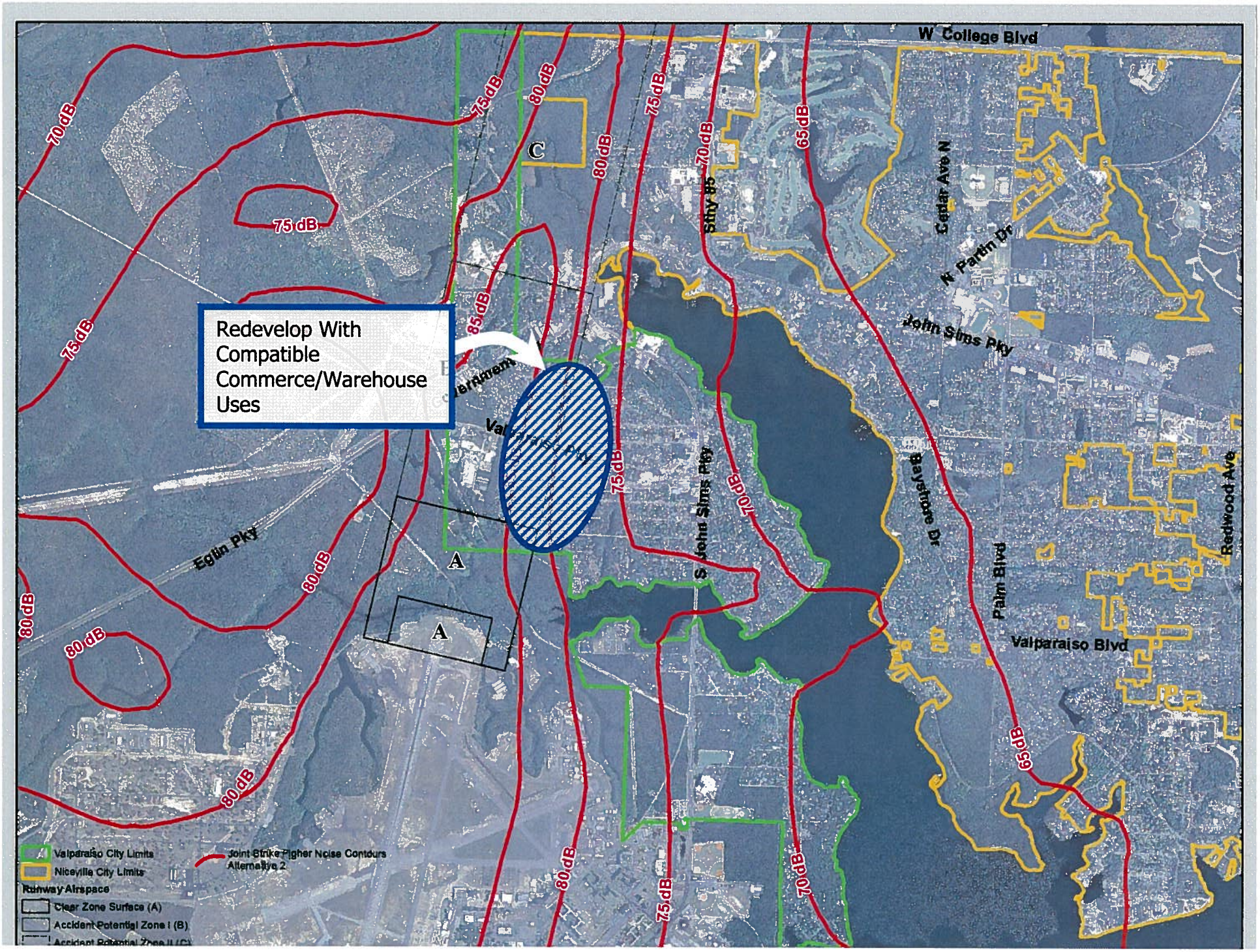
Redevelop With Compatible Commerce/Warehouse Uses
W College Blvd
Cedar Ave N
N Partin Dr
John Sims Pky
Bayshore Dr
Palm Blvd
Valparaiso Blvd
Redwood Ave
S John Sims Pky
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C
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70 dB
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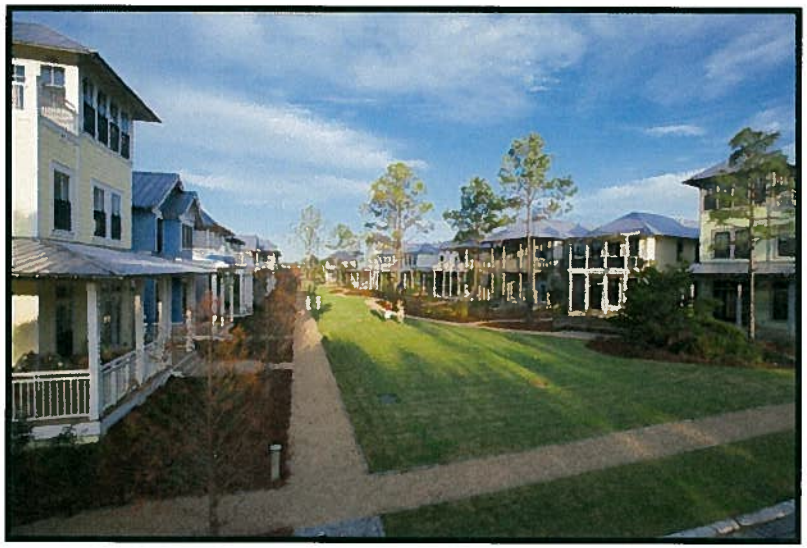
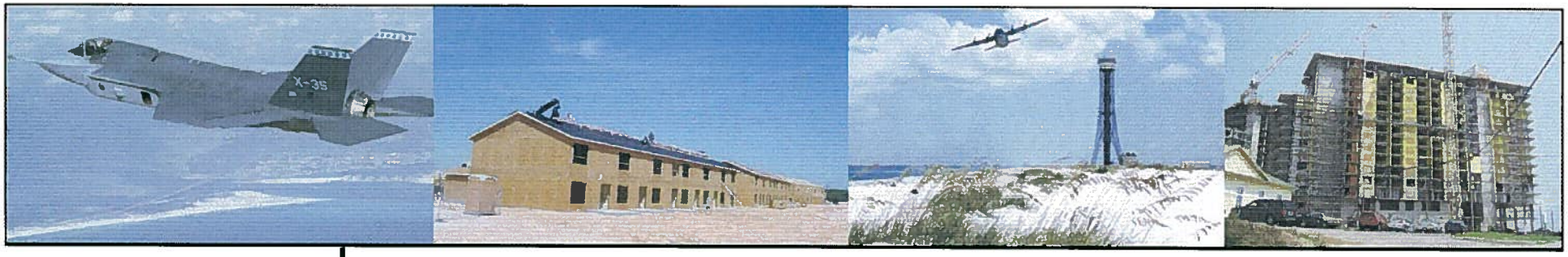
Joint Strike Fighter Noise Contours Alternative 2



Sherlock's of Celebration

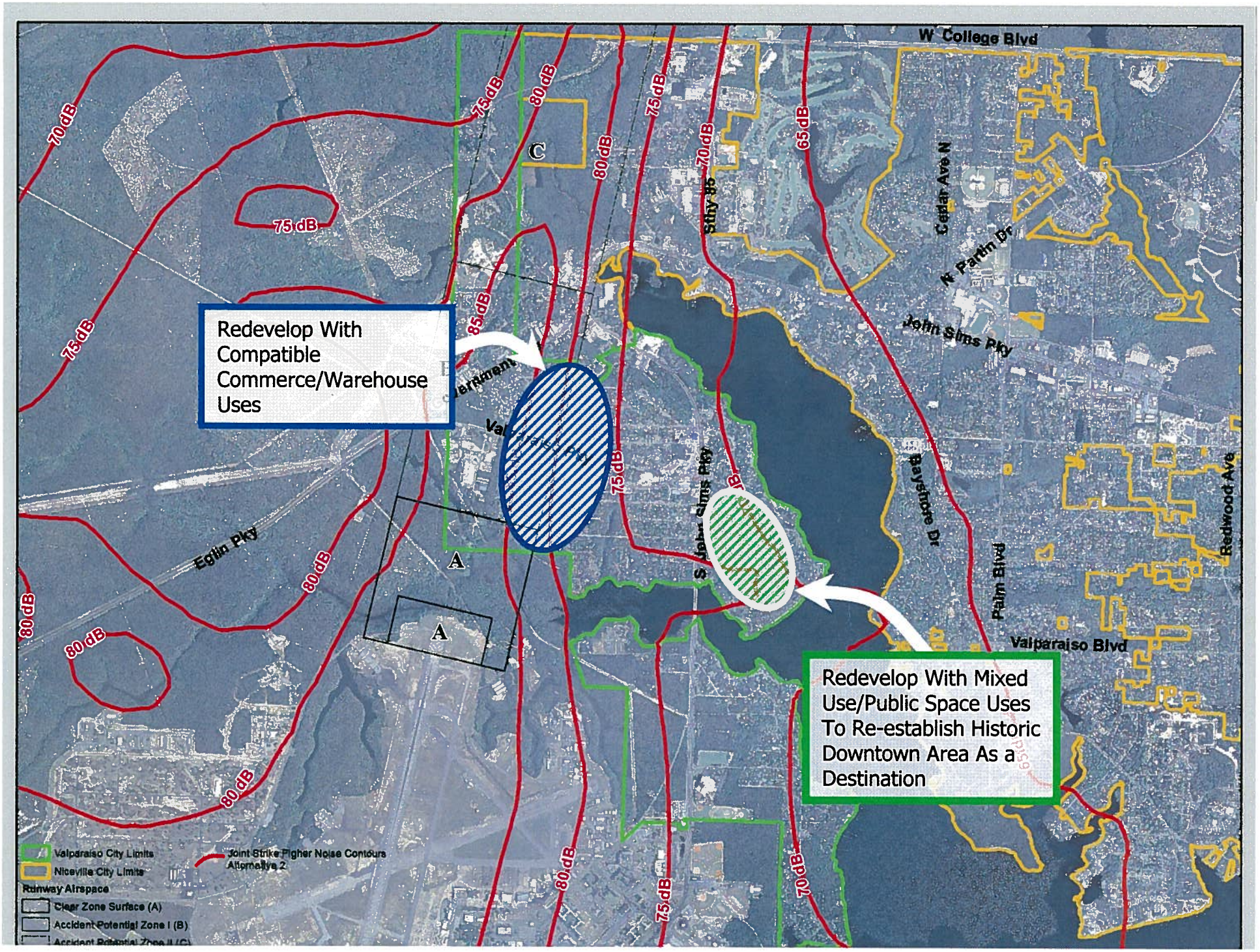
Unique
Boutique
Jewelry
Accessories
Unique Boutique

THE CAFE
RAW BAR
FRESH MARKET



Historic Downtown Valparaiso

July 15, 2008 – Chamber


Redevelop With Compatible Commerce/Warehouse Uses
Redevelop With Mixed Use/Public Space Uses To Re-establish Historic Downtown Area As a Destination
W College Blvd
Cedar Ave N
N Partin Dr
John Sims Pky
Baystore Dr
Palm Blvd
Valparaiso Blvd
Redwood Ave
Eglin Pky
Stby 85
S John Sims Pky
70 dB
75 dB
80 dB
85 dB
65 dB
A
C
Valparaiso City Limits
Niceville City Limits
Joint Strike Fighter Noise Contours Alternative 2
Runway Airspace
Clear Zone Surface (A)
Accident Potential Zone I (B)
Accident Potential Zone II (C)

FRESH MARKET

Unique
Boutique
Jewelry
Accessories
Unique Boutique

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SECTION 7.0

Policy Committee Meeting

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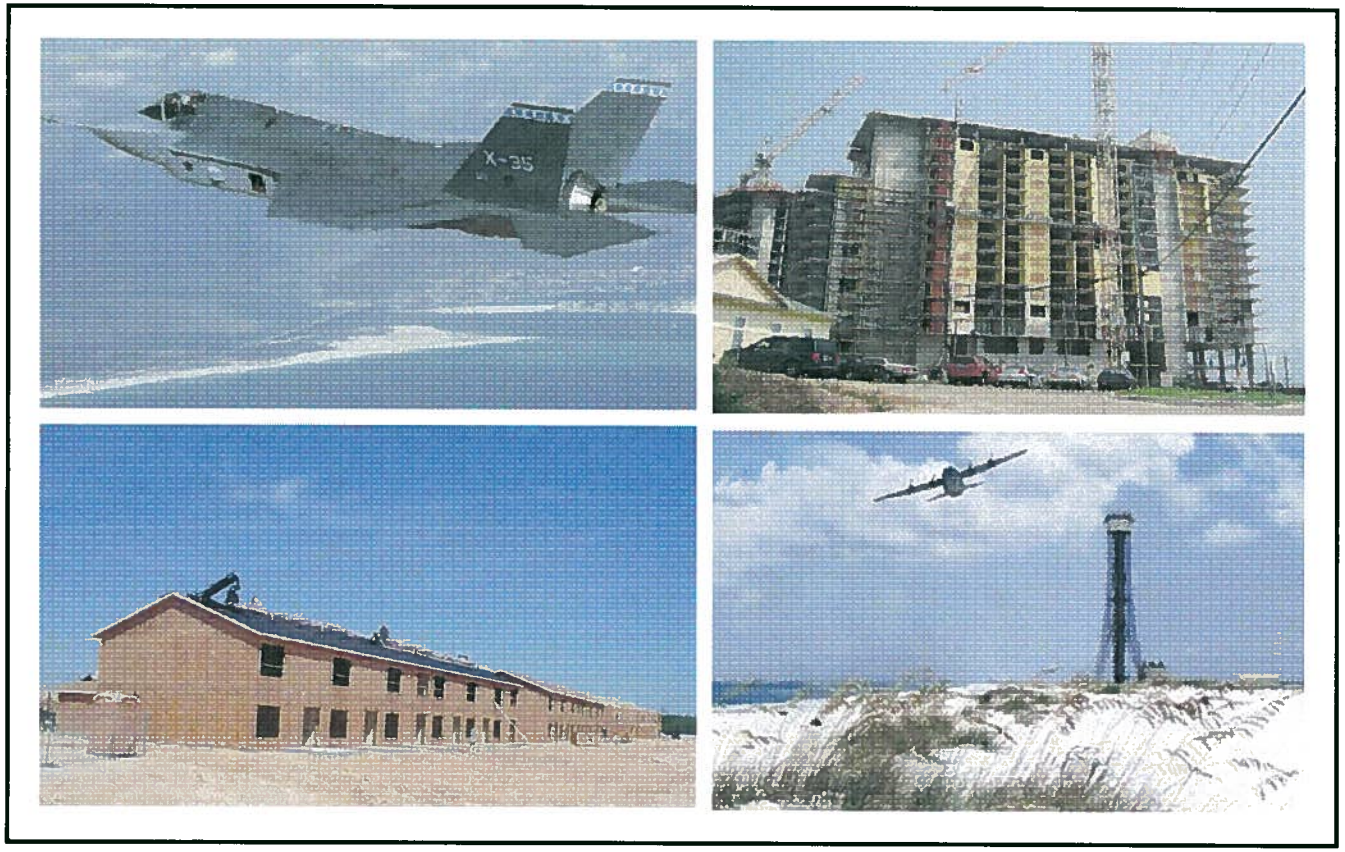
Eglin Joint Land Use Study (JLUS) Policy Committee Meeting



TETRA TECH

SOLIN & ASSOC INC.

July 23, 2008

A JLUS is...

- A cooperative land use planning effort between military installations and the surrounding communities.

- It promotes compatible community growth while supporting military training and operational missions.

TETRA TECH

SOLIN & ASSOC

Two Primary Concerns

- First, to protect the health, safety and welfare of the local community with regard to military operations.

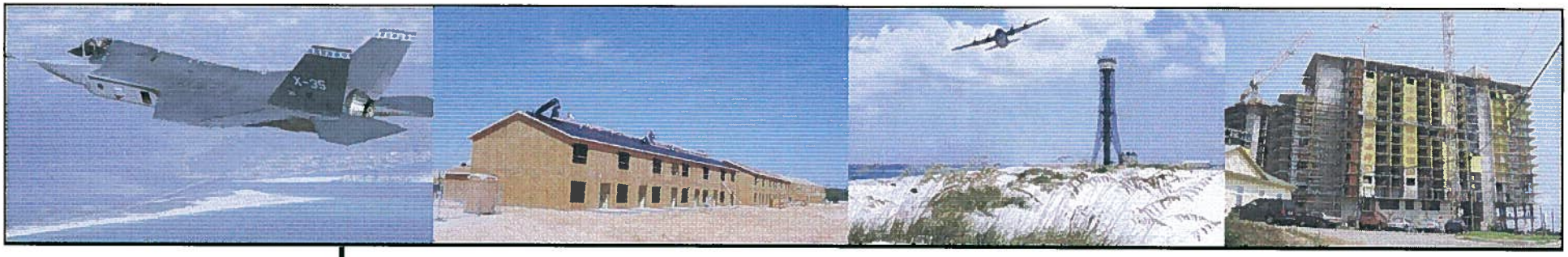
- Second, to address encroachment that is threatening or may threaten the mission and viability of an installation.

TETRA TECH

SOLIN & ASSOC

TETRA TECH

SOLIN & ASSOC.



Background

- Expanded Scope & Grant with OEA
- Waiting on EIS (This is Not the EIS)
- Revising GIS Maps & Data Analysis
- Identifying Issues – May 2008
- Recognizing Potential Strategies – May 2008
- Recommended Strategies – June 2008
- Interim Draft Report – July 2008

TETRA TECH

SOLIN & ASSOC INC

Report Format

- SECTION 1 - INTRODUCTION
- SECTION 2 - SANTA ROSA COUNTY
- SECTION 3 - OKALOOSA COUNTY
- SECTION 4 - CINCO BAYOU
- SECTION 5 - CRESTVIEW
- SECTION 6 - DESTIN
- SECTION 7 - FORT WALTON BEACH
- SECTION 8 - LAUREL HILL
- SECTION 9 - MARY ESTHER
- SECTION 10 - NICEVILLE
- SECTION 11 - SHALIMAR
- SECTION 12 - VALPARAISO
- SECTION 13 - WALTON COUNTY
- SECTION 14 - DEFUNIAK SPRINGS
- SECTION 15 - FREEPORT

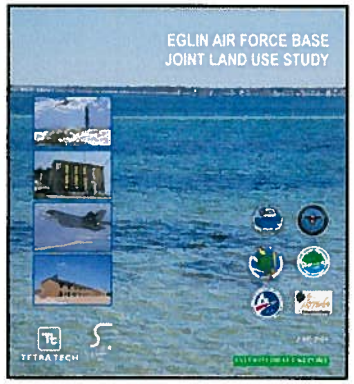
TETRA TECH

SOLIN & ASSOC INC

Plan of Action

July 7 ⟷ Public Comment Period ⟷ Aug 28

Interim Draft → **Draft** → **Final** → **Accepted Report**



July 30

Aug 20

TAG – July 10

PC – July 23

Public Hearing – Aug 6

PC – Aug 28

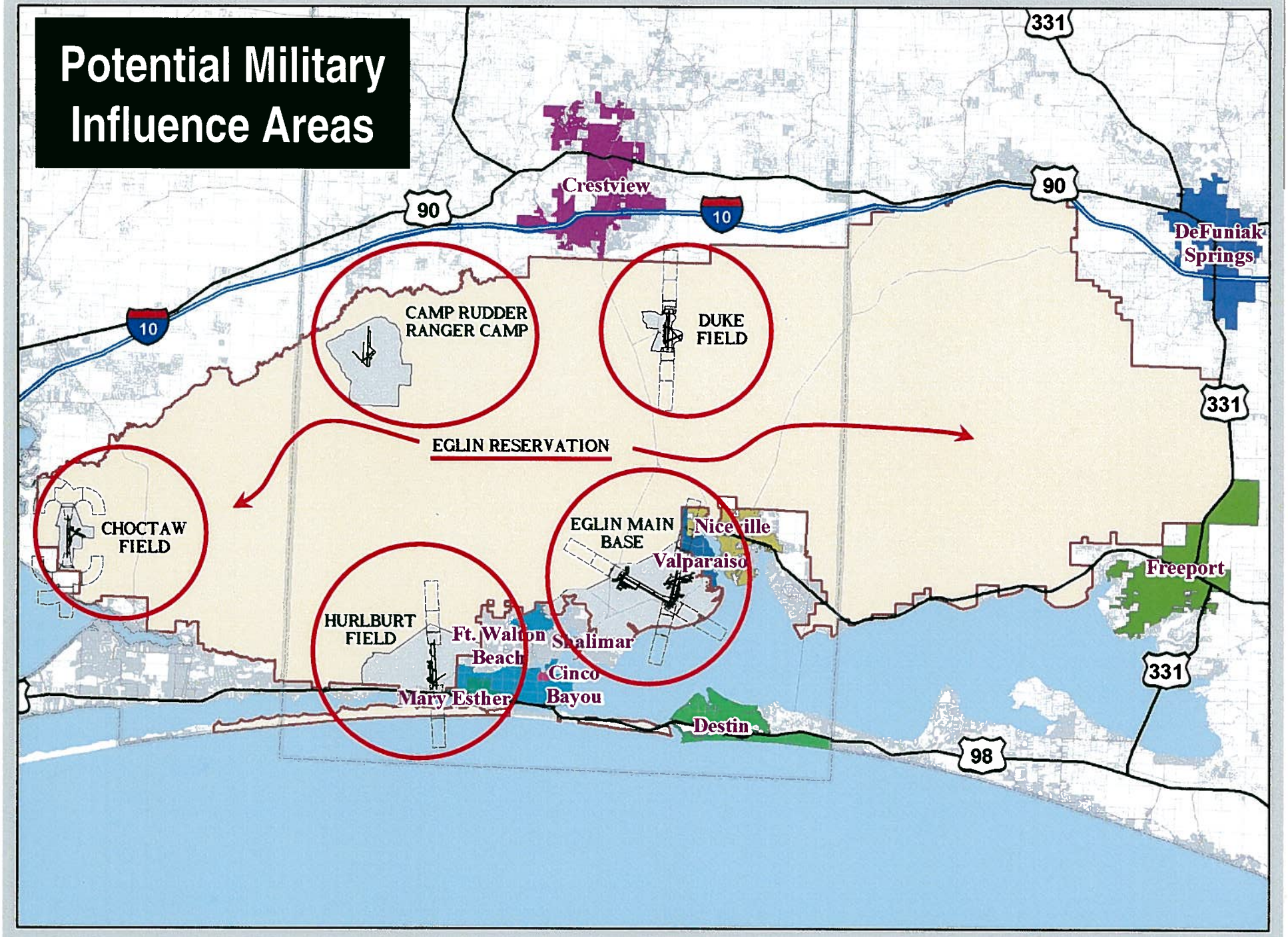
Scheduled Meetings

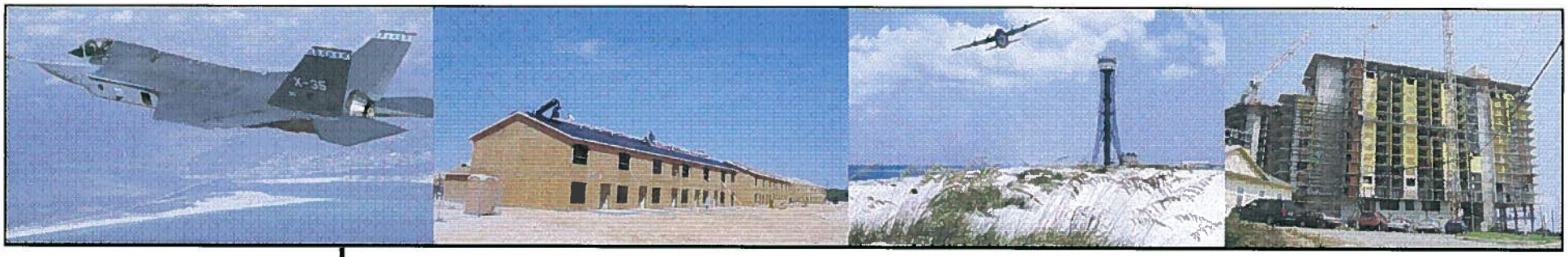
TETRA TECH

SOLIN & ASSOC

Legend:
TAG: JLUS Technical Advisory Group
PC: JLUS Policy Committee

Potential Military Influence Areas





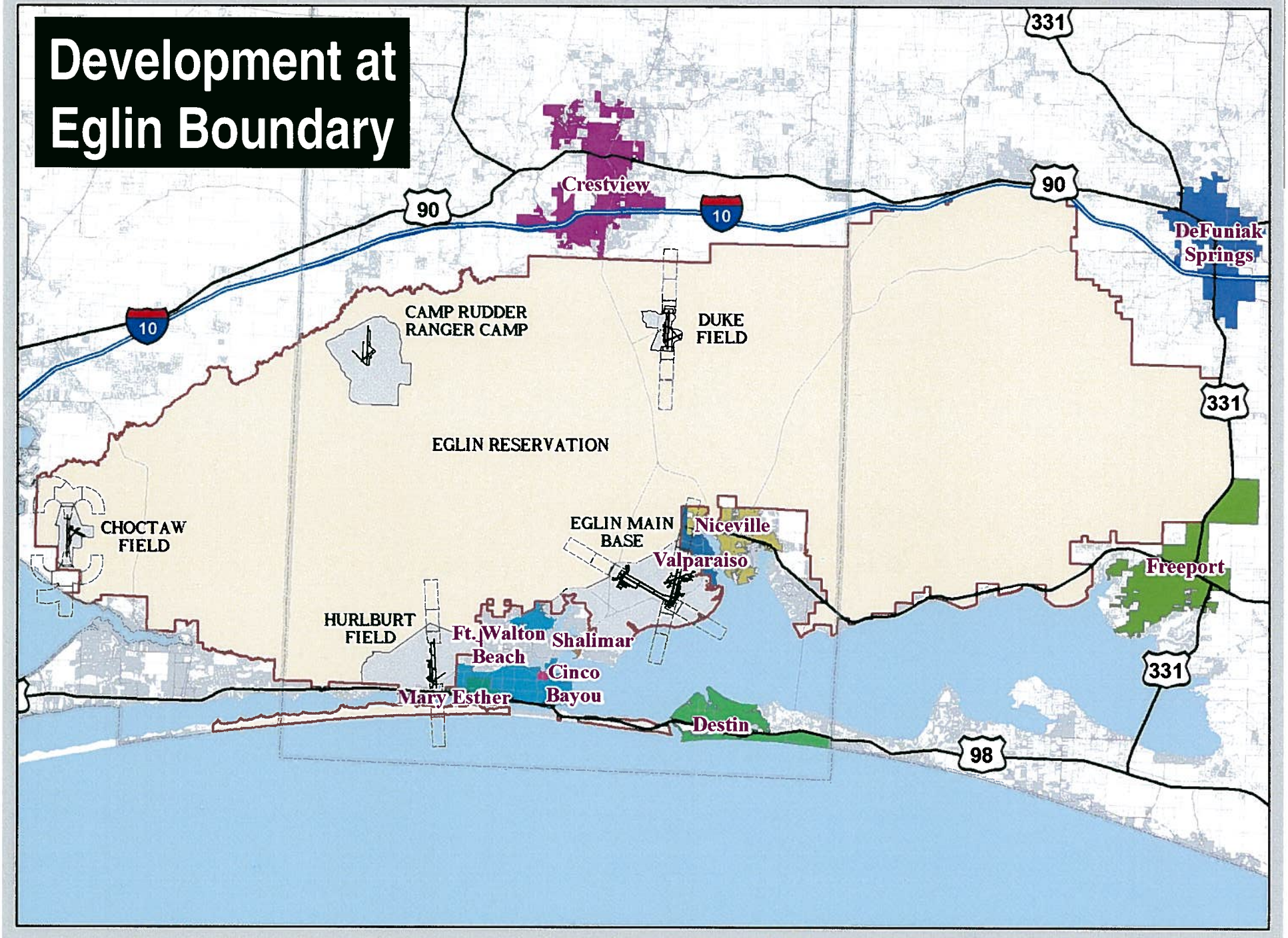
Issues

- Issues Identified:
  - Development at Eglin Boundary
  - Clear Zone & Accident Potential Zones
  - Noise – Aircraft, Impulse, Supersonic
  - Low Level Approach Zones
  - Low Level Helicopter Training
  - Height of Objects
  - Lighting
  - Controlled Firing Areas
  - Cruise Missile Corridors

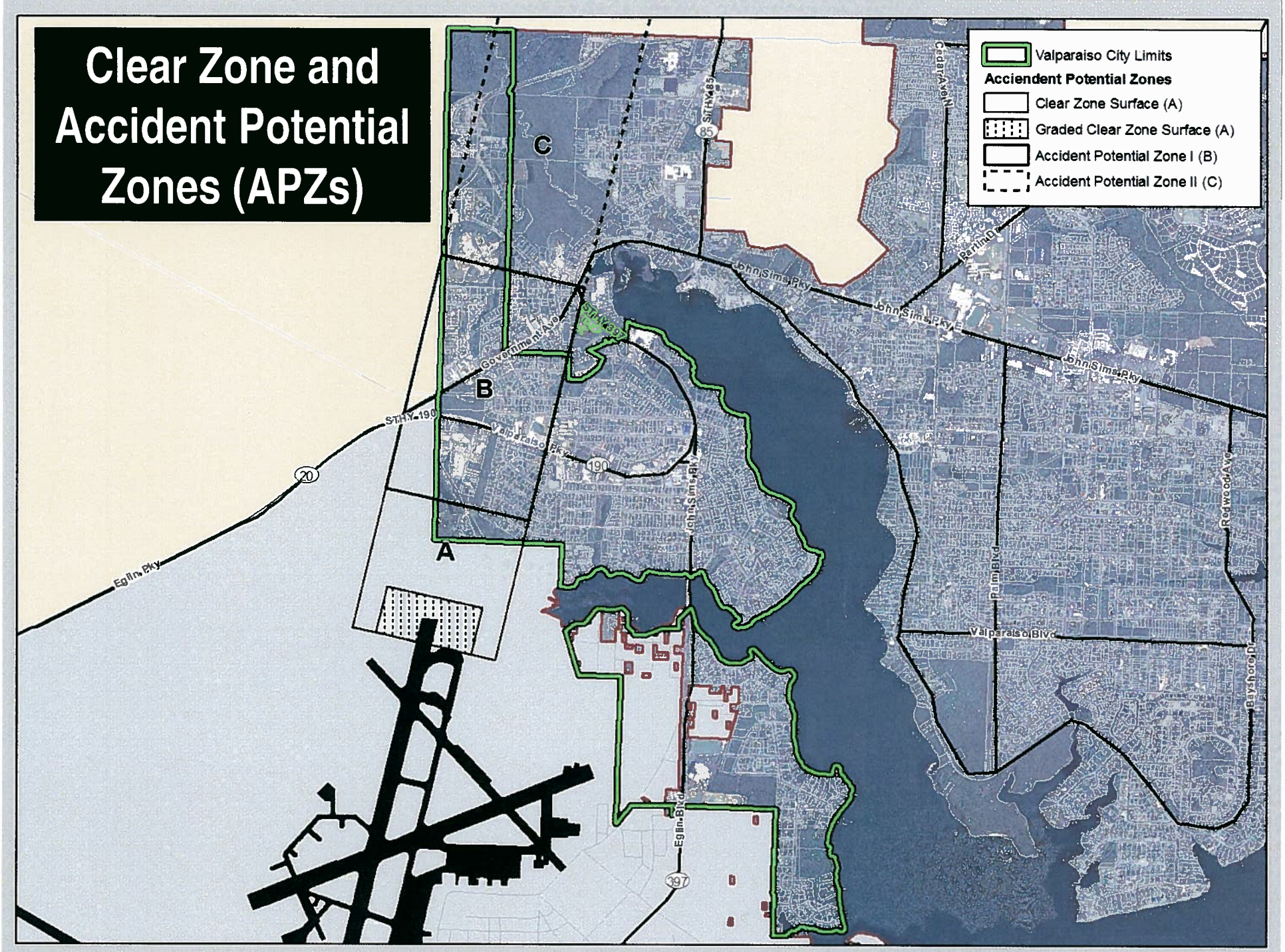
TETRA TECH

SOLIN & ASSOC

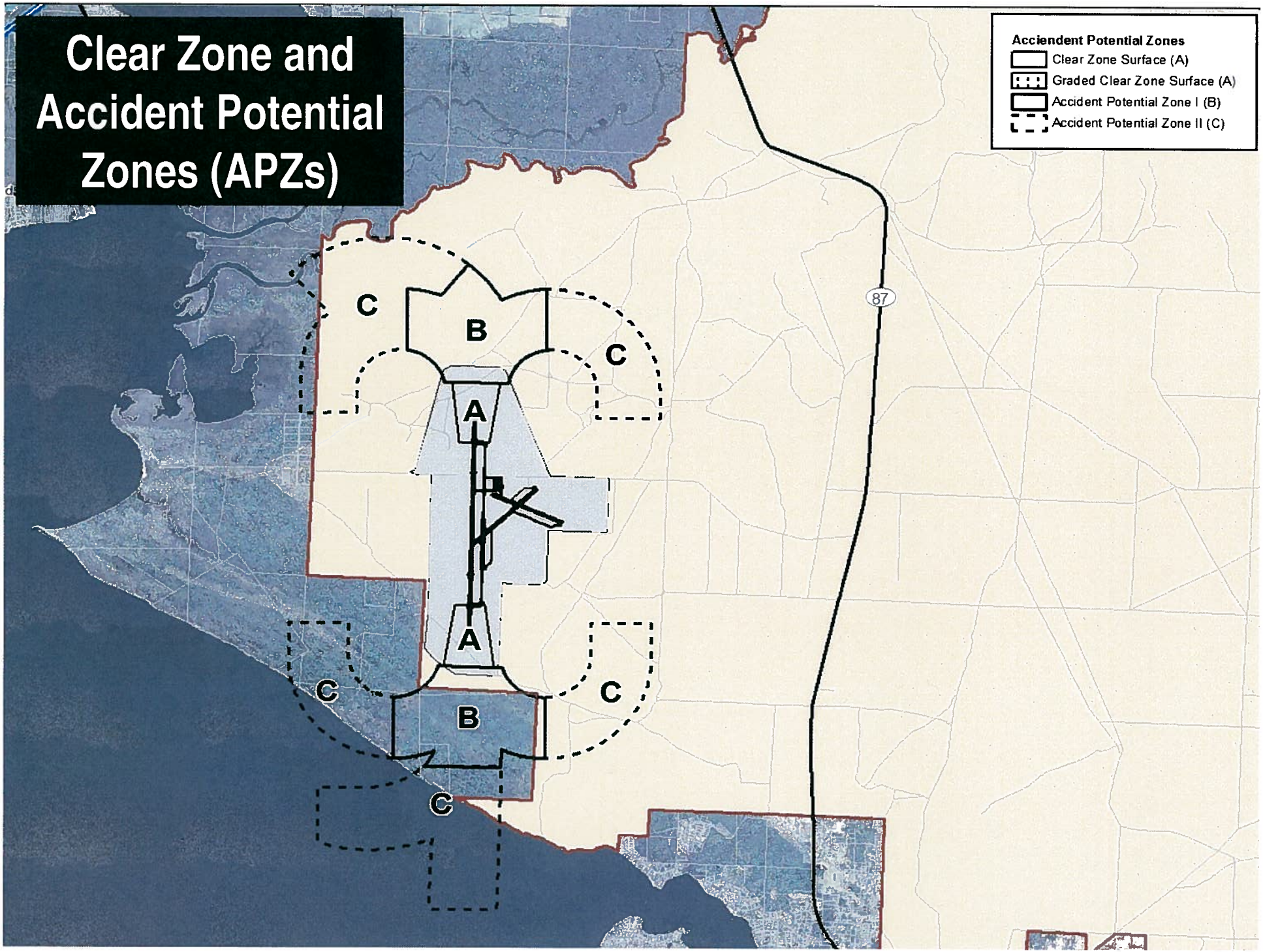
Development at Eglin Boundary



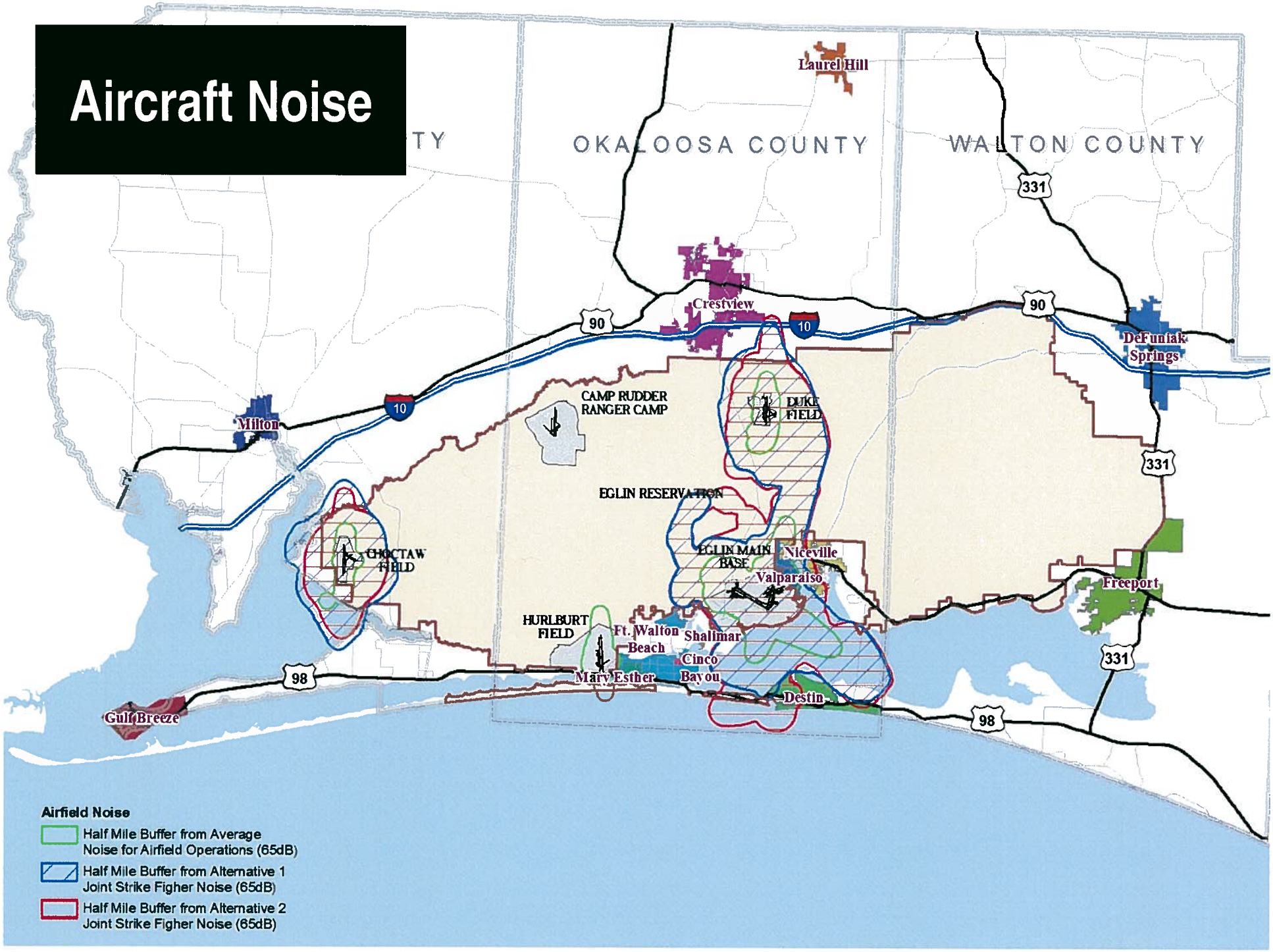
Clear Zone and Accident Potential Zones (APZs)



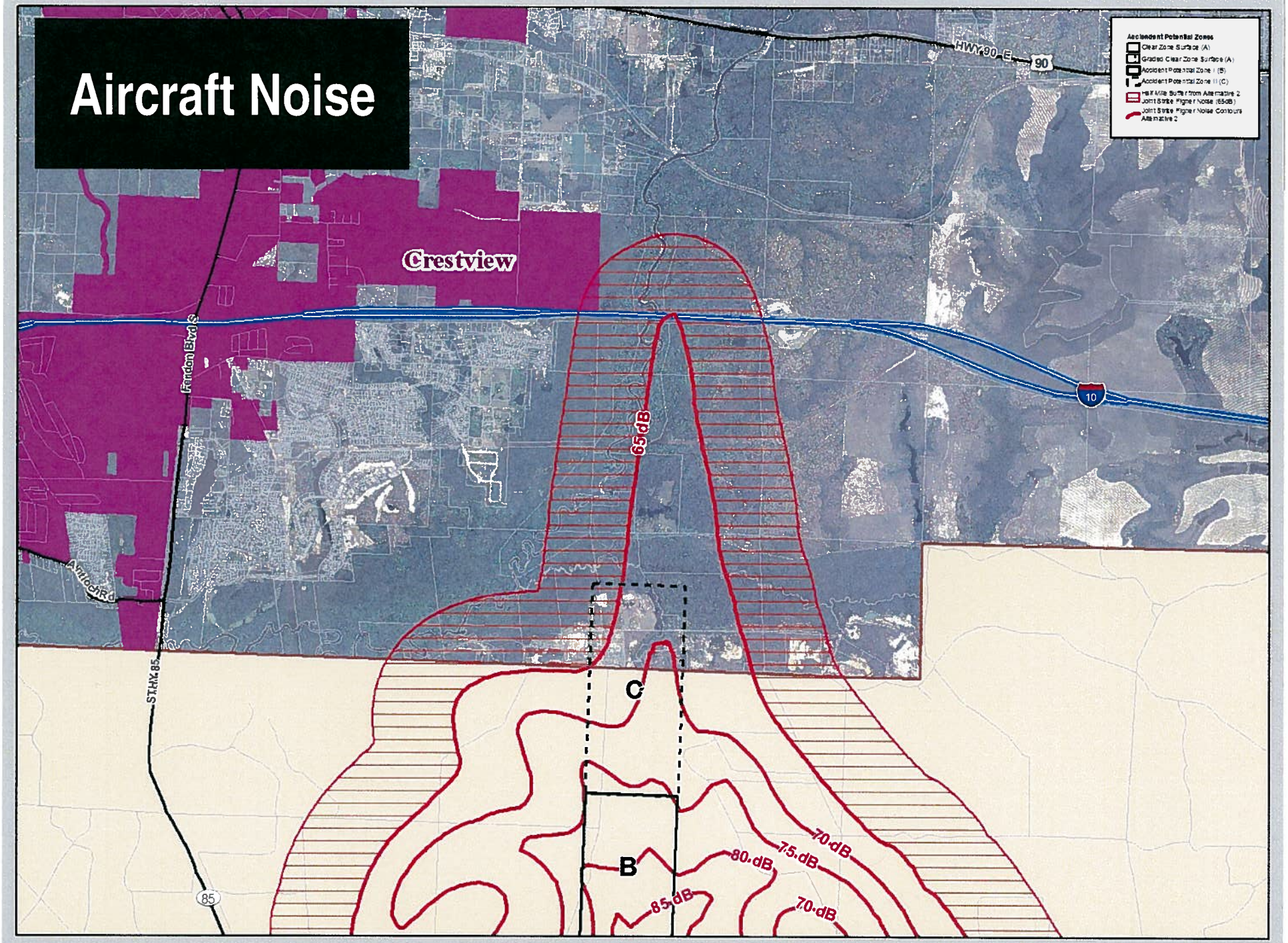
Clear Zone and Accident Potential Zones (APZs)



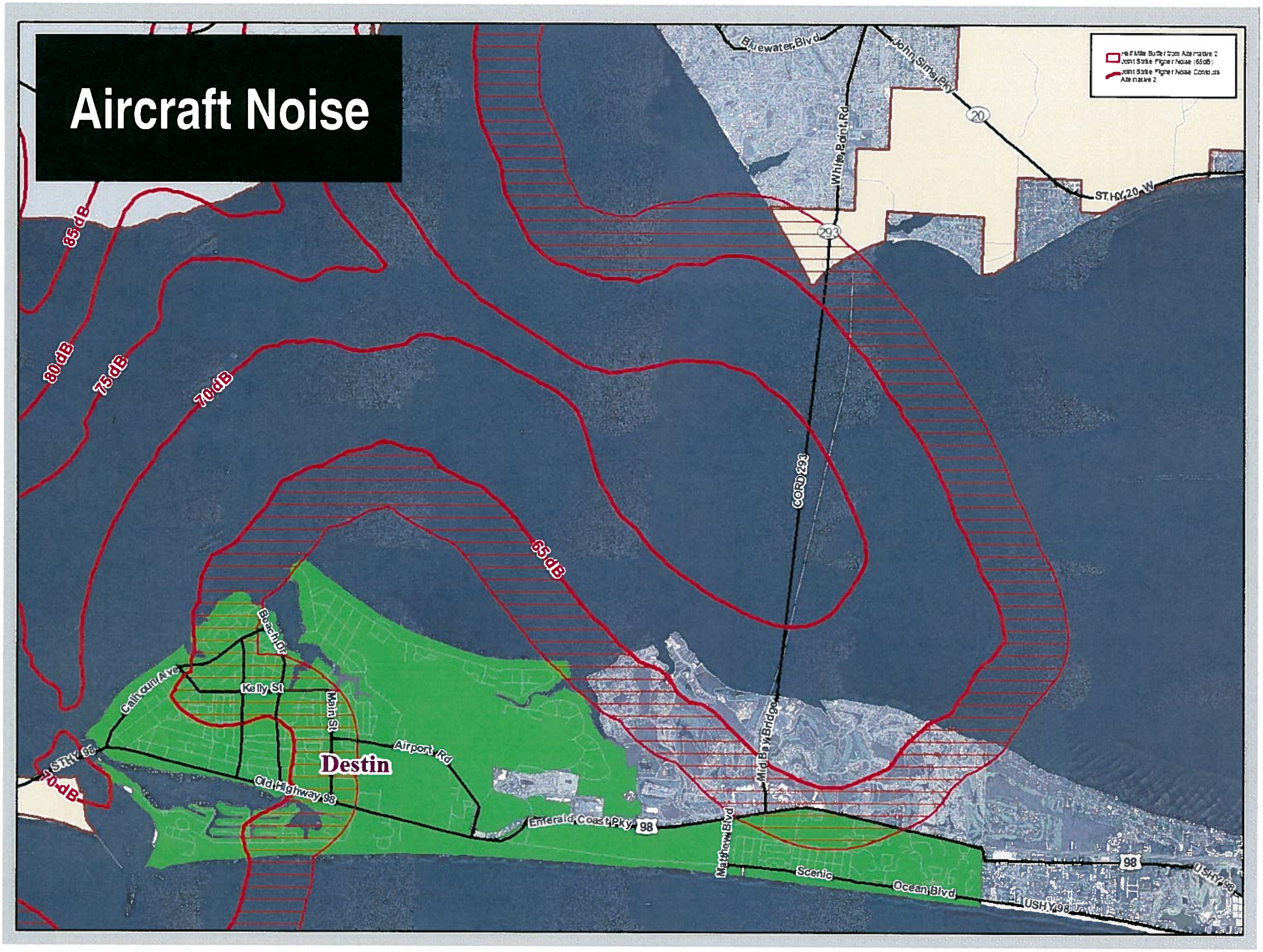
Aircraft Noise



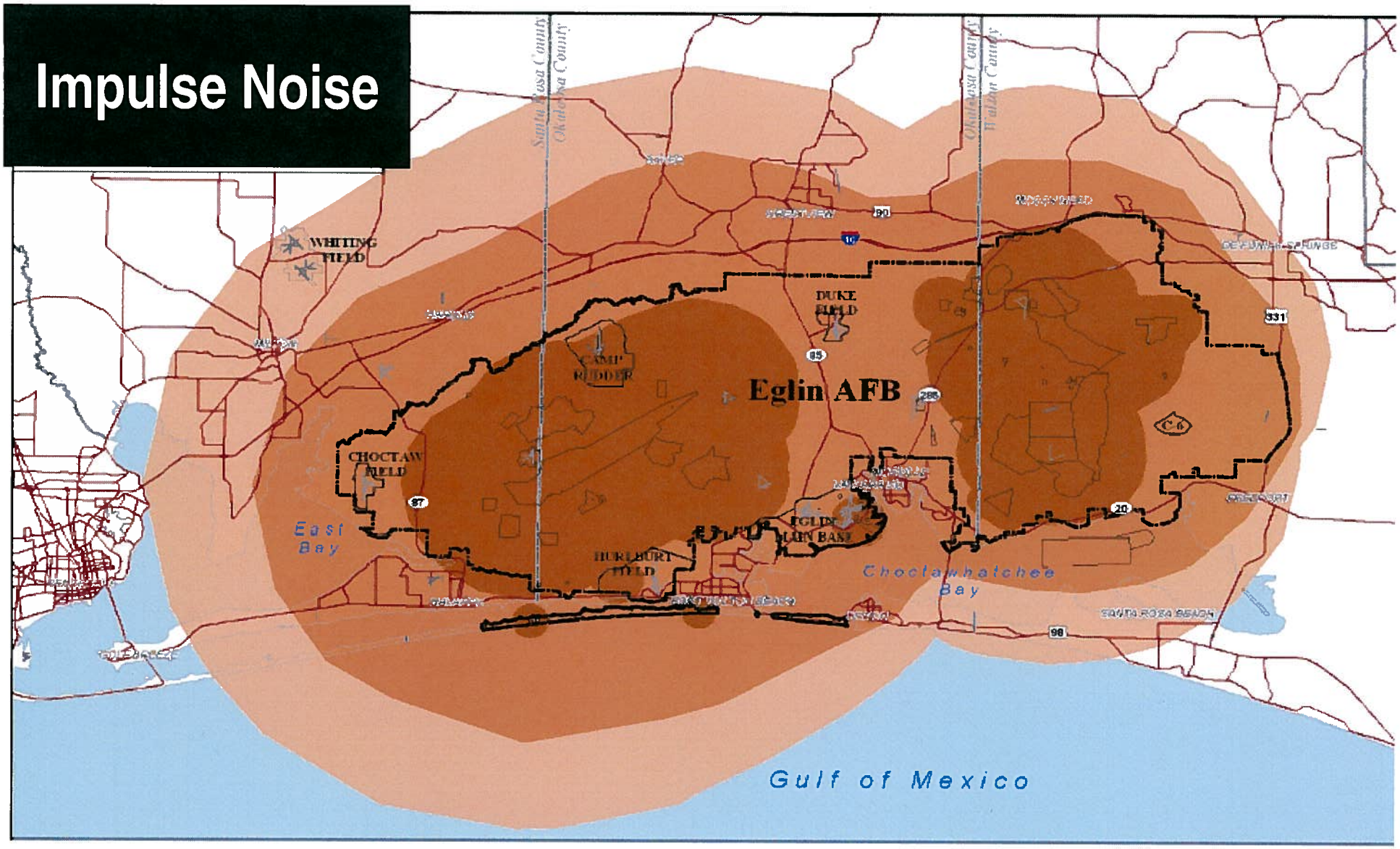
Aircraft Noise



Aircraft Noise



Impulse Noise



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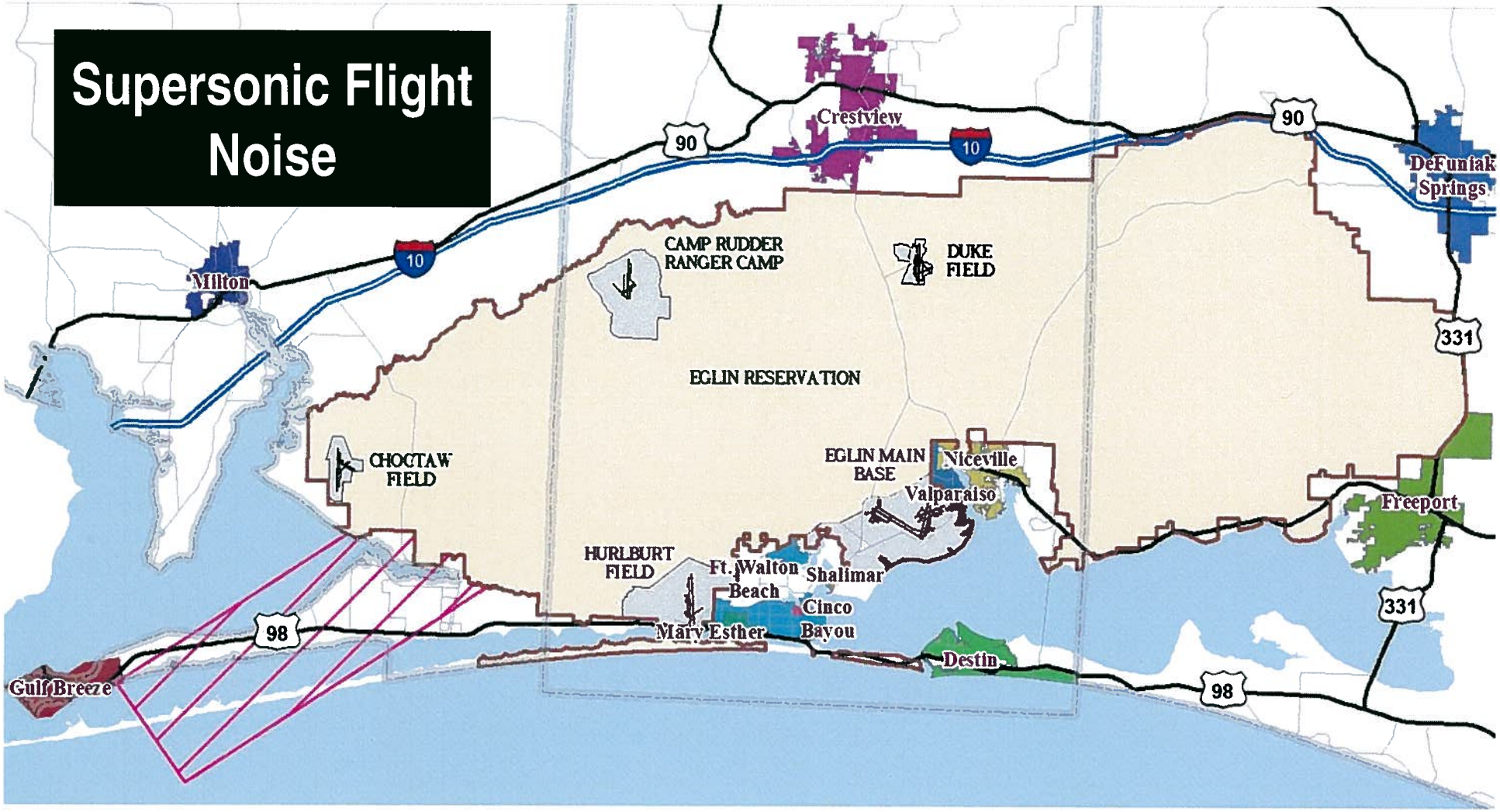
Supersonic Flight Noise



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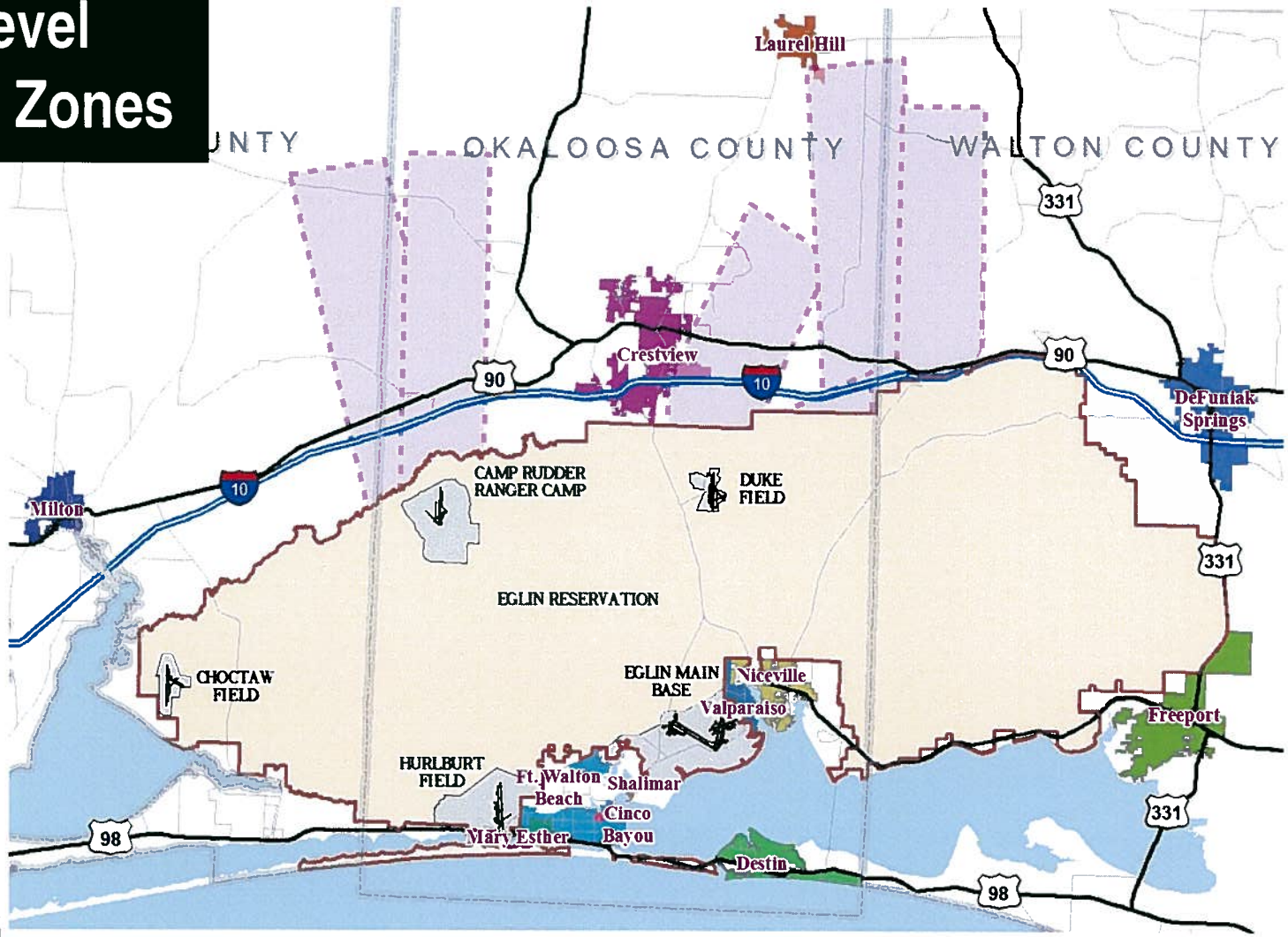
July 23, 2008 – Policy Committee

Low Level Approach Zones



TETRA TECH

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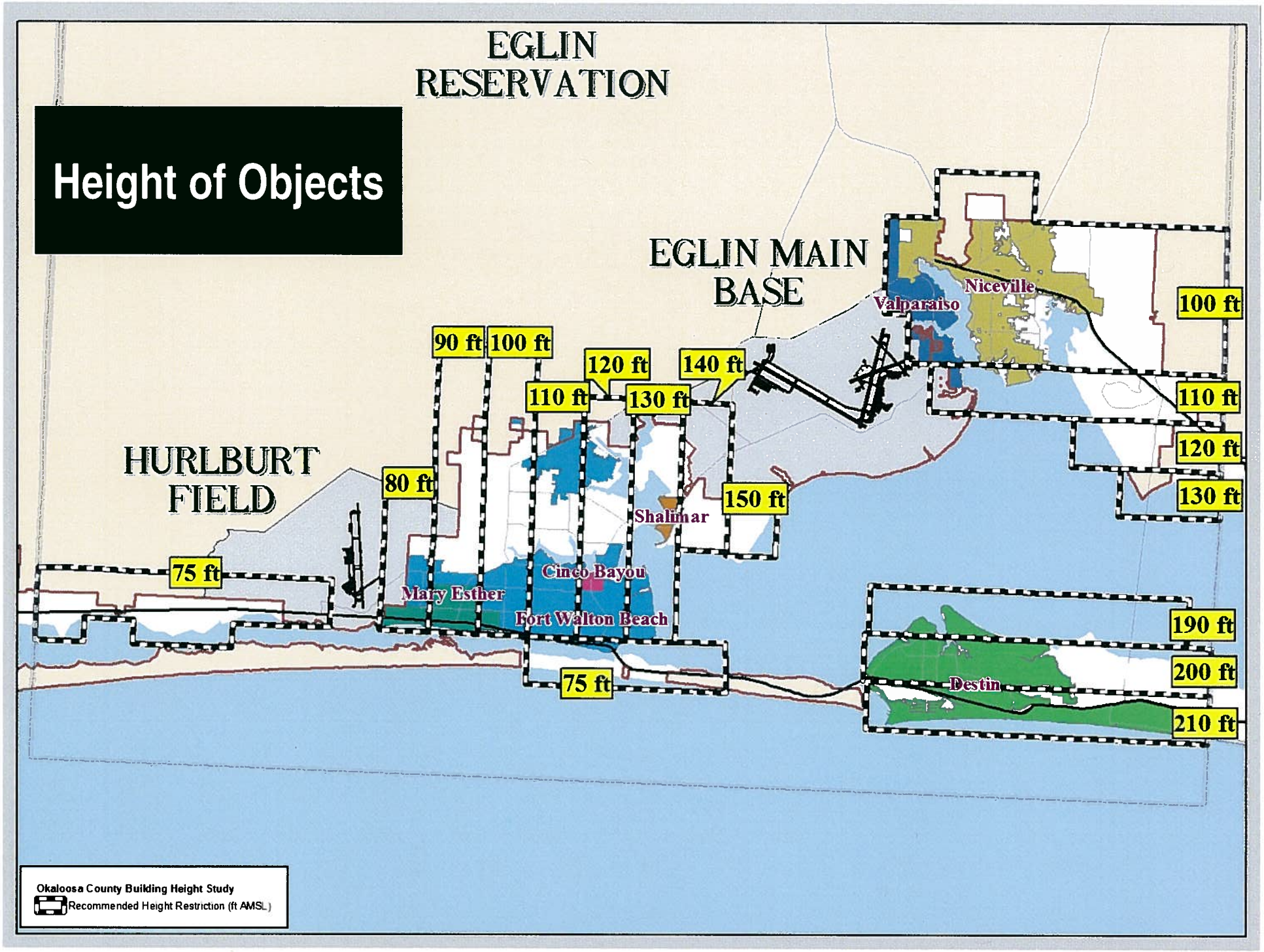
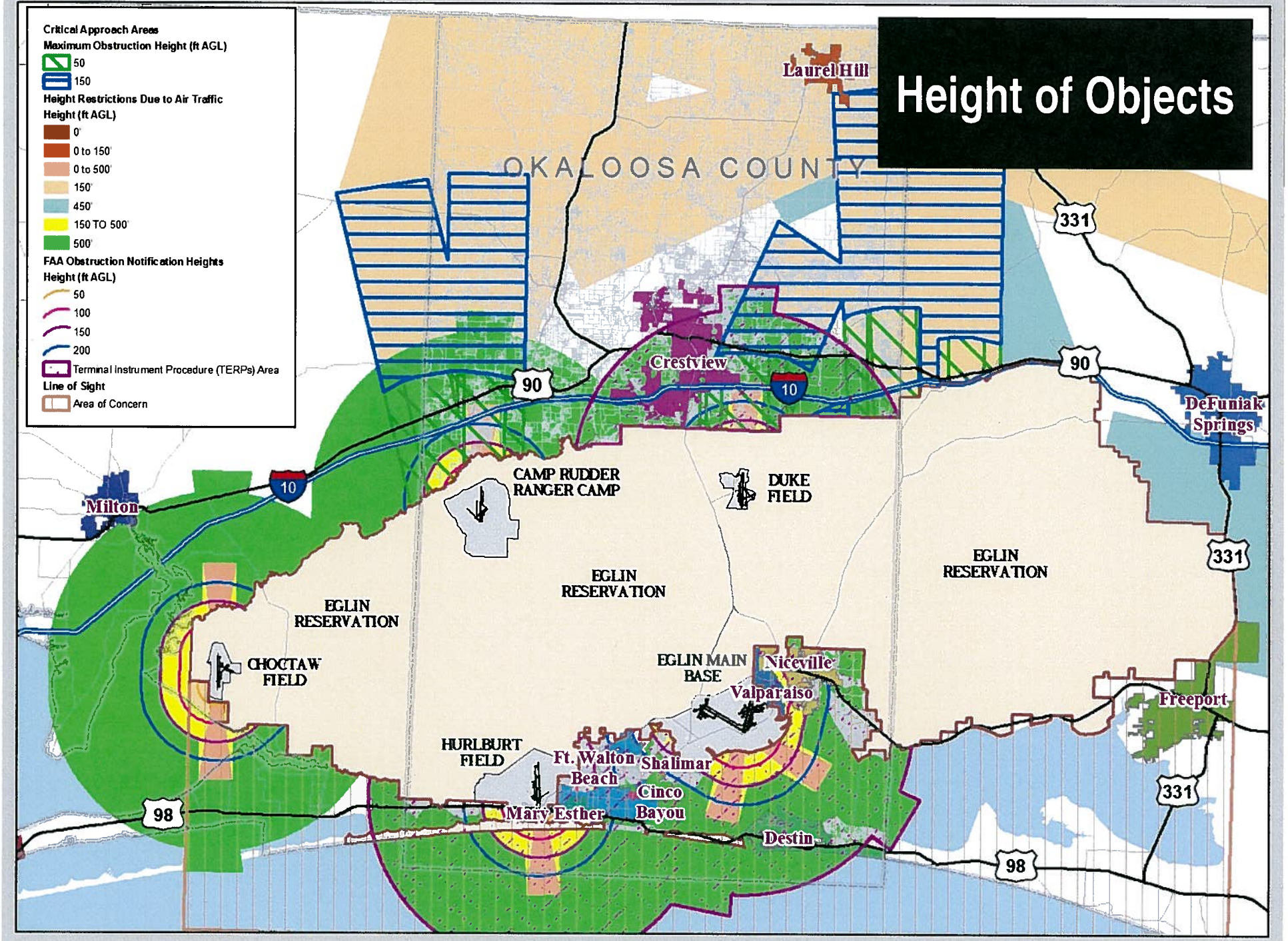
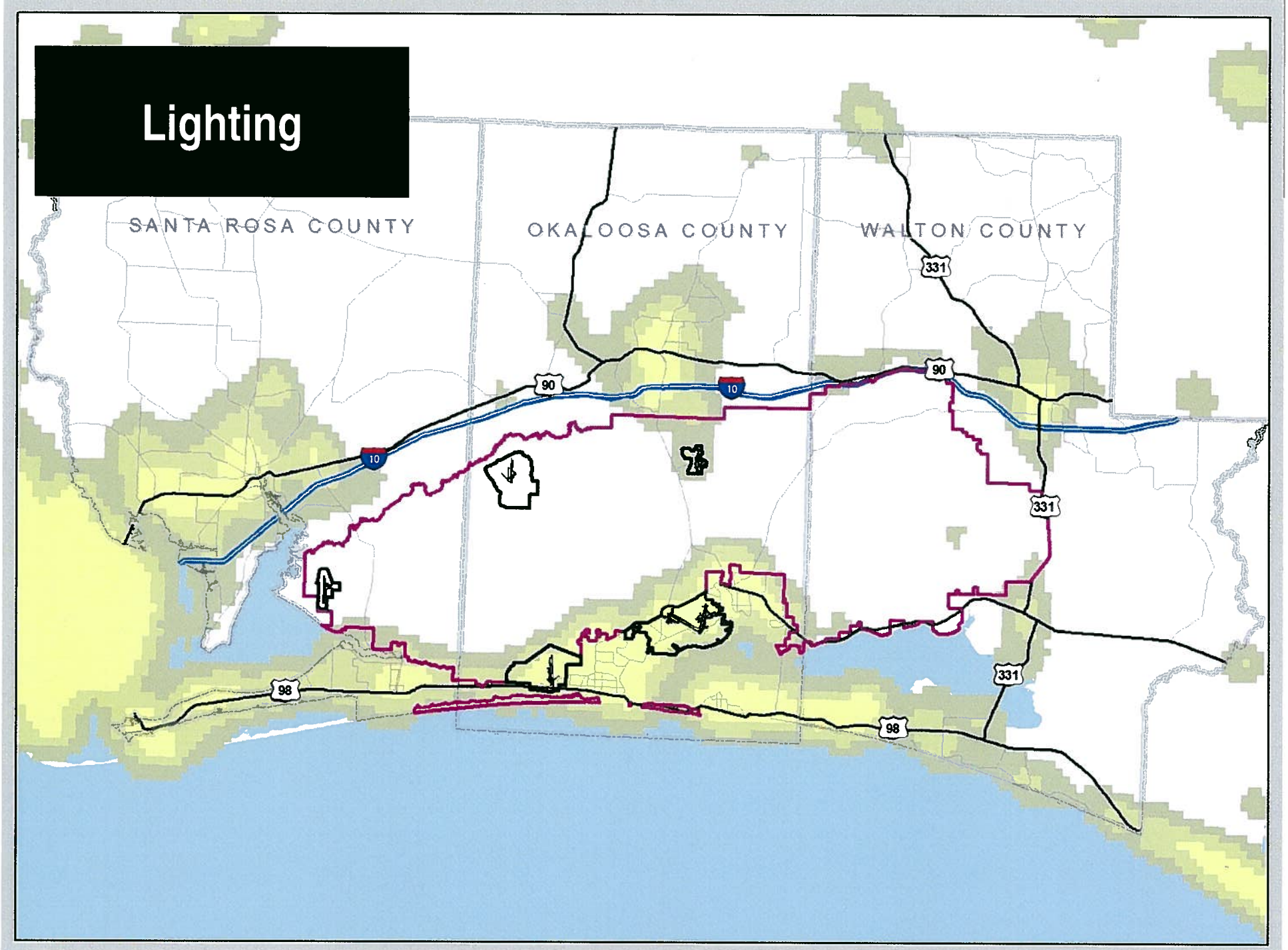

Height of Objects
EGLIN RESERVATION
EGLIN MAIN BASE
HURLBURT FIELD
Valparaiso
Niceville
Shalimar
Cinco Bayou
Mary Esther
Fort Walton Beach
Destin
100 ft
110 ft
120 ft
130 ft
190 ft
200 ft
210 ft
90 ft
100 ft
120 ft
140 ft
110 ft
130 ft
150 ft
80 ft
75 ft
75 ft
Okaloosa County Building Height Study
Recommended Height Restriction (ft AMSL)

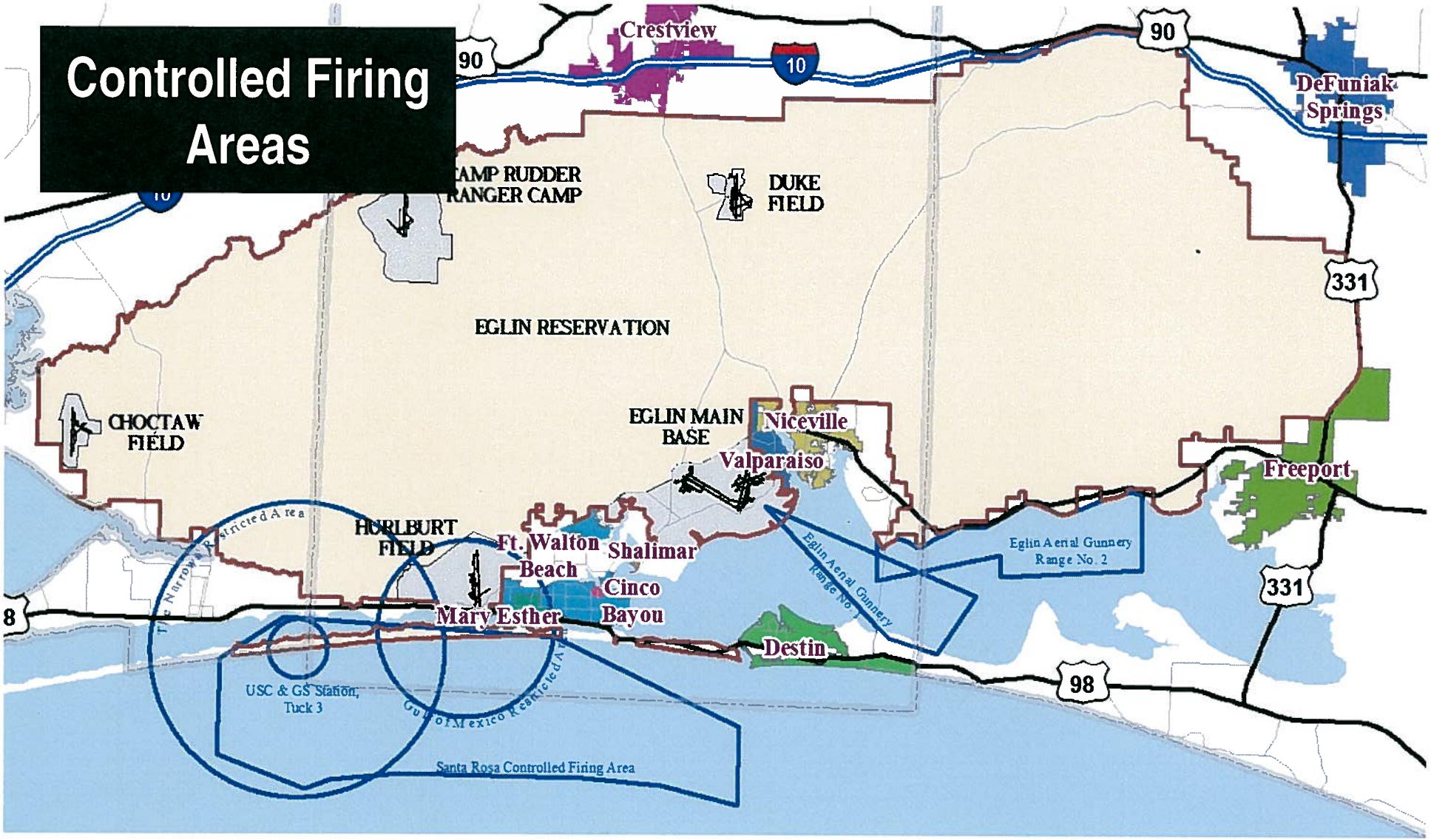
Height of Objects



Lighting


SANTA ROSA COUNTY
OKALOOSA COUNTY
WALTON COUNTY
10
90
331
98

Controlled Firing Areas



TETRA TECH

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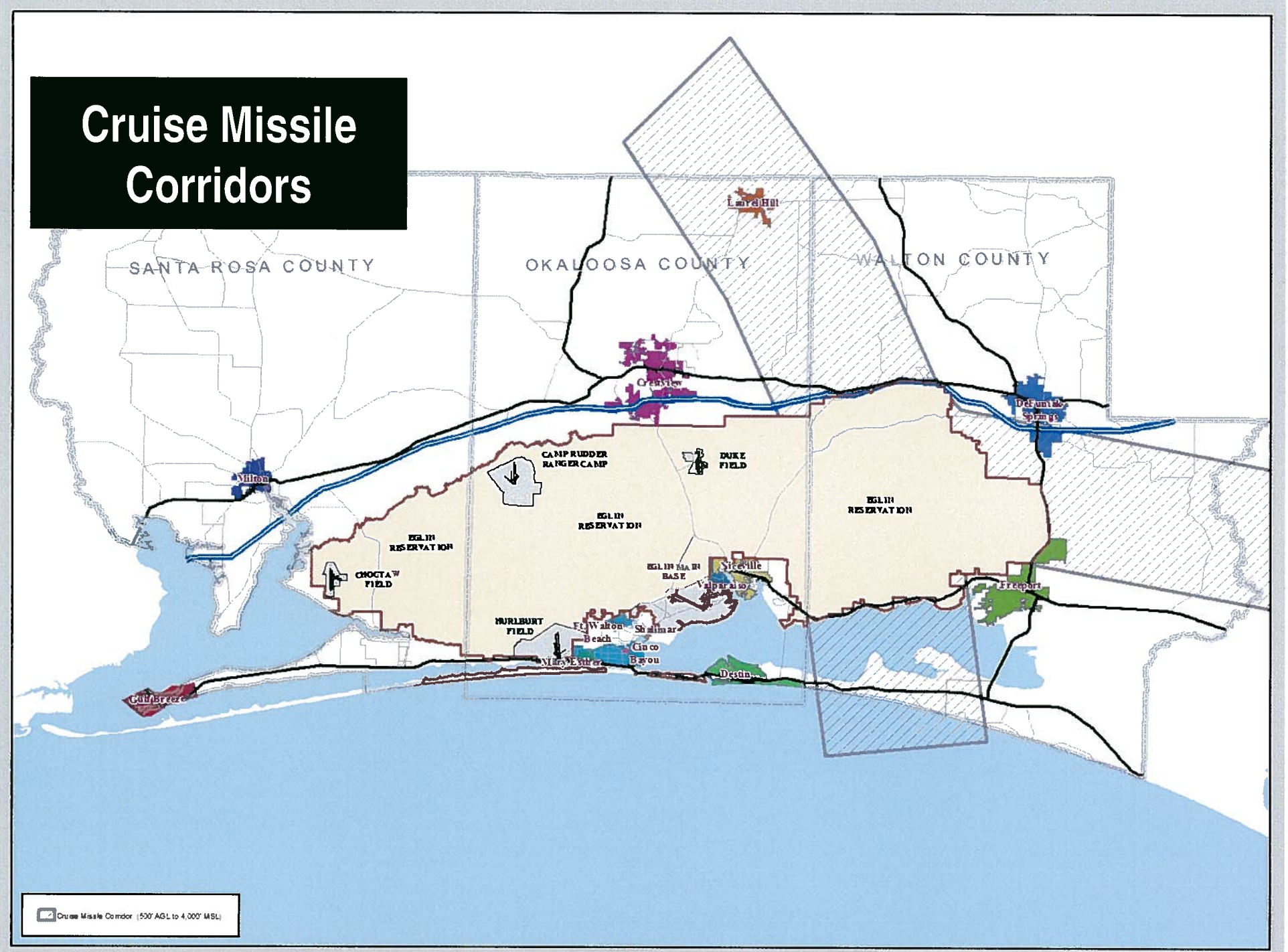
Cruise Missile Corridors

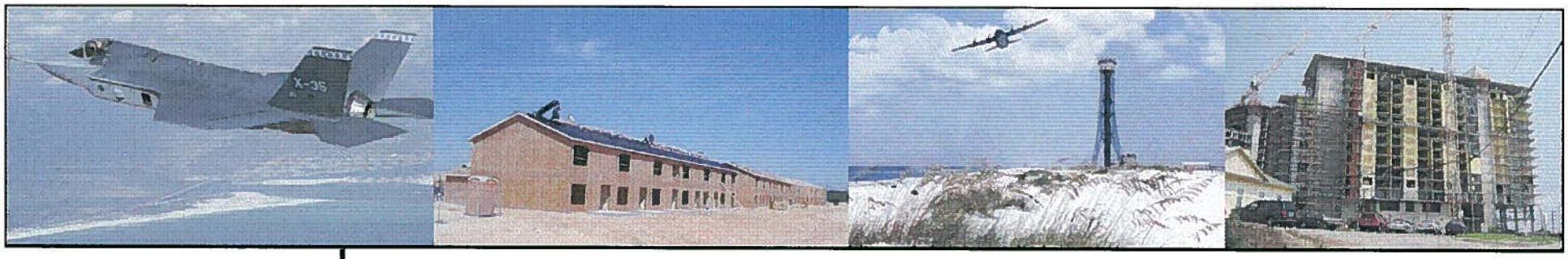


Issues Matrix

Military Area	Issue													
	Development at Boundary	Clear Zone & APZs	Noise	Low Level Approach	Low Level Helicoptor Training	Terminal Instrument Procedures (TERPs)	Radio Frequency	Height of Objects	Lighting	Controlled Firing Areas	Line of Sight - Radar	High Intensity Impulse Noise	Cruise Missile Corridor	Supersonic Noise
Camp Rudder	●		●	●				●	●					
Choctaw Field	●	●	●				●	●	●					
Duke Field	●	●	●	●		●	●	●	●		●			
Eglin Main	●	●	●			●	●	●	●	●	●	●		
Eglin Reservation	●		●	●	●		●	●	●	●	●		●	●
Hurlburt Field	●		●			●	●	●	●	●	●			

TETRA TECH

SOLIN & ASSOC INC

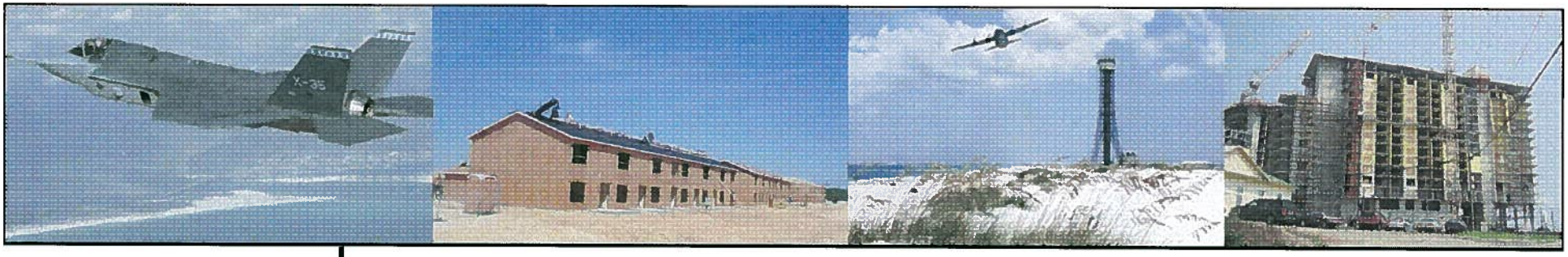


Military Impacts on Civilian Land, Facilities, & Citizens

- Noise (≥65 Decibels)
  - Disrupts daily activities and impacts health and facilities
- Low flying aircraft
  - Noise and accident potential
- Accident potential
  - Threatens public safety, loss of life, and property
- Controlled firing and Drops
  - Hiatus on civilian activity, disruption of activity, and/or noise

TETRA TECH

SOLIN & ASSOC. INC.



Civilian Impacts on Military Operations

- Excessive Lighting
  - Interferes with night training missions
- Tall Structures
  - Interference with aircraft and instrumentation
- Incompatible Development
  - Intensifies public safety hazard and complaints (Places of Assembly, High Density Residential, Tall Structures)
- Line of Sight Obstructions
  - Interfere with aircraft and instrumentation
- Marina Construction/Boat Traffic
  - Disrupts firing range, drop zone, and test operations
- Electronic Transmissions Interference
  - Impedes radar, communication, instrumentation, surveillance

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MILITARY OPERATIONS POTENTIALLY IMPACTED BY CIVILIAN LAND USE/ACTIVITIES IN OKALOOSA, SANTA ROSA, AND WALTON COUNTIES (INCLUDING MUNICIPALITIES)

Eglin AFB Facilities and Operations Potentially Impacted by Civilian Land Use and Activities

Check Marks (√) Indicate that Listed Facilities or, Operations are Impacted by Land Uses or Activities within Local Governments Cited Below.	Perimeter Boundary Development	Clear Zone Incompatibilities	APZ I Incompatible Uses/Structures	APZ II Incompatible Uses/Structures	Military Aircraft: High Noise Concentrations					Sonic Boom	Danger Zones for Munitions Firing/ Drop Zones				Operations Impacted by Excessive Heights of Bldgs/Structures							Outdoor Lighting Impacts Certain Missions	Communication Impacted by Certain Radio Frequency Spectrum Waves	Removal or Development of NW FL Region's Major Conservation Resources
					≥ 65-69 decibels	70-74 decibels	75-79 decibels	80-84 decibels	≥ 85 decibels	Supersonic Flight Corridor	Higher Impulse Intensity & Frequency	Moderate Impulse Intensity & Frequency	Lower Impulse Intensity & Frequency	Firing Areas and/or Bay Area Strikes	Low Level Helicopter Training (Eglin)	Low Level Helicopter Training (Whiting)	Line of Sight for Reference Radars/TERPs	Cruise/Missile Testing Corridors	Other Military Training Routes	Height Restrictions by Okaloosa Co.	FAA Height Requirements	Night Vision Training	Bandwidth between 5.2 to 5.9 GHz	Public Safety on- and Off the Eglin Reservation is Threatened by Potential Loss of Portions of the NW FL Greenway and/or Other High Priority Conservation Areas Scheduled for Acquisition or Purchase of Development Rights
Uninc. Okaloosa County	√			√	√	√					√	√	√	√	√	√	√	√	√	75-210'	√	√	√	NW FL Region's Major Natural Conservation Corridors are designated for conservation i n NW FL Region's Sustainable Growth Plan adopted by the FL Legislature. These resources should also include the Shoal River Floodway located NW of Duke Field & extends due E. in front of the Field's APZ II. The JLUS participating governments support acquisition of these lands to conserve lasting habitats and prevent encroachment.
Cinco Bayou												√			√		√			120-130'	√	√	√	
Crestview	√											√			√				√		√	√	√	
Destin					√							√	√		√		√			190-210'	√	√	√	
Fort Walton Beach	√											√		√	√		√			80-120'	√	√	√	
Mary Esther	√											√		√	√		√			80-90'	√	√	√	
Niceville	√		√	√	√	√	√	√	√			√			√		√			100-130	√	√	√	
Shalimar												√			√		√			130-140'	√	√	√	
Valparaiso	√	√	√	√	√	√	√	√	√			√			√		√			100-110	√	√	√	
Uninc. Santa Rosa County	√		√	√	√	√	√	√		√	√	√	√	√	√	√	√		√		√	√	√	
Gulf Breeze																					√			
Milton																√					√			
Uninc. North Walton Co.	√										√	√	√	√	√		√	√	√		√	√	√	
Uninc. South Walton Co.												√	√	√	√		√	√			√	√	√	
DeFuniak Springs													√		√			√	√		√	√	√	
Freeport	√											√	√		√			√	√		√	√	√	

Recommendations

- Discourage Increases in Density and Intensity Within One Mile of Eglin Boundary
- Implement Construction Standards for New Construction to Decrease Noise Levels Inside Structures Within High Noise Areas (>65 dB)
- Retrofit Existing Public Buildings Within the High Noise Level Areas (>65dB) with Sound Attenuation
- Develop and Implement Assistance Program for Sound Reduction Program for Private Property Owners
- Implement Property Sales and Lease Disclosures
- Develop and Implement Land Acquisition Program
- Limit Object Heights
- Identify Low Level Training/Critical Approach Areas on All County Maps and Public Reports and Require Developers to Identify on All Proposed Projects

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Recommendations (cont.)

- Record and Disclose Low Level Training/Critical Approach Areas and Cruise Missile Corridors in Offices of County Clerk and Property Appraiser
- Limit Residential Density and/or Allow Clustering Away From Low Level Approach Patterns
- Implement Outdoor Lighting Standards
- Educate Developers and Builders on Radio Frequency Interference Through Education Handouts
- Implement Comprehensive Plan Amendments Discouraging Boat Slips, Marina Facilities, and Boat Traffic in Controlled Firing Areas
- Implement Public Awareness Measures
- Conduct Small Area Studies
- Adjust Flight Patterns, Runway Usage Frequency, and/or Hours of Operations
- Implement Military Influence Area (MIA) Ordinance

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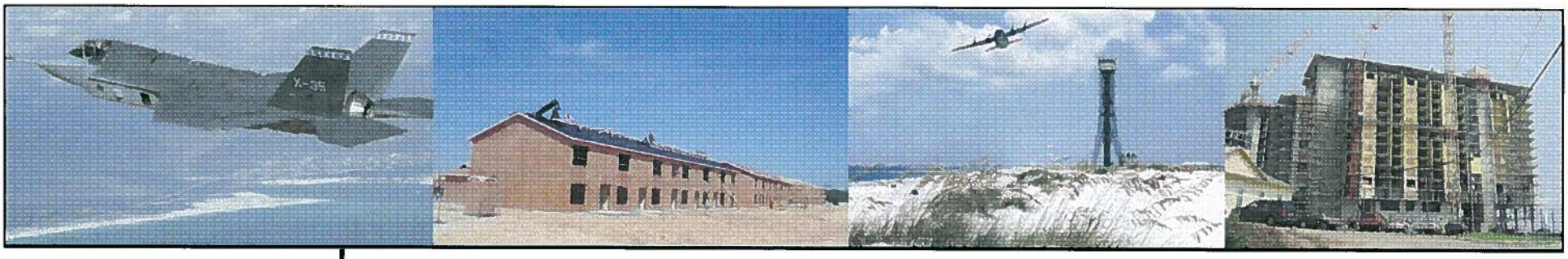

Military Influence Area (MIA) Ordinance

- Comprehensive Plan Future Land Use Sub-Element
- Data Inventory and Analysis:
  - Describe Military Missions & Operations Impacting Local Government
  - Describe Civilian Land Use & Activities Encroaching on Military Operations and Possible Remedial Actions
- Goals, Objectives, and Policies
- Potential Goals:
  - Region's Role & Function in Nation's Defense and Northwest Florida Economy
  - Coordination, Partnerships, & Management Initiatives to Promote Land Use Compatibility
  - Partnering to Preserve Quality of Life & Resource Conservation

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Military Influence Area (MIA) Ordinance (cont.)

- Identify Objectives for Resolving Encroachment Issues
- Identify Policies to Implement Each Objective:
  - Future Land Use Map Amendments
  - Amendments to Regulatory Land Use Controls
  - Special Issues: Small Area Studies
  - Public Awareness Program
  - Property Disclosure
  - Construction Standards Revisions
  - Land Acquisition, Land Swaps, Easements
  - Collaborative Efforts to Mitigate Issues
  - Funding for Implementations

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- Study Feasibility of Redevelopment Plan and Program

Recommendations

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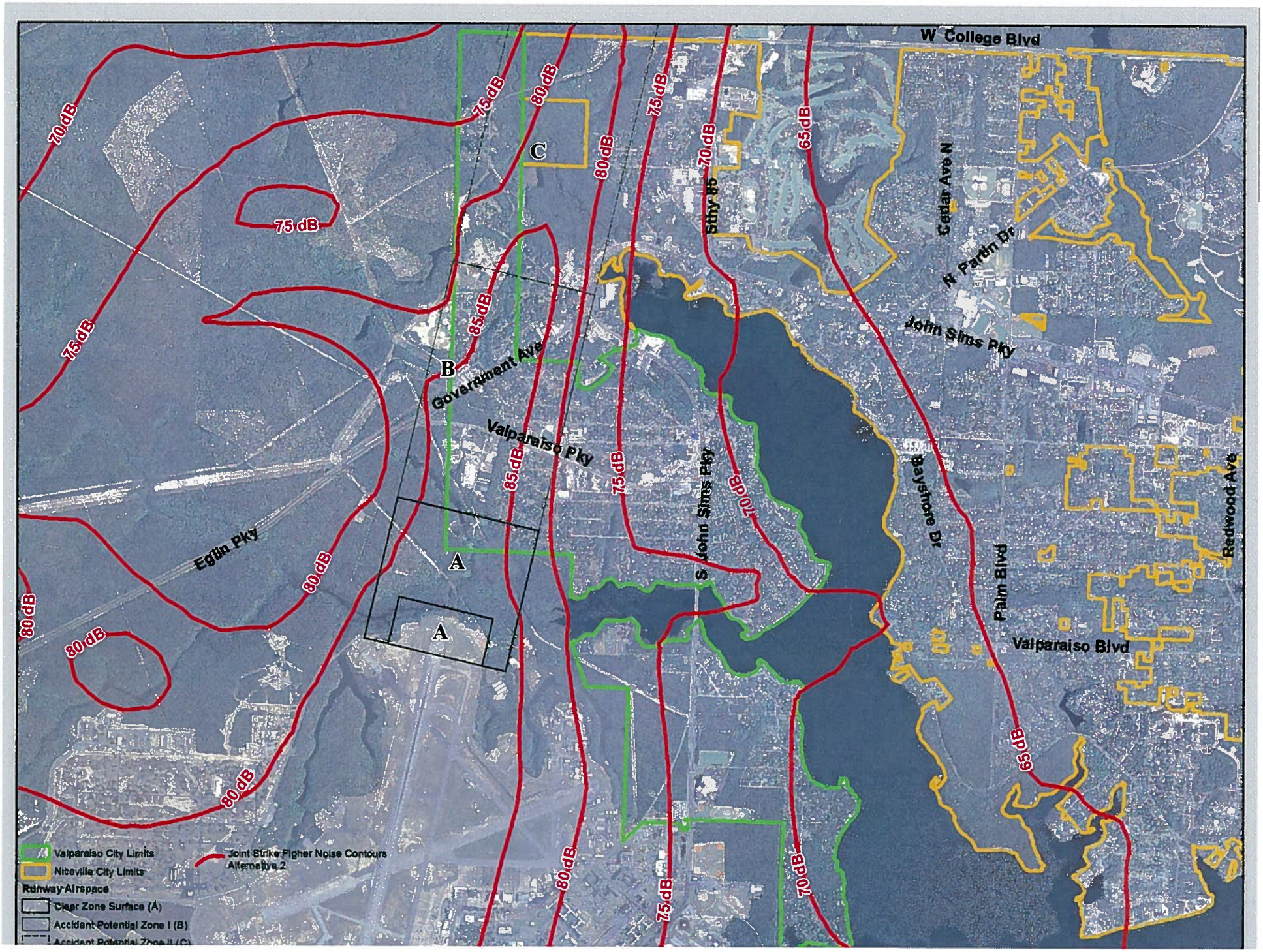
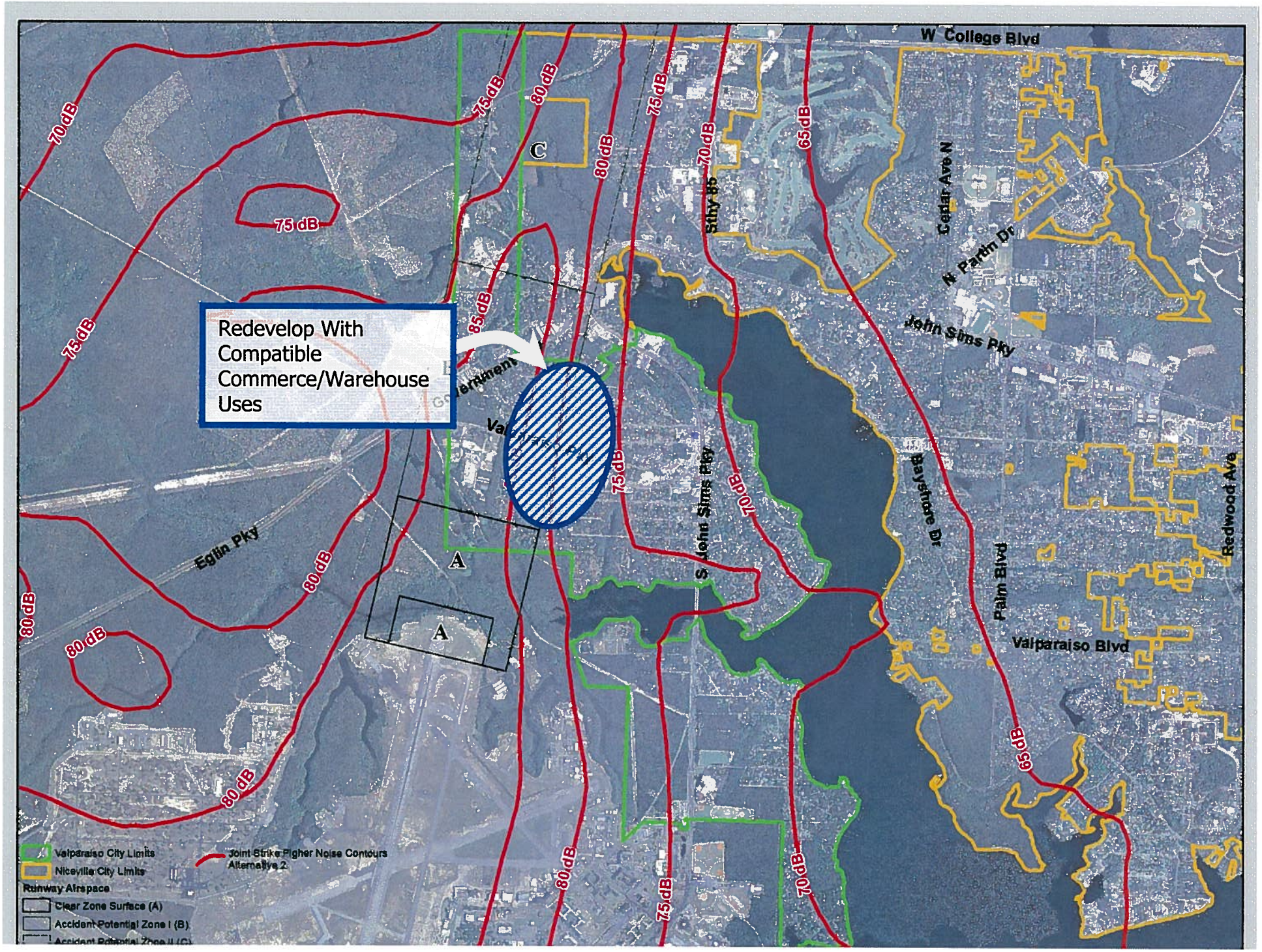
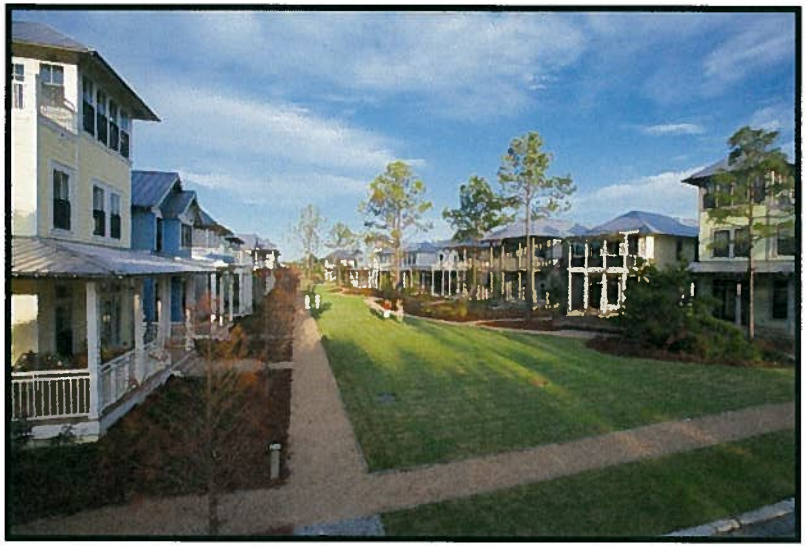
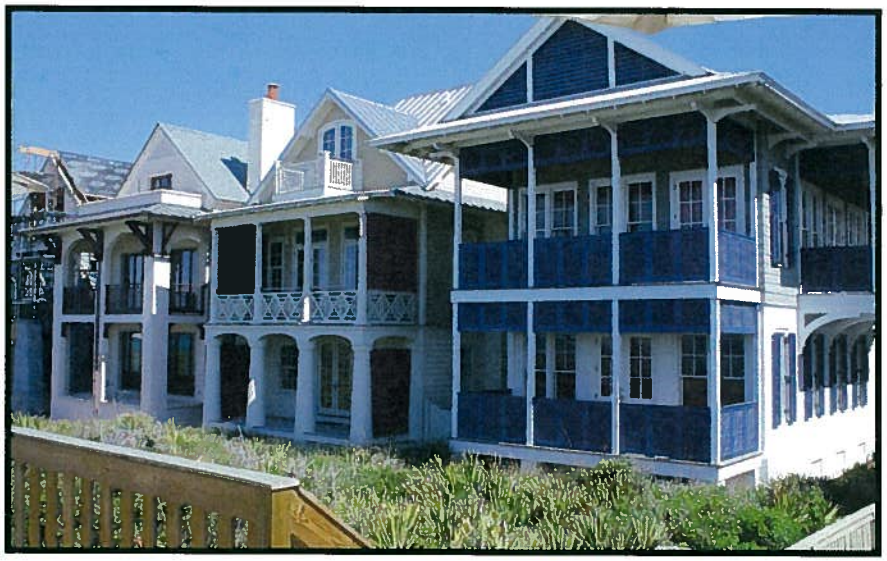

W College Blvd
Cedar Ave N
N Partin Dr
John Sims Pky
Hwy 85
S John Sims Pky
Baystore Dr
Palm Blvd
Valparaiso Blvd
Redwood Ave
Government Ave
Valparaiso Pky
Eglin Pky
A
B
C
65 dB
70 dB
75 dB
80 dB
85 dB
Valparaiso City Limits
Niceville City Limits
Joint Strike Fighter Noise Contours Alternative 2
Runway Airspace
Clear Zone Surface (A)
Accident Potential Zone I (B)
Accident Potential Zone II (C)


Redevelop With Compatible Commerce/Warehouse Uses
W College Blvd
Cedar Ave N
N Partin Dr
John Sims Pky
Bayshore Dr
Palm Blvd
Valparaiso Blvd
Redwood Ave
S John Sims Pky
Sthy 85
Eglin Pky
Valparaiso City Limits
Niceville City Limits
Joint Strike Fighter Noise Contours Alternative 2
Runway Airspace
Clear Zone Surface (A)
Accident Potential Zone I (B)
Accident Potential Zone II (C)





Sherlock's of Celebration

Unique
Boutique
Jewelry
Accessories
Unique Boutique

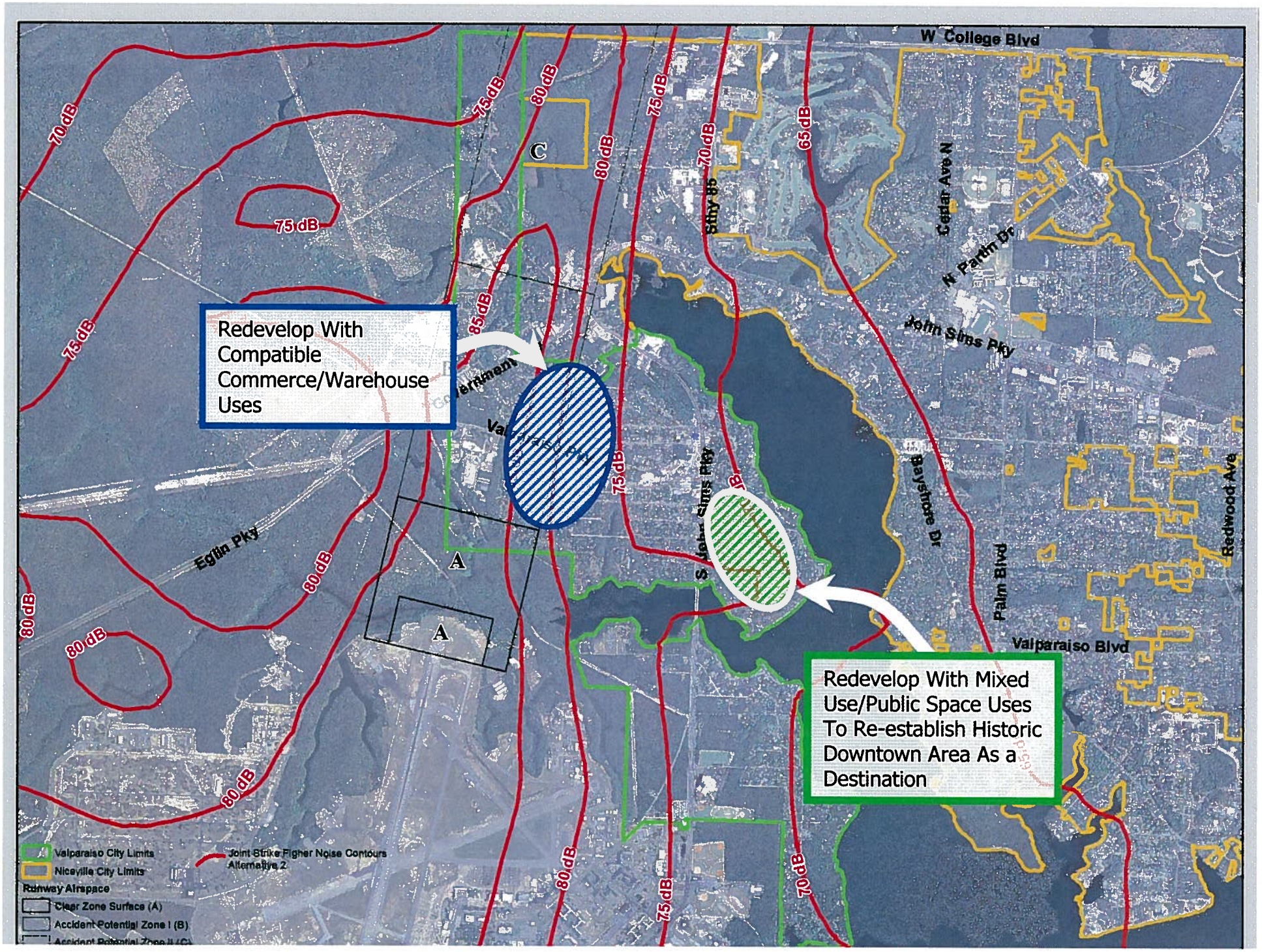
RAW BAR
FOREIGN MARKET

Historic Downtown Valparaiso

TETRA TECH

SOLIN & ASSOC. INC.

July 23, 2008 – Policy Committee


Redevelop With Compatible Commerce/Warehouse Uses
Redevelop With Mixed Use/Public Space Uses To Re-establish Historic Downtown Area As a Destination
W College Blvd
Cedar Ave N
N Partin Dr
John Sims Pky
Shy St
Baystone Dr
Palm Blvd
Valparaiso Blvd
Redwood Ave
Eglin Pky
70 dB
75 dB
80 dB
85 dB
65 dB
A
C
Valparaiso City Limits
Niceville City Limits
Joint Strike Fighter Noise Contours Alternative 2
Runway Airspace
Clear Zone Surface (A)
Accident Potential Zone I (B)

FRESH MARKET

Unique
Boutique
Jewelry
Accessories
Unique Boutique

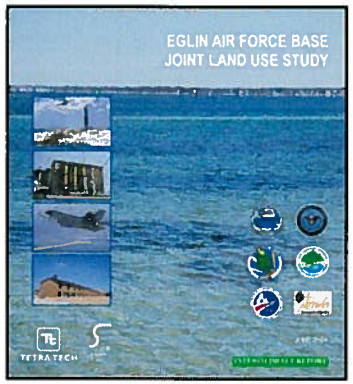
POTENTIAL STRATEGIES TO MITIGATE ADVERSE IMPACTS OF CIVILIAN LAND USES/ACTIVITIES ON MILITARY OPERATIONS

Check Marks (√) Indicate that Adoption of Respective Strategies Summarized Below May Potentially Mitigate Adverse Impacts on Military Operations and/or Adverse Impacts of Military Operations on Civilian Land Uses/Activities	Eglin AFB Facilities and Operations Potentially Impacted by Civilian Land Use and Activities																							
					Military Aircraft: High Noise Concentrations					Sonic Boom	Danger Zones for Munitions Firing/ Drop Zones				Operations Impacted by Excessive Heights of Bldgs/Structures							Outdoor Lighting Impacts Certain Missions	Communication Impacted by Certain Radio Frequency Spectrum Waves	Development of NW FL Region's Major Conservation Resources
	Perimeter Boundary Security	Clear Zone Incompatibilities	APZ I Incompatible Uses/Structures	APZ II Incompatible Uses/Structures	≥ 65-69 decibels	70-74 decibels	75-79 decibels	80-84 decibels	≥ 85 decibels	Supersonic Flight Corridor	Higher Impulse Intensity & Frequency	Moderate Impulse Intensity & Frequency	Lower Impulse Intensity & Frequency	Firing Areas and/or Bay Area Strikes	Low Level Helicopter Training (Eglin)	Low Level Helicopter Training (Whiting)	Line of Sight for Reference Radars/TERPs	Cruise Military Testing Corridors	Other Military Training Routes	Height Restrictions by Okaloosa Co.	FAA Height Requirements	Night Vision Training	Bandwidth between 5.4 to 5.9 GHz	Public Safety on- and Off the Eglin Reservation is Threatened by Potential Loss of Portions of the NW FL Greenway and/or Other High Priority Conservation Areas Scheduled for Acquisition or Purchase of Development Rights
Military Encroachment. Comp Plan Element	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
Military Influence Area(MIA) in LDC																								
• **Establish MIA**																								
• Adopt Maps of Areas Impacted																								
• Uses Permitted & Prohibited	√	√	√	√							√	√	√	√										
• Height Regs for Impacted Sub Areas														√	√	√	√	√	√	√	√			
• Noise Insulation Standards					√	√	√	√	√															
• Outdoor Lighting Standards																						√		
• Radio Frequency Spectrums Regs																							√	
• Revise Admin Procedures																								
○ Improve Notice Procedures	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
○ Eglin Rep as Member of Plg. Board	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
Disclosure of Military Encroachments		√	√	√	√	√	√	√	√															
Public Awareness																								
• MIA Website incl. maps, regs, & public Info	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
• Signs in Areas with CZs, APZs, Excess Noise		√	√	√	√	√	√	√	√															
• Special Forum on Encroachment Issues	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
Special or Small Area Studies	√	√	√	√	√	√	√	√	√		√			√			√	√		√			√	
Land Acquisition/Purchase of Dvlpt. Rts.	√	√	√	√			√	√	√															
Transfer of Development Rights	√	√	√	√			√	√	√															
Partner to Purchase NW FL Greenway/Shoal River and Join Partnerships to Obtain Development Rights to Greenway Connecting FL Panhandle Military Airways Spanning from Pensacola to Panama City.																								√

Plan of Action

July 7 ⟷ Public Comment Period ⟷ Aug 28

Interim Draft → **Draft** → **Final** → **Accepted Report**



July 30

Aug 20

TAG – July 10

PC – July 23

Public Hearing – Aug 6

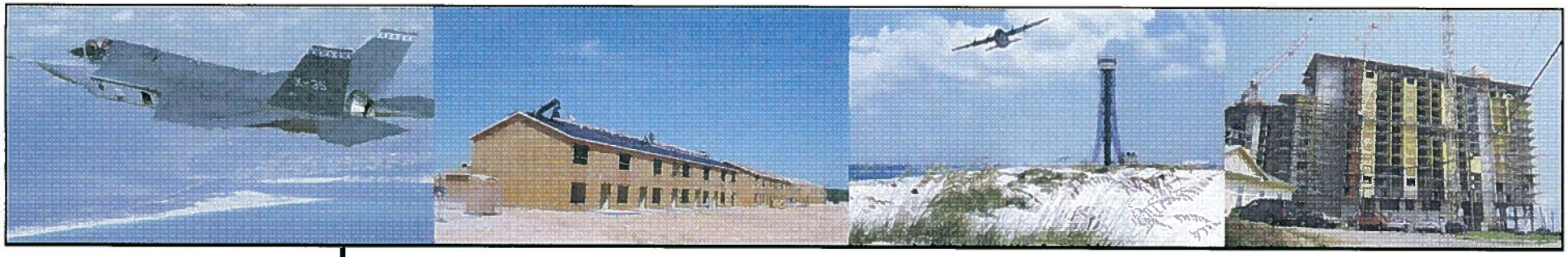
PC – Aug 28

Scheduled Meetings

TETRA TECH

SOLIN & ASSOC

Legend:
TAG: JLUS Technical Advisory Group
PC: JLUS Policy Committee



Comment Form

EGLIN AIR FORCE BASE JOINT LAND USE STUDY
INTERIM DRAFT REVIEW COMMENT FORM

Name: _____

Representing: _____

Address: _____

_____

Phone #: _____

Fax #: _____

Email address: _____

Section:	Subsection Reference:
Comments:	
Section:	Subsection Reference:
Comments:	
Section:	Subsection Reference:
Comments:	

TETRA TECH

SOLIN & ASSOC

SECTION 8.0

City of Destin Council Briefing

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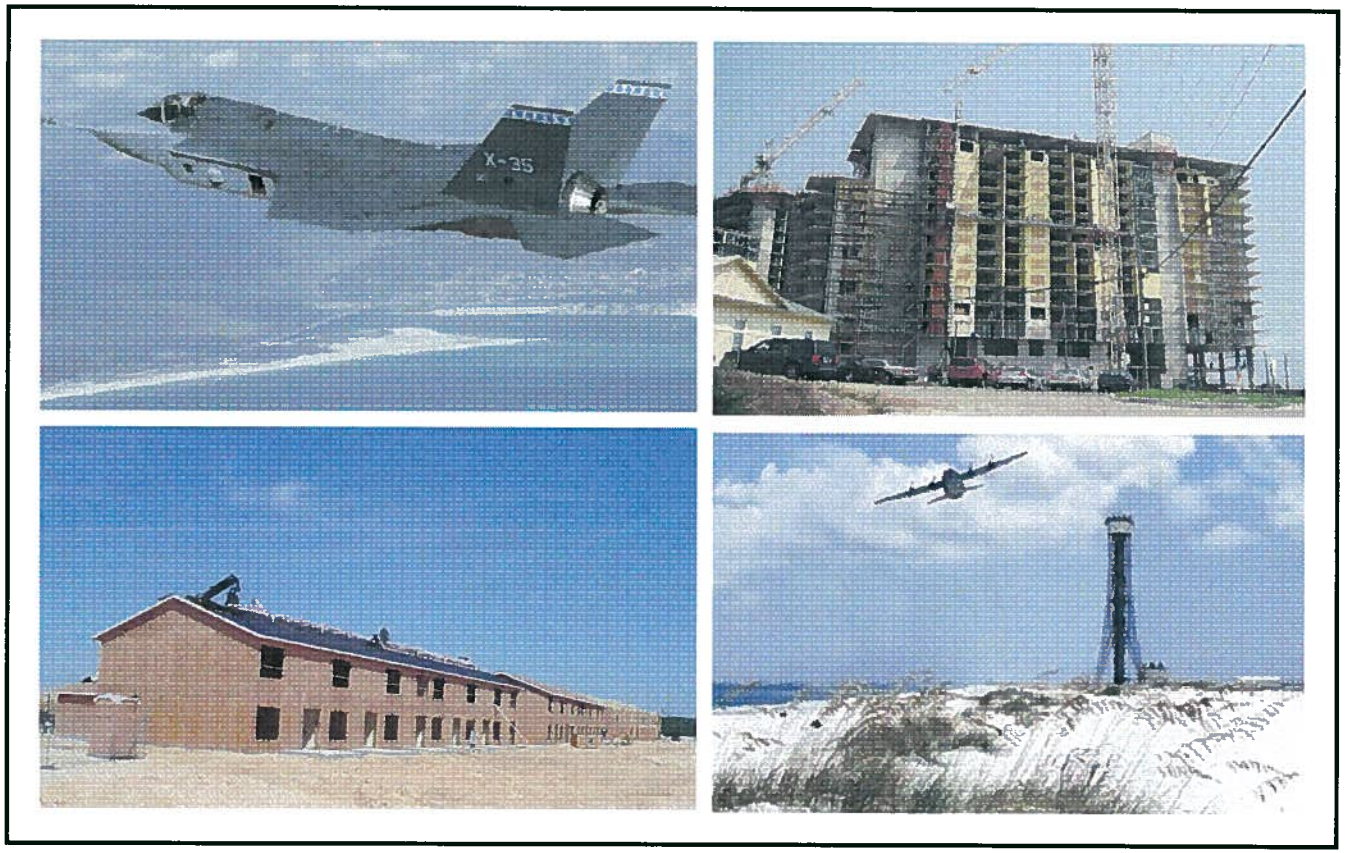
Eglin Joint Land Use Study (JLUS)
City of Destin Council Briefing



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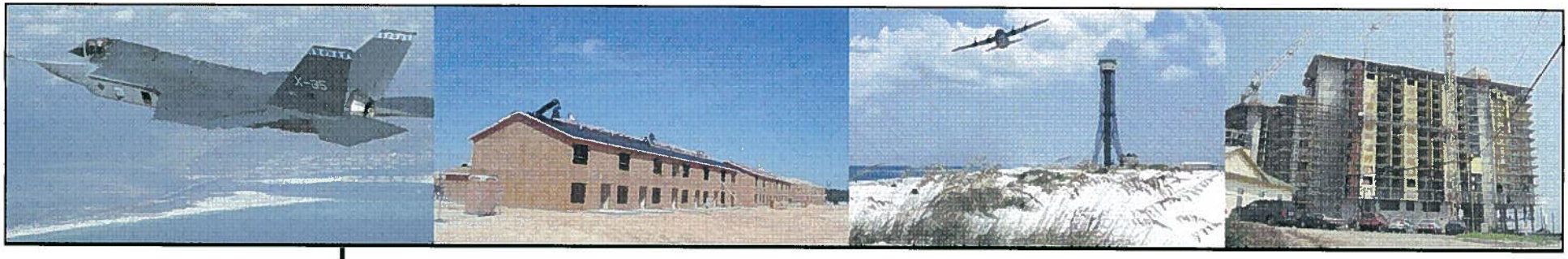
September 29, 2008



Chronology

BRAC 05 → F-35 7th SFG

Environmental Impact Statement (EIS)

Draft EIS → Final EIS

-Two F-35 Training Alternatives

-Two 7th SFG Cantonment Area Alternatives

JLUS

Growth Mgmt Plan

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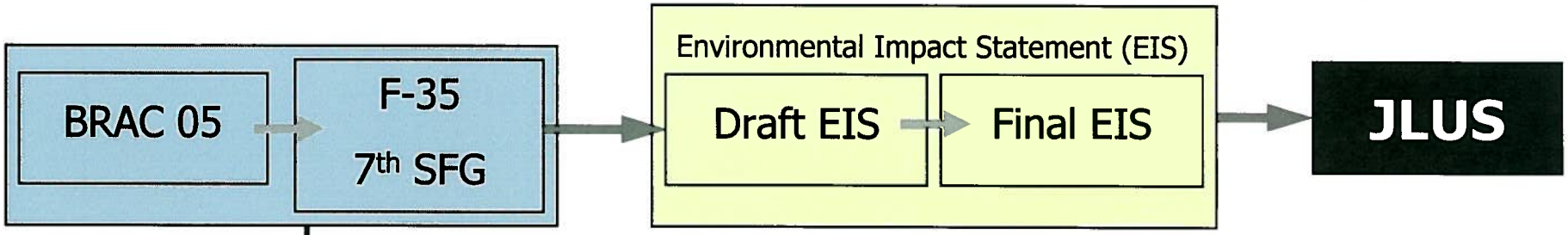

Background

- Expanded Scope & Grant with OEA - Jan 2008
- Waiting on EIS (This is Not the EIS)
- Revised GIS Maps & Data Analysis - Apr 2008
- Identified Issues – May 2008
- Recognized Potential Strategies – May 2008
- Recommended Strategies – June 2008
- Interim Draft JLUS Report – July 2008
- Draft & Final JLUS On-Hold Pending Final EIS

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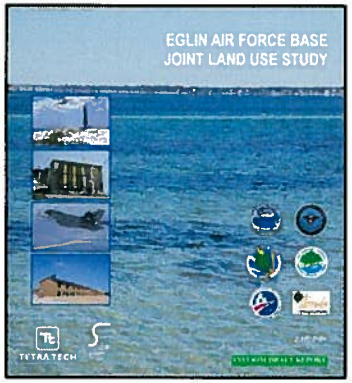
Plan of Action

July 7 ⟷ Public Comment Period ⟷ *TBD*

Interim Draft → **Draft** → **Final** → **Accepted Report**



TBD

TBD

TAG – July 10

PC – July 23

Public Hearing – *TBD*

PC – *TBD*

Scheduled Meetings

TETRA TECH

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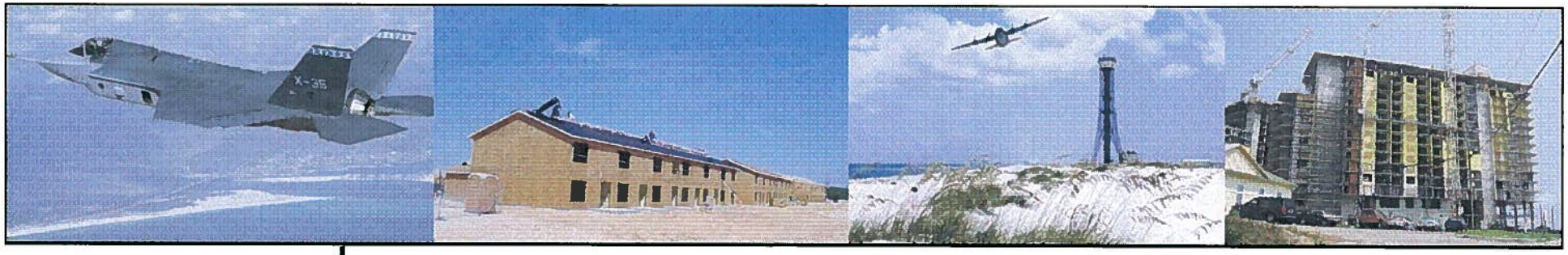
Legend:
TAG: JLUS Technical Advisory Group
PC: JLUS Policy Committee
TBD: Date To Be Determined



A JLUS is...

- A cooperative land use planning effort between military installations and the surrounding communities.

- It promotes compatible community growth while supporting military training and operational missions.

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Two Primary Concerns

- First, to protect the health, safety and welfare of the local community with regard to military operations.

- Second, to address encroachment that is threatening or may threaten the mission and viability of an installation.

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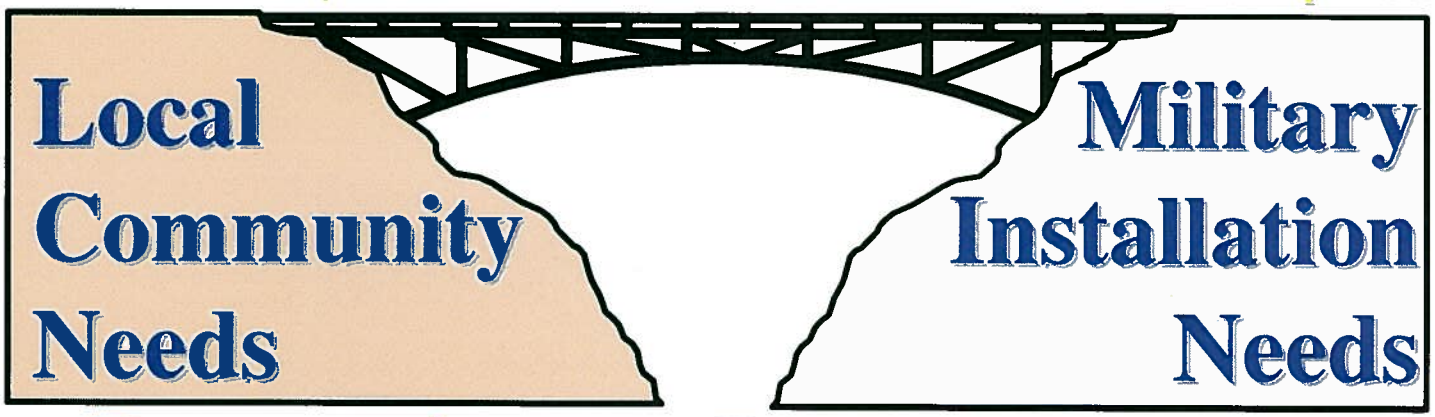
Creative Community Planning Can Bridge the Encroachment Gap

JLUS — Compatibility — AICUZ

Joint Land Use Study — *Air Installation Compatible Use Zones*



Partnering to Plan the Future

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September 29, 2008 – City of Destin

Anticipated Benefits

- Improved Intergovernmental Relationships With Respect to Land Use Planning & Development Regulations
- Improved Communications Among Local Governments, Eglin AFB, and Local Neighborhoods
- Increased Awareness of Potential Conflicts Between Land Development and Eglin AFB
- Improved Local Development Regulations
- Protection of Future Military Missions at Eglin AFB
- Health, Safety, and Welfare Concerns of the Local Communities Addressed

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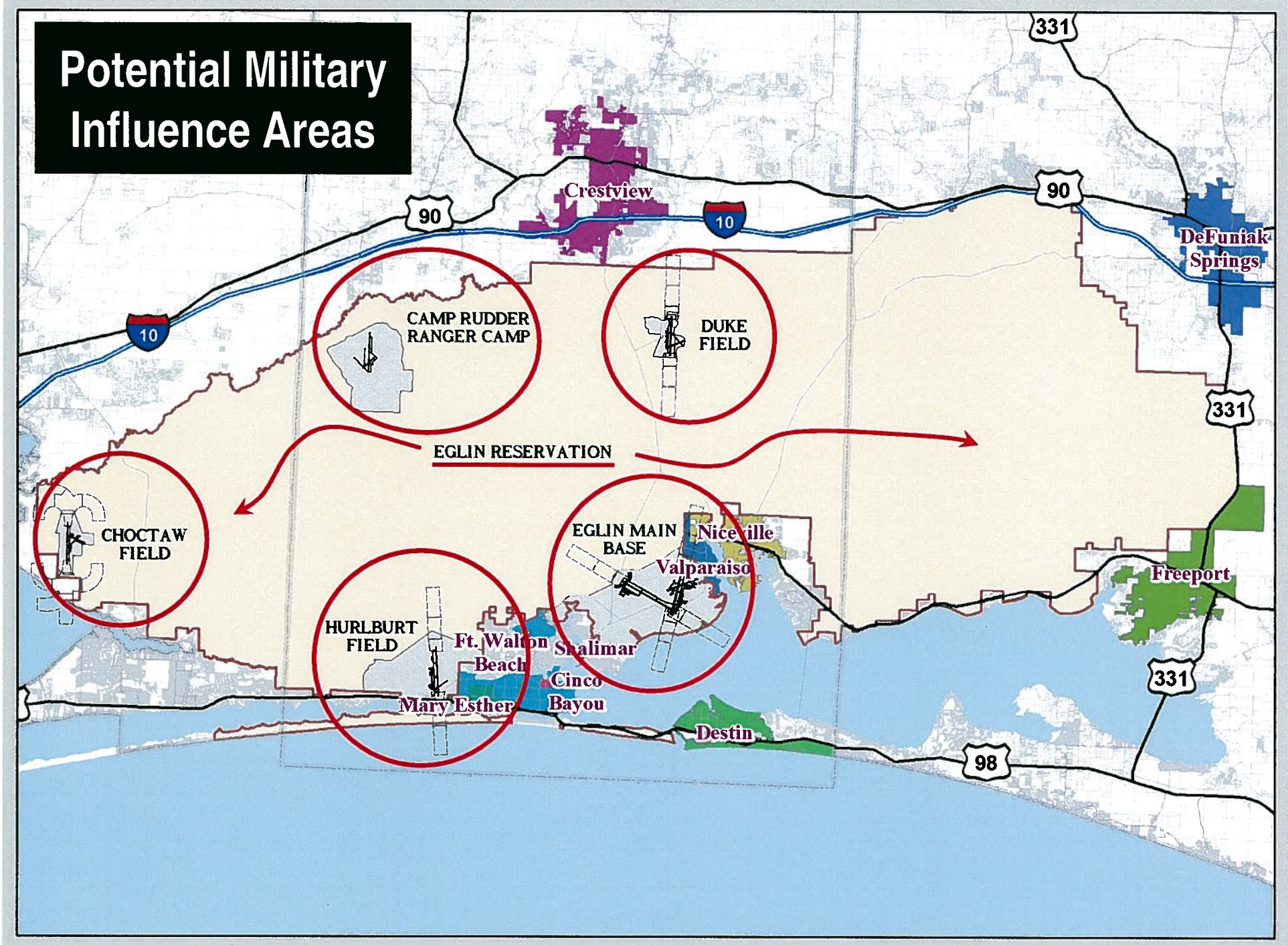
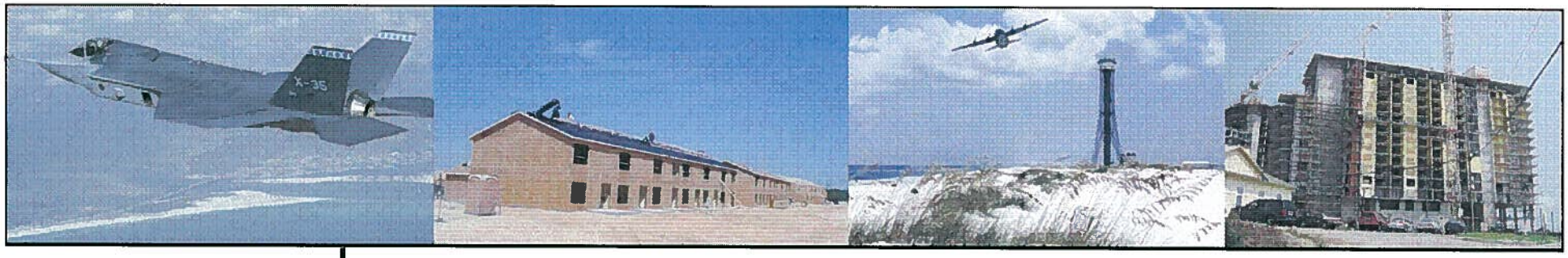
Potential Military Influence Areas





Issues

- Issues Identified:
  - Development at Eglin Boundary
  - Clear Zone & Accident Potential Zones
  - Noise – Aircraft, Impulse, Supersonic
  - Low Level Approach Zones
  - Low Level Helicopter Training
  - Height of Objects
  - Lighting
  - Controlled Firing Areas
  - Cruise Missile Corridors

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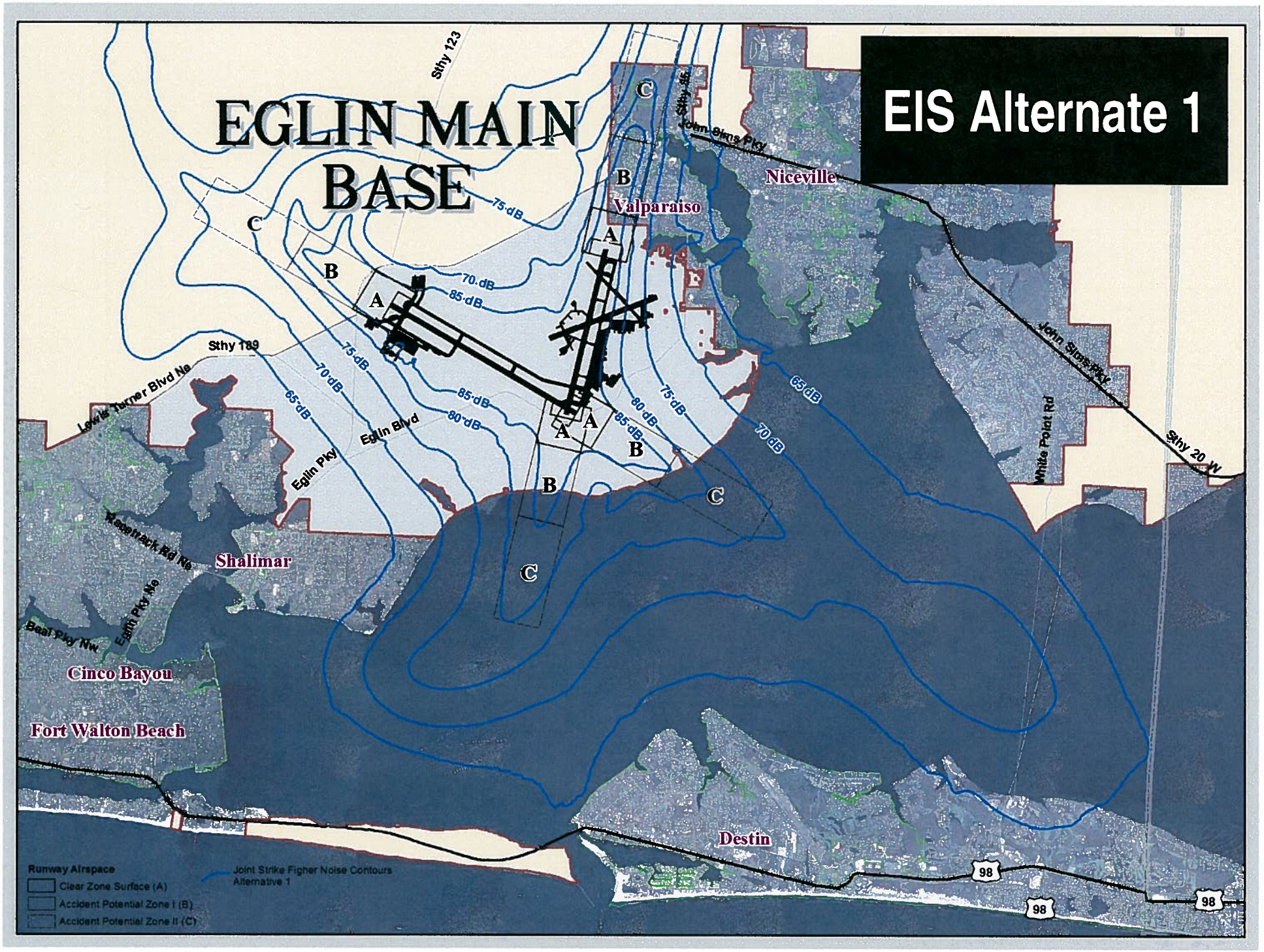
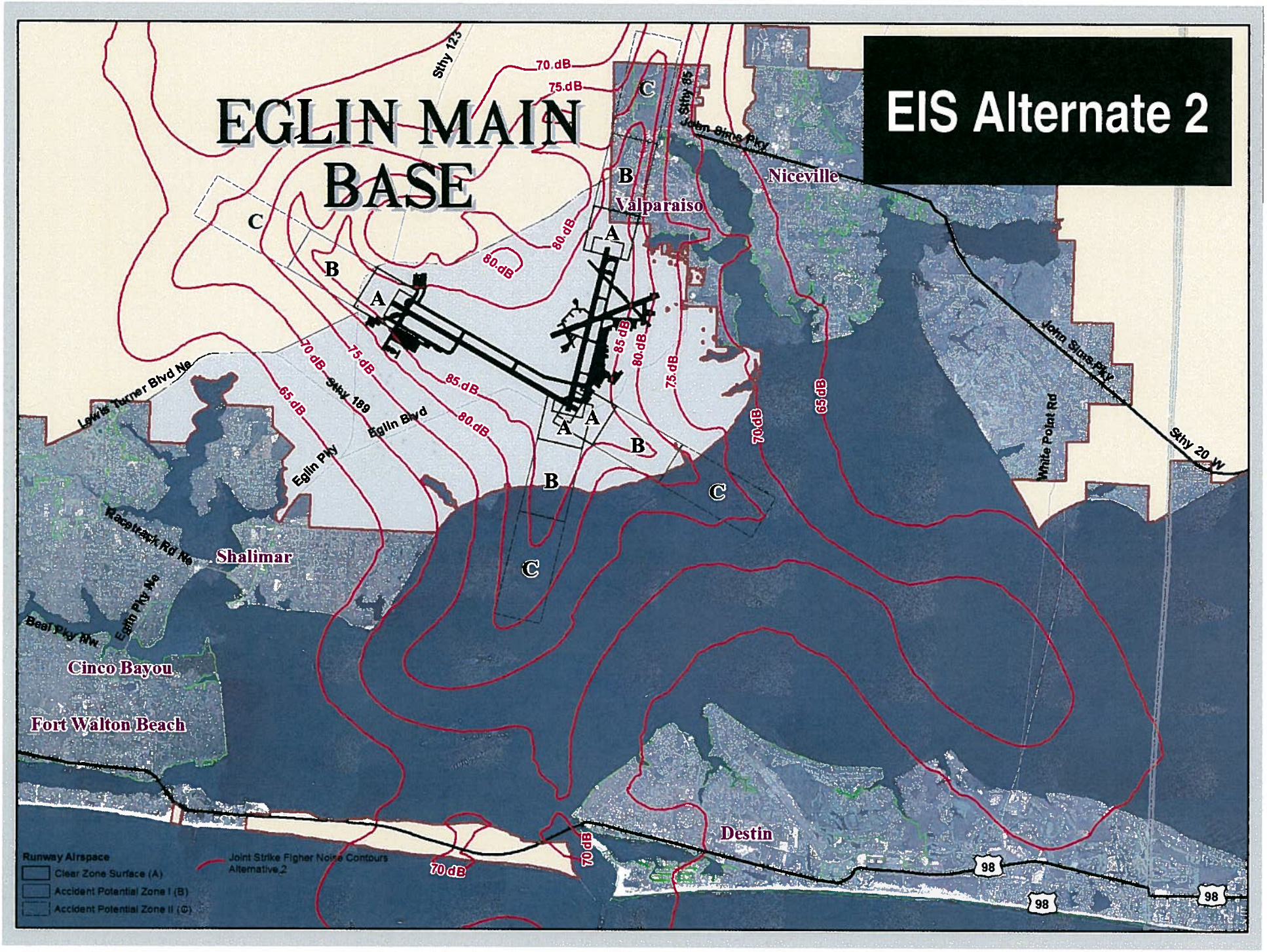
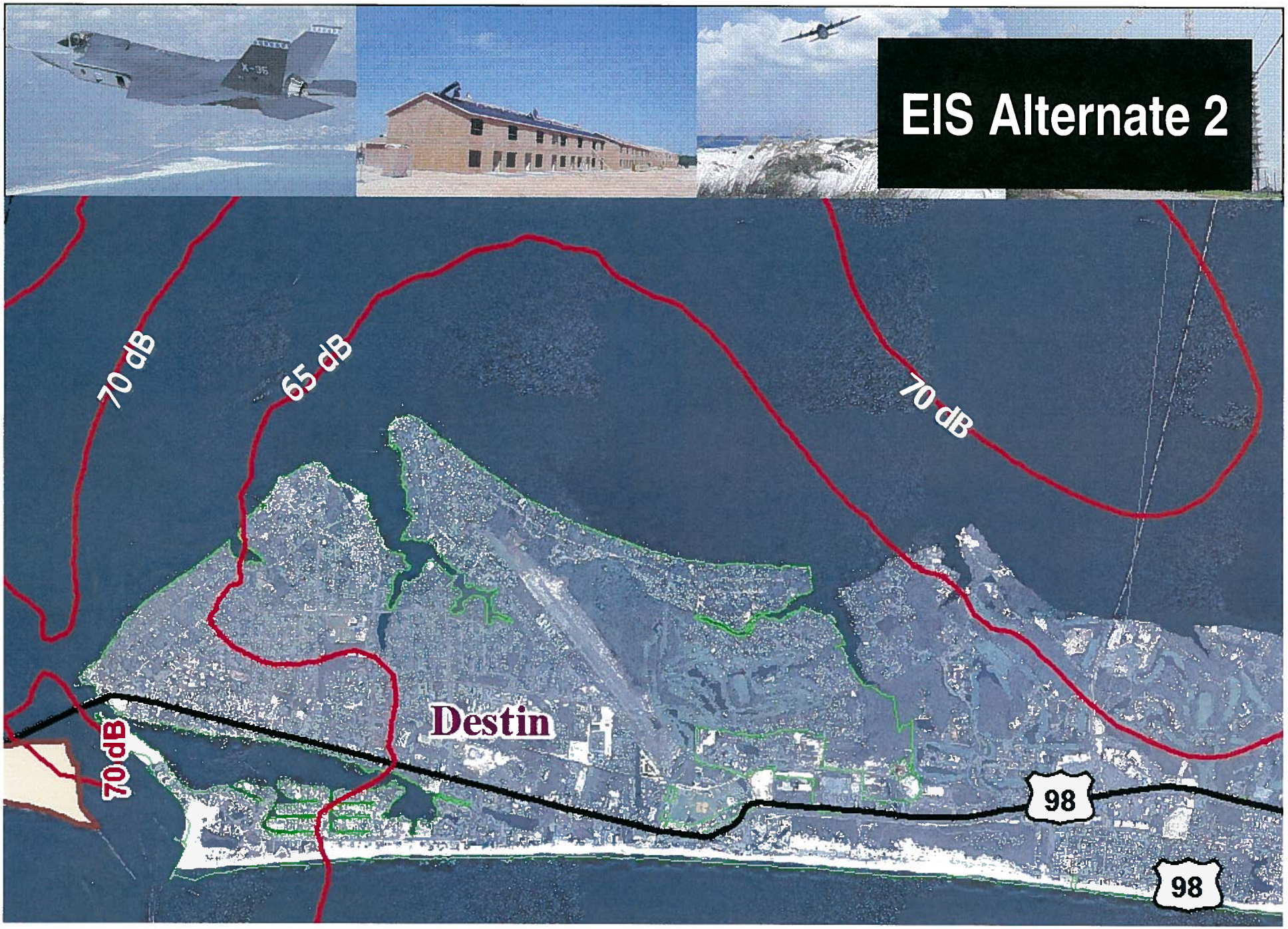
MILITARY OPERATIONS POTENTIALLY IMPACTED BY CIVILIAN LAND USE/ACTIVITIES IN OKALOOSA, SANTA ROSA, AND WALTON COUNTIES (INCLUDING MUNICIPALITIES)

Check Marks (√) Indicate that Listed Facilities or, Operations are Impacted by Land Uses or Activities within Local Governments Cited Below.	Eglin AFB Facilities and Operations Potentially Impacted by Civilian Land Use and Activities																							
	Perimeter Boundary Development	Clear Zone Incompatibilities	APZ I Incompatible Uses/Structures	APZ II Incompatible Uses/Structures	Military Aircraft: High Noise Concentrations					Sonic Boom	Danger Zones for Munitions Firing/ Drop Zones				Operations Impacted by Excessive Heights of Bldgs/Structures							Outdoor Lighting Impacts Certain Missions	Communication Impacted by Certain Radio Frequency Spectrum Waves	Removal or Development of NW FL Region's Major Conservation Resources
					≥ 65-69 decibels	70-74 decibels	75-79 decibels	80-84 decibels	≥ 85 decibels	Supersonic Flight Corridor	Higher Impulse Intensity & Frequency	Moderate Impulse Intensity & Frequency	Lower Impulse Intensity & Frequency	Firing Areas and/or Bay Area Strikes	Low Level Helicopter Training (Eglin)	Low Level Helicopter Training (Whiting)	Line of Sight for Reference Radars/TERPs	CruiseMissile Testing Corridors	Other Military Training Routes	Height Restrictions by Okaloosa Co.	FAA Height Requirements	Night Vision Training	Bandwidth between 5.2 to 5.9 GHz	Public Safety on- and Off the Eglin Reservation is Threatened by Potential Loss of Portions of the NW FL Greenway and/or Other High Priority Conservation Areas Scheduled for Acquisition or Purchase of Development Rights
Uninc. Okaloosa County	√			√	√	√					√	√	√	√	√	√	√	√	√	75-210'	√	√	√	NW FL Region's Major Natural Conservation Corridors are designated for conservation i n NW FL Region's Sustainable Growth Plan adopted by the FL Legislature. These resources should also include the Shoal River Floodway located NW of Duke Field & extends due E. in front of the Field's APZ II. The JLUS participating governments support acquisition of these lands to conserve lasting habitats and prevent encroachment.
Cinco Bayou												√			√		√			120-130'	√	√	√	
Crestview	√											√			√				√		√	√	√	
Destin					√							√	√		√		√			190-210'	√	√	√	
Fort Walton Beach	√											√		√	√		√			80-120'	√	√	√	
Mary Esther	√											√		√	√		√			80-90'	√	√	√	
Niceville	√		√	√	√	√	√	√	√			√			√		√			100-130	√	√	√	
Shalimar												√			√		√			130-140'	√	√	√	
Valparaiso	√	√	√	√	√	√	√	√	√			√			√		√			100-110	√	√	√	
Uninc. Santa Rosa County	√		√	√	√	√	√	√		√	√	√	√	√	√	√	√		√		√	√	√	
Gulf Breeze																					√			
Milton																√					√			
Uninc. North Walton Co.	√										√	√	√	√	√		√	√	√		√	√	√	
Uninc. South Walton Co.												√	√	√	√		√	√			√	√	√	
DeFuniak Springs													√		√			√	√		√	√	√	
Freeport	√											√	√		√			√	√		√	√	√	


EIS Alternate 1
EGLIN MAIN BASE
Sthy 123
Sthy 189
Sthy 20 W
John Sims Pky
Lewis Turner Blvd Ne
Eglin Blvd
Eglin Pky
Eglin Pky Ne
Beal Pky Nw
Racetrack Rd Ne
White Point Rd
Niceville
Valparaiso
Shalimar
Cinco Bayou
Fort Walton Beach
Destin
98
75 dB
70 dB
65 dB
85 dB
80 dB
A
B
C
Runway Airspace
Clear Zone Surface (A)
Accident Potential Zone I (B)
Accident Potential Zone II (C)
Joint Strike Figher Noise Contours
Alternative 1


EIS Alternate 2
EGLIN MAIN BASE
Sthy 123
70 dB
75 dB
80 dB
85 dB
65 dB
Sthy 85
John Sims Pky
Niceville
Valparaiso
Lewis Turner Blvd Ne
Sthy 189
Eglin Blvd
Eglin Pky
Racetrack Rd Ne
Shalimar
Eglin Pky Ne
Beal Pky Nw
Cinco Bayou
Fort Walton Beach
White Point Rd
Sthy 20 W
Destin
98
A
B
C
Runway Airspace
Clear Zone Surface (A)
Accident Potential Zone I (B)
Accident Potential Zone II (C)
Joint Strike Figher Noise Contours Alternative 2

EIS Alternate 2



City of Destin
Interim Draft
Recommendations

- Implement Construction Standards for New Construction to Decrease Noise Levels Inside Structures Within High Noise Areas (>65 dB) – awaiting Final EIS
- Retrofit Existing Public Buildings Within the High Noise Level Areas (>65dB) with Sound Attenuation – awaiting Final EIS
- Develop and Implement Assistance Program for Sound Reduction Program for Private Property Owners – awaiting Final EIS
- Implement Property Sales and Lease Disclosures
- Limit Object Heights
- Identify Low Level Training/Critical Approach Areas on All County Maps and Public Reports and Require Developers to Identify on All Proposed Projects
- Implement Outdoor Lighting Standards
- Educate Developers and Builders on Radio Frequency Interference Through Education Handouts
- Implement Public Awareness Measures
- Implement Military Influence Area (MIA) Ordinance

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SECTION 9.0

Policy Committee Update

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EGLIN JOINT LAND USE STUDY (JLUS) POLICY COMMITTEE UPDATE

FEBRUARY 5, 2009

TETRA TECH

SOLIN & ASSOC. inc.

DRAFT – NOT FINAL

TETRA TECH

Eglin Joint Land Use Study (JLUS) Update

February 5, 2009

DRAFT – NOT FINAL

RECAP

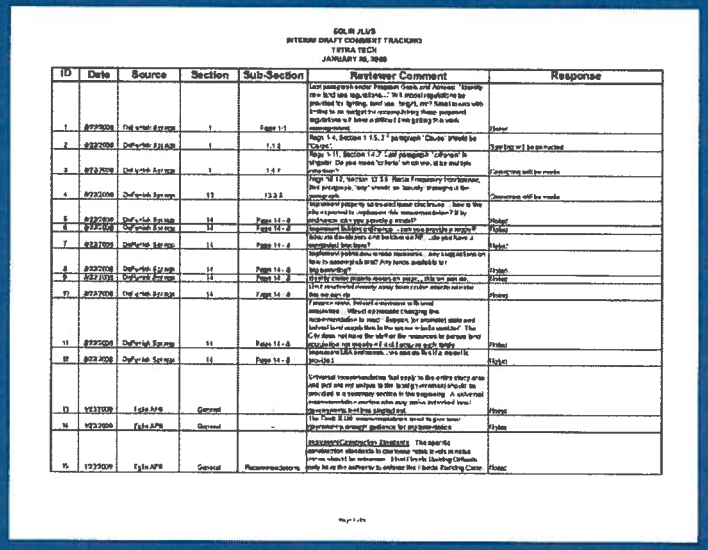
- Expanded Scope & Grant with OEA
- Waiting on EIS (This is Not the EIS)
- Revising GIS Maps & Data Analysis
- Identified Issues – May 08
- Recognized Potential Strategies – May 08
- Recommended Strategies – June 08
- Interim Draft Report – July 08
- JLUS On Hold Pending Final EIS – July 08

R E C A P (continued) – E I S

- BRAC EIS Final Document Released: 17 Oct 08
- 30 day waiting period ended: 17 Nov 08
- ROD signed for 7 SFG: 20 Nov 08
- Signed JSF ROD Forecasted: Early 09
- Eglin anticipates a Supplemental EIS Will Be Needed -- Adaptive Management Process:
  - Awaiting direction from SAF/IEI

INTERIM DRAFT COMMENTS

- Received 77 Comments
- 5 Entities
- Stakeholder Meetings & Presentations
- No Public Comments
- All Comments Dated and Tracked



EGLIN JLUS
INTERIM DRAFT COMMENT TRACKING
TETRA TECH
JANUARY 30, 2009

ID	Date	Source	Section	Sub-Section	Reviewer Comment	Response
1	8/27/2008	Dept of Hab Services	1	Pages 1-1	Last paragraph under Program Goals and Purpose: "Identify new land use regulations..." Is it more realistic to be provided by lighting, land use, height, etc? Most issues with living in an height/noise exceeding these proposed regulations will have a difficult time getting in a work environment.	Noted
2	8/27/2008	Dept of Hab Services	1	1.1.3	Page 1-4, Section 1.1.3.7 paragraph "Clause" should be "Clause".	Typo bug will be corrected
3	8/27/2008	Dept of Hab Services	1	1.4.7	Page 1-11, Section 1.4.7 Last paragraph "Cultures" is singular. Do you mean "cultures" or do you, it be cultural resources?	Typo bug will be corrected
4	8/27/2008	Dept of Hab Services	13	13.3.3	Page 13-12, Section 13.3.3 Noise Frequency Impulsive, first paragraph, "may" should be "should" throughout the paragraph.	Comments will be made
5	8/27/2008	Dept of Hab Services	14	Pages 14 - 8	Implement page 14 to avoid land conflicts. How is this city expected to implement this recommendation? If by ordinance, do you provide a model?	Noted
6	8/27/2008	Dept of Hab Services	14	Pages 14 - 8	Implement Subject preference - can you provide a model?	Noted
7	8/27/2008	Dept of Hab Services	14	Pages 14 - 8	Subject to Eglin joint use facilities and NF. ...do you have a municipal law here?	Noted
8	8/27/2008	Dept of Hab Services	14	Pages 14 - 8	Implement public land use noise measures. Any suggestions on how to accomplish this? Any funds available for implementing?	Noted
9	8/27/2008	Dept of Hab Services	14	Pages 14 - 8	Identify noise impacts zones on page... this can be an UNLIMITED density zone from noise impacts outside this can be an zip	Noted
10	8/27/2008	Dept of Hab Services	14	Pages 14 - 8	Prepare noise. Should a minimum in land acquisition. Without appropriate changing the recommendation to read "Support for promoting state and federal land acquisition in the area which contain". The City does not have the ability or the resources to pursue land acquisition not exceeds 4 acre acres per year. Implement LBA instruments. ...we can do this if a mutual joint-use.	Noted
11	8/27/2008	Dept of Hab Services	14	Pages 14 - 8	Implement LBA instruments. ...we can do this if a mutual joint-use.	Noted
12	1/23/2009	Eglin AFB	General	-	Universal recommendations that apply to the entire study area and are not unique to any jurisdiction should be provided in a summary section in the beginning. A universal recommendation applies also may apply individual land development actions and may be adopted out.	Noted
13	1/23/2009	Eglin AFB	General	-	The Tech JLUS recommendations need to give more information and more guidance for implementation.	Noted
15	1/23/2009	Eglin AFB	General	Recommendations	Assessment/Construction Standards: The specific construction standards in the home noise ordinance should be reviewed. Short Form Building Criteria. Only the City authority to enforce the Florida Building Code.	Noted

MOVING FORWARD - ASSUMPTIONS

- **Focus on Citizens' Health, Safety & Welfare While Protecting Mission Viability**
- **J S F:**
  - Draft JLUS Will Address Noise *Strategies*
  - Upon Receipt of Supplemental ROD, JLUS Will Be Updated With Recommendations for JSF Noise
- **No Compatibility Issues Identified with 7 SFG**
- **Remaining Issues Will Be Addressed**
- **RAICUZ Information Adopted & Final**
- **Comments Received on Interim Draft JLUS Will Be Reconciled**

LOOK AHEAD

- **Draft JLUS to TAG & PC:** 20 Feb 09
- **TAG Meeting - Draft JLUS Review:** 10 Mar 09
- **PC Meeting – Draft JLUS Review:** 11 Mar 09
- **Draft JLUS Release:** 25 Mar 09
- **Public Workshop:** 08 Apr 09
- **Final JLUS Release:** 06 May 09
- **PC Public Hearing:** 20 May 09
- **Implementation Steps For Local Communities**

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OFFICE OF THE SECRETARY OF DEFENSE

OFFICE OF ECONOMIC ADJUSTMENT

JOINT LAND USE STUDY PROGRAM

Eglin AFB – 5 Feb 09

Rich Tenga - Project Manager
(703) 604-5160 www.oea.gov

A JLUS is:

- A cooperative land use planning effort between military installations and the surrounding communities.

- It promotes compatible community growth while supporting military training and operational missions.

JLUS GOALS

- To address encroachment that is threatening or may threaten the mission and viability of an installation

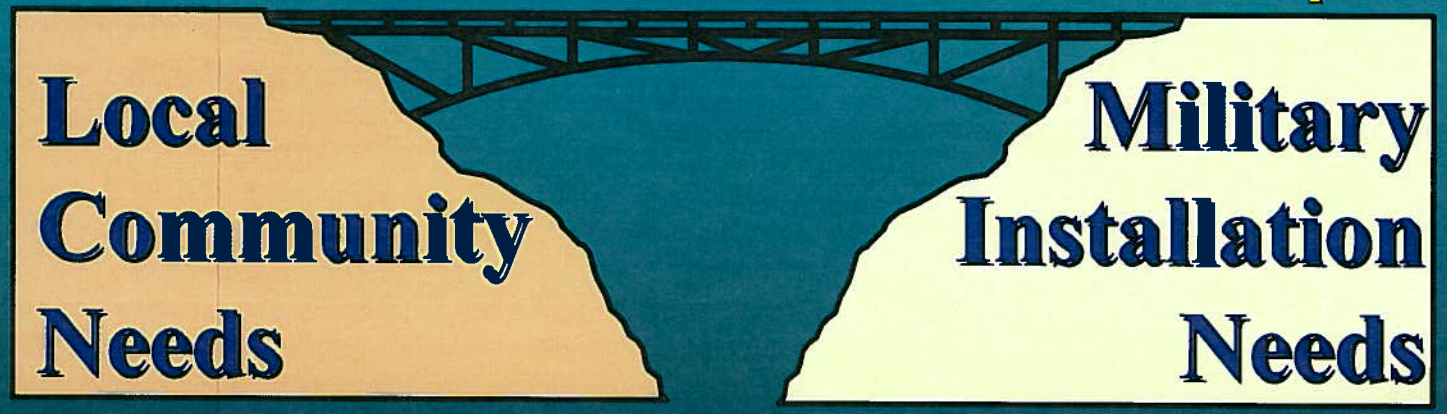
- To protect the health, safety and welfare of the local community with regard to military operations

Creative Community Planning can Bridge the Encroachment Gap

JLUS — **Compatibility** — ***AICUZ***

Joint Land Use Study

Air Installation Compatible Use Zones



Partnering to Plan the Future

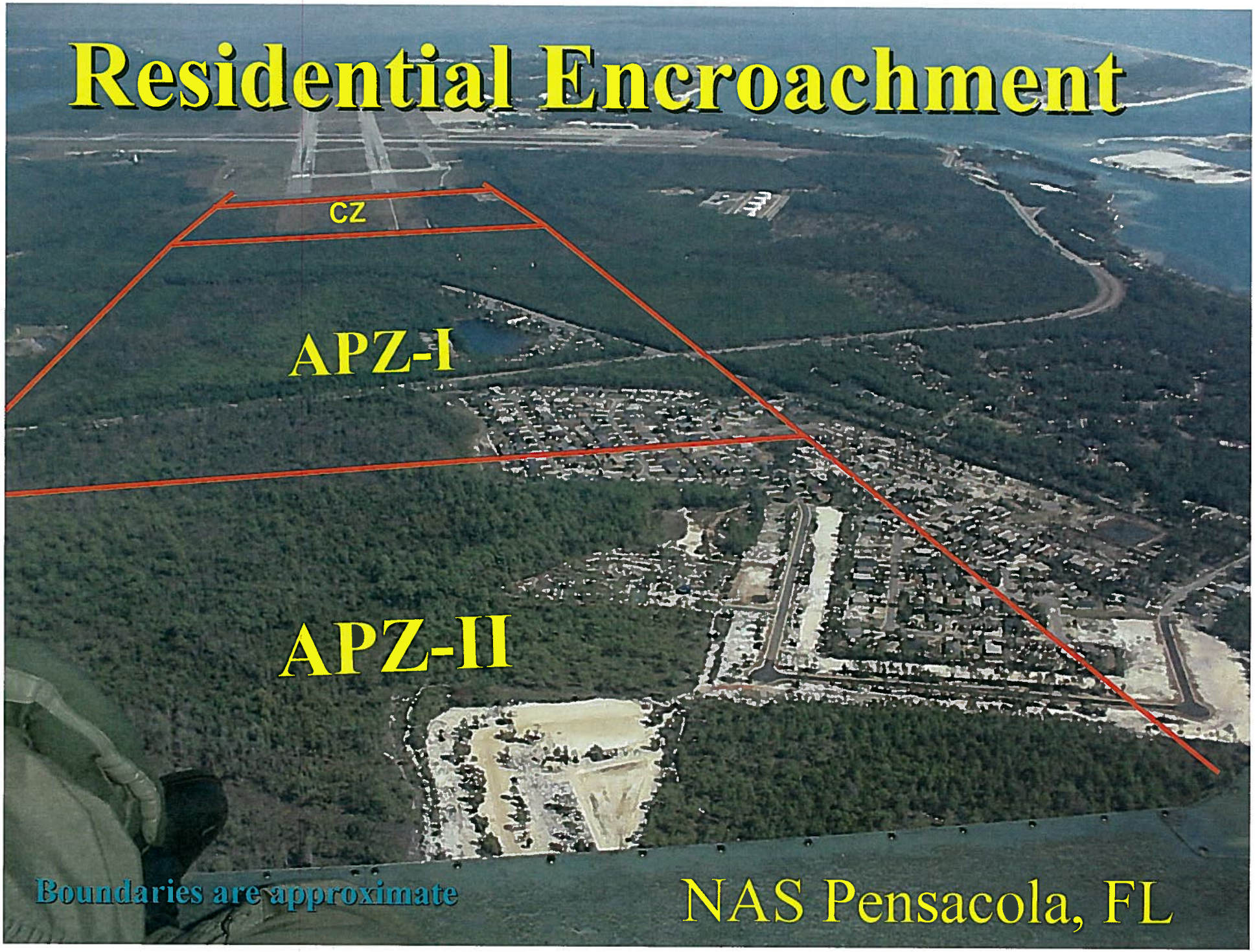
2006 AICUZ – Eglin AFB

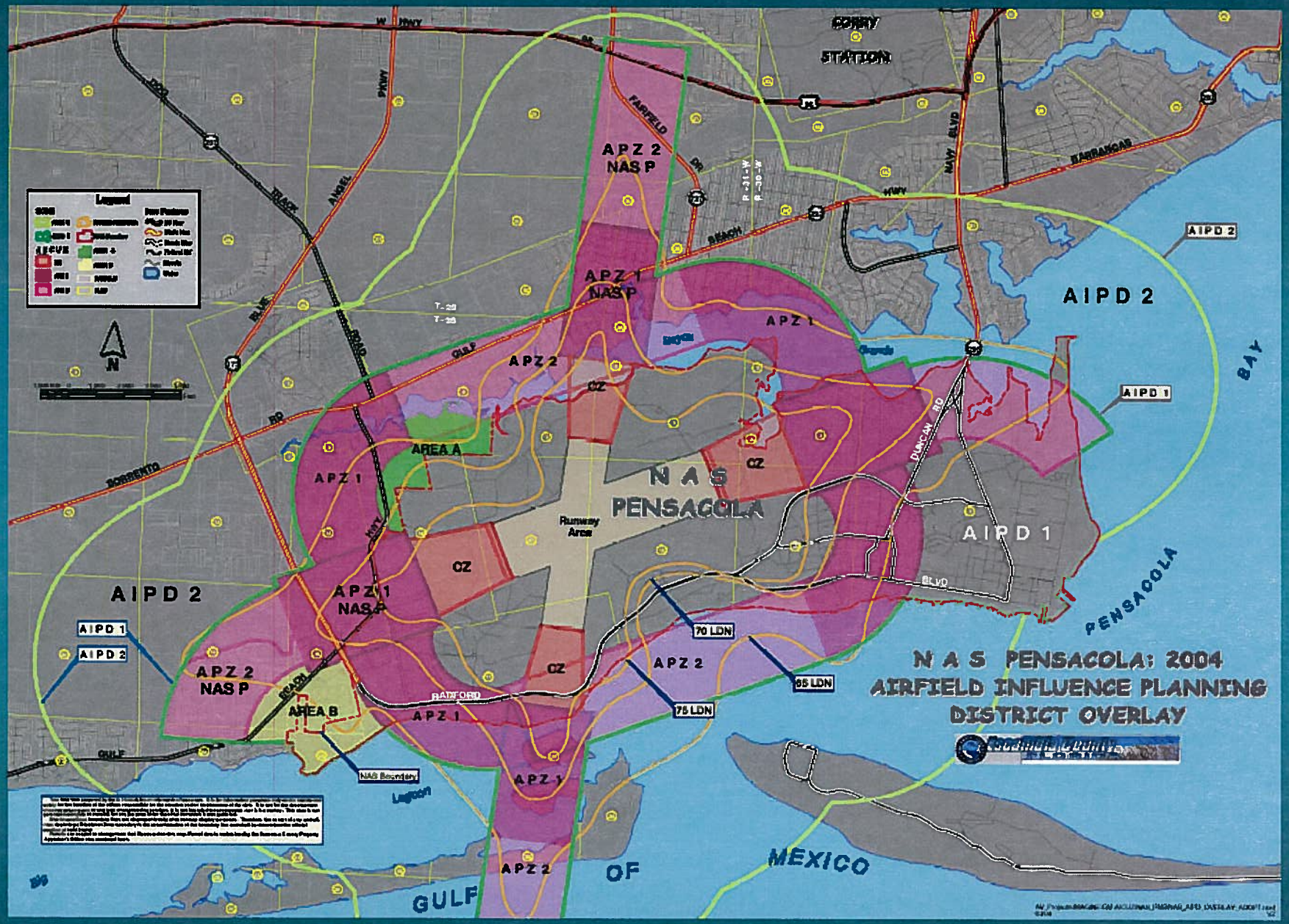
Land Use Compatibility							
	Clear Zones and Accident Potential Zones			DNL Noise Contours			
Generalized Land Use	Clear Zones	APZ I	APZ II	65-69 dB	70-74 dB	75-79dB	80+ dB
Residential	No	No	Yes[1]	No[4]	No[4]	No	No
Manufacturing	No	Yes[2]	Yes[2]	Yes	Yes	Yes	Yes
Transportation, Communications, and Utilities	No	Yes[2]	Yes[2]	Yes	Yes	Yes	No
Trade, Business, and Offices	No	Yes[2]	Yes[2]	Yes	Yes	Yes	No
Shopping Districts	No	No	Yes[2]	Yes	Yes	Yes	No
Public and Quasi-Public Service	No	No	Yes[2]	Yes	No[4]	No[4]	No
Recreation	No	Yes[2]	Yes[2]	Yes	Yes	No	No
Public Assembly	No	No	No	Yes	No	No	No
Agriculture and Mining	No[3]	Yes[2]	Yes[2]	Yes	Yes	Yes	Yes

1 Suggested maximum density - 1 dwelling unit per acre.
2 Only limited low-density, low intensity, uses recommended.
3 Except limited agricultural uses are permitted.
4 Unless sound attenuation materials are installed.

This chart is for general information. See Table 4.3 in the AICUZ Study for more detailed information.

Residential Encroachment




N A S PENSACOLA: 2004
AIRFIELD INFLUENCE PLANNING
DISTRICT OVERLAY
Legend
N
AIPD 1
AIPD 2
APZ 1
APZ 2
CZ
AREA A
AREA B
N A S
PENSACOLA
Runway Area
NAS Boundary
70 LDN
75 LDN
65 LDN
GULF OF MEXICO
PENSACOLA BAY
Lagoon
FAIRFIELD
BEACH
BARRANCAS
NAVY BLVD
DUNCAN RD
SORRENTO
GULF BEACH HWY
PLEASANT GROVE RD
ANDERS
PARKWAY
W HWY
BORREN STATION

Airfield Influence Planning Districts (AIPD)

The purpose of the AIPDs are to:

- Fill gaps between the airfield and AICUZ boundaries to ensure fair, consistent and compatible land use
- Promote an orderly transition and rational organization of land uses
- Enhance the military mission while protecting the health, safety and welfare of local citizens
- Create a compatible mix of land uses

PCola JLUS RECOMMENDATIONS

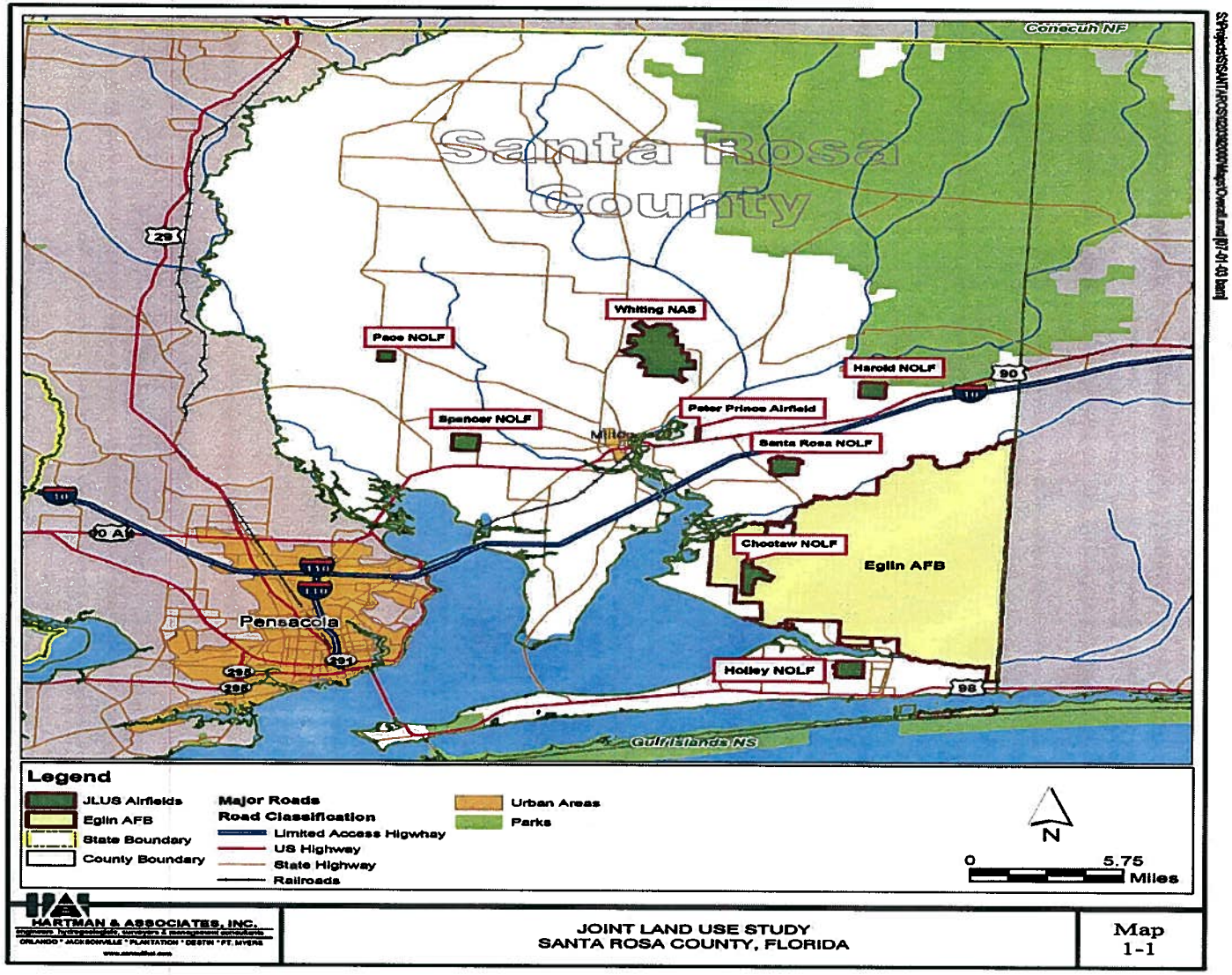
Short-term strategies:

- Create Airfield Influence Planning Districts (AIPDs)
- Revise Density Restrictions and Land Use Regulations
- Strengthen Real Estate Disclosure requirements
- Use Sound Attenuation for new construction
- Use Avigation Easements for new construction
- Create a searchable, web-based information system
- Revise the County Comprehensive Plan
- Form JLUS Implementation Committee

Long-term strategies:

- Develop a county-wide Land Acquisition program
- Develop a Transfer of Development Rights program

NAS Whiting Field – Santa Rosa County



Whiting Field JLUS Recommendations

Regulatory Changes/Other Strategies

New Overlay Zones:

- Military Airport Zone (MAZ)
- Military Airport Influence Area Zone (MAIAZ)
- Military Airport Notification Zone (MANZ)

- Land Acquisition: Conservation purchase and Agriculture Easements
- Real Estate Disclosure
- Cluster Zoning

Eglin JLUS Strategy

- NAPA study - JLUS benefit w/o AICUZ or EIS
- Guidance: OEA Director / SAF / Eglin / Comm.
- Re-start JLUS using assumptions in lieu of JSF EIS – ROD - AICUZ
- Separate JLUS Process from NEPA Process
  - JLUS is a voluntary community planning process with base input (not a DoD study)
  - NEPA is mandatory - guided by strict statute and protocol - public scoping official comments
  - Consideration for JLUS interactive planning?
- Develop strategies for implementation in 2009
- Amend JLUS after final JSF EIS/ROD (AICUZ)?

LESSONS LEARNED

- Obtain & Consider all inputs – keep an open mind
- Keep the Public Informed on process & results
  - Public Workshops – Public Hearing
  - Advertise: website, press, written notice
- Address concerns – try to reach consensus
- Ensure JLUS strategies are fully vetted through the Technical Advisory Group (TAG) and Policy Committee prior to final draft.

SECTION 10.0
Technical Advisory Group Update

EGLIN JOINT LAND USE STUDY (JLUS) TECHNICAL ADVISORY GROUP (TAG) DRAFT REPORT MEETING

APRIL 9, 2009

TETRA TECH

AGENDA

- INTRODUCTIONS
- RECAP
- EXPECTATIONS & ROLES
- BACKGROUND – ISSUES, STRATEGIES, & RECOMMENDATIONS IDENTIFIED
- SUMMARY OF RECOMMENDATIONS
- TAG DISCUSSION & CONSENSUS
- NEXT STEPS
- FINAL COMMENTS

RECAP

- Expanded JLUS Scope & Grant with OEA
- Waiting on EIS (This is Not the EIS)
- Revised GIS Maps & Data Analysis
- Identified JLUS Issues – May 08
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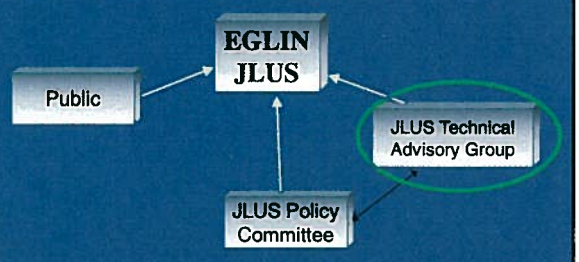
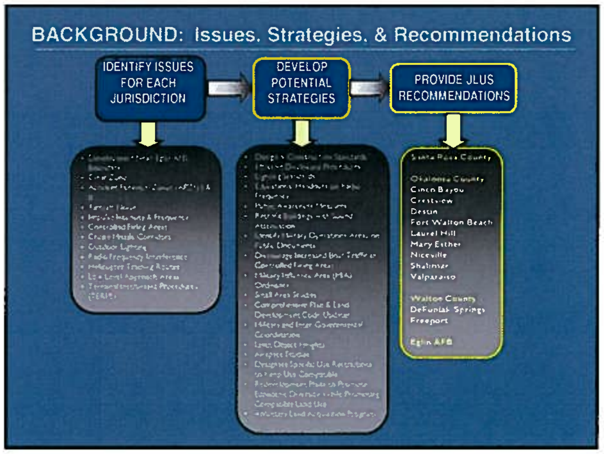
EXPECTATIONS & ROLES



BACKGROUND: Issues, Strategies, & Recommendations



Jurisdiction	Summary of Recommendations																					
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Santa Rosa County	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓		✓		✓	
Okaloosa County	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	✓	✓	✓
Cinco Bayou			✓	✓	✓						✓	✓	✓						✓			
Crestview		✓	✓	✓	✓		✓		✓	✓	✓	✓	✓				✓		✓		✓	
Destin	✓	✓		✓	✓	✓	✓	✓			✓	✓	✓	✓					✓	✓	✓	
Fort Walton Beach			✓	✓	✓			✓			✓	✓	✓						✓			
Laurel Hill		✓	✓	✓	✓		✓		✓	✓	✓	✓	✓						✓		✓	
Mary Esther			✓	✓	✓			✓			✓	✓	✓						✓			
Niceville	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓				✓		✓		✓	
Shalimar			✓	✓	✓						✓	✓	✓						✓			
Valparaiso	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓		✓	✓	✓	✓	✓		✓	
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DeFuniak Springs		✓		✓	✓		✓		✓	✓	✓	✓	✓	✓					✓		✓	
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RECOMMENDATIONS FOR TAG CONSIDERATION

A. Implement Lighting Standards to Avoid Glare and Reflection *(All 14 Jurisdictions)*

B. Distribute Educational Handouts on Radio Frequency Provided by Eglin AFB *(All 14 Jurisdictions)*

C. Implement Public Awareness Measures *(All 14 Jurisdictions)*

D. Discourage Increased Boat Traffic in Controlled Firing Areas Through Comp Plan Amendments *(SRC, OKC, DST, FWB, MES, WLT)*

E. Limit Object Heights *(All 14 Jurisdictions)*

F. Participate in Ongoing GRASI Airspace Study *(OKC, DST, DFS)*

G. Support Funding and Construction of Destin Airport Control Tower *(OKC, DST)*

H. Formalize Military and Inter-Governmental Coordination Policies and Procedures *(All 14 Jurisdictions)*

RECOMMENDATIONS FOR TAG CONSIDERATION

I. Establish Military Influence Area (MIA) Zoning Overlay Districts Creating MIA Designations I, II, and/or III *(SRC, OKC, CRV, DST, LHL, NCV, VLP, WLT, DFS, FRP)*

J. Conduct Small Area Studies in MIA III's *(SRC, OKC, CRV, LHL, WLT, DFS, FRP)*

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L. Update Comprehensive Plan & Land Development Code to Strengthen Position Related to Compatible Uses *(All 14 Jurisdictions)*

M. Support and Promote State and/or Federal Land Acquisition *(SRC, OKC, CRV, LHL, NCV, VLP, WLT, DFS, FRP)*

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P. Study Retrofitting Public and Private Buildings with Sound Attenuation *(OKC, DST, NCV, VLP)*

Q. Identify Military Operations and High Noise Areas on Public Documents *(10 Jurisdictions)*

RECOMMENDATIONS FOR TAG CONSIDERATION

R. Designate Specific Use Restrictions on Magnitude of Activities at Wolverine Park For Compatible Use Within AICUZ Compatibility Guidelines *(VLP)*

S. Apply for Funding Assistance to Reconfigure Wolverine Park to Comply with AICUZ Compatible Use Guidelines *(VLP)*

T. Study Redevelopment Plans and Enterprise Zone Creation Promoting Compatible Land Use in the Clear Zone, APZ I, & APZ II and Economic Diversity for the City *(VLP)*

U. Develop and Implement Voluntary Land Acquisition Program *(SRC, OKC, CRV, NCV, VLP)*

V. Okaloosa County Shall Continue as Lead Facilitator of JLUS Recommendation Implementation *(OKC)*

NEXT STEPS

- Preliminary Draft JLUS to PC and TAG Members – 17 Mar 09
- TAG Meeting: Draft JLUS Review – 9 Apr 09
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FINAL COMMENTS

TETRA TECH

EGLIN JOINT LAND USE STUDY (JLUS)
TECHNICAL ADVISORY GROUP MEETING MINUTES
APRIL 9, 2009

A Technical Advisory Group (TAG) meeting for the Eglin Joint Land Use Study (JLUS) was called to order at 8:15am on April 9, 2009 for the purpose of reviewing and discussing the Draft Eglin JLUS report. Twenty-two people attended the meeting including representatives from the TAG, Office of Economic Adjustment (OEA), and JLUS consultant (Tetra Tech). A copy of the Sign-In Sheet from this meeting is attached and made part of the minutes.

The meeting was opened by Mr. Jeff Fanto (Okaloosa County) with a welcome and summary of the purpose of the meeting. Mr. Fanto stressed the importance of constructive discussions amongst this group regarding the JLUS and summarized key dates for the following 2-3 months as this study concludes. He encouraged each TAG member to continue coordinating with their respective member of the Eglin JLUS Policy Committee in anticipation of a PC Meeting and similar discussions on April 30, 2009. Mr. Fanto then asked for every attendee to introduce themselves and state which entity they represent. Following introductions, Mr. Fanto introduced Mr. Michael Bomar (Tetra Tech) to conduct the meeting.

Mr. Bomar began a Powerpoint™ presentation (copy attached to the minutes) with slides covering the agenda for the meeting, recapping past efforts for the Eglin JLUS, and reviewing the expectations and roles of the TAG (Slides 1 – 5). Part of this information included an emphasis on the goal of today's TAG meeting being to review the Draft JLUS Recommendations and determine as a group how the Recommendations should move forward to the April 30, 2009 Policy Committee meeting. Mr. Bomar suggested the Recommendations be broken down and presented in groups and then the TAG could discuss and vote on each group of Recommendations.

Mr. Bomar then reviewed a brief history (slide 6) of how Issues, Strategies, and Recommendations for each jurisdiction (three counties and eleven cities) were previously "rolled out" in the spring and summer of 2008 for TAG, Policy Committee, and public review. He then briefly reviewed the process of the Eglin JLUS Approach (slide 7) and presented an overall Recommendations Matrix (slide 8) covering the proposed recommendations for each jurisdiction.

A slide (slide 9) showing 8 of the 22 Recommendations (A – H) was presented. Mr. Bomar suggested that if the TAG concurred, he would prefer to read each Recommendation on each slide and provide additional background as required such as which jurisdiction the Recommendation applied and then open the floor for discussion by the TAG for this group of recommendations. Mr. Bomar stated each Recommendations slide could be viewed as a sort of Consent Agenda type listing of Recommendations and the TAG could choose to vote on all of the Recommendations on the slide or pull one or more from the list for discussion. Each Recommendation on slide 9 was read to the TAG. Discussion pertaining to this group of recommendations ensued and included comments that Lighting Standards should be tailored for each jurisdiction and Eglin should identify specific areas of concern regarding glare and reflection which Eglin agreed to do as part of implementation. It was noted the lighting standard Recommendation was missing for Destin and Mr. Bomar concurred that omission was previously identified and the Recommendation was applicable to Destin and the Final JLUS would correct that omission. Following a motion to approve the 8 Recommendations on slide 9 and a second, there were discussions regarding the other Recommendations on this slide with no substantial changes or revisions requested. The motion was called for a vote and the motion passed unanimously.

Mr. Bomar then proceeded to the next slide (slide 10) showing 5 of the 22 Recommendations (I – M) and read each Recommendation and their relevance to specific jurisdictions. A motion to approve the 5 Recommendations was made and seconded. There was a comment to consider a different acronym than MIA for the Military Influence Area designation and perhaps a Military Influence Planning Area (MIPA) could be substituted for MIA. Discussion regarding Recommendation K followed and a motion to amend the previous motion was made with a second to include adding clarification that Recommendation K did not apply to vested properties or those developments previously approved by jurisdictions. It was also suggested with a motion and a second that Recommendation M include language for Land Acquisition Programs include efforts to offset decreases in tax revenue resulting from the implementation of this Recommendation. There was additional discussion regarding land acquisition which included a statement that there have been recent efforts at the state level regarding the Florida Communities Trust localized purchases to give applicants certain points in their ranking system for projects associated with military buffering. Both the original motion and amended motions passed unanimously.

The next slide (slide 11) showing 4 of the 22 Recommendations (N – Q) was presented by Mr. Bomar for the TAG's consideration. The discussion for this group of Recommendations included adding a Benefit/Cost analysis to the Noise Attenuation Construction Standards and Sound Attenuation Retrofit Studies recommended. A motion to approve the 4 Recommendations was made, seconded, and passed unanimously.

Slide 12 identifying 5 of the 22 Recommendations (R – V) was presented for consideration. Mr. Bomar noted the majority of the recommendations on this slide were applicable to only the City of Valparaiso and requested the TAG recognize that and allow Valparaiso, if they so chose, to begin comments related to those specific recommendations. Mr. Bomar stated that he had received comments from Valparaiso regarding the JLUS Recommendations and there was good information included in Valparaiso's comments such as the City agreeing to further study a redevelopment plan to adjust land use in APZ I and II but would like to have additional discussions related to the boundaries of the redevelopment area. Mr. Bomar also explained that Valparaiso did not disagree with the recommendations pertaining to Wolverine Park but they felt it was a moot issue considering the lease with the Air Force for the Park was set to expire in September 2009 with no option to renew. Valparaiso's representative concurred and said if Wolverine Park remained open for discussions with Air Force representatives they felt it was a good recommendation and would be willing to further discuss.

Questions were posed related to Recommendation U and how it differed from Recommendation M. Mr. Bomar explained the recommendations were similar with both related to different means to ensure compatible land use is either conserved (focus of Recommendation M) or transitioned (Recommendation U). It was recommended that a distinction be made where Recommendation M applied versus Recommendation U or combine both recommendations into a single recommendation. The TAG agreed to combine Recommendations M and U with clarifications regarding where land conservation was preferred versus where land use transitions into compatible use were recommended. It was also agreed that Recommendation U be replaced with a recommendation that the land acquisition programs include strategies to offset any tax revenue loss resulting from the change in land use on the local jurisdictions' tax roll.

A motion to approve Recommendations R – V was made with the noted revisions, seconded, and passed unanimously.

The next slide (slide 13) covered the Next Steps in the Eglin JLUS process and then Mr. Bomar opened the floor for Final Comments (slide 14). There was discussion regarding creating a single table showing allowable heights from each jurisdiction. The TAG agreed this table would prove useful in the implementation of height restrictions and Mr. Bomar stated that a table could be created based on

information provided by each TAG member covering height limits for their respective jurisdiction. There was also a comment made regarding prioritizing each recommendation for each jurisdiction in the JLUS but there was no official action on this suggestion. There was also a short discussion related to identifying how each jurisdiction includes Eglin in local development plans or projects as required by Florida Statutes. Mr. Bomar stated that each jurisdiction has an *ex-officio* member on their Planning Commission and includes that member with all meeting agendas and packets and they are invited to each Planning Commission meeting. He then explained that one item identified in the JLUS (Recommendation H) was for a stronger role of staff to coordinate planning and development review processes such as through the ongoing TAG. This group could continue meeting on a monthly, quarterly, or special basis to share and coordinate planning activities associated with land use and development plans. Mr. Bomar also said Eglin could keep this group informed, at a minimum once a year, of Eglin's mission and any pending changes.

Meeting adjourned at 11:30am.

EGLIN JOINT LAND USE STUDY (JLUS)
TECHNICAL ADVISORY GROUP (TAG)
DRAFT REPORT REVIEW MEETING

April 9, 2009
Niceville City Hall
Sign-In Sheet

Name	Representing	Ph #
Marion Cook	Eglin	872-8054
Jesse Borthwick	46th Test Wing, Eglin AFB	882-7624
MARISOL A. REINA	EGLIN AFB (96CEG/CEPP)	882-8078
RICH TENGA	OEA	(703) 604-5160
Walker Banning	FL Dept of Community Affairs	850-922-1785
ELLIOT KAMPERT	Okaloosa County	850-651-7524
Greg Scoville	City of Defuniak Springs	850.892.8571
RANDALL WISE	City of Niceville	850 642 5000
TERRY D. CURRY	OKALOOSA COUNTY AIRPORTS	(850) 651-7160 ext 208
JIM BREITENFELD	OKALOOSA Defense Support INITIATIVE	850-598-1197
ROY PETREY	CITY OF VALPARAISO	609-1100
Michael WING	CITY OF CRESTVIEW	682-1618
DAN SAMBENEDETTO	OKALOOSA COUNTY	850-651-7570
KEN GALLANDER	CITY OF DESTIN	850.837.4242
KIMBERLY STEELE	OKALOOSA COUNTY GIS	850-651-7598
Mary Ann Vance	Santa Rosa County	850-981-7081
Becki Faulkenberry	Santa Rosa County P+Z	850-981-7077

EGLIN JOINT LAND USE STUDY (JLUS)
TECHNICAL ADVISORY GROUP (TAG)
DRAFT REPORT REVIEW MEETING

April 9, 2009
Niceville City Hall
Sign-In Sheet

Name	Representing	Ph #
Glenn Lattanze	Hurlburt Field	884-6439
BOB BLACK	CONGRESSMAN MILLER	803-0470
Pat Blackshear	Walton County	267-1955
JEFF FANTO	OKALOOSA Co.	609-3014
Michael Bomar	Tetra Tech	837.9278

EGLIN JOINT LAND USE STUDY (JLUS) TECHNICAL ADVISORY GROUP (TAG) DRAFT REPORT MEETING

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- INTRODUCTIONS
- RECAP
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- BACKGROUND – ISSUES, STRATEGIES, & RECOMMENDATIONS IDENTIFIED
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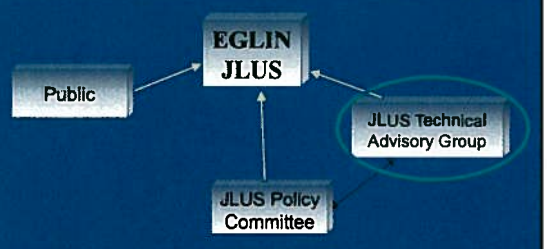

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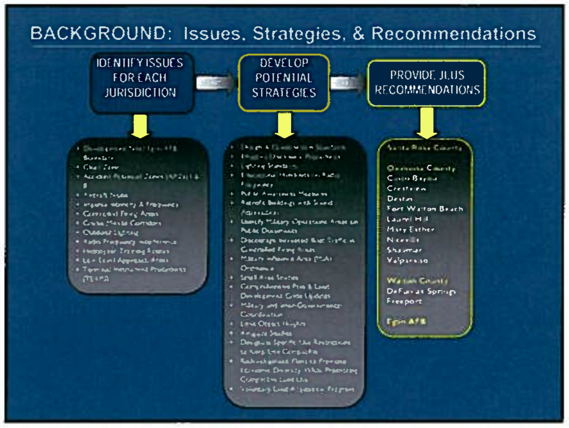

Jurisdiction	Summary of Recommendations																					
Santa Rosa County	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓		✓		✓	
Okaloosa County	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	✓	✓	✓
Cinco Bayou			✓	✓	✓						✓	✓	✓						✓			
Crestview		✓	✓	✓	✓		✓		✓	✓	✓	✓	✓				✓		✓		✓	
Destin	✓	✓		✓	✓	✓	✓	✓			✓	✓	✓	✓					✓	✓	✓	
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Laurel Hill		✓	✓	✓	✓		✓		✓	✓	✓	✓	✓						✓		✓	
Mary Esther			✓	✓	✓			✓			✓	✓	✓						✓			
Niceville	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓				✓		✓		✓	
Shalimar			✓	✓	✓						✓	✓	✓						✓			
Valparaiso	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓		✓	✓	✓	✓	✓		✓	
Walton County		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓						✓		✓	
DeFuniak Springs		✓		✓	✓		✓		✓	✓	✓	✓	✓	✓					✓		✓	
Freeport		✓	✓	✓	✓		✓		✓	✓	✓	✓	✓						✓		✓	

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A. Implement Lighting Standards to Avoid Glare and Reflection *(All 14 Jurisdictions)*

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E. Limit Object Heights *(All 14 Jurisdictions)*

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L. Update Comprehensive Plan & Land Development Code to Strengthen Position Related to Compatible Uses *(All 14 Jurisdictions)*

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RECOMMENDATIONS FOR TAG CONSIDERATION

R. Designate Specific Use Restrictions on Magnitude of Activities at Wolverine Park For Compatible Use Within AICUZ Compatibility Guidelines *(VLP)*

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FINAL COMMENTS

SECTION 11.0

Policy Committee Meeting

EGLIN JOINT LAND USE STUDY (JLUS) POLICY COMMITTEE DRAFT REPORT MEETING

APRIL 30, 2009

TETRA TECH

AGENDA

- INTRODUCTIONS
- RECAP
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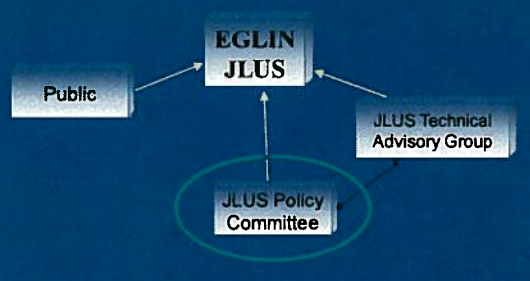

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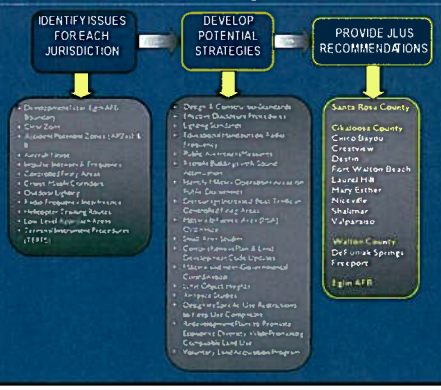

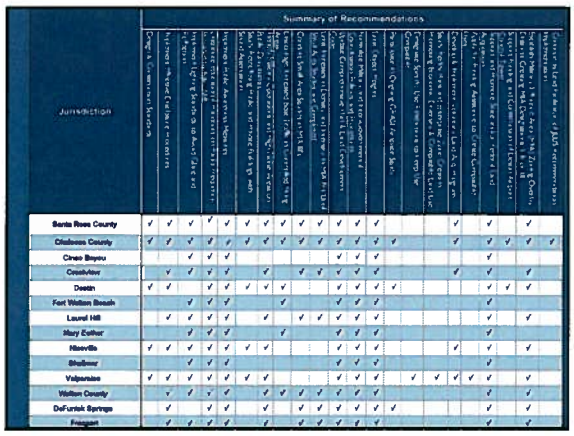

RECOMMENDATIONS FOR POLICY COMMITTEE CONSIDERATION:

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C. Implement Public Awareness Measures *(All 14 Jurisdictions)*

D. Discourage Increased Boat Traffic in Controlled Firing Areas Through Comp Plan Amendments *(SRC, OKC, DST, FWB, MES, WLT)*

E. Limit Object Heights *(All 14 Jurisdictions)*

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G. Support Funding and Construction of Destin Airport Control Tower *(OKC, DST)*

H. Formalize Military and Inter-Governmental Coordination Policies and Procedures *(All 14 Jurisdictions)*

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L. Update Comprehensive Plan & Land Development Code to Strengthen Position Related to Compatible Uses *(All 14 Jurisdictions)*

M. Support and Promote State and/or Federal Land Acquisition. *Include strategies to offset tax revenue losses. (SRC, OKC, CRV, LHL, NCV, VLP, WLT, DFS, FRP)*

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P. Study Retrofitting Public and Private Buildings with Sound Attenuation. *Include Benefit/Cost analysis in the studies. (OKC, DST, NCV, VLP)*

Q. Identify Military Operations and High Noise Areas on Public Documents *(10 Jurisdictions)*

RECOMMENDATIONS FOR POLICY COMMITTEE CONSIDERATION:

R. Designate Specific Use Restrictions on Magnitude of Activities at Wolverine Park For Compatible Use Within AICUZ Compatibility Guidelines *(VLP)*

S. Apply for Funding Assistance to Reconfigure Wolverine Park to Comply with AICUZ Compatible Use Guidelines *(VLP)*

T. Study Redevelopment Plans and Enterprise Zone Creation Promoting Compatible Land Use in the Clear Zone, APZ I, & APZ II and Economic Diversity for the City. *With coordination with Valparaiso on the preferred redevelopment area. (VLP)*

U. Develop and Implement Voluntary Land Acquisition Program. *Combine with M and include Recommendation for strategies to offset tax revenue losses. (SRC, OKC, CRV, NCV, VLP)*

RECOMMENDATIONS FOR POLICY COMMITTEE CONSIDERATION:

R. Okaloosa County Shall Continue as Lead Facilitator of JLUS Recommendation Implementation *(OKC)*

NEXT STEPS

- Preliminary Draft JLUS to PC and TAG Members – 17 Mar 09
- TAG Meeting: Draft JLUS Review – 9 Apr 09
- PC Meeting: Draft JLUS Review – 30 Apr 09
- Draft JLUS Public Release – 15 May 09
- JLUS Public Workshop – 2 Jun 09
- Final JLUS Public Release – 16 Jun 09
- PC Public Hearing – 30 Jun 09

FINAL COMMENTS

EGLIN JOINT LAND USE STUDY (JLUS)
TECHNICAL ADVISORY GROUP MEETING MINUTES
APRIL 9, 2009

A Technical Advisory Group (TAG) meeting for the Eglin Joint Land Use Study (JLUS) was called to order at 8:15am on April 9, 2009 for the purpose of reviewing and discussing the Draft Eglin JLUS report. Twenty-two people attended the meeting including representatives from the TAG, Office of Economic Adjustment (OEA), and JLUS consultant (Tetra Tech). A copy of the Sign-In Sheet from this meeting is attached and made part of the minutes.

The meeting was opened by Mr. Jeff Fanto (Okaloosa County) with a welcome and summary of the purpose of the meeting. Mr. Fanto stressed the importance of constructive discussions amongst this group regarding the JLUS and summarized key dates for the following 2-3 months as this study concludes. He encouraged each TAG member to continue coordinating with their respective member of the Eglin JLUS Policy Committee in anticipation of a PC Meeting and similar discussions on April 30, 2009. Mr. Fanto then asked for every attendee to introduce themselves and state which entity they represent. Following introductions, Mr. Fanto introduced Mr. Michael Bomar (Tetra Tech) to conduct the meeting.

Mr. Bomar began a Powerpoint™ presentation (copy attached to the minutes) with slides covering the agenda for the meeting, recapping past efforts for the Eglin JLUS, and reviewing the expectations and roles of the TAG (Slides 1 – 5). Part of this information included an emphasis on the goal of today's TAG meeting being to review the Draft JLUS Recommendations and determine as a group how the Recommendations should move forward to the April 30, 2009 Policy Committee meeting. Mr. Bomar suggested the Recommendations be broken down and presented in groups and then the TAG could discuss and vote on each group of Recommendations.

Mr. Bomar then reviewed a brief history (slide 6) of how Issues, Strategies, and Recommendations for each jurisdiction (three counties and eleven cities) were previously "rolled out" in the spring and summer of 2008 for TAG, Policy Committee, and public review. He then briefly reviewed the process of the Eglin JLUS Approach (slide 7) and presented an overall Recommendations Matrix (slide 8) covering the proposed recommendations for each jurisdiction.

A slide (slide 9) showing 8 of the 22 Recommendations (A – H) was presented. Mr. Bomar suggested that if the TAG concurred, he would prefer to read each Recommendation on each slide and provide additional background as required such as which jurisdiction the Recommendation applied and then open the floor for discussion by the TAG for this group of recommendations. Mr. Bomar stated each Recommendations slide could be viewed as a sort of Consent Agenda type listing of Recommendations and the TAG could choose to vote on all of the Recommendations on the slide or pull one or more from the list for discussion. Each Recommendation on slide 9 was read to the TAG. Discussion pertaining to this group of recommendations ensued and included comments that Lighting Standards should be tailored for each jurisdiction and Eglin should identify specific areas of concern regarding glare and reflection which Eglin agreed to do as part of implementation. It was noted the lighting standard Recommendation was missing for Destin and Mr. Bomar concurred that omission was previously identified and the Recommendation was applicable to Destin and the Final JLUS would correct that omission. Following a motion to approve the 8 Recommendations on slide 9 and a second, there were discussions regarding the other Recommendations on this slide with no substantial changes or revisions requested. The motion was called for a vote and the motion passed unanimously.

Mr. Bomar then proceeded to the next slide (slide 10) showing 5 of the 22 Recommendations (I – M) and read each Recommendation and their relevance to specific jurisdictions. A motion to approve the 5 Recommendations was made and seconded. There was a comment to consider a different acronym than MIA for the Military Influence Area designation and perhaps a Military Influence Planning Area (MIPA) could be substituted for MIA. Discussion regarding Recommendation K followed and a motion to amend the previous motion was made with a second to include adding clarification that Recommendation K did not apply to vested properties or those developments previously approved by jurisdictions. It was also suggested with a motion and a second that Recommendation M include language for Land Acquisition Programs include efforts to offset decreases in tax revenue resulting from the implementation of this Recommendation. There was additional discussion regarding land acquisition which included a statement that there have been recent efforts at the state level regarding the Florida Communities Trust localized purchases to give applicants certain points in their ranking system for projects associated with military buffering. Both the original motion and amended motions passed unanimously.

The next slide (slide 11) showing 4 of the 22 Recommendations (N – Q) was presented by Mr. Bomar for the TAG's consideration. The discussion for this group of Recommendations included adding a Benefit/Cost analysis to the Noise Attenuation Construction Standards and Sound Attenuation Retrofit Studies recommended. A motion to approve the 4 Recommendations was made, seconded, and passed unanimously.

Slide 12 identifying 5 of the 22 Recommendations (R – V) was presented for consideration. Mr. Bomar noted the majority of the recommendations on this slide were applicable to only the City of Valparaiso and requested the TAG recognize that and allow Valparaiso, if they so chose, to begin comments related to those specific recommendations. Mr. Bomar stated that he had received comments from Valparaiso regarding the JLUS Recommendations and there was good information included in Valparaiso's comments such as the City agreeing to further study a redevelopment plan to adjust land use in APZ I and II but would like to have additional discussions related to the boundaries of the redevelopment area. Mr. Bomar also explained that Valparaiso did not disagree with the recommendations pertaining to Wolverine Park but they felt it was a moot issue considering the lease with the Air Force for the Park was set to expire in September 2009 with no option to renew. Valparaiso's representative concurred and said if Wolverine Park remained open for discussions with Air Force representatives they felt it was a good recommendation and would be willing to further discuss.

Questions were posed related to Recommendation U and how it differed from Recommendation M. Mr. Bomar explained the recommendations were similar with both related to different means to ensure compatible land use is either conserved (focus of Recommendation M) or transitioned (Recommendation U). It was recommended that a distinction be made where Recommendation M applied versus Recommendation U or combine both recommendations into a single recommendation. The TAG agreed to combine Recommendations M and U with clarifications regarding where land conservation was preferred versus where land use transitions into compatible use were recommended. It was also agreed that Recommendation U be replaced with a recommendation that the land acquisition programs include strategies to offset any tax revenue loss resulting from the change in land use on the local jurisdictions' tax roll.

A motion to approve Recommendations R – V was made with the noted revisions, seconded, and passed unanimously.

The next slide (slide 13) covered the Next Steps in the Eglin JLUS process and then Mr. Bomar opened the floor for Final Comments (slide 14). There was discussion regarding creating a single table showing allowable heights from each jurisdiction. The TAG agreed this table would prove useful in the implementation of height restrictions and Mr. Bomar stated that a table could be created based on

information provided by each TAG member covering height limits for their respective jurisdiction. There was also a comment made regarding prioritizing each recommendation for each jurisdiction in the JLUS but there was no official action on this suggestion. There was also a short discussion related to identifying how each jurisdiction includes Eglin in local development plans or projects as required by Florida Statutes. Mr. Bomar stated that each jurisdiction has an *ex-officio* member on their Planning Commission and includes that member with all meeting agendas and packets and they are invited to each Planning Commission meeting. He then explained that one item identified in the JLUS (Recommendation H) was for a stronger role of staff to coordinate planning and development review processes such as through the ongoing TAG. This group could continue meeting on a monthly, quarterly, or special basis to share and coordinate planning activities associated with land use and development plans. Mr. Bomar also said Eglin could keep this group informed, at a minimum once a year, of Eglin's mission and any pending changes.

Meeting adjourned at 11:30am.

EGLIN JOINT LAND USE STUDY (JLUS)
TECHNICAL ADVISORY GROUP (TAG)
DRAFT REPORT REVIEW MEETING

April 9, 2009
Niceville City Hall
Sign-In Sheet

Name	Representing	Ph #
Marion Cook	Eglin	872-8054
Jesse Borthwick	46th Test Wing, Eglin AFB	882-7624
MARISOL A. REINA	EGLIN AFB (96CEG/CEPP)	882-8078
RICH TENGA	OEA	(703) 604-5160
Walker Banning	FL Dept of Community Affairs	850-922-1785
ELLIOT KAMPERT	Okaloosa County	850-651-7524
Greg Scoville	City of Defuniak Springs	850.892.8571
RANDALL WISE	City of NICEVILLE	850 642 5000
TERRY D. CURRY	OKALOOSA COUNTY AIRPORTS	(850) 651-7160 ext 208
JIM BREITENFELD	OKALOOSA Defense Support INITIATIVE	850-598-1197
ROY PETREY	CITY OF V/DUPARDISO	609-1100
Michael WING	CITY OF CRESTVIEW	682-1618
DAN SAMBENEDETTO	OKALOOSA COUNTY	850-651-7570
KEN GALLANDER	CITY OF DESTIN	850.837.4242
KIMBERLY STEELE	OKALOOSA COUNTY GIS	850-651-7598
Mary Ann Vance	Santa Rosa County	850-981-7081
Becki Faulkenberry	Santa Rosa County P+Z	850-981-7077

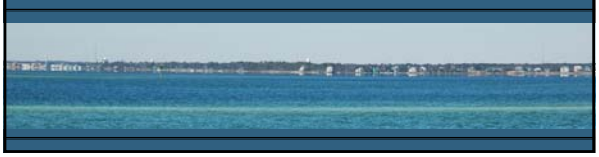
EGLIN JOINT LAND USE STUDY (JLUS)
TECHNICAL ADVISORY GROUP (TAG)
DRAFT REPORT REVIEW MEETING

April 9, 2009
Niceville City Hall
Sign-In Sheet

Name	Representing	Ph #
Glenn Lattanze	Hurlburt Field	884-6439
BOB BLACK	CONGRESSMAN MILLER	803-0470
Pat Blackshear	Walton County	267-1955
JEFF FANTO	OKALOOSA Co.	609-3014
Michael Bomar	Tetra Tech	837.9278

EGLIN JOINT LAND USE STUDY (JLUS) TECHNICAL ADVISORY GROUP (TAG) DRAFT REPORT MEETING

APRIL 9, 2009



AGENDA

- INTRODUCTIONS
- RECAP
- EXPECTATIONS & ROLES
- BACKGROUND – ISSUES, STRATEGIES, & RECOMMENDATIONS IDENTIFIED
- SUMMARY OF RECOMMENDATIONS
- TAG DISCUSSION & CONSENSUS
- NEXT STEPS
- FINAL COMMENTS

RECAP

- Expanded JLUS Scope & Grant with OEA
- Waiting on EIS (This is Not the EIS)
- Revised GIS Maps & Data Analysis
- Identified JLUS Issues – May 08
- Recognized Potential JLUS Strategies – May 08
- Recommended JLUS Strategies – June 08
- Interim Draft JLUS Report – July 08
- JLUS Placed *On Hold* Pending Final EIS – July 08
- Directed to Resume Preparation of Draft JLUS Report – Feb 09

RECAP

- Preliminary Draft JLUS to PC and TAG Members – 17 Mar 09
- TAG Meeting: Draft JLUS Review – 9 Apr 09
- PC Meeting: Draft JLUS Review – 30 Apr 09
- Draft JLUS Public Release – 15 May 09
- JLUS Public Workshop – 2 Jun 09
- Final JLUS Public Release – 16 Jun 09
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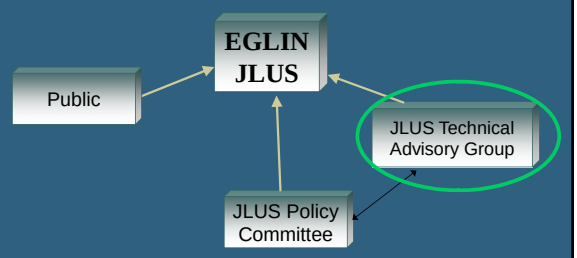
EXPECTATIONS & ROLES



BACKGROUND: Issues, Strategies, & Recommendations

BACKGROUND: Issues, Strategies, & Recommendations

IDENTIFY ISSUES FOR EACH JURISDICTION → DEVELOP POTENTIAL STRATEGIES → PROVIDE JLUS RECOMMENDATIONS

- Development Near Eglin AFB Boundary
- Clear Zone
- Accident Potential Zones (APZs) I & II
- Aircraft Noise
- Impulse Intensity & Frequency
- Controlled Firing Areas
- Cruise Missile Corridors
- Outdoor Lighting
- Radio Frequency Interference
- Helicopter Training Routes
- Low Level Approach Areas
- Terminal Instrument Procedures (TERPS)

- Design & Construction Standards
- Effective Disclosure Procedures
- Lighting Standards
- Educational Handouts on Radio Frequency
- Public Awareness Measures
- Retrofit Buildings with Sound Attenuation
- Identify Military Operations Areas on Public Documents
- Discourage Increased Boat Traffic in Controlled Firing Areas
- Military Influence Area (MIA) Ordinance
- Small Area Studies
- Comprehensive Plan & Land Development Code Updates
- Military and Inter-Governmental Coordination
- Limit Object Heights
- Airspace Studies
- Designate Specific Use Restrictions to Keep Use Compatible
- Redevelopment Plans to Promote Economic Diversity While Promoting Compatible Land Use
- Voluntary Land Acquisition Program

Santa Rosa County

Okaloosa County
Cinco Bayou
Crestview
Destin
Fort Walton Beach
Laurel Hill
Mary Esther
Niceville
Shalimar
Valparaiso

Walton County
DeFuniak Springs
Freeport

Eglin AFB

Summary of Recommendations

Jurisdiction	Design & Construction Standards	Implement Effective Disclosure Procedures	Implement Lighting Standards to Avoid Glare and Reflection	Distribute Educational Handouts on Radio Frequency Provided by Eglin AFB	Implement Public Awareness Measures	Study Retrofitting Public and Private Buildings with Sound Attenuation	Identify Military Operations and High Noise Areas on Public Documents	Discourage Increased Boat Traffic in Controlled Firing Areas	Conduct Small Area Studies in MIA III's	Limit Increases in Density and Intensity in MIA III's Until Small Area Studies are Completed	Update Comprehensive Plan & Land Development Code to Strengthen Position Related to Compatible Uses	Coordinate Policies and Procedures	Formalize Military and Inter-Governmental	Limit Object Heights	Participate in Ongoing GRASI Airspace Study	Designate Specific Use Restrictions to Keep Use Compatible	Study Redev Plans and Enterprise Zone Creation Promoting Economic Diversity & Compatible Land Use	Develop & Implement Voluntary Land Acq. Program	Apply for Funding Assistance to Create Compatible Uses	Support Funding and Construction of Destin Airport Control Tower	Support Funding and Construction of Dixon Airport	Establish Military Influence Area (MIA) Zoning Overlay Districts Creating MIA Designations I, II, or III	Continue as Lead Facilitator of JLUS Recommendation Implementation
Santa Rosa County	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓		✓			✓	
Okaloosa County	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	✓	✓	✓	✓
Cinco Bayou			✓	✓	✓						✓	✓	✓							✓				
Crestview		✓	✓	✓	✓		✓		✓	✓	✓	✓	✓					✓		✓			✓	
Destin	✓	✓		✓	✓	✓	✓	✓			✓	✓	✓	✓						✓	✓	✓	✓	
Fort Walton Beach			✓	✓	✓			✓			✓	✓	✓							✓				
Laurel Hill		✓	✓	✓	✓		✓		✓	✓	✓	✓	✓							✓			✓	
Mary Esther			✓	✓	✓			✓			✓	✓	✓							✓				
Niceville	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓					✓		✓			✓	
Shalimar			✓	✓	✓						✓	✓	✓							✓				
Valparaiso	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓		✓	✓	✓	✓	✓	✓			✓	
Walton County		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓							✓			✓	
DeFuniak Springs		✓		✓	✓		✓		✓	✓	✓	✓	✓	✓						✓			✓	
Freeport		✓	✓	✓	✓		✓		✓	✓	✓	✓	✓							✓			✓	

RECOMMENDATIONS FOR TAG CONSIDERATION

A. Implement Lighting Standards to Avoid Glare and Reflection *(All 14 Jurisdictions)*

B. Distribute Educational Handouts on Radio Frequency Provided by Eglin AFB *(All 14 Jurisdictions)*

C. Implement Public Awareness Measures *(All 14 Jurisdictions)*

D. Discourage Increased Boat Traffic in Controlled Firing Areas Through Comp Plan Amendments *(SRC, OKC, DST, FWB, MES, WLT)*

E. Limit Object Heights *(All 14 Jurisdictions)*

F. Participate in Ongoing GRASI Airspace Study *(OKC, DST, DFS)*

G. Support Funding and Construction of Destin Airport Control Tower *(OKC, DST)*

H. Formalize Military and Inter-Governmental Coordination Policies and Procedures *(All 14 Jurisdictions)*

RECOMMENDATIONS FOR TAG CONSIDERATION

I. Establish Military Influence Area (MIA) Zoning Overlay Districts Creating MIA Designations I, II, and/or III *(SRC, OKC, CRV, DST, LHL, NCV, VLP, WLT, DFS, FRP)*

J. Conduct Small Area Studies in MIA III's *(SRC, OKC, CRV, LHL, WLT, DFS, FRP)*

K. Limit Increases in Density and Intensity in MIA III's Until Small Area Studies are Completed *(SRC, OKC, CRV, LHL, WLT, DFS, FRP)*

L. Update Comprehensive Plan & Land Development Code to Strengthen Position Related to Compatible Uses *(All 14 Jurisdictions)*

M. Support and Promote State and/or Federal Land Acquisition *(SRC, OKC, CRV, LHL, NCV, VLP, WLT, DFS, FRP)*

RECOMMENDATIONS FOR TAG CONSIDERATION

N. Implement Noise Attenuation Design & Construction Standards *(SRC, OKC, DST, NCV, VLP)*

O. Implement Effective Disclosure Procedures *(SRC, OKC, CRV, DST, LHL, NCV, VLP, WLT, DFS, FRP)*

P. Study Retrofitting Public and Private Buildings with Sound Attenuation *(OKC, DST, NCV, VLP)*

Q. Identify Military Operations and High Noise Areas on Public Documents *(10 Jurisdictions)*

RECOMMENDATIONS FOR TAG CONSIDERATION

R. Designate Specific Use Restrictions on Magnitude of Activities at Wolverine Park For Compatible Use Within AICUZ Compatibility Guidelines *(VLP)*

S. Apply for Funding Assistance to Reconfigure Wolverine Park to Comply with AICUZ Compatible Use Guidelines *(VLP)*

T. Study Redevelopment Plans and Enterprise Zone Creation Promoting Compatible Land Use in the Clear Zone, APZ I, & APZ II and Economic Diversity for the City *(VLP)*

U. Develop and Implement Voluntary Land Acquisition Program *(SRC, OKC, CRV, NCV, VLP)*

V. Okaloosa County Shall Continue as Lead Facilitator of JLUS Recommendation Implementation *(OKC)*

NEXT STEPS

- Preliminary Draft JLUS to PC and TAG Members – 17 Mar 09
- TAG Meeting: Draft JLUS Review – 9 Apr 09
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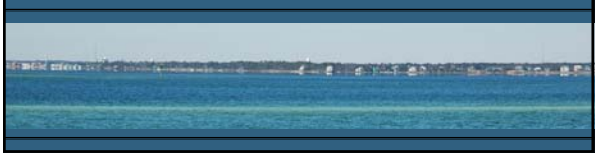
FINAL COMMENTS



MINUTES ARE NOT VERBATIM

JOINT LAND USE STUDY
POLICY COMMITTEE
APRIL 30, 2009

MINUTES

The Joint Land Use Study Policy Committee meeting was held April 30, 2009 at 1:30 p.m. in the Third Floor Large Conference Room, Okaloosa County Water and Sewer Building, 1804 Lewis Turner Boulevard, Fort Walton Beach. Attendee list is provided below (Attachment 1).

Commissioner Bill Roberts, Policy Committee chairman, called the meeting to order. He asked for a moment of silence in honor and memory of Okaloosa Sheriff's Deputies Lopez and York who were killed in the line of duty.

Chairman Roberts then turned the meeting over to Jeff Fanto, Growth Project Coordinator, for introductions and comments. He stressed this meeting will be most productive the more interactive it is; thus the Tetra Tech presentation is arranged to provide numerous opportunities for interaction and to vote on the information presented. The goal of the meeting is to receive the "next steps" from the Committee and to move forward with the schedule as will be presented. The intent, with the Committee's approval, is to publish the JLUS document on or about May 15, 2009. There has been scheduled (tentatively) a public workshop for public input and review on June 2, 2009 at the Crestview Chamber of Commerce building, but would like to get the Committee's input on that too. That would afford the Consultant approximately 2 weeks to prepare and present the Final JLUS document to the public about the middle of June 2009; then targeting June 30 for a public hearing to be conducted by the Policy Committee as the last step in this process that will allow the Committee to accept the Final JLUS document as complete. Following that acceptance, it would then be the responsibility of each Policy Committee member and their staff to take that document back to their respective community for adoption. Mr. Fanto then asked to go around the room so everyone in attendance can introduce themselves and asked everyone to sign in on the attendance rosters circulating around the room. Mr. Fanto then introduced Michael Bomar, Vice President of Tetra Tech, Destin, as the lead for the JLUS.

Mr. Bomar began by stressing that the process needs the input of the attendees and that he looks forward to moving forward with this study. After a review of the agenda (Attachment 2), he then provided a recap of actions and meetings that have occurred to date. Mr. Bob Black questioned what the expectation was for the Public Workshop scheduled on June 2. Mr. Bomar responded that the idea is an open house format with physical boards (maps/charts) and a brief PowerPoint presentation with personnel available to answer any questions from the public. The idea is to have that interaction with the public so they understand what is in the document.

Mr. Black then asked about the final public hearing the policy committee will conduct. Specifically, how do the entities, the cities and counties in this case, adopt the JLUS? Mr. Bomar responded that the intent of the Policy Committee Public Hearing is for acceptance of the JLUS document. Upon that action, it will be up to each individual jurisdiction to go back to their staff and policy makers to adopt their section of the JLUS. That will help the County as the lead for implementation and Mr. Tenga from the Office of Economic Adjustment (OEA) who will be looking for the acceptance of the document by the Policy Committee as well as the adoption by each jurisdiction to resource the implementation strategy.

Mayor Arnold then asked what happens if a jurisdiction rejects the study. Mr. Fanto responded that the intent was to craft a document that would be adopted by the communities as we move forward, understanding that there will be portions that may not be acted upon by communities; to make it as wholly-adoptable as possible. Adoption by the communities is key as we move forward in the implementation efforts in that as we look to OEA as our follow-on funding partner, there is an expectation by them that this document would be adopted by those communities, and that those adopting communities would be eligible for further assistance from OEA and that Okaloosa County would continue its lead role. If the study is rejected by a community, the County would need to look at ways to assist that community with its issues that have been identified and codified in the document. Mr. Bomar added that as a result of the Technical Advisory Group (TAG), the recommendations were accepted with some comments made on each one (to be discussed), but the recommendations were adopted unanimously by the TAG. As a result, they are moving forward with the expectation that we have that joint interaction and that we have received comments to date on the recommendations. Mayor Arnold replied that he didn't think that adoption of the recommendations by the TAG against one entity where everybody votes is not a fair way of doing business. He also said he feels that, for example, in Valparaiso the elements related to Valparaiso, maybe he should have 10 votes and Fort Walton Beach should only have one. That you have the full rest of the County "telling us what we're supposed to do and not even appraised or involved with what the problems are. He said that is a fallacy in the make up that you have here; having other people outside of the cities direct what some cities are supposed to do." Mr. Fanto responded that this system is applicable to any entity in the same manner.

Ms. Beckie Faulkenberry, Santa Rosa County Planning Director, commented in response to the earlier question on how local governments will handle individual adoption. She said that Santa Rosa County has done this before. One of the things they will be looking at will relate to advertising, to make sure affected property owners know about it. When they adopted their 2003 JLUS, they notified every single property owner, but they will make that decision after the public workshop supporting this study effort. She went on to say that her responsibility as Planning Director is the same for this plan as any other; and that the Eglin Range has such a broad impact with so many areas to interact with local governments. The good thing with regard to encroachment is that even if one community chooses to not adopt the recommendations, it just says that they choose not to address this issue at this time.

Mayor Arnold then questioned the jointness of the effort; that usually you consider a joint effort a give-and-take with two people sitting down, discussing and negotiating and solving their

problems. His particular perspective was that he didn't see any joint effort between Valparaiso and Eglin with any give-and-take, with no discussion having taken place. Mr. Fanto responded that those discussions did occur at the TAG at the staff level and as the managers and leaders of the process and this project, take that to be adequate on behalf of your community realizing that this document is designed to assist your community not penalize your community. This applies across the board in that identifying the incompatibilities is vital for both your community and Eglin's future missions. The Mayor then responded that Valparaiso adopting the recommendations is a "death blow" to the city; that the city can't survive – "no way." He further said that he didn't think they wanted to participate in their own demise. Commissioner Roberts responded to the Mayor that this was the best process we had available to us and that what was being raised as a concern today would have been better addressed at the front end of the study, when the JLUS structure was being formed. He also said that it is certainly the City of Valparaiso's prerogative to reject the JLUS, but he felt we were "too far down the line" to change the path of where we are headed. The Mayor countered that he would like to see the path changed, that the path is not a legitimate one because the premise that the whole study was built upon is false. Commissioner Roberts stressed that he wished this was brought up much earlier in the process.

Mr. Black then said that he felt the idea of the premise the whole study was built upon being false is just not true. The recommendations in this study are what everyone is making input upon. No particular entity has to accept any of those recommendations; and that with or without the JSF, there are incompatibilities today. So, there is a need for this and no one is going to get help if they don't help quantify the issues. He stressed the most important thing out of this effort, from a Congressional standpoint, is what could be the impact if something doesn't change. What gets discussed and what gets implemented is a follow-on process. The 2006 Air Installation Compatible Use Zone (AICUZ) identifies incompatibilities, so as entities, everyone should participate to ensure their respective issues get quantified accurately. The recommendations are ideas that if each entity could consider if they wanted to try it on their own. The Mayor replied that this study doesn't have enough detail for "us" to do anything. For example, the 2006 AICUZ is "bad, it has significant impact on the city. When I looked at the Alternative 2 in the EIS, it was more devastating than you could ever dream of. All of our efforts have been trying to rectify or solve those problems and we haven't had one minute's notice trying to look at the 2006 JLUS, that's a separate follow-on effort. Your recommendations and the ideas in the report I've read so far are so general there's no way I can go to the Congressman or you and say 'hey we need half-a-million dollars, five-million dollars or ten-million dollars to do this study.' There's no background data to support it."

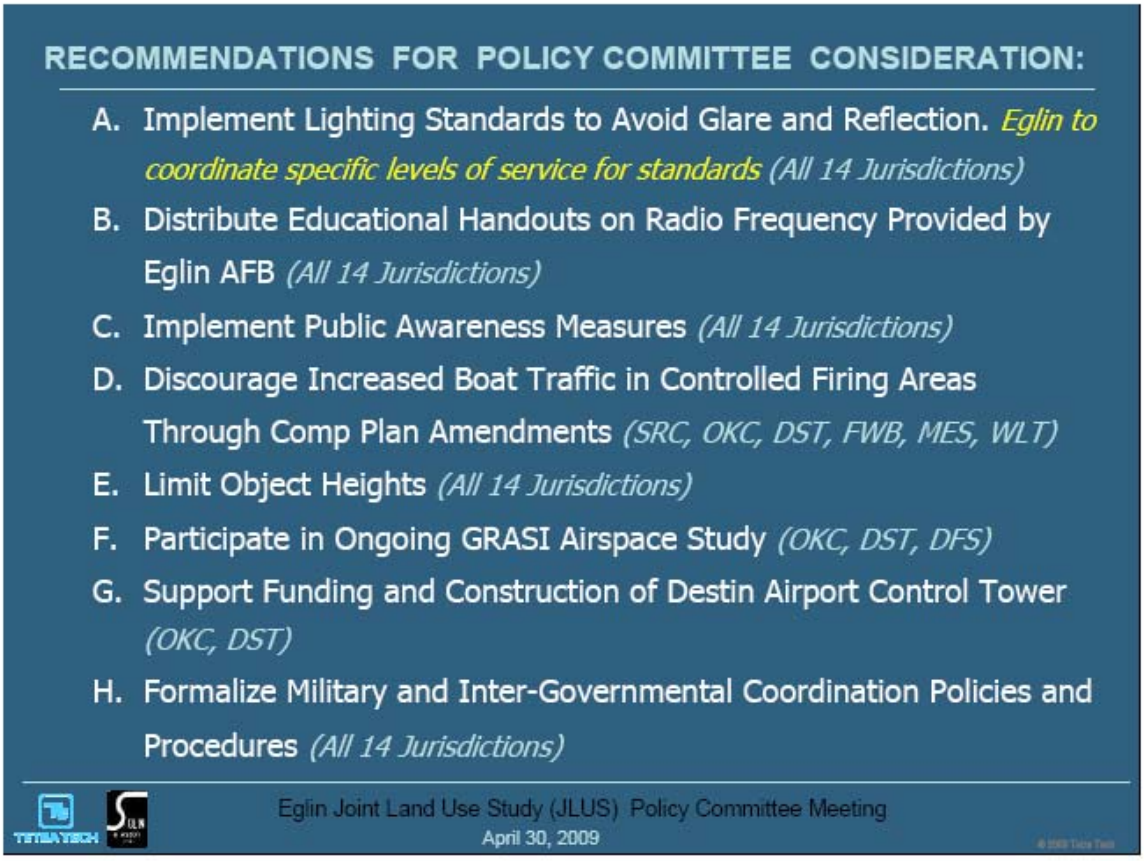
Mr Black then asked the Mayor what he would propose as additional recommendations. The Mayor replied that all the recommendations they have were submitted to the Air Force to mitigate the situation. Mr Fanto then asked if those same recommendations had been submitted to the consultant for inclusion in the JLUS. The Mayor responded that he believed them to be public documents readily available and that the base can give "us" copies of them. Commissioner Roberts replied that is not the purpose of the JLUS Committee; that we are supposed to be a cooperative effort and that when we lack that level of cooperation, it is hard to get to this point and talk about how it wasn't a team effort. The Mayor responded that was the point he was making that the idea of "Joint" suggests to him all the communities and talking to

the Air Force and looking at ways to solve problems. "So far it's the Air Force saying 'I need this and this is in concrete.' And that the JLUS Executive Summary states that the purpose of JLUS is to protect the Eglin mission today and into the future."

Colonel McClintock responded that he has reviewed the minutes from the last TAG which read very optimistically. He said he was also very pleased and appreciated the work of Tetra Tech. He said he stated last summer that he thought the recommendations for Valparaiso were unacceptable and that if he was the Mayor of Valparaiso, the interim draft of the JLUS was unacceptable because of what it proposed. He further said he came out in support of re-writing the interim draft JLUS and that the version presented today is a substantive, detailed analysis that shows how all communities that are encroached is workable and that we can move forward. He then proposed to allow the group to see the briefing to see the good work that has been done. Commissioner Roberts concurred and recognized Mr. Bomar to continue his presentation.

Mr. Bomar resumed his presentation, talking through the expectations and roles of all the participants in the study as well as formally identifying the complete study area via a map. He then went to the next slide which basically reduces the complete JLUS volume into a single slide that highlights issues, strategies, and recommendations. He again reiterated the purpose of today's meeting is to focus on the recommendations in the draft report and looking at effective ways to make implementation as easy as possible. He then transitioned to slides that summarize each recommendation contained in the document.

The first slide listed recommendations A through H as indicated on the attached slide:



Councilmember Wood asked about the lighting recommendation and how it applies to those affected jurisdictions; is it a one-size-fits-all issue. Colonel McClintock responded that this is a tasker to Eglin from the TAG to look at specific concerns for specific areas for the training/operational requirements of the military. Mayor Arnold then asked how boat traffic can be discouraged. Mr. Bomar responded that by inserting language in the applicable jurisdiction's Comprehensive Plans to address this issue, those jurisdictions would not approve boat channels or other such initiatives and this would also be a factor as these initiatives worked their way through the various permitting agencies for such projects. Additional discussion occurred on this issue. Mr. Black then asked for additional clarification on recommendation H. Mr. Bomar responded that this is a two-pronged approach in that this board (JLUS Policy Committee) would remain in place but would then be the JLUS Implementation Policy Committee moving forward from the second leg which would be the Technical Advisory Group for JLUS implementation. This would allow the continued sharing of information as well as the use of a comprehensive GIS database for all three counties. It could also help formalize the interaction between the base and local planning councils when coordinating on development packages, etc. Mr. Black interjected that this could be a formal forum where Eglin could bring ideas and help with solutions to issues raised during implementation of the JLUS. Mr. Tenga remarked that this is one of the most important things to come out of this study; that their experience in other Joint

Land Use Studies is that these provide a structure for the community and the base to come together and discuss issues.

Motion by Councilmember James Wood (Destin), seconded by Councilman Bob Allen (Crestview) to accept these recommendations for inclusion in the Draft JLUS document. Motion passed unanimously.

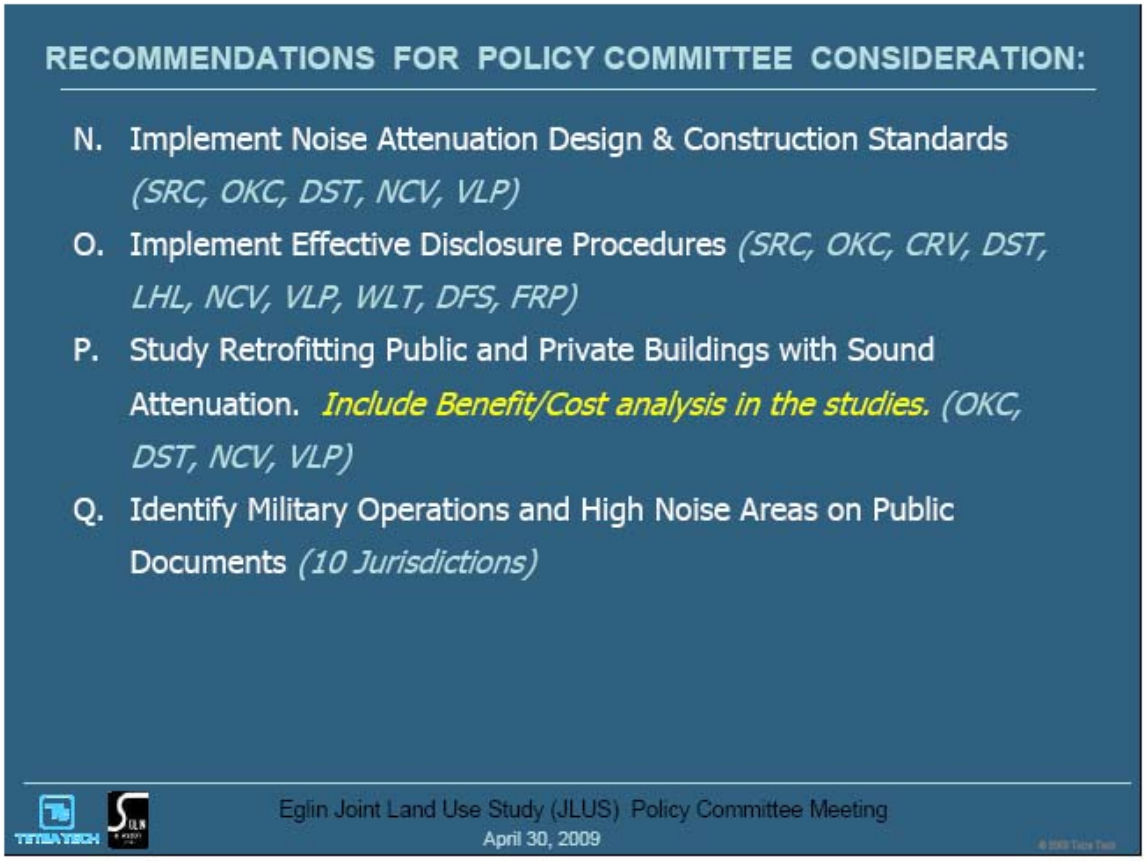
The next slide listed recommendations I through M as indicated on the attached slide:

Mayor Arnold asked what the operational concept was for the MIPAs. Mr. Bomar responded that they are areas around, for example, MIPA I encompassing the Clear Zone and Accident Potential Zones, such that the jurisdiction creates the allowable density and type of development in that zoning area. So if someone comes in during the pre-application time, the restrictions to development in that area are already set and staff knows what allowable uses are for that particular parcel. The restrictions and allowable use would be different depending on the MIPA classification, I, II or III. Mr. Scoville asked if helicopter low-level training routes were included in the MIPA. Mr. Bomar responded they are not.

Mayor Arnold asked to vote on each recommendation separately. Chairman Roberts agreed.

Motion Councilmember Wood, second Councilman Allen to approve recommendation I. Passed 6-1 with Mayor Arnold voting against approval. Motion Councilmember Wood, second Councilman Allen to approve recommendation J. Passed unanimously. Motion Councilmember Wood, second Councilman Allen to approve recommendation K. Passed 6-1 with Mayor Arnold voting against approval. Motion Councilmember Wood, second Colonel McClintock to approve recommendation L. Passed 6-1 with Mayor Arnold voting against approval. Motion Councilmember Wood, second Colonel McClintock to approve recommendation M. Passed 6-1 with Mayor Arnold voting against approval.

The next slide listed recommendations N through Q as indicated on the attached slide:



Mayor Arnold questioned why private homes were not included in recommendation P. Mr. Bomar responded that private homes are included in the Private Buildings category contained in this recommendation. The Mayor then stated that recommendations providing for additional studies with EIS Alternative 2 as the basis are premature until the Air Force issues its Supplemental EIS in 2010. Colonel McClintock responded that at the previous Policy Committee meeting (February 5, 2009) that most, if not all of this applies with or without a positive SEIS. The Mayor argued that this could be a waste of money if the SEIS noise contours were less than the current Alternative 2. Mr. Black responded that the picture is different from

the Congressional perspective, especially since the SEIS is ongoing. This study and the others recommended will provide quantitative information that will then allow other elected officials to influence the outcomes of the other activities as they go on. He did not see this as a waste of money because this information is needed to assist possible Congressional action to ensure those impacts are mitigated. Councilman Allen then asked for additional clarification on recommendation O. Mr. Bomar identified several bullets in the full text of the JLUS, such as adopting an ordinance including real estate disclosure requirements; notifying all property owners in the Clear Zones, APZs, as well as the high impulse noise areas that their parcel actually falls in this area so they are aware; participation of this body and the TAG joining efforts with a concerted lobbying effort not only at Legislative level, but also in the Florida Association of Realtors, local Realtors Association; Chapter 475 in Florida Statutes (real estate disclosures); work with West Florida Regional Planning Council seeking their assistance moving forward to broaden this out beyond the tri-county area; and then there's also a recommendation to conduct public information meetings on the disclosure, so it's part of educating the public of what steps are in place.

Mayor Arnold then asked to discuss recommendation P. His question centered on what was meant by "cost/benefit analysis?" Mr. Bomar replied that this recommendation includes an effort to look at what it would take to sound attenuate the public and private buildings, assign a dollar value in general terms on a square foot basis, with the cost/benefit side is if it costs more than a certain percentage to sound attenuate the house with sound insulation, it may be a better opportunity or more advantageous opportunities for the use of that structure. He indicated he was not saying that was going to be the result of the study, rather if you have a $100,000 house and it costs $80,000 to sound attenuate the structure, the cost/benefit is very low and the TAG comment is that should be part of the study recommended in P. After additional discussion, Mr. Bomar commented this is intended to be a tool for the local jurisdiction. It was agreed to remove the word "benefit" from the recommendation.

Motion Colonel McClintock, second Councilman Allen to approve recommendation P removing the word "benefit" from the overall recommendation. Passed unanimously.

Chairman Roberts then went back to recommendation N. Mayor Arnold said he believed this should be done through the Southern Standard Building Code so things are designed based on the same specifications. Mr. Petrey said this is also a key to keeping the Technical Advisory Group together so communities can work together on these issues and help advocate changes necessary at the State level. Mr. Bomar agreed that the idea behind all of the recommendations was to use the TAG to help work issues collectively. It was also identified by Mr. Kampert that the Florida Defense Alliance is pursuing this initiative through the state building code mechanism.

Motion Councilman Allen, second Councilmember Wood to approve recommendation N.
Passed 6-1 with Mayor Arnold voting against approval.

Motion Councilman Allen, second Councilmember Wood to approve recommendation O.
Passed unanimously.

Mayor Arnold then inquired about recommendation Q. After discussion, it was agreed the word "future" would be added to the recommendation so that it reads "Identify military operations and high noise areas on future public documents." Motion Mayor Arnold, second Colonel McClintock to approve recommendation Q as amended. Passed unanimously.

The next slide listed recommendations R through U as indicated on the attached slide:

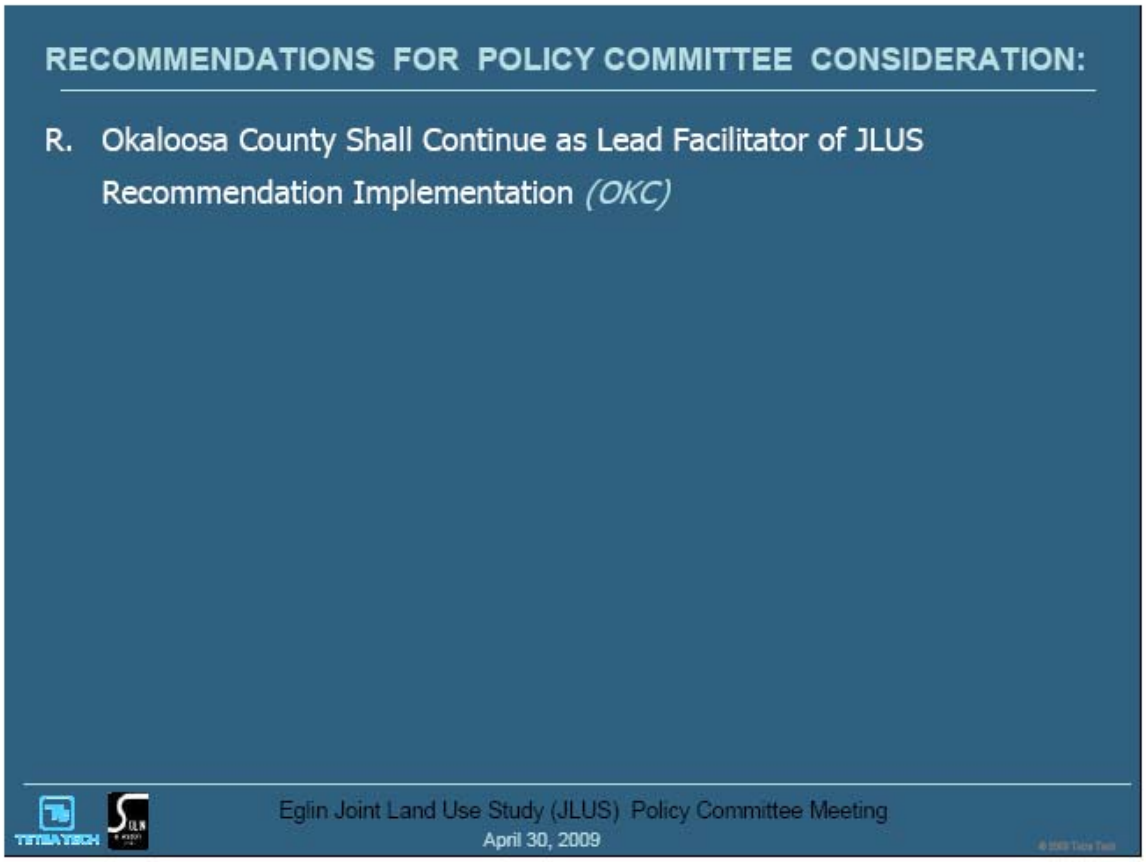
Mayor Arnold moved, seconded by Colonel McClintock to eliminate recommendations R and S as the lease on Wolverine Park will not be renewed by the Air Force. Passed unanimously.

Mr. Bomar then presented recommendation T and stressed this was only to conduct a study for the purpose of looking at redevelopment plans and possible enterprise zone creation that promotes compatible land use in the Clear Zone and APZs in the city of Valparaiso. Mayor Arnold objected to this recommendation due to the noise impact on the city overall. Colonel McClintock asked if this recommendation had anything to do with noise contours. Mr. Bomar replied that it does not.

Motion Mr. Robert Arnold, second Councilman Allen to approve recommendation T. Passed 6-1 with Mayor Arnold voting against approval.

Motion Colonel McClintock, second Councilman Allen to approve recommendation U with the changes as follows: "Develop and implement voluntary land acquisition program using existing models." Passed 6-1 with Mayor Arnold voting against approval.

The next slide listed recommendation R as indicated on the attached slide:



The final recommendation was that Okaloosa County continue as the lead facilitator in implementing the recommendations in the JLUS. OEA prefers to have a single point of contact for these efforts; Okaloosa County already has such a relationship with OEA.

Motion Councilman Allen, second Councilmember Wood to approve recommendation V (erroneously referred to as "R" on the slide). Mayor Arnold commented that as far as Valparaiso is concerned, they'd like to do their own. Passed 6-1 with Mayor Arnold voting against approval.

Last action to be addressed was the next steps in the process. The consultant is requesting the Policy Committee endorse release of the Draft JLUS document on May 15, 2009 and to proceed with the schedule as presented. Chairman Roberts asked for discussion on the recommendation

of the Crestview Chamber of Commerce as the suggested public workshop venue and the next steps in general. Ms. Lisa Algiere recommended that the Policy Committee direct more than one public workshop to gather public comment and input. The Committee agreed and directed one public workshop be held for each county. Mayor Arnold then asked if there was a provision in the executive summary for a Minority Report, or if one was provided, could it be published as part of the JLUS. Mr. Black recommended that some contextual information be included in the front of the document to help with a layman's understanding of the effort.

Motion Colonel McClintock, second Councilman Allen to issue the Draft JLUS document as soon as the consultant can have it completed. Passed unanimously.

There was then discussion on the schedule to completion, to include why there is no additional Policy Committee meeting before issuing the Final JLUS document. The Committee directed another Policy Committee meeting before the final document is released.

The meeting was concluded at approximately 3:30 p.m.

Prepared By _____

Jeff Fanto, Growth Project Coordinator
Okaloosa County Department of Growth Management

Attachment 1

Attendees

JLUS-APRIL-30TH-SIGN-IN-SHEET.PDF

Attachment 2

Agenda

- Introductions
- Recap
- Expectations and Roles
- Background – Issues, Strategies, & Recommendations Identified
- Summary of Recommendations
- TAG Discussion & Consensus
- Next Steps
- Final Comments

Attachment 3

PC 043009 print.pdf

EGLIN JOINT LAND USE STUDY (JLUS)
POLICY COMMITTEE
DRAFT REPORT REVIEW MEETING

April 30, 2009
Okaloosa County Water & Sewer Building
Sign-In Sheet

Name	Representing	Ph #
Marion Cook	Eglin	882-8054
Jacqueline Bouchard	" Legal	882-8014
MARISOL REINA	EGLIN - CEC	
Mike Penland	46TW	882-4188
Mike Spears	96 AGW/PA	882-3931
Greg Scoville	City of DeFuniak Springs	892.8571
KEN GALLANDER	CITY OF DESTIN	837.4242
STEVEN D. GUINTER, J.D.	1st Spec. Ops. Wing, Hurlburt FLD	884-6437
Thomas G. Miller	City of Valparaiso, FL	729-0404
Lisa Algiere	City of Valparaiso	389-4077
DAN SAMBIONI BOTTO	OKALOOSA COUNTY	200-5346
KYLE S. HOLBY	AFZAG	712-8788
Mary Ann Vance	Santa Rosa County	981-7081
Kimberly Steele	Okaloosa County GIS	651-7598
Glenn Lattanze	Hurlburt Field, FL	884-6439
Danielle Slaterpryce	Okaloosa County PW	689-5772

EGLIN JOINT LAND USE STUDY (JLUS)
POLICY COMMITTEE
DRAFT REPORT REVIEW MEETING

April 30, 2009
Okaloosa County Water & Sewer Building
Sign-In Sheet

Name	Representing	Ph #
Roy Petrey	City of Valparaiso	609-1100
Elliot L Kampert	Okaloosa County	685-0257
George Newman	Walton Co. Public Works neargeorge@co.walton.fl.us	585-1623
Chris Sammelmann	Walton County Planning Div.	267-1955
Jim Breitenfeld	EDC - Defense Support Initiative	598-1197
Chris Smith	96 ABW/XP (Plans & Programs)	882-5614
Andre Partin	96 ABW/XP (Plans & Programs)	882-6507
Terry D. Curry	Okaloosa County Airports	651-7160
John Jannazo	Okaloosa County BCC District 2	651-7105

EGLIN JOINT LAND USE STUDY (JLUS)
POLICY COMMITTEE
DRAFT REPORT REVIEW MEETING

April 30, 2009
Okaloosa County Water & Sewer Building
Sign-In Sheet

Name	Representing	Ph #
JEFF FANTO	Okaloosa Co.	609-3014
RICH TENGA	OEA	(703) 604-5160
BOB BLACK	CONGRESSMAN MILLER	(850) 803-0470
BRUCE MCCLINTOCK	EGLIN AFB	850-882-9600
Bill Roberts	Okaloosa Cty	850 651 7105
Bruce Arnold	City of Valparaiso	850-729-5402
Beckie Faulkenberry	Santa Rosa County	850-981-7077
BOB ALLEN	CITY OF CRESTVIEW	850-683-098
Jim Wood	Destin	(850) 269-0196
BOB ARNOLD	EGLIN AFB	850-259-1753
Michael Bomar	Tetra Tech	837.9278

EGLIN JOINT LAND USE STUDY (JLUS) POLICY COMMITTEE DRAFT REPORT MEETING

APRIL 30, 2009

TETRA TECH

A G E N D A

- INTRODUCTIONS
- RECAP
- EXPECTATIONS & ROLES
- BACKGROUND – ISSUES, STRATEGIES, & RECOMMENDATIONS IDENTIFIED
- SUMMARY OF RECOMMENDATIONS
- TAG DISCUSSION & CONSENSUS
- NEXT STEPS
- FINAL COMMENTS

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RECAP

- Expanded JLUS Scope & Grant with OEA
- Waiting on EIS (This is Not the EIS)
- Revised GIS Maps & Data Analysis
- Identified JLUS Issues – May 08
- Recognized Potential JLUS Strategies – May 08
- Recommended JLUS Strategies – June 08
- Interim Draft JLUS Report – July 08
- JLUS Placed *On Hold* Pending Final EIS – July 08

- Directed to Resume Preparation of Draft JLUS Report – Feb 09

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RECAP

- Preliminary Draft JLUS to PC and TAG Members – 17 Mar 09
- TAG Meeting: Draft JLUS Review – 9 Apr 09
- PC Meeting: Draft JLUS Review – 30 Apr 09
- Draft JLUS Public Release – 15 May 09
- JLUS Public Workshop – 2 Jun 09
- Final JLUS Public Release – 16 Jun 09
- PC Public Hearing – 30 Jun 09

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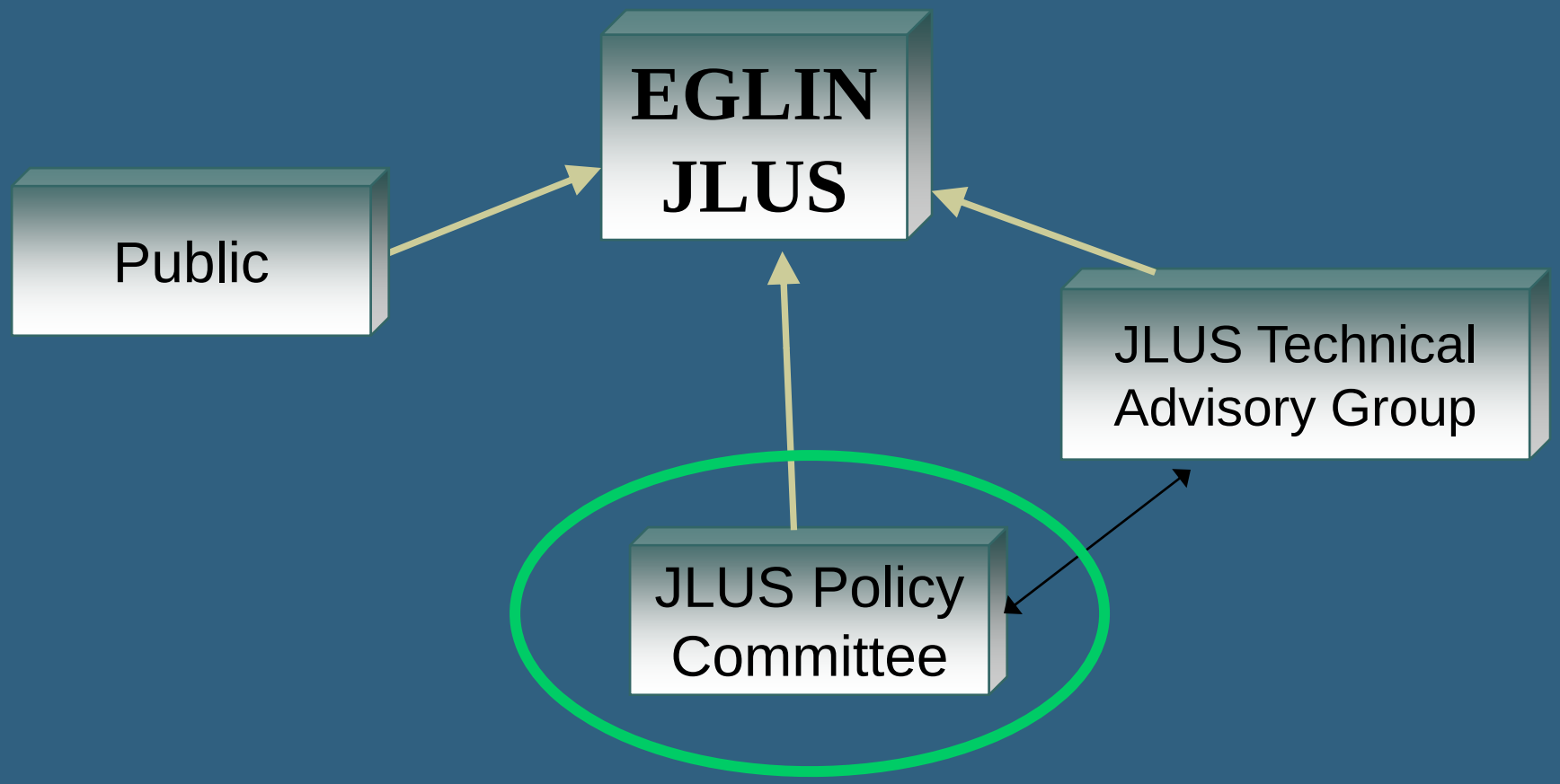
EXPECTATIONS & ROLES



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BACKGROUND: Issues, Strategies, & Recommendations

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BACKGROUND: Issues, Strategies, & Recommendations

IDENTIFY ISSUES FOR EACH JURISDICTION → DEVELOP POTENTIAL STRATEGIES → PROVIDE JLUS RECOMMENDATIONS

- Development Near Eglin AFB Boundary
- Clear Zone
- Accident Potential Zones (APZs) I & II
- Aircraft Noise
- Impulse Intensity & Frequency
- Controlled Firing Areas
- Cruise Missile Corridors
- Outdoor Lighting
- Radio Frequency Interference
- Helicopter Training Routes
- Low Level Approach Areas
- Terminal Instrument Procedures (TERPS)

- Design & Construction Standards
- Effective Disclosure Procedures
- Lighting Standards
- Educational Handouts on Radio Frequency
- Public Awareness Measures
- Retrofit Buildings with Sound Attenuation
- Identify Military Operations Areas on Public Documents
- Discourage Increased Boat Traffic in Controlled Firing Areas
- Military Influence Area (MIA) Ordinance
- Small Area Studies
- Comprehensive Plan & Land Development Code Updates
- Military and Inter-Governmental Coordination
- Limit Object Heights
- Airspace Studies
- Designate Specific Use Restrictions to Keep Use Compatible
- Redevelopment Plans to Promote Economic Diversity While Promoting Compatible Land Use
- Voluntary Land Acquisition Program

Santa Rosa County

Okaloosa County
Cinco Bayou
Crestview
Destin
Fort Walton Beach
Laurel Hill
Mary Esther
Niceville
Shalimar
Valparaiso

Walton County
DeFuniak Springs
Freeport

Eglin AFB

Jurisdiction	Summary of Recommendations																				
	Design & Construction Standards	Implement Effective Disclosure Procedures	Implement Lighting Standards to Avoid Glare and Reflection	Distribute Educational Handouts on Radio Frequency Provided by Eglin AFB	Implement Public Awareness Measures	Study Retrofitting Public and Private Buildings with Sound Attenuation	Identify Military Operations and High Noise Areas on Public Documents	Discourage Increased Boat Traffic in Controlled Firing Areas	Conduct Small Area Studies in MIA III's	Limit Increases in Density and Intensity in MIA III's Until Small Area Studies are Completed	Update Comprehensive Plan & Land Development Code	Formalize Military and Inter-Governmental Coordination Policies and Procedures	Limit Object Heights	Participate in Ongoing GRASI Airspace Study	Designate Specific Use Restrictions to Keep Use Compatible	Promoting Economic Diversity & Compatible Land Use	Study Redev Plans and Enterprise Zone Creation	Develop & Implement Voluntary Land Acq. Program	Apply for Funding Assistance to Create Compatible Uses	Support and Promote State and/or Federal Land Acquisition	Support Funding and Construction of Destin Airport Control Tower	Establish Military Influence Area (MIA) Zoning Overlay Districts Creating MIA Designations I, II, or III	Continue as Lead Facilitator of JLUS Recommendation Implementation
Santa Rosa County	√	√	√	√	√	√	√	√	√	√	√	√	√				√		√		√	
Okaloosa County	√	√	√	√	√	√	√	√	√	√	√	√	√	√			√		√	√	√	√
Cinco Bayou			√	√	√						√	√	√						√			
Crestview		√	√	√	√		√		√	√	√	√	√				√		√		√	
Destin	√	√		√	√	√	√	√			√	√	√	√					√	√	√	
Fort Walton Beach			√	√	√			√			√	√	√						√			
Laurel Hill		√	√	√	√		√		√	√	√	√	√						√		√	
Mary Esther			√	√	√			√			√	√	√						√			
Niceville	√	√	√	√	√	√	√				√	√	√				√		√		√	
Shalimar			√	√	√						√	√	√						√			
Valparaiso	√	√	√	√	√	√	√				√	√	√		√	√	√	√	√		√	
Walton County		√	√	√	√		√	√	√	√	√	√	√						√		√	
DeFuniak Springs		√		√	√		√		√	√	√	√	√	√					√		√	
Freeport		√	√	√	√		√		√	√	√	√	√						√		√	

RECOMMENDATIONS FOR POLICY COMMITTEE CONSIDERATION:

A. Implement Lighting Standards to Avoid Glare and Reflection. *Eglin to coordinate specific levels of service for standards* *(All 14 Jurisdictions)*

B. Distribute Educational Handouts on Radio Frequency Provided by Eglin AFB *(All 14 Jurisdictions)*

C. Implement Public Awareness Measures *(All 14 Jurisdictions)*

D. Discourage Increased Boat Traffic in Controlled Firing Areas Through Comp Plan Amendments *(SRC, OKC, DST, FWB, MES, WLT)*

E. Limit Object Heights *(All 14 Jurisdictions)*

F. Participate in Ongoing GRASI Airspace Study *(OKC, DST, DFS)*

G. Support Funding and Construction of Destin Airport Control Tower *(OKC, DST)*

H. Formalize Military and Inter-Governmental Coordination Policies and Procedures *(All 14 Jurisdictions)*

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RECOMMENDATIONS FOR POLICY COMMITTEE CONSIDERATION:

I. Establish Military Influence Area (MIA) Zoning Overlay Districts Creating MIA Designations I, II, and/or III. *Use Military Influence Planning Area (MIPA) in lieu of MIA.* *(SRC, OKC, CRV, DST, LHL, NCV, VLP, WLT, DFS, FRP)*

J. Conduct Small Area Studies in MIA III's *(SRC, OKC, CRV, LHL, WLT, DFS, FRP)*

K. Temporarily Limit Increases in Density and Intensity in MIA III's Until Small Area Studies are Completed. *Not applicable to approved developments or developments under review.* *(SRC, OKC, CRV, LHL, WLT, DFS, FRP)*

L. Update Comprehensive Plan & Land Development Code to Strengthen Position Related to Compatible Uses *(All 14 Jurisdictions)*

M. Support and Promote State and/or Federal Land Acquisition. *Include strategies to offset tax revenue losses.* *(SRC, OKC, CRV, LHL, NCV, VLP, WLT, DFS, FRP)*

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RECOMMENDATIONS FOR POLICY COMMITTEE CONSIDERATION:

N. Implement Noise Attenuation Design & Construction Standards *(SRC, OKC, DST, NCV, VLP)*

O. Implement Effective Disclosure Procedures *(SRC, OKC, CRV, DST, LHL, NCV, VLP, WLT, DFS, FRP)*

P. Study Retrofitting Public and Private Buildings with Sound Attenuation. *Include Benefit/Cost analysis in the studies. (OKC, DST, NCV, VLP)*

Q. Identify Military Operations and High Noise Areas on Public Documents *(10 Jurisdictions)*

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RECOMMENDATIONS FOR POLICY COMMITTEE CONSIDERATION:

R. Designate Specific Use Restrictions on Magnitude of Activities at Wolverine Park For Compatible Use Within AICUZ Compatibility Guidelines *(VLP)*

S. Apply for Funding Assistance to Reconfigure Wolverine Park to Comply with AICUZ Compatible Use Guidelines *(VLP)*

T. Study Redevelopment Plans and Enterprise Zone Creation Promoting Compatible Land Use in the Clear Zone, APZ I, & APZ II and Economic Diversity for the City. *With coordination with Valparaiso on the preferred redevelopment area. (VLP)*

U. Develop and Implement Voluntary Land Acquisition Program. *Combine with M and include Recommendation for strategies to offset tax revenue losses. (SRC, OKC, CRV, NCV, VLP)*

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RECOMMENDATIONS FOR POLICY COMMITTEE CONSIDERATION:

R. Okaloosa County Shall Continue as Lead Facilitator of JLUS Recommendation Implementation *(OKC)*

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NEXT STEPS

- Preliminary Draft JLUS to PC and TAG Members – 17 Mar 09
- TAG Meeting: Draft JLUS Review – 9 Apr 09
- PC Meeting: Draft JLUS Review – 30 Apr 09
- Draft JLUS Public Release – 15 May 09
- JLUS Public Workshop – 2 Jun 09
- Final JLUS Public Release – 16 Jun 09
- PC Public Hearing – 30 Jun 09

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FINAL COMMENTS

TETRA TECH

EGLIN JOINT LAND USE STUDY (JLUS) POLICY COMMITTEE - SUMMARY OF PUBLIC MEETINGS & FINAL REPORT MEETING

JUNE 29, 2009

TETRA TECH

AGENDA

- INTRODUCTIONS
- RECAP 30-APR POLICY COMMITTEE MEETING
- SUMMARY OF PRESENTATIONS TO JURISDICTIONS
- SUMMARY OF PUBLIC COMMENTS
- PROJECT CLOSEOUT TIMELINE

30-APR POLICY COMMITTEE MTG

- Reviewed Draft Eglin JLUS Recommendations:
  - 20 Recommendations Passed (12 Unanimously; 8 Passed 6-1)
  - 2 Recommendations Removed
- Authorized Release of Draft Eglin JLUS (Passed Unanimously)
- Directed One Public Meeting in Each County
- Directed Additional Policy Committee Meeting Prior to Release of Final Eglin JLUS
- Meeting Minutes Attached (Attachment A)

PUBLIC PRESENTATIONS SUMMARY

22-May 07	Public Meeting #1
03-Oct-07	Public Meeting #2
01-Nov-07	Eglin Vector Check Presentation
08-May-08	Special Valparaiso City Commission
18-Jun-08	Public Meeting #3
23-Jul-08	Eglin JLUS Policy Committee
28-Sep-09	Destin City Council Meeting
05-Feb-09	Eglin JLUS Policy Committee
30-Apr-09	Eglin JLUS Policy Committee
18-May-09	Destin City Council Meeting
26-May-09	Crestview City Council Meeting
28-May-09	Freeport City Council Meeting
01-Jun-09	Public Meeting—Walton County
02-Jun-09	Okaloosa County Commissioners Meeting
02-Jun-09	Public Meeting—Okaloosa County
04-Jun-09	Public Meeting—Santa Rosa County
29-Jun-09	Eglin JLUS Policy Committee

SUMMARY OF PUBLIC COMMENTS

- Navarre Beach Marine Sanctuary Committee (Attachment B)
- City of Valparaiso (Attachment C)
- Eglin AFB (Attachment D)
- American Farms Zoning Awareness Group (Attachment E)
- General Public (Attachment F)

NAVARRE BEACH SANCTUARY COM.

- **SRC 7:** Implement Comprehensive Plan Amendments Discouraging Additional Marine Navigation Channels or Land Cuts, Artificial Reefs, or Other Proposed Activities Increasing Marine Traffic in Controlled Firing Areas *Santa Rosa, Gulf of Mexico, and USC & GS Stations*

- *"The Navarre Beach Marine Sanctuary committee requests that the wording of either the recommendation or the analysis that speaks to the recommendation, be changed to include a specific exception for snorkeling and diving reefs or fishing piers in the Santa Rosa Sound that are accessible by swimmers and pedestrians from shore, and those in the Gulf of Mexico that do not extend past 2,000 feet. This would ensure no future misinterpretation of the study's recommendations and also ensure no conflict with long held desires of the citizens and government of Santa Rosa County to establish a Marine Sanctuary with snorkeling and diving reefs at Navarre Beach. This public interest is manifested by Resolution 2009-13 passed by the Santa Rosa County Board of Commissioners in May of this year supporting the creation of the Marine Sanctuary and agreeing to apply for and hold required permits pending gathering of permit application information. "*

CITY OF VALPARAISO

- 8 Apr 09 Response to Draft JLUS
- 9 Jun 09 Letter
- 24 Jun 09 Response Letter from Okaloosa County
- Attachment C

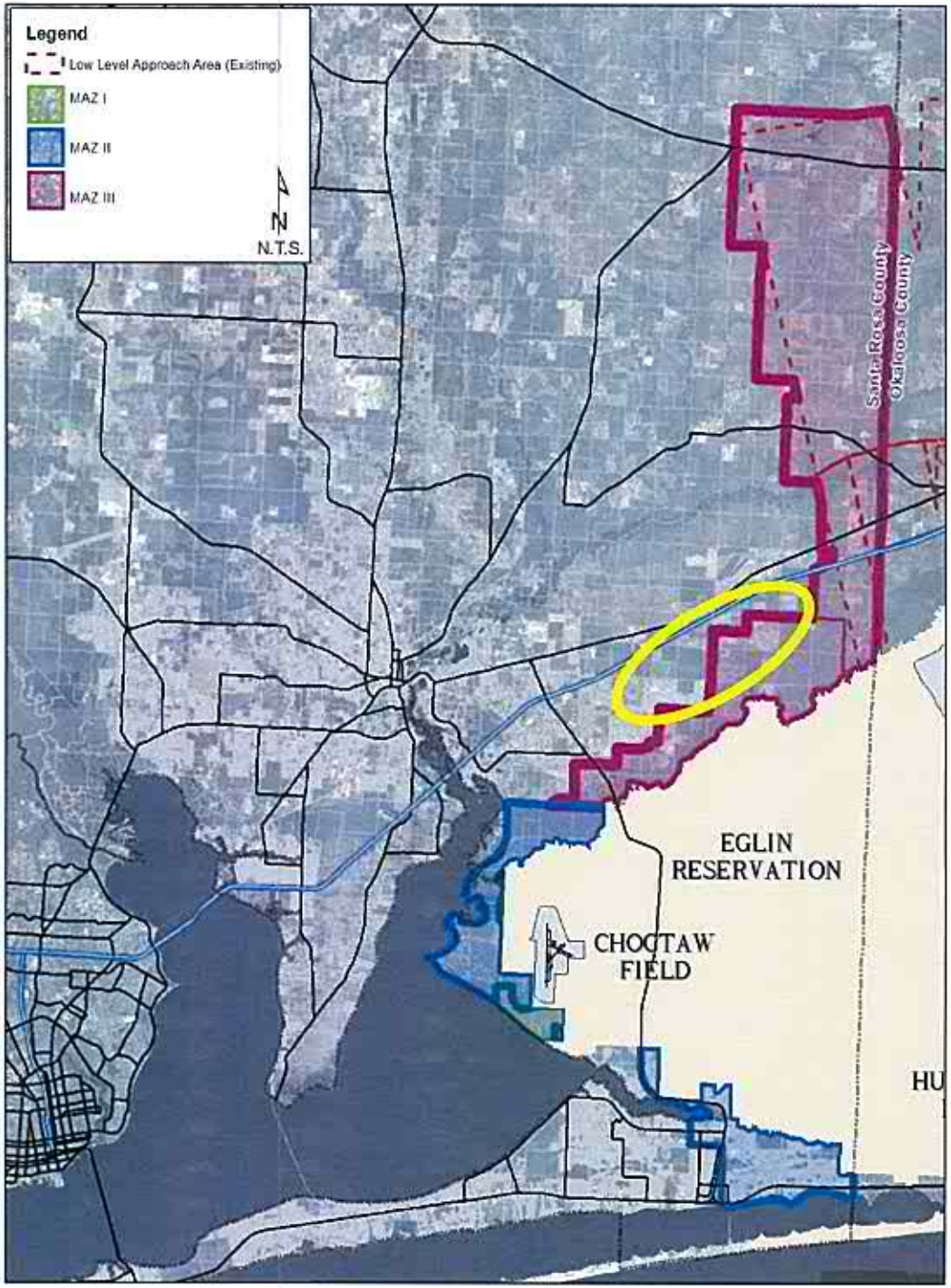
EGLIN AFB

- Received Comments from Community Planner and Test Wing
- All Comments Categorized as "Substantive" or "Administrative"
- Five Questions Included
- Some Comments Addressed in Public Release (May 2009) Version of Draft Eglin JLUS Report

AMERICAN FARMS ZONING AWARENESS GROUP

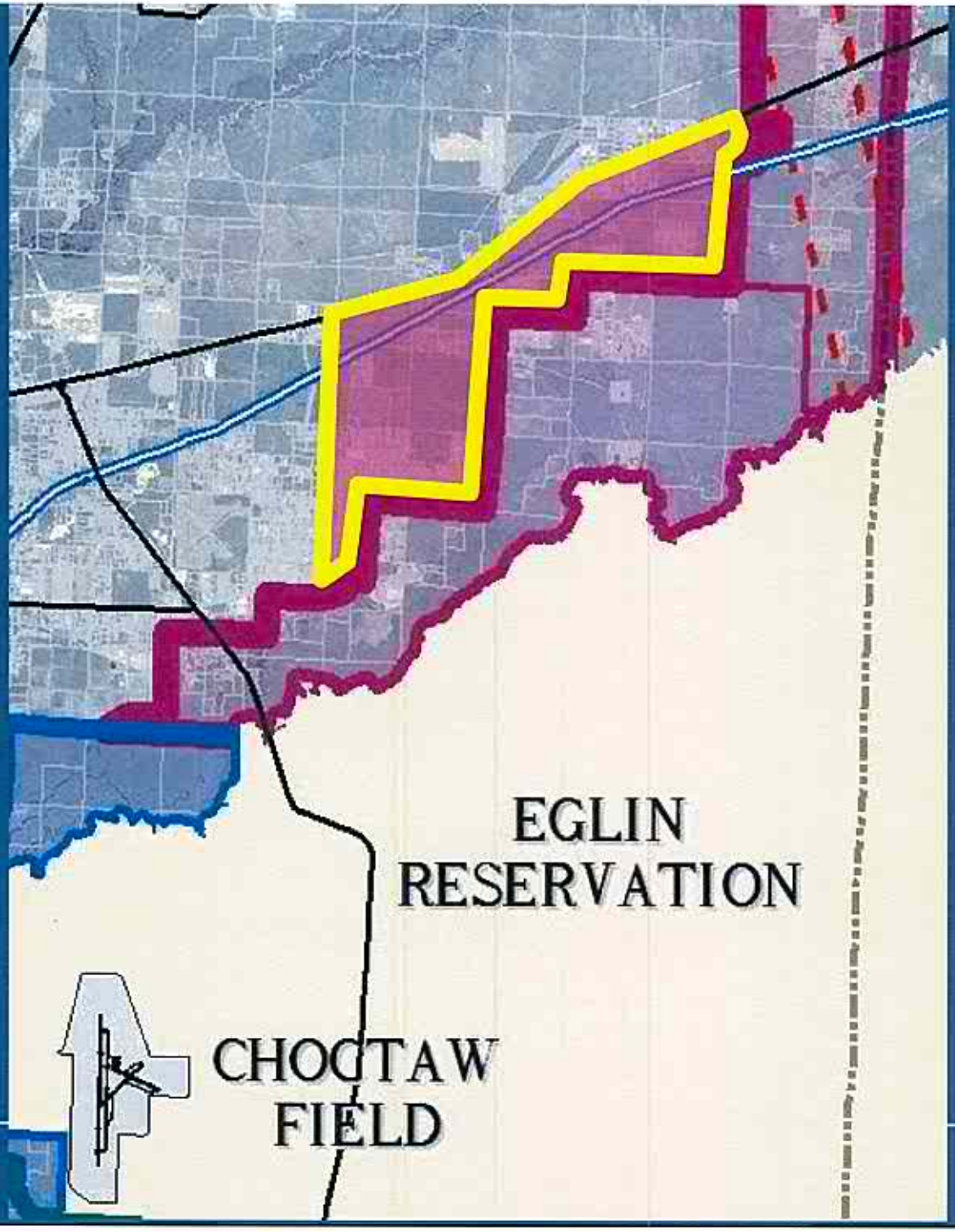
- Recommends Expanding MAZ-III Area in Santa Rosa County to Include Area Included in 19 Dec 07 Correspondence from Eglin AFB Mission Enhancement Committee (included in Attachment E)

Military Influence Planning Areas (MIPAs) for Santa Rosa County



TETRA TECH

Eglin Joint Land Use



TETRA TECH

GENERAL PUBLIC COMMENTS

- Received Two Comments (Attachment F):
  - Opposition to SRC 7 Until Additional Data & Studies Are Completed
  - Statement Received Via Fax: "With increased military facilities and housing, have any plans been made for increased power generation?"

PROJECT TIMELINE

- Preliminary Draft JLUS to PC and TAG Members – 17 Mar 09
- TAG Meeting: Draft JLUS Review – 9 Apr 09
- PC Meeting: Draft JLUS Review – 30 Apr 09
- Draft JLUS Public Release – 15 May 09
- JLUS Public Workshops – 1-4 Jun 09
- PC Meeting: Public Comment Review – 29 Jun 09
- Final JLUS Public Release – 15 Jul 09
- PC Public Hearing – 30 Jul 09

FINAL COMMENTS

JUNE 29, 2009

TETRA TECH

ATTACHMENT A

30 APR 09 EGLIN JLUS POLICY COMMITTEE MEETING MINUTES

MINUTES ARE NOT VERBATIM

JOINT LAND USE STUDY
POLICY COMMITTEE
APRIL 30, 2009

MINUTES

The Joint Land Use Study Policy Committee meeting was held April 30, 2009 at 1:30 p.m. in the Third Floor Large Conference Room, Okaloosa County Water and Sewer Building, 1804 Lewis Turner Boulevard, Fort Walton Beach. Attendee list is provided below (Attachment 1).

Commissioner Bill Roberts, Policy Committee chairman, called the meeting to order. He asked for a moment of silence in honor and memory of Okaloosa Sheriff's Deputies Lopez and York who were killed in the line of duty.

Chairman Roberts then turned the meeting over to Jeff Fanto, Growth Project Coordinator, for introductions and comments. He stressed this meeting will be most productive the more interactive it is; thus the Tetra Tech presentation is arranged to provide numerous opportunities for interaction and to vote on the information presented. The goal of the meeting is to receive the "next steps" from the Committee and to move forward with the schedule as will be presented. The intent, with the Committee's approval, is to publish the JLUS document on or about May 15, 2009. There has been scheduled (tentatively) a public workshop for public input and review on June 2, 2009 at the Crestview Chamber of Commerce building, but would like to get the Committee's input on that too. That would afford the Consultant approximately 2 weeks to prepare and present the Final JLUS document to the public about the middle of June 2009; then targeting June 30 for a public hearing to be conducted by the Policy Committee as the last step in this process that will allow the Committee to accept the Final JLUS document as complete. Following that acceptance, it would then be the responsibility of each Policy Committee member and their staff to take that document back to their respective community for adoption. Mr. Fanto then asked to go around the room so everyone in attendance can introduce themselves and asked everyone to sign in on the attendance rosters circulating around the room. Mr. Fanto then introduced Michael Bomar, Vice President of Tetra Tech, Destin, as the lead for the JLUS.

Mr. Bomar began by stressing that the process needs the input of the attendees and that he looks forward to moving forward with this study. After a review of the agenda (Attachment 2), he then provided a recap of actions and meetings that have occurred to date. Mr. Bob Black questioned what the expectation was for the Public Workshop scheduled on June 2. Mr. Bomar responded that the idea is an open house format with physical boards (maps/charts) and a brief PowerPoint presentation with personnel available to answer any questions from the public. The idea is to have that interaction with the public so they understand what is in the document.

Mr. Black then asked about the final public hearing the policy committee will conduct. Specifically, how do the entities, the cities and counties in this case, adopt the JLUS? Mr. Bomar responded that the intent of the Policy Committee Public Hearing is for acceptance of the JLUS document. Upon that action, it will be up to each individual jurisdiction to go back to their staff and policy makers to adopt their section of the JLUS. That will help the County as the lead for implementation and Mr. Tenga from the Office of Economic Adjustment (OEA) who will be looking for the acceptance of the document by the Policy Committee as well as the adoption by each jurisdiction to resource the implementation strategy.

Mayor Arnold then asked what happens if a jurisdiction rejects the study. Mr. Fanto responded that the intent was to craft a document that would be adopted by the communities as we move forward, understanding that there will be portions that may not be acted upon by communities; to make it as wholly-adoptable as possible. Adoption by the communities is key as we move forward in the implementation efforts in that as we look to OEA as our follow-on funding partner, there is an expectation by them that this document would be adopted by those communities, and that those adopting communities would be eligible for further assistance from OEA and that Okaloosa County would continue its lead role. If the study is rejected by a community, the County would need to look at ways to assist that community with its issues that have been identified and codified in the document. Mr. Bomar added that as a result of the Technical Advisory Group (TAG), the recommendations were accepted with some comments made on each one (to be discussed), but the recommendations were adopted unanimously by the TAG. As a result, they are moving forward with the expectation that we have that joint interaction and that we have received comments to date on the recommendations. Mayor Arnold replied that he didn't think that adoption of the recommendations by the TAG against one entity where everybody votes is not a fair way of doing business. He also said he feels that, for example, in Valparaiso the elements related to Valparaiso, maybe he should have 10 votes and Fort Walton Beach should only have one. That you have the full rest of the County "telling us what we're supposed to do and not even appraised or involved with what the problems are. He said that is a fallacy in the make up that you have here; having other people outside of the cities direct what some cities are supposed to do." Mr. Fanto responded that this system is applicable to any entity in the same manner.

Ms. Beckie Faulkenberry, Santa Rosa County Planning Director, commented in response to the earlier question on how local governments will handle individual adoption. She said that Santa Rosa County has done this before. One of the things they will be looking at will relate to advertising, to make sure affected property owners know about it. When they adopted their 2003 JLUS, they notified every single property owner, but they will make that decision after the public workshop supporting this study effort. She went on to say that her responsibility as Planning Director is the same for this plan as any other; and that the Eglin Range has such a broad impact with so many areas to interact with local governments. The good thing with regard to encroachment is that even if one community chooses to not adopt the recommendations, it just says that they choose not to address this issue at this time.

Mayor Arnold then questioned the jointness of the effort; that usually you consider a joint effort a give-and-take with two people sitting down, discussing and negotiating and solving their

problems. His particular perspective was that he didn't see any joint effort between Valparaiso and Eglin with any give-and-take, with no discussion having taken place. Mr. Fanto responded that those discussions did occur at the TAG at the staff level and as the managers and leaders of the process and this project, take that to be adequate on behalf of your community realizing that this document is designed to assist your community not penalize your community. This applies across the board in that identifying the incompatibilities is vital for both your community and Eglin's future missions. The Mayor then responded that Valparaiso adopting the recommendations is a "death blow" to the city; that the city can't survive – "no way." He further said that he didn't think they wanted to participate in their own demise. Commissioner Roberts responded to the Mayor that this was the best process we had available to us and that what was being raised as a concern today would have been better addressed at the front end of the study, when the JLUS structure was being formed. He also said that it is certainly the City of Valparaiso's prerogative to reject the JLUS, but he felt we were "too far down the line" to change the path of where we are headed. The Mayor countered that he would like to see the path changed, that the path is not a legitimate one because the premise that the whole study was built upon is false. Commissioner Roberts stressed that he wished this was brought up much earlier in the process.

Mr. Black then said that he felt the idea of the premise the whole study was built upon being false is just not true. The recommendations in this study are what everyone is making input upon. No particular entity has to accept any of those recommendations; and that with or without the JSF, there are incompatibilities today. So, there is a need for this and no one is going to get help if they don't help quantify the issues. He stressed the most important thing out of this effort, from a Congressional standpoint, is what could be the impact if something doesn't change. What gets discussed and what gets implemented is a follow-on process. The 2006 Air Installation Compatible Use Zone (AICUZ) identifies incompatibilities, so as entities, everyone should participate to ensure their respective issues get quantified accurately. The recommendations are ideas that if each entity could consider if they wanted to try it on their own. The Mayor replied that this study doesn't have enough detail for "us" to do anything. For example, the 2006 AICUZ is "bad, it has significant impact on the city. When I looked at the Alternative 2 in the EIS, it was more devastating than you could ever dream of. All of our efforts have been trying to rectify or solve those problems and we haven't had one minute's notice trying to look at the 2006 JLUS, that's a separate follow-on effort. Your recommendations and the ideas in the report I've read so far are so general there's no way I can go to the Congressman or you and say 'hey we need half-a-million dollars, five-million dollars or ten-million dollars to do this study.' There's no background data to support it."

Mr Black then asked the Mayor what he would propose as additional recommendations. The Mayor replied that all the recommendations they have were submitted to the Air Force to mitigate the situation. Mr Fanto then asked if those same recommendations had been submitted to the consultant for inclusion in the JLUS. The Mayor responded that he believed them to be public documents readily available and that the base can give "us" copies of them. Commissioner Roberts replied that is not the purpose of the JLUS Committee; that we are supposed to be a cooperative effort and that when we lack that level of cooperation, it is hard to get to this point and talk about how it wasn't a team effort. The Mayor responded that was the point he was making that the idea of "Joint" suggests to him all the communities and talking to

the Air Force and looking at ways to solve problems. "So far it's the Air Force saying 'I need this and this is in concrete.' And that the JLUS Executive Summary states that the purpose of JLUS is to protect the Eglin mission today and into the future."

Colonel McClintock responded that he has reviewed the minutes from the last TAG which read very optimistically. He said he was also very pleased and appreciated the work of Tetra Tech. He said he stated last summer that he thought the recommendations for Valparaiso were unacceptable and that if he was the Mayor of Valparaiso, the interim draft of the JLUS was unacceptable because of what it proposed. He further said he came out in support of re-writing the interim draft JLUS and that the version presented today is a substantive, detailed analysis that shows how all communities that are encroached is workable and that we can move forward. He then proposed to allow the group to see the briefing to see the good work that has been done. Commissioner Roberts concurred and recognized Mr. Bomar to continue his presentation.

Mr. Bomar resumed his presentation, talking through the expectations and roles of all the participants in the study as well as formally identifying the complete study area via a map. He then went to the next slide which basically reduces the complete JLUS volume into a single slide that highlights issues, strategies, and recommendations. He again reiterated the purpose of today's meeting is to focus on the recommendations in the draft report and looking at effective ways to make implementation as easy as possible. He then transitioned to slides that summarize each recommendation contained in the document.

The first slide listed recommendations A through H as indicated on the attached slide:

Councilmember Wood asked about the lighting recommendation and how it applies to those affected jurisdictions; is it a one-size-fits-all issue. Colonel McClintock responded that this is a tasker to Eglin from the TAG to look at specific concerns for specific areas for the training/operational requirements of the military. Mayor Arnold then asked how boat traffic can be discouraged. Mr. Bomar responded that by inserting language in the applicable jurisdiction's Comprehensive Plans to address this issue, those jurisdictions would not approve boat channels or other such initiatives and this would also be a factor as these initiatives worked their way through the various permitting agencies for such projects. Additional discussion occurred on this issue. Mr. Black then asked for additional clarification on recommendation H. Mr. Bomar responded that this is a two-pronged approach in that this board (JLUS Policy Committee) would remain in place but would then be the JLUS Implementation Policy Committee moving forward from the second leg which would be the Technical Advisory Group for JLUS implementation. This would allow the continued sharing of information as well as the use of a comprehensive GIS database for all three counties. It could also help formalize the interaction between the base and local planning councils when coordinating on development packages, etc. Mr. Black interjected that this could be a formal forum where Eglin could bring ideas and help with solutions to issues raised during implementation of the JLUS. Mr. Tenga remarked that this is one of the most important things to come out of this study; that their experience in other Joint

Land Use Studies is that these provide a structure for the community and the base to come together and discuss issues.

Motion by Councilmember James Wood (Destin), seconded by Councilman Bob Allen (Crestview) to accept these recommendations for inclusion in the Draft JLUS document. Motion passed unanimously.

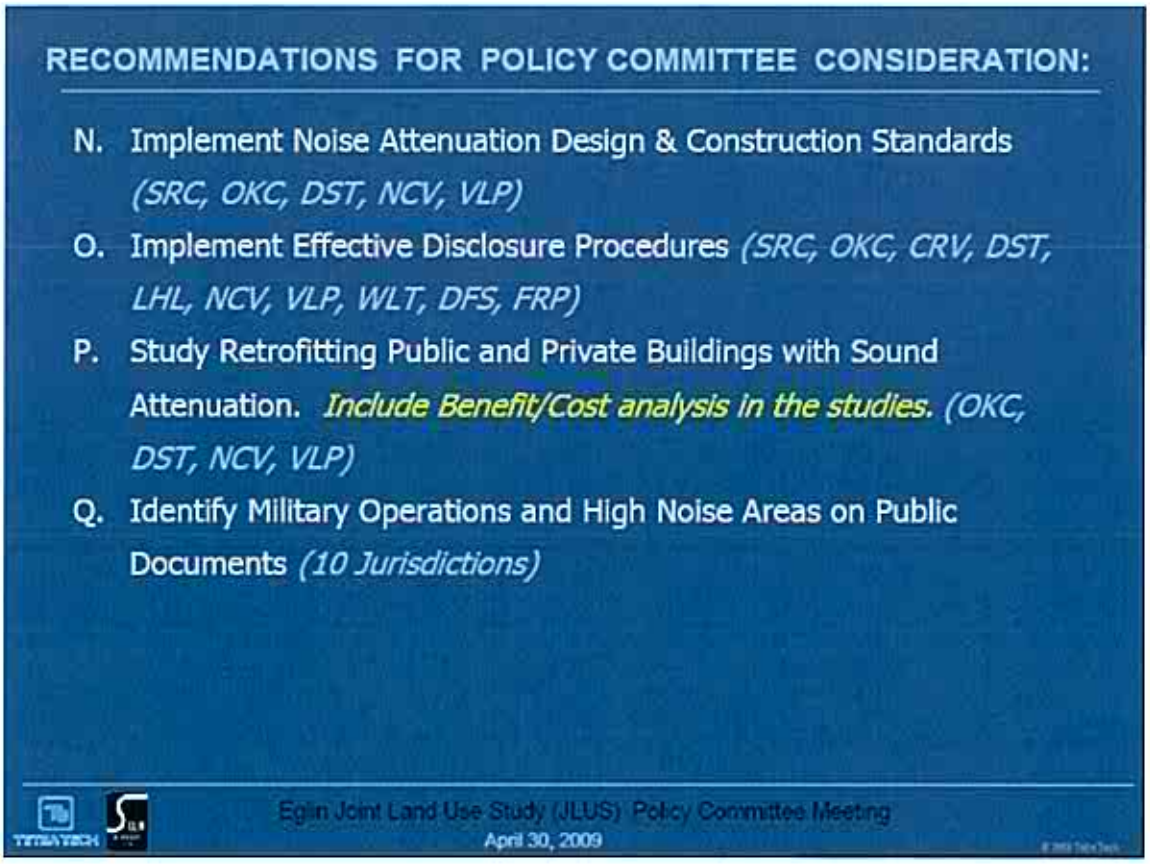
The next slide listed recommendations I through M as indicated on the attached slide:

Mayor Arnold asked what the operational concept was for the MIPAs. Mr. Bomar responded that they are areas around, for example, MIPA I encompassing the Clear Zone and Accident Potential Zones, such that the jurisdiction creates the allowable density and type of development in that zoning area. So if someone comes in during the pre-application time, the restrictions to development in that area are already set and staff knows what allowable uses are for that particular parcel. The restrictions and allowable use would be different depending on the MIPA classification, I, II or III. Mr. Scoville asked if helicopter low-level training routes were included in the MIPA. Mr. Bomar responded they are not.

Mayor Arnold asked to vote on each recommendation separately. Chairman Roberts agreed.

Motion Councilmember Wood, second Councilman Allen to approve recommendation I. Passed 6-1 with Mayor Arnold voting against approval. Motion Councilmember Wood, second Councilman Allen to approve recommendation J. Passed unanimously. Motion Councilmember Wood, second Councilman Allen to approve recommendation K. Passed 6-1 with Mayor Arnold voting against approval. Motion Councilmember Wood, second Colonel McClintock to approve recommendation L. Passed 6-1 with Mayor Arnold voting against approval. Motion Councilmember Wood, second Colonel McClintock to approve recommendation M. Passed 6-1 with Mayor Arnold voting against approval.

The next slide listed recommendations N through Q as indicated on the attached slide:



Mayor Arnold questioned why private homes were not included in recommendation P. Mr. Bomar responded that private homes are included in the Private Buildings category contained in this recommendation. The Mayor then stated that recommendations providing for additional studies with EIS Alternative 2 as the basis are premature until the Air Force issues its Supplemental EIS in 2010. Colonel McClintock responded that at the previous Policy Committee meeting (February 5, 2009) that most, if not all of this applies with or without a positive SEIS. The Mayor argued that this could be a waste of money if the SEIS noise contours were less than the current Alternative 2. Mr. Black responded that the picture is different from

the Congressional perspective, especially since the SEIS is ongoing. This study and the others recommended will provide quantitative information that will then allow other elected officials to influence the outcomes of the other activities as they go on. He did not see this as a waste of money because this information is needed to assist possible Congressional action to ensure those impacts are mitigated. Councilman Allen then asked for additional clarification on recommendation O. Mr. Bomar identified several bullets in the full text of the JLUS, such as adopting an ordinance including real estate disclosure requirements; notifying all property owners in the Clear Zones, APZs, as well as the high impulse noise areas that their parcel actually falls in this area so they are aware; participation of this body and the TAG joining efforts with a concerted lobbying effort not only at Legislative level, but also in the Florida Association of Realtors, local Realtors Association; Chapter 475 in Florida Statutes (real estate disclosures); work with West Florida Regional Planning Council seeking their assistance moving forward to broaden this out beyond the tri-county area; and then there's also a recommendation to conduct public information meetings on the disclosure, so it's part of educating the public of what steps are in place.

Mayor Arnold then asked to discuss recommendation P. His question centered on what was meant by "cost/benefit analysis?" Mr. Bomar replied that this recommendation includes an effort to look at what it would take to sound attenuate the public and private buildings, assign a dollar value in general terms on a square foot basis, with the cost/benefit side is if it costs more than a certain percentage to sound attenuate the house with sound insulation, it may be a better opportunity or more advantageous opportunities for the use of that structure. He indicated he was not saying that was going to be the result of the study, rather if you have a $100,000 house and it costs $80,000 to sound attenuate the structure, the cost/benefit is very low and the TAG comment is that should be part of the study recommended in P. After additional discussion, Mr. Bomar commented this is intended to be a tool for the local jurisdiction. It was agreed to remove the word "benefit" from the recommendation.

Motion Colonel McClintock, second Councilman Allen to approve recommendation P removing the word "benefit" from the overall recommendation. Passed unanimously.

Chairman Roberts then went back to recommendation N. Mayor Arnold said he believed this should be done through the Southern Standard Building Code so things are designed based on the same specifications. Mr. Petrey said this is also a key to keeping the Technical Advisory Group together so communities can work together on these issues and help advocate changes necessary at the State level. Mr. Bomar agreed that the idea behind all of the recommendations was to use the TAG to help work issues collectively. It was also identified by Mr. Kampert that the Florida Defense Alliance is pursuing this initiative through the state building code mechanism.

Motion Councilman Allen, second Councilmember Wood to approve recommendation N.
Passed 6-1 with Mayor Arnold voting against approval.

Motion Councilman Allen, second Councilmember Wood to approve recommendation O.
Passed unanimously.

Mayor Arnold then inquired about recommendation Q. After discussion, it was agreed the word "future" would be added to the recommendation so that it reads "Identify military operations and high noise areas on future public documents." Motion Mayor Arnold, second Colonel McClintock to approve recommendation Q as amended. Passed unanimously.

The next slide listed recommendations R through U as indicated on the attached slide:

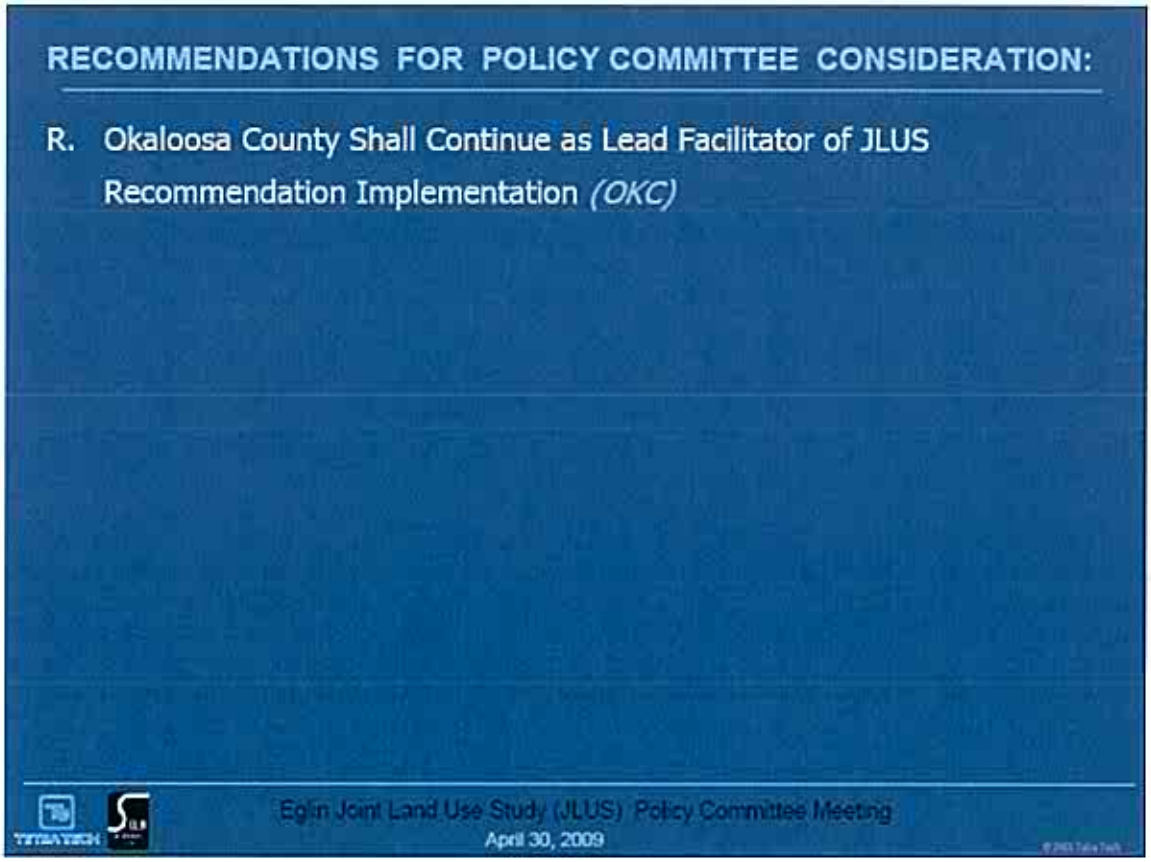
Mayor Arnold moved, seconded by Colonel McClintock to eliminate recommendations R and S as the lease on Wolverine Park will not be renewed by the Air Force. Passed unanimously.

Mr. Bomar then presented recommendation T and stressed this was only to conduct a study for the purpose of looking at redevelopment plans and possible enterprise zone creation that promotes compatible land use in the Clear Zone and APZs in the city of Valparaiso. Mayor Arnold objected to this recommendation due to the noise impact on the city overall. Colonel McClintock asked if this recommendation had anything to do with noise contours. Mr. Bomar replied that it does not.

Motion Mr. Robert Arnold, second Councilman Allen to approve recommendation T. Passed 6-1 with Mayor Arnold voting against approval.

Motion Colonel McClintock, second Councilman Allen to approve recommendation U with the changes as follows: "Develop and implement voluntary land acquisition program using existing models." Passed 6-1 with Mayor Arnold voting against approval.

The next slide listed recommendation R as indicated on the attached slide:



The final recommendation was that Okaloosa County continue as the lead facilitator in implementing the recommendations in the JLUS. OEA prefers to have a single point of contact for these efforts; Okaloosa County already has such a relationship with OEA.

Motion Councilman Allen, second Councilmember Wood to approve recommendation V (erroneously referred to as "R" on the slide). Mayor Arnold commented that as far as Valparaiso is concerned, they'd like to do their own. Passed 6-1 with Mayor Arnold voting against approval.

Last action to be addressed was the next steps in the process. The consultant is requesting the Policy Committee endorse release of the Draft JLUS document on May 15, 2009 and to proceed with the schedule as presented. Chairman Roberts asked for discussion on the recommendation

of the Crestview Chamber of Commerce as the suggested public workshop venue and the next steps in general. Ms. Lisa Algiere recommended that the Policy Committee direct more than one public workshop to gather public comment and input. The Committee agreed and directed one public workshop be held for each county. Mayor Arnold then asked if there was a provision in the executive summary for a Minority Report, or if one was provided, could it be published as part of the JLUS. Mr. Black recommended that some contextual information be included in the front of the document to help with a layman's understanding of the effort.

Motion Colonel McClintock, second Councilman Allen to issue the Draft JLUS document as soon as the consultant can have it completed. Passed unanimously.

There was then discussion on the schedule to completion, to include why there is no additional Policy Committee meeting before issuing the Final JLUS document. The Committee directed another Policy Committee meeting before the final document is released.

The meeting was concluded at approximately 3:30 p.m.

Prepared By _____

Jeff Fanto, Growth Project Coordinator
Okaloosa County Department of Growth Management

Attachment 1

Attendees

JLUS-APRIL-30TH-SIGN-IN-SHEET.PDF

Attachment 2

Agenda

- Introductions
- Recap
- Expectations and Roles
- Background – Issues, Strategies, & Recommendations Identified
- Summary of Recommendations
- TAG Discussion & Consensus
- Next Steps
- Final Comments

Attachment 3

PC 043009 print.pdf

ATTACHMENT B

NAVARRE BEACH MARINE SANCTUARY COMMENT

Eglin Joint Land Use Study (JLUS) Policy Committee Meeting

June 29, 2009

TETRA TECH

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Bomar, Michael

From: Mark Griffith [navbms@navarrebeachmarinesanctuary.com]
Sent: Friday, June 05, 2009 9:09 AM
To: Bomar, Michael
Cc: jfanto@co.okaloosa.fl.us
Subject: FW: Eglin Air Force Base Joint Land Use Study Comments from Navarre Beach Marine Sanctuary Committee
Attachments: LandUseStudySantaRosaRecommendations.pdf; LandUseStudySantaRosaRecommendationsText.pdf

Michael,

Thank you for presenting information on the JLUS last night in Milton. Forwarded are the Navarre Beach Marine Sanctuary concerns I mentioned at the public meeting. You may have already been forwarded this information but I wanted to make sure you had a written version of our concerns with regard to SRC 7 recommendation in the Draft report.

Please let me know if you have any questions or need any clarification on our concerns and request for specific exclusion from the recommendation. Also please note that the marine sanctuary committee request for exclusion from the recommendation is neither an endorsement nor an objection to the recommendation. It is a clarification to ensure near shore snorkeling and diving reefs are not discouraged by proposal or implementation of any of the study's recommendations.

Best Regards,

Mark Griffith
Chairman
Navarre Beach Marine Sanctuary Committee
850.677.1875
navbms@navarrebeachmarinesanctuary.com
www.navarrebeachmarinesanctuary.com

From: Mark Griffith [mailto:navbms@navarrebeachmarinesanctuary.com]
Sent: Thursday, June 04, 2009 11:26 AM
To: 'gmdirector@co.okaloosa.fl.us'; 'wharris@co.okaloosa.fl.us'; 'jjannazo@co.okaloosa.fl.us'; 'damunds@co.okaloosa.fl.us'; 'jcampbell@co.okaloosa.fl.us'; 'broberts@co.okaloosa.fl.us'; 'Gordon Goodin (comm-goodin@santarosa.fl.gov)'; comm-lynchard@santarosa.fl.gov; 'Commissioner Williamson'; comm-cole@santarosa.fl.gov; Comm-Salter@santarosa.fl.gov; 'saiplans@aol.com'; 'talia.starkey@tetratech.com'; 'info@tetratech.com'
Cc: tilemanjm@msn.com; RickH@santarosa.fl.gov; 'Danowakley00@cs.com'; 'Hunter Walker'; 'dustyr@nwfdailynews.com'
Subject: Eglin Air Force Base Joint Land Use Study Comments from Navarre Beach Marine Sanctuary Committee

To:
Okaloosa County Growth Management Director
Tetra Tech, Inc (Destin Office)
Solin and Associates, Inc.
Santa Rosa County Board of Commissioners
Okaloosa County Commissioners

Dear Sir or Madam,

I was unaware of the June 3rd public hearing on the Eglin Air Force Base Joint Land Use Study prepared for Eglin Joint Land Use Study Policy Committee and Technical Advisory Group by
Solin Associates, Inc., Tetra Tech, Inc. Therefore I am writing to you to provide comments on behalf of the Navarre Beach Marine Sanctuary Committee.

I have reviewed the study's summary recommendations and those specifically for Santa Rosa County (Section 2). I've specifically noted recommendation SRC 7 as listed on page 2-47 and outlined in page 2-33 of the study. I've attached .pdf file versions of those pages for your reference.

We believe most people would interpret the recommendation to discourage artificial reefs off of the Navarre coast as excluding the snorkeling and diving reefs on the beach and in the sound on the shores of the Navarre Beach Park that the Marine Sanctuary Committee is working toward. However the wording in the recommendation makes no specific exclusion for such reefs. Without such an exclusion explicitly stated, one could argue that the recommendation would oppose the rebuilding of the Navarre fishing pier, as it extends substantially further in to the Gulf of Mexico than the snorkeling reefs and be generally more populated on a day to day basis.

The Navarre Beach Marine Sanctuary committee requests that the wording of either the recommendation or the analysis that speaks to the recommendation, be changed to include a specific exception for snorkeling and diving reefs or fishing piers in the Santa Rosa Sound that are accessible by swimmers and pedestrians from shore, and those in the Gulf of Mexico that do not extend past 2,000 feet. This would ensure no future misinterpretation of the study's recommendations and also ensure no conflict with long held desires of the citizens and government of Santa Rosa County to establish a Marine Sanctuary with snorkeling and diving reefs at Navarre Beach. This public interest is manifested by Resolution 2009-13 passed by the Santa Rosa County Board of Commissioners in May of this year supporting the creation of the Marine Sanctuary and agreeing to apply for and hold required permits pending gathering of permit application information.

I would appreciate any of you addressed on this email commenting publicly to affirm the important exclusion of the snorkeling and diving reefs to recommendation SRC 7 of the study, and requesting/changing the wording to reflect that change.

Please note that the same recommendation is made for Walton County. While we are unaware of any efforts to establish similar land accessible snorkeling/diving reefs in Walton County it may be prudent to consider adding the same exception wording to that recommendation.

Please do not hesitate to contact me if you have any questions regarding these comments or the wording request change.

Best Regards,

Mark Griffith
Chairman
Navarre Beach Marine Sanctuary Committee
850.677.1875
navbms@navarrebeachmarinesanctuary.com
www.navarrebeachmarinesanctuary.com

ATTACHMENT C

CITY OF VALPARAISO 8 APR 09
STAFF COMMENTS, 9 JUN 09
LETTER FROM CITY AND 24 JUN 09
RESPONSE LETTER
FROM OKALOOSA COUNTY

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RESPONSE TO DRAFT JLUS

PREPARED BY CITY OF VALPARAISO STAFF

SUBMITTED ON APRIL 8, 2009

The City of Valparaiso offers the following comments in response to March 2009 draft JLUS. However, by providing comments the City of Valparaiso is not expressly or impliably accepting or acknowledging the lawfulness of the United States Air Force's recent Record of Decision establishing the IJTS at Eglin main base and bedding down 59 Joint Strike Fighter aircraft at Eglin main base. Indeed, nothing contained here within should be construed to limit the City of Valparaiso's ability to raise any argument it has available to it in its recently – filed challenge to the Record of Decision, formerly the City of Valparaiso v. USAF et al, case # 3: 09-cv-00135-MCR-MD.

VLP 1 – No Issue

VLP 2 – No Issue

VLP 3 – The draft recommendation to study the implementation steps to retrofit existing public buildings for sound attenuation is premature. The first step should be to determine the required standards and cost to retrofit existing public buildings within the high noise level areas (>65 db) before you study the implementation. Since this recommendation is repeated for other cities and county, the appropriate recommendation should provide for collaboration among all local governments to establish a consistent standard with the county serving as the lead. The recommendation should address the need to obtain funding to conduct the study.

VLP 4 – Same as VLP3, except as it applies to habitable buildings.

VLP 5 – The draft recommendation to study the Development and Implementation of a Voluntary Land Acquisition Program is lacking in substance. The recommendation identifies several entities that may be interested in purchasing property to further their causes, but fails to identify the negative effects on the city. In this section, the idea is to purchase undeveloped land for conservation, but in other sections there is a recommendation to develop property for manufacturing and other compatible uses. It is noted in the report that this should be

coordinated with the Redevelopment Study. Conservation is desirable as well as appropriate development. However, to separate the recommendations does not address the issue holistically. Land acquisition by the proposed groups will remove the land from the tax rolls reducing the city's revenue. This recommendation should contain an essential element to offset lost ad valorem revenue by releasing federally owned land for taxable development within the same jurisdiction.

VLP 6 – This requirement is already addressed in Section 163.3175 Florida Statutes. The city currently has a policy for an Eglin representative to sit on the Planning and Advisory Board. Notices are sent to the representative for each meeting. Historically there has been little to no participation by the military. Additionally, the County hosts an intergovernmental coordination committee monthly that addresses development issues.

VLP 7 – No Issue

VLP 8 – The study of a redevelopment plan is very costly. In addition, the parameters of the plan have not been fully identified in the proposed recommendation. The study area identifies three areas that would demolish homes for commerce and manufacturing. A fourth area is identified for redevelopment of homes in the historic area into a dense development of mixed use for residential, office and retail. To redevelop the historic area is contrary to the city's vision of maintaining its small, fishing village atmosphere, thus making Area IV an unviable alternative. The city has had conversations with the JLUS consultant about federally owned land in the southwest portion of the city that would be ideal for appropriate development that could provide economic prosperity to the city and offset losses from the voluntary land acquisition. It is noted in the Eglin 18 recommendation, the JLUS consultant recommends Eglin purchase land in Valparaiso adjacent to the federally owned land to increase their land holdings for future use. The city is interested in what that future use will be. Does the JLUS consultant have advanced knowledge of Eglin expanding their missions into the City of Valparaiso? Does the JLUS consultant realize that when Eglin acquires those parcels, the city's ad valorem revenue will be further reduced? The City will consider studying a redevelopment plan only if it contains viable components. Valparaiso recommends that Okaloosa County take the lead to obtain funding to study the creation of a Redevelopment Plan and Program to help resolve the existing incompatibilities in the Clear Zone, APZ I, and APZ II.

Valparaiso will collaborate with the County in preparing the scope of work and selecting the consultant.

VLP 9 – An Enterprise Zone can only be established based on existing criteria which Valparaiso does not qualify. Further, the number of Enterprise Zones is set by the State Legislature. This recommendation should be reworded to reflect these facts. A more viable recommendation would be to lobby the State Legislature for enabling legislation establishing an Enterprise Zone in Valparaiso. The establishment of an Enterprise Zone should be one facet of the Redevelopment Plan in VLP 8.

VLP 10 –Okaloosa County should take the lead on developing acceptable construction standards for new construction providing noise level reduction inside structures proposed within maximum mission noise areas (>65 dB). Construction standards should be consistent throughout the county rather than each local government creating their own standards.

VLP 11 – Effective disclosures concerning notification of buyers and leasers that property is near a military installation subject to clear zone, APZs I and II, ... is not limited to a single jurisdiction. This recommendation should be directed to lobbying for a change to Florida Statute, Chapter 475. Since this is a statewide issue and lobbying is an expensive endeavor, Okaloosa County should take the lead to obtain funding to lobby for a change to Florida Statute, Chapter 475 that will require mandatory disclosure of properties within the Clear Zone, APZ I, and APZ II. Valparaiso will consider adopting a resolution supporting the County's efforts.

VLP 12 – No Issue

VLP 13 – No Issue

VLP 14 – This recommendation is inconsistent with current events. Eglin has already notified the City that the lease for Wolverine Park will expire on September 30, 2009. The City is interested in obtaining a new lease from Eglin for land that is more appropriate for development of a sports complex for girls softball. The lease could include provisions for the military to use the ball fields during their tournaments as part of the city's in-kind donation.

VLP 15 – As stated in VLP 14, Eglin has notified the city that its lease for Wolverine Park will expire this year. To make the recommendation to obtain funding is moot.

VLP 16 – Establishing an MIA designation in Valparaiso is very premature. Eglin is preparing a supplemental EIS with a final ROD to be issued. As it stands now, an MIA designation would include the entire City of Valparaiso. Suggested language on page 12-40 to "Promote an orderly transition and rational organization of land uses" and "Create compatible mix of land uses" implies drastic rezoning. Before an MIA is designated in Valparaiso, it is more appropriate to conduct the Redevelopment Study and then follow with the MIA. There are too many unknown facts for Valparaiso to wholeheartedly endorse an MIA. The preferred language for this recommendation is to incorporate the idea of an MIA into the scope of work for the Redevelopment Study.

VLP 17 – Updating the city's comprehensive plan and LDC is premature for the same reasons as stated above. Also, the city is in the process of preparing its EAR. The process of amending a comprehensive plan and LDC is very time consuming. The process involves citizen input. Amending these documents several times will be confusing to our citizens. It makes more sense to prepare one amendment to the comprehensive plan and LDC rather than piecemeal the documents. Valparaiso needs all the facts from the supplemental EIS and final ROD so that the amendments will completely address the issues and meet the needs of our citizens. The preferred language for this recommendation is to incorporate appropriate amendments to the comprehensive plan and LDC into the scope of work for the Redevelopment Study.

EGL 1 – No Issue

EGL 2 – No Issue

EGL 3 – No Issue

EGL 4 – No Issue

EGL 5 – No Issue

EGL 6 – No Issue

EGL 7 – Participate in an on-going and proposed voluntary land acquisition programs. This recommendation needs to be amended to include a commitment to identify federally owned land that may be made available for taxable development within the same jurisdiction to offset loss of ad valorem revenue.

EGL 8 –No Issue

EGL 9 – Same as VLP 6.

EGL 10 – No Issue

EGL 11 – Sponsor Acquisition of Properties in the Clear Zone. The recommendation should address source of funding and entity responsible for making purchase. It should also include identification of federally owned land that may be made available for taxable development within the same jurisdiction to offset loss of ad valorem revenue.

EGL 12 – No Issue

EGL 13 – No Issue

EGL 14 – Any updates to the AICUZ should address future events that may impact local communities but do not require an EIS.

EGL 15 – No Issue

EGL 16 – No Issue

EGL 17 – As addressed in VLP 15 and VLP 16, Eglin has notified the City of Valparaiso that its lease for Wolverine Park will expire September 30, 2009. The city would consider negotiating for other land that is more appropriate for development of a sports complex. One possible term of the lease would be for Eglin to have use of the ball fields during their tournaments to be counted as in-kind. This arrangement could be mutually beneficial to both parties.

EGL 18 – The JLUS consultant needs to identify future uses under consideration by Eglin. Additionally, this recommendation needs to include language that addresses identification of federally owned land that may be made available for taxable development within the same jurisdiction to offset loss of ad valorem revenue.

FRESH AND SALTWATER SPORTS
ON CHOCTAWHATCHEE BAY

CITY OF VALPARAISO

465 VALPARAISO PARKWAY • (850) 729-5402
VALPARAISO, FLORIDA 32580

HOME OF
EGLIN AIR FORCE BASE

June 9, 2009

Chairman Bill Roberts
Okaloosa County Board of Commissioners
1804 Lewis Turner Blvd - Suite 100
Ft. Walton Beach, FL 32547

Dear Chairman Roberts:

On behalf of the Valparaiso City Commission, this letter serves as official notice that the City of Valparaiso cannot approve the majority of the draft JLUS of May 20, 2009, and the recommendations cited for Valparaiso; as matter of fact we take a strong opposition stance.

I am extremely disappointed in the JLUS process. The City had hopes that this study would be a true joint effort between the Air Force and affected communities. Instead, Tetra Tech and JLUS consultants produced a report that only protects the Air Force mission today and in the future. There are no recommendations in the Eglin AFB portion of the study that require the Air Force to alter their operations to reduce negative impacts. Tetra Tech only reminded the Air Force to complete the supplemental Environmental Impact Study (EIS) and Record of Decision (ROD).

The whole premise of the JLUS is based on invalid assumptions rather than facts. Tetra Tech used Alternate 2 of the draft EIS, the worst case scenario which will decimate Valparaiso. Most importantly, the Air Force has stated it will not choose Alternate 2 of the final EIS of September 2008. Furthermore, Tetra Tech is recommending Valparaiso implement extreme measures of redevelopment and land acquisitions. Even if successful it will take many years to implement these recommendations, during which time the City will lose a very large portion of its revenue and its ability to survive. Also, the city has no resources to acquire indentified troubled properties.

In addition, the process of formulating the JLUS is a violation to the Valparaiso citizens' constitutional rights. The idea of officials from other municipalities voting to tell one municipality what recommendations they should accept is preposterous. We are guaranteed the right to home rule as a local government, not rule by a JLUS committee.

The JLUS finalization should be delayed until the Air Force supplemental EIS and a ROD are issued. The City sees no alternative other than rejecting the majority of this study and recommending completion be delayed until effects of the aforementioned documents are evaluated so sound and viable policy decisions can be formulated by a just process resulting in sound policy decisions for the future of our City.

Respectfully,

John B. Arnold, Jr.
Mayor

cc: Congressman Jeff Miller
Senator Bill Nelson
Senator Mel Martinez
Rich Tenga
Jeff Fanto
Walker Banning

Board of County Commissioners

State of Florida

June 24, 2009

The Honorable John B. Arnold, Jr.
Mayor of the City of Valparaiso
465 Valparaiso Parkway
Valparaiso FL 32580

Dear Mayor Arnold:

I'm writing in response to your June 9, 2009 letter which you indicated was serving as the "official notice that the City of Valparaiso cannot approve the majority of the draft JLUS of May 20, 2009, and the recommendations cited for Valparaiso; as a matter of fact we take a strong opposition stance."

It is regrettable that you are "extremely disappointed in the Joint Land Use Study (JLUS) process" and that "the City had hopes that this study would be a true joint effort between the Air Force and affected communities." By measure of the state, the three counties, 10 other cities, and Eglin AFB all which are fully satisfied with the JLUS process, your disappointment appears to stand alone. In fact, all jurisdictions have been very impressed with the efforts so far and have unanimously voted in support of all JLUS recommendations. Even the Valparaiso representatives who attended all JLUS meetings have supported the JLUS and voted in favor of all recommendations. It wasn't until your first-time attendance at the April 30, 2009 Policy Committee meeting that the committee became aware of your disagreement with 8 of the recommendations, although you did vote in favor of 12 recommendations.

It's important to remember the two primary JLUS Program objectives:

1) To encourage cooperative land use planning between military installations and the surrounding communities so that <u>future</u> civilian growth and development are compatible with the training or operational missions of the installation; and

2) To seek ways to reduce the operational impacts on the adjacent land.

The "Joint" in the Joint Land Use Study pertains primarily to the land use planning effort in which the community leads the JLUS; the military participates in a supporting role by providing mission information and staff to support the cooperative planning effort. The goal in this case is for Eglin AFB to provide sufficient information to assist the community in future development planning and to identify current encroachment concerns. This jointness is clearly evident through the participation by community and base representatives in the JLUS Technical Advisory Group (TAG) and the JLUS Policy Committee, which have met 4 times each throughout this three year process as well as

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(850) 689-5030 • Fax: 689-5059

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(850) 651-7100

1804 Lewis Turner Blvd., Suite 100
Fort Walton Beach, FL 32547
(850) 651-7105 • FAX: 651-7142

the recently-held Public Workshops held June 1, 2, and 4, 2009 at Walton, Okaloosa, and Santa Rosa County venues. Our records indicate that Valparaiso has been represented at every meeting, not to mention the 5 one-on-one meetings between the County, the Office of Economic Adjustment (OEA), Tetra Tech, and City Staff on Valparaiso concerns associated with the JLUS. As the JLUS program manager, OEA has provided both the Air Force and community with valuable technical assistance on conducting the study. Eglin AFB senior representatives have been fully engaged with the JLUS with attendance at JLUS Policy Committee by the 96th Air Base Wing Commander (as Vice Chairman), and by the Chairman of the Eglin Mission Enhancement Committee. Eglin staff has participated extensively at the TAG level.

Jointness is also evident in this study by Eglin's efforts to seek ways to reduce operational impacts. Unlike a normal JLUS, which is not initiated until a current Air Installation Compatible Use Zones (AICUZ) is available; the Eglin JLUS utilizes available Environmental Impact Statement (EIS) data, as requested by Valparaiso. In this case, the Air Force is conducting a Supplemental Environmental Impact Statement (SEIS) to review all possible mitigation measures for new mission compatibility with the local community, which far out weighs normal installation compatibility measures. The intent is to add these supplemental measures to a supplemental JLUS when the SEIS is completed in fall 2010.

On February 5, 2009, the JLUS Policy Committee, including a representative from the City of Valparaiso, met and voted unanimously to use the October 2008 Final EIS noise contours and to further use the Maximum Mission Contours (MMC) for each participating jurisdiction. The MMC are in reality maximum planning contours. The Policy Committee also voted to approve use of Military Influence Planning Areas (MIPA) to define the areas affected by the JLUS recommendations. MIPA lines are derived from the MMC lines. The MIPA boundaries are also useful for defining specific areas in which additional analysis such as small area studies and sound attenuation analysis could be conducted. Implementation of the JLUS recommendations can be initiated upon completion of the study understanding the noise contour lines are designed for initial planning purposes. Again, this is a land use planning study conducted by the community, it's not the operational environmental impact study conducted by the Air Force.

The Policy Committee's intent has always been to supplement the JLUS with more precise noise contour overlays with refined contours from SEIS, keeping in mind that the noise contours may change again when the AICUZ is updated with actual F-35 flight operations, several years from now. However, a majority of the recommendations in the JLUS can be worked on while waiting for the SEIS to address compatibility issues before it's too late. This is particularly important for the Tri-County area since the new missions coming to Eglin are expected to bring thousands of new military personnel, DOD civilians, contractors and family members. This rapid growth must be considered in land use planning for undeveloped areas now, which is the primary purpose of the JLUS.

Delaying the entire JLUS project for one jurisdiction until the completion of the SEIS would do a tremendous disservice to the jurisdictions that worked so hard on this and to the residents of the Tri-County area; I do not support your request. The Policy Committee has encouraged all jurisdictions to work together and to adopt the recommendations in their chapter once the JLUS is final since this step is required to

receive additional Federal assistance to help the jurisdictions with implementation of the recommendations. This adoption signals each jurisdiction's acknowledgment of the issues identified and a commitment to resolving the conflicts that exist. Failure to adopt the JLUS could result in a lost opportunity for continued financial and technical assistance available through OEA.

As I've already said, Okaloosa County is committed to supplementing the noise analysis in the JLUS once SEIS data is available to fine tune the lines. I believe the Policy Committee will continue to support completion of the JLUS, additional analysis, and implementation of the recommendations to the maximum extent possible with the understanding noise contour and MIPA lines may shift over time. As a result, I will recommend the expedient completion of the JLUS at the upcoming June 29, 2009 Policy Committee meeting. I encourage you to attend this meeting.

In response to your concerns, I will recommend the following statement as an additional agenda item at that meeting for inclusion in the Valparaiso chapter of the Final JLUS document: "On behalf of the City of Valparaiso, the Mayor voted to disapprove recommendations I, K, L. M, N, T, U, and V. The City has indicated they may reconsider its position on these recommendations after release of the Air Force Supplemental Environmental Impact Statement (SEIS) for the F-35 training mission at Eglin AFB in the fall of 2010 and inclusion in a supplemental volume of this JLUS."

For your convenience, each recommendation title and subsequent vote is listed for clarity in the attachment; the full detail of each recommendation is provided in the text of the Draft JLUS.

Respectfully,

Bill

Bill Roberts
Chairman, JLUS Policy Committee
Chairman, Okaloosa County Commission

cc:
Congressman Miller
Senator Bill Nelson
Senator Mel Matinez
Rich Tenga
Jeff Fanto
Walker Banning

ATTACHMENT

Summary of recommendations and votes:

A. Implement Lighting Standards to Avoid Glare and Reflection. Eglin to coordinate specific levels of service for standards (All 14 Jurisdictions): *Approved 7-0, you voted to approve.*
B. Distribute Educational Handouts on Radio Frequency Provided by Eglin AFB (All 14 Jurisdictions): *Approved 7-0; you voted to approve.*
C. Implement Public Awareness Measures (All 14 Jurisdictions): *Approved 7-0; you voted to approve.*
D. Discourage Increased Boat Traffic in Controlled Firing Areas through Comp Plan Amendments (SRC, OWC, DST, FWB, MES, WLT): *Approved 7-0; you voted to approve.*
E. Limit Object Heights (All 14 Jurisdictions): *Approved 7-0; you voted to approve.*
F. Participate in Ongoing GRASI Airspace Study (All 14 Jurisdictions): *Approved 7-0; you voted to approve.*
G. Support Funding and Construction of Destin Airport Control Tower (OKC, DST): *Approved 7-0; you voted to approve.*
H. Formalize Military and Inter-Governmental Coordination Policies and Procedures (All 14 Jurisdictions): *Approved 7-0; you voted to approve.*
I. Establish Military Influence Area (MIA) Zoning Overlay Districts Creating MIA Designations I, II, and/or III. Use Military Influence Planning Area (MIPA) in lieu of MIA (SRC, OKC, CRV, DST, LHL, NCV, VLP, WLT, DFS, FRP): *Approved 6-1; you voted against approval.*
J. Conduct Small Area Studies in MIA III's (SRC, OKC, CRV, LHL, WLT, DFS, FRP): *Approved 7-0; you voted to approve.*
K. Temporarily Limit Increases in Density and Intensity in MIA III's Until Small Area Studies are completed. Not applicable to approved developments or developments under review (SRC, OKC, CRV, LHL, WLT, DFS, FRP): *Approved 6-1; you voted against approval.*
L. Update Comprehensive Plan and Land Development Code to Strengthen Position Related to Compatible Uses (All 14 Jurisdictions). *Approved 6-1; you voted against approval.*
M. Support and Promote State and/or Federal Land Acquisition. Include strategies to offset tax revenue losses (SRC, OKC, CRV, LHL, NCV, VLP, WLT, DFS, FRP): *Approved 6-1; you voted against approval.*
N. Implement Noise Attenuation Design & Construction Standards (SRC, OKC, DST, NCV, VLP): *Approved 6-1; you voted against approval.*
O. Implement Effective Disclosure Procedures (SRC, OKC, CRV, DST, LHL, NCV, VLP, WLT, DFS, FRP): *Approved 7-0; you voted to approve.*
P. Study Retrofitting Public and Private Buildings with Sound Attenuation. Include Benefit/Cost analysis in the studies. (OKC, DST, NCV, VLP). *You recommended the word "Benefit" be eliminated from this recommendation, which was agreed to by the Committee. Recommendation Approved 7-0; you voted to approve.*
Q. Identify Military Operations and High Noise Areas on Public Documents (10 Jurisdictions). It was recommended the word "Future" be inserted between "on" and "Public." *Recommendation approved 7-0; you voted to approve.*

R. Designate Specific Use Restrictions on Magnitude of Activities at Wolverine Park for Compatible Use Within AICUZ Compatibility Guidelines (VLP). *Upon your motion which was seconded by Col McClintock, this recommendation was removed from the JLUS. Approved 7-0; you voted to approve.*

S. Apply for Funding Assistance to Reconfigure Wolverine Park to Comply with AICUZ Compatible Use Guidelines (VLP). *Upon your motion which was seconded by Col McClintock, this recommendation was removed from the JLUS. Approved 7-0; you voted to approve.*

T. Study Redevelopment Plans and Enterprise Zone Creation Promoting Compatible Land Use in the Clear Zone, APZ I & APZ II and Economic Diversity for the City. With coordination with Valparaiso on the preferred redevelopment area (VLP). *Approved 6-1; you voted against approval.*

U. Develop and Implement Voluntary Land Acquisition Program. Combine with "M" and include Recommendation for Strategies to offset tax revenue losses (SRC, OKC, CRV, NCV, VLP). Recommendation was changed to include the words "using existing models" at the end of the recommendation. *Approved 6-1; you voted against approval.*

V. Okaloosa County Shall Continue as Lead Facilitator of JLUS Recommendation Implementation (OKC). *Approved 6-1; you voted against approval.*

ATTACHMENT D

EGLIN AFB COMMENTS

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TEST WING COMMENTS
EGLIN COORDINATION COMMENT/RECOMMENDATION MATRIX
FOR 90% DRAFT JLUS

CRITICAL - AAC non-concurs with document. Identified concern must be satisfactorily resolved to obtain concurrence.

MAJOR - AAC concurs with document; however, agency has significant reservations about indicated section and requests concern be specifically addressed with designated point of contact prior to publication.

SUBSTANTIVE - AAC concurs with document but recommends change to improve clarity or content. Agencies should suggest substantive changes whenever sections in document appear to be or are potentially: unnecessary, incorrect, incomplete, misleading, confusing, or inconsistent with other sections.

ADMINISTRATIVE - ACC comments to correct what appear to be inconsistencies between different sections, typographical errors, or grammatical errors.

CATEGORY	COMMENT/RATIONALE
SUBSTANTIVE	Our Cape San Blas Test Site is barely mentioned, I guess because the study area is limited to the local tri-county area. Recommend you at least have it and Gulf County mentioned briefly in the 16.1 Intro with a reference to the map at Figure 16-13. Reviewer: Tom Heffernan
SUBSTANTIVE	Recommend maps be amended as follows to ensure audience appreciates key features of the Eglin Range and our military mission: a. Show NAS Whiting Field airspace b. Add Site C-6 and Field 1 c. Show 7th SFG(A) Cantonment (under construction) d. Fig 16-13 should be modified: a good place to illustrate the GRASI initiative in terms of regional airspace being considered; good place to show the new East Bay Airport (replacing PC Airport). e. Figure 16-11: I don't believe all of these areas are legally considered "Controlled Firing Areas", check with Don Roswell, 46OSS Airspace Manager for confirmation. Reviewer: Tom Heffernan
SUBSTANTIVE	Mission aspects overlooked: key features of past, current and likely future military missions are missing from the narrative and therefore from the analysis: laser operations on our Santa Rosa Island test sites; impacts of large footprint weapons test and training on regional airspace and surface transportation; 16.2.4 & 16.3.4 Lighting: add the use of Choctaw Field by US Navy training wings for Fleet Carrier Landing Practice (FCLP) at night, a very important reason to maintain the Dark Skies in that part of the study area; the H-53 fleet of helicopters at Hurlburt is being replaced by the CV-22 Osprey, this should be made clear throughout the document, particularly as it will change noise impacts from low level helicopter (and tilt-rotor) training; Unmanned Aerial Vehicle (UAV) use aboard the Eglin Range Complex is a rapidly growing presence, including players from AFRL, AFSOC, 7th SFG(A) and Test Wing. Regionally, noise impacts and airspace congestion will rise proportionately as this test and training mission area continues to evolve; 16.2.7: Controlled Firing Areas: the last para of this section addresses mission impact from water surface traffic, the perfect place to discuss the recent request to support re-opening the Navarre Beach Pass (a narrow outlet connecting Santa Rosa Sound and the Gulf beneath our Santa Rosa Island CFA) and how it's been dealt with by the MissionEncroachment Committee, to date. Reviewer: Tom Heffernan

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SUBSTANTIVE	Figure ES-2: in the "Issues" bubble, recommend "Sensitive Species Habitat" be listed or at least added to the narrative as an additional yet crucial goal of compatible use management of "Development Near Eglin AFB Boundary". Not too far down the road, Eglin is likely to become an island of biodiversity, a Noah's Ark if you will, due to the fact that the last remaining enclaves of suitable habitat outside the fence are being cut, filled and built-up/paved over. As these protected species have fewer and fewer options, they default to the expertly-managed DoD acreage inside the fence line for habitat, increasing our management obligations & potential mission constraints. This process is taking place across the country around DoD installations and forward-leaning regional partners are taking appropriate steps to turn the tide in order to sustain their installation's mission capability. I believe this is our opportunity to educate and encourage our regional partners to do the same. Reviewer: Tom Heffernan
SUBSTANTIVE	Page 1-6: Recommend providing a better explanation of Special Use Airspace (SUA) especially the importance of Restricted Airspace (RA) which is required for the conduct of hazardous military operations such as munitions test and training. RA is also currently required for the operation of unmanned aerial systems (UASs). Eglin has 66 percent of the RA, extending from surface to unlimited altitude, east of the Mississippi River. This combined with the connection to 123,000 square miles of overwater RA and Warning Areas (also authorized for hazardous operations) is one of the key reasons the 2005 BRAC Test and Training Panel ranked Eglin as DoD's highest military value installation in the continental United States (CONUS). Eglin controlled SUA is truly a national asset. Reviewer: Jess Borthwick, 46 TW/XP
SUBSTANTIVE	Page 1-6: Recommend provided an explanation of the AICUZ program in addition to RAICUZ. Reviewer: Jess Borthwick, 46 TW/XP
SUBSTANTIVE	Page 1-8: Recommend adding Jesse Borthwick and Mike Penland to list of Eglin Planners under the Technical Advisory Group in Figure 1-4, to ensure range and airspace planner representation. Reviewer: Jess Borthwick, 46 TW/XP
SUBSTANTIVE	Page 1-9: 1.4.3 Alternatives for F-35 need to be updated to reflect the JSF Record of Decision (ROD) signed on Feb 5th.
SUBSTANTIVE	Page 1-9: 1.6.3 Needs to define Military Training Routes in area (including altitude blocks). Report indicates they are below 10,000 ft above MSL, when in fact, most extend down to 500 ft MSL. Recommend highlighting the MTRs identified in the Eglin BRAC EIS which will be used by JSF along with potential noise consequences for various land uses. Also recommend addressing JSF ROD decision to assess all MTRs surrounding Eglin in the JSF Supplemental EIS (SEIS). Reviewer: Jess Borthwick, 46 TW/XP
SUBSTANTIVE	Page 2-9: Figure 2-6 can mislead as it shows instantaneous sound levels for representative sources as opposed to examples of environments that are representative of communities with 24 hour Day Night Sound Levels (Ldn) which are depicted in contour maps contained within the report. For example the figure shows examples of an automobile at 100 ft (65 dB), vacuum (70 dB) , garbage disposal (75 dB) and a truck at 50 ft (80 dB). Readers may mistakenly assume these examples relate directly to the Ldn noise contours contained in the report. If the intent is to compare to military noise sources, then it may be appropriate to include instantaneous sound levels from representative military aircraft over flights at specific altitudes. Examples of various typical communities at various Ldn levels can

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	be found in the 1974 EPA Report to Congress entitled Levels of Noise Requisite to Protect the Public's Health and Welfare (often referred to as the "Levels Document") or one of several other EPA documents that were used to support the establishment of Ldn as the metric for compatible land use planning. Recommend soliciting Air Force noise subject matter expert (Ms Lynn Engelman, Chair, Defense Noise Working Group, AF/A7, 703-692-9147) for specific guidance in this area. Reviewer: Jess Borthwick 46 TW/XP
SUBSTANTIVE	Page 2-17. 2.2.10 Supersonic Noise – Recommend noting Test Area B-70 is the only overland low level supersonic range in CONUS, east of the Mississippi River. Reviewer: Jess Borthwick 46 TW/XP
ADMINISTRATIVE	General Comment: Recommend referring to the 1000 Friends of Florida 2060 Report and the Sustainable Emerald Coast Committee Report submitted to the Governor in Dec 2007 regarding population trends for area. Reviewer: Jess Borthwick 46 TW/XP
ADMINISTRATIVE	General Comment: Recommend the term "Maximum mission noise areas", often referred to as the Ldn 65db and greater, be defined somewhere at the front of the document or in a glossary. The term can confuse as it suggests the contours constitute maximum noise levels. As I understand the use of the term, it is meant to represent the annual average Ldn noise level forecast as Alternative 1 in the Eglin BRAC EIS with a one mile buffer added. Reviewer: Jess Borthwick 46 TW/XP
SUBSTANTIVE	General Comment on buffer land acquisition: Where land acquisition is discussed, it should be specific the affected county or city government. In the executive summary, recommend all Florida Forever Projects in the study area be identified and reference made to the Sustainable Emerald Coast Report that addresses conservation needs. Narrative should address potential benefits to military installation and low level special use airspace (airfield approaches and low level MTRs). SRC9 Recommendation: In addition to NWF Greenway, recommend including description of Gulf Coastal Plain Ecosystem Partnership, Yellow River Ravines and Escribano Point Florida Forever Projects, including acquisitions to date. Reviewer: Jess Borthwick 46 TW/XP
SUBSTANTIVE	General Comment on Lighting: Lighting control recommendations should include area of critical strategic value to military. In particular, low level approaches to airfields where night vision goggle training (areas north of Fld 6 and Duke Field) and Choctaw Field which is used to simulate a carrier deck lighted for night lands (simulated as being at sea). General reference is good with regard to light

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	encroachment, but need specific references to these key areas. Reviewer: Jess Borthwick 46 TW/XP
SUBSTANTIVE	General Comment on Noise Mitigation: Numerous references are made to Retro fit Program for public and private buildings. However, no cost estimates or source of potential funding is identified. Reviewer: Jess Borthwick 46 TW/XP
SUBSTANTIVE	General Comment on Special Use Airspace: In addition to the airfield approaches and the cruise missile route, all low level Military Training Routes (MRTs) where aircraft are authorized to fly as low as 500 feet MSL should be included on maps and in the associated narratives. Reviewer: Jess Borthwick 46 TW/XP
SUBSTANTIVE	Chapter 16 Eglin Air Force Base: Section should be strengthened to include specific measures Eglin can take (i.e. to mitigate noise, help ensure advanced notification of mission changes, and share strategic plans that have the potential to impact the community). Recommend this be developed by Eglin planners, staffed to Wing and Center leadership, and presented for inclusion in the final JLUS report. Reviewer: Jess Borthwick 46 TW/XP
SUBSTANTIVE	General Comment: Unless I missed it, there does not appear to be a planning process to ensure implementation/follow-on work recommended by the JLUS Study. Recommend the Report provide more specific recommendations on methods for continued coordination after JLUS is complete. Also, how does the BRAC Growth Management Study, also funded by the Office of Economic Adjustment, relate to the JLUS study? Reviewer: Jess Borthwick 46 TW/XP
SUBSTANTIVE	General Comment: Dimensions and locations of Military Influence Areas are not specified: The JLUS now has maps designating recommended Military Influence Areas. Personally, I don't like the use of the acronym MIA in this regard. Reviewer: David Prichard 46 TW/XP
ADMINISTRATIVE	General Comment: An Index would be helpful. Reviewer: David Prichard 46 TW/XP
SUBSTANTIVE	General Comment: "Limit Residential Density or Allow Clustering of Development Away from Low Level Approach Patterns" or "Cruise Missile Corridors"– at what densities?: The JLUS now recommends conducting "small area" studies in low level approach zones. Who will do these studies? Who will fund? Reviewer: David Prichard 46 TW/XP
SUBSTANTIVE	General Comment: Which parcels are recommended for acquisition, and at what cost?: There is some specificity for Valparaiso; for other communities the recommendation is non-specific. There are no estimated costs.

	Reviewer: David Prichard 46 TW/XP
ADMINISTRATIVE	General Comment: Which properties are recommended for sound-insulation retrofit? What are the estimated costs?: No cost estimates Reviewer: David Prichard 46 TW/XP
SUBSTANTIVE	General Comment: Valparaiso "Redevelopment Plan" does not identify specific parcels for transfer of land use; expected costs; expected time frame: No cost estimates Reviewer: David Prichard 46 TW/XP
SUBSTANTIVE	General Comment: There are no guidelines or specifics for "Limiting Object Heights": The JLUS Appendix contains examples. Reviewer: David Prichard 46 TW/XP

RECEIVED
APR 30 2009
TETRA TECH DES

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APR 30 2009

TETRA TECH DES

COMMUNITY PLANNER COMMENTS
EGLIN COORDINATION COMMENT/RECOMMENDATION MATRIX
FOR 90% DRAFT JLUS

CRITICAL - AAC non-concurs with document. Identified concern must be satisfactorily resolved to obtain concurrence.

MAJOR - AAC concurs with document; however, agency has significant reservations about indicated section and requests concern be specifically addressed with designated point of contact prior to publication.

SUBSTANTIVE - AAC concurs with document but recommends change to improve clarity or content. Agencies should suggest substantive changes whenever sections in document appear to be or are potentially: unnecessary, incorrect, incomplete, misleading, confusing, or inconsistent with other sections.

ADMINISTRATIVE - ACC comments to correct what appear to be inconsistencies between different sections, typographical errors, or grammatical errors.

CATEGORY	COMMENT/RATIONALE
SUBSTANTIVE	Sections 2-15 – The JLUS does not clearly set out what planning activities have already been adopted by the local governments that achieve military compatibility. Understanding the starting point will help us to better understand the gaps Need an analysis of how the current local government's Comp Plans comply with F.S. 163.3175 and 163.3177: • Does the Comp Plan require the military installation be provided an opportunity to review and comment on the proposed changes to density and intensity? • Does the Comp Plan require a representative of a military installation acting on behalf of all military installations within that jurisdiction shall be included as an ex officio, nonvoting member of the county's or affected local government's land planning or zoning board? • Does the future land use plan element include criteria to be used to achieve the compatibility of adjacent or closely proximate lands with military installations? What criteria is used? Need an analysis of how the current local government Comp Plans and Land Development Codes address the identified issues. What is the maximum height currently allowed by Code? Is there a lighting ordinance currently in the Code? What is the maximum density and intensity of the Future Land Use? Is the currently allowed density and intensity incompatible?
SUBSTANTIVE	Section 3.3.2, Page 3-21 – A discussion of Future Land Use categories in APZII and the 65+ noise contour is needed to determine if any FLUM amendments or rezonings are needed as mentioned in Section 3.4 OKC 19, Page 3-56. The fact that only one dwelling unit per 10 acres is allowed in AG is important to know when considering if future development would be compatible with the AICUZ suggested maximum density of 1-2 dwelling units per acre.
SUBSTANTIVE	Section 4.4, CCB6, Page 4-13 – Delete items that do not apply to Cinco Bayou such as addressing incompatible densities, land swaps for enclaves, etc.
ADMINISTRATIVE	ES-1 "Increase communication and cooperation between Eglin AFB and neighboring ~~counties~~ local governments" Changing counties to local governments includes cities as well as counties.
ADMINISTRATIVE	Table ES-2 – Change"greenway connecting military airways spanning from Pensacola to Panama City" to "Pensacola to Cape San Blas"? Row "Uses Permitted and Prohibited" should be checked under noise zone columns.

	Row "Comprehensive Plan" should be checked under column "conservation resources". Change "Encroachment Element" to "Future Land Use Element" to be consistent with the following: "The future land use plan element shall include criteria to be used to achieve the compatibility of adjacent or closely proximate lands with military installations." **Fla. Stat.** § 163.3177(6)(a).
ADMINISTRATIVE	In Section 1.3.2 density is discussed before object height, Section 1.3.3, the order is reversed in Sections 1.5 and 1.6
ADMINISTRATIVE	Section 1.5.6, Page 1-12 – Reference map of height restriction areas, Figure 16-9
ADMINISTRATIVE	Section 2.2, Page 2-4 - Technical Advisory Committee or Group?
ADMINISTRATIVE	Section 2.3.3, Page 2-27 – Should be 4,018 acres instead of 4.018 acres.
ADMINISTRATIVE	Section 2.3.3, Page 2-27 - When talking about noise level reduction materials and methodologies, reference *New Construction Acoustical Design Guide* in Appendix.
ADMINISTRATIVE	Figure 3-22, Page 3-27 -Don't see IP in the legend.
ADMINISTRATIVE	Figure 4-3, Page 4-5 – Hard to see hatch in legend
ADMINISTRATIVE	Figure 12.2.3, Page 12-5 – Clear Zone is not shown as 3000' x 3000' see Figure 3.5 of the UFC 3-260-01
QUESTION	Has any research been done on the level of noise reduction attained by following the Florida Building Code Hurricane Zone standards?
QUESTION	Table ES-1 – Why isn't Laurel Hill included in table? What is height Restrictions by Okaloosa County?
QUESTION	Table ES-3 – What does "designate specific use restrictions to keep use compatible" and "Apply for funding assistance to create compatible uses" mean? Does Shalimar need MIA?
QUESTION	Figure 2-11, Page 2-16 – How does the figure show a comparison from 1992 to 2000? Is a legend needed?
INTERNAL EGLIN QUESTION	Table 2-3, Page 2-47 - Will Public Affairs be the lead for distributing handouts on radio frequency?

ATTACHMENT E

AMERICAN FARMS ZONING AWARENESS GROUP COMMENT

Eglin Joint Land Use Study (JLUS) Policy Committee Meeting

June 29, 2009

TETRA TECH

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AFZAG

AMERICAN FARMS ZONING AWARENESS GROUP

June 25, 2009

Commission Don Salter

Santa Rosa County BOCC

Caroline Street

Milton, Fl.

Dear Mr. Salter,

After careful review of the draft document of the Tri-county Joint Land Use Study we see recommendations and graphics that send a message to land owners in our area that we do not feel is in the best interest of the County, the current land owners, or the mission of Eglin Air Force Base. The net affect of the document in its current form is to encourage noise complaints from land owners in the area we identify as that part of unincorporated SRC underneath Restricted Air Space 2915-A not currently covered in the JLUS graphic Figure 2-26 found on page 2-37. See Enclosures.

JLUS page 2-9 paragraph 2.2.4 Low Level Helicopter and Tiltrotor Training indicates that population increases in the area and increased complaints will subject flight operations to increases in altitude and "severely" impact the training capability of the 1st Special Operations Wing and NAS Whiting Field. The JLUS graphic identifying the recommended areas in SRC as MAZ III, areas requiring small study groups, funded by OEA in conjunction with the local jurisdiction, do not include areas previously recommended as areas in which the AFB Mission Enhancement Committee recommends "that Santa Rosa County place the same MAZ development restrictions on this area as have been implemented around Choctaw Field and NOLF Santa Rosa." (Ltr. Arnold, Dec. 2007)

This inconsistency sends a clear message that this area is not as sensitive to the mission of Eglin or NAS Whiting as it was in DEC of 2007 and thus encourages us to move forward with normal quality of life issues (health, safety, and welfare) to include minimizing noise from military aircraft in the area not recommended for further study in the Current JLUS document. It appears that this area was not "resourced" for study by Tetra Tech; however, our planning group presented and copied recommendations with supporting documentation to all appropriate points of contact and received from Mr. Bob Arnold's office a very specific letter of opinion regarding our area. We are confused by the external messaging.

Our representatives witnessed the suggestion by the SRC Planning Director at the last Technical Advisory Meeting that SRC was willing to extend the area for further study to include this area north of what is currently included in Figure 2-26. The suggestion was not at that time made in the form of a motion and did not receive fair consideration as a result of the continuing deconstructive and disruptive comments from municipality leaders in Okaloosa County.

We strongly recommend that you make a very specific motion to include in the JLUS final document the designation of the remaining area of Restricted Airspace 2915-A south of Hwy 90 in the JLUS graphic identifying areas for additional study by local jurisdictions, Figure 2-26; at the Policy committee meeting on Monday, June 29.(See Enclosures, Figure 2-26,modified)

We do not see the need for any language changes in its current form. Without the area included in the study as an MAZ III residents will complain and no funding will be available from OEA to support additional study for the area further aggravating residents who currently live in harmony with the missions of both Eglin and NAS Whiting and who have worked diligently to incorporate the joint missions into their development and redevelopment agendas.

If you need additional supporting information I will be glad to provide it for you immediately.

Sincerely,

Kyle S. Holley

Kyle S. Holley, AFZAG Lead Donor
712 - 8788

Cc:

Michael B. Bomar, P.E.

Tetra Tech, Inc.

Fax 850-837-7269

EGLIN R-2915A
RESTRICTED AIRSPACE

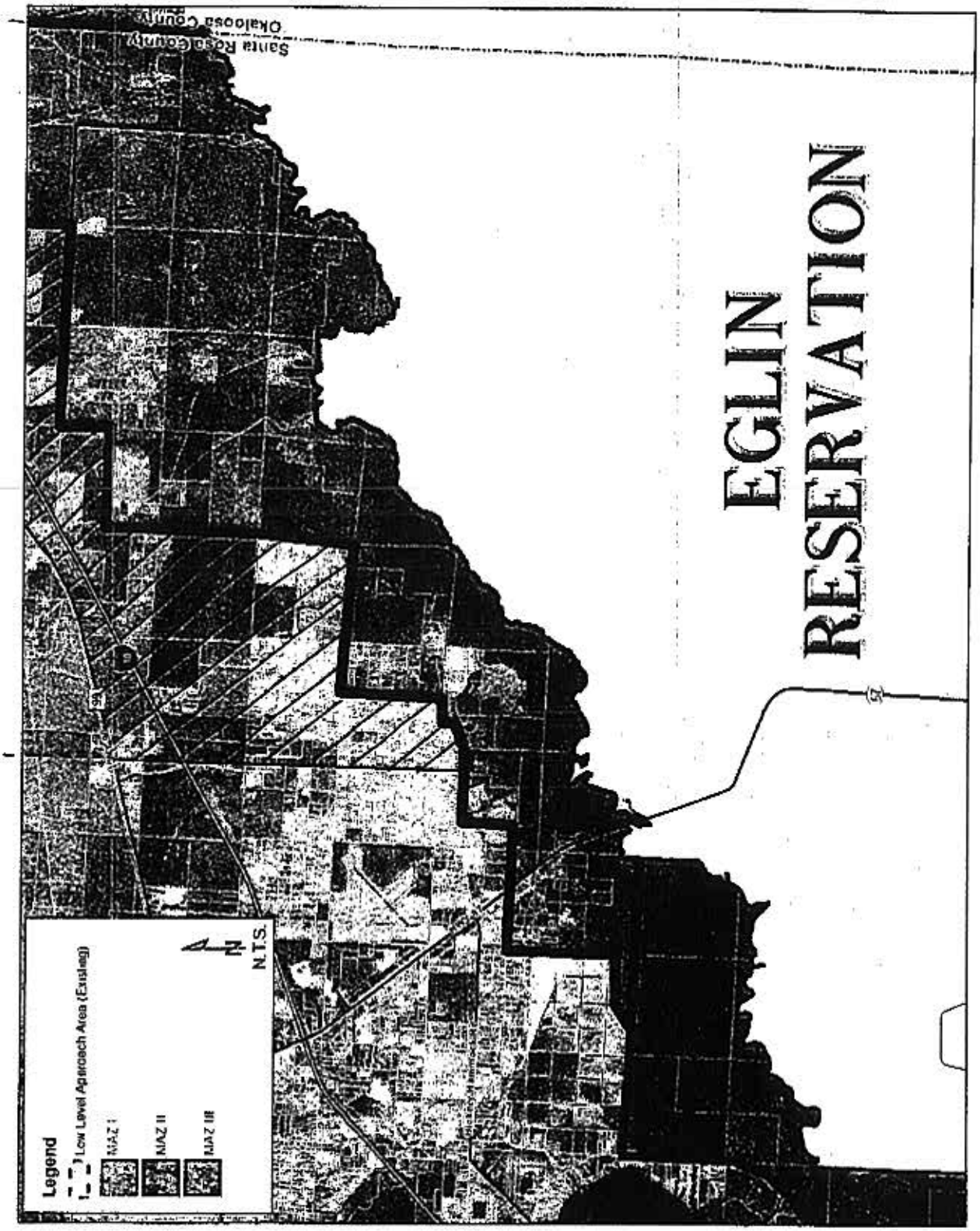


Figure 2-26: Proposed Central MAZ II and III Areas in Santa Rosa County

TETRA TECH

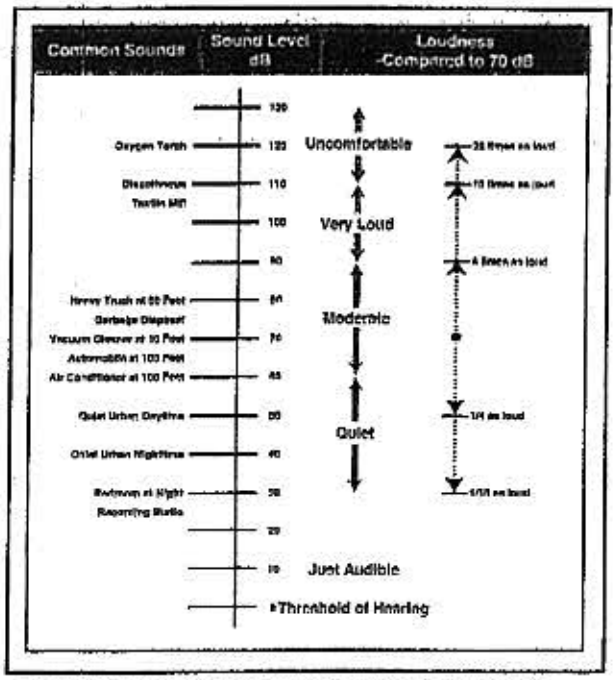
2.2.4 Low Level Helicopter and Tiltrotor Training

Training helicopters (TH-57) from NAS Whiting Field and CV-22s, UH-1s, and MI-17s from Hurlburt Field conduct training operations within the low altitude tactical navigation area (designated as *Helicopter Low Level Training Area)* as shown in *Figure 2-7*. The TH-57 helicopters utilize specific areas designated for NAS Whiting Field within the overall low altitude tactical navigation area.

As population density increases underneath the low level training areas, the required altitude for flight operations is subject to being adjusted upwards to meet federal regulations and to minimize noise and risk to the population underneath. Increases in altitude would severely impact the training capability of the 1st Special Operations Wing (1 SOW) and NAS Whiting Field.

2.2.5 Airfield Noise

At the time of this report, the Air Force is in the process of developing the curriculum and finalizing the process for the F-35. *Figure 2-6* provides ranges of Typical A-weighted levels compared with common sounds. Two different noise alternatives (Alternate 1 and Alternate 2) were developed as part of the *Base Realignment And Closure (BRAC) 2005 Environmental Impact Statement (EIS)* and this information is being utilized as part of this JLUS. Noise contours for Alternate 1 will provide the maximum mission contours in the unincorporated parts of the County and, therefore, are the noise contours used for analysis and form the basis for the recommendations contained herein. The analysis and recommendations associated with aircraft noise shall be reevaluated based on information forthcoming from the AF in the Supplemental BRAC EIS.



Source: Handbook of Noise Control, C.M. Harris, McGraw-Hill Book Co., 1979, and Ref. F3.

Figure 2-6: Typical A-weighted Levels of Common Sounds

At a typical installation, the AICUZ addresses noise exposure to non-military lands near military installations with safety concerns. Noise exposure can create conflicts with public welfare and quality of life for those living or working near airfields. Noise level contours extending from the airfield are incrementally measured from the highest typical decibel (dB) generated within a military installation to 65 dB within non-military property. For the Eglin AFB JLUS, the future aircraft (F-35) is not located at Eglin at this time so the AICUZ does not include noise levels associated with the F-35. In order for this study to be based on best available useful and applicable information, it was determined this study would utilize noise levels available from the Air Force for the proposed F-35 in lieu of using F-15 noise levels which will be obsolete in the coming years.

Based on numerous sociological surveys and recommendations of federal interagency councils, the most common benchmarks for assessing environmental noise impacts to people are a Day-Night Average Sound Level (DNL) of 65 dBA for A-weighted noise, and 62 dBC for C-weighted noise. When measuring single event impulse noise, the benchmark for assessing noise impacts to people is 115 dBP (unweighted scale). These noise level thresholds are often used to determine residential land use compatibility and the risk of human annoyance. In general, when exposed to less than the noise levels identified above, land uses are unrestricted. As noise levels increase above these levels, some land uses become incompatible.

Noise contours are delineated by computerized simulation of aircraft activity at each installation and integrate operational data specific to the types of aircraft using a particular airfield. The methodology used to identify noise counters takes into consideration flight paths, frequency and time of operation, as well as the type and mix of aircraft. The noise contours utilized in this study were provided by the Air Force. The scope of this study does not include manipulating the computer simulation to adjust noise contours.

Figure 2-8 shows the Choctaw Field airfield noise associated with the two F-35 alternatives with a one-half mile buffer from each of the respective 65 dB contours for each alternative. *Figure 2-9* specifically shows the F-35 Alternate 1 noise contours from operations currently proposed at Choctaw Field.

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR ARMAMENT CENTER (AFMC)
EGLIN AIR FORCE BASE, FLORIDA

19 December 2007

Mr. Robert J. Arnold
Eglin AFB Mission Enhancement Committee
101 West D Avenue; Suite 222
Eglin AFB FL 32542-5492

Mr. John Broxson
Chairman, Santa Rosa County Board of Commissioners
6495 Caroline Street; Suite M
Milton FL 32570

Dear Mr. Broxson

We understand, in the near future, the Santa Rosa County Board of County Commissioners will consider changes to Future Land Use near Eglin AFB. The specific area under consideration is located north of Yellow River, south of US 90, and beneath the northwest portion of restricted airspace R2915A (See attached maps).

We recommend Santa Rosa County place the same Military Airport Zone (MAZ) development restrictions in this area as have been implemented around NOLF Choctaw and the southwestern boundary of R2915A. We are concerned about potential impact to our mission from noise complaints, light pollution, building heights, and safety.

The military currently utilizes the airspace above this area (R2915A) to train personnel on low-level flight operations for MH-53 and MH-60 helicopters. These flight operations are typically very low and noisy. Future plans are to use this airspace for flight training for the new CV-22 Ospreys that will be arriving at Hurlburt Field.

In addition, the new F-35 Joint Strike Fighter (JSF) aircraft, at Eglin AFB, will conduct training missions at Choctaw Field. Current plans are for Choctaw, which lies approximately six miles south of NOLF Santa Rosa, to be one of three airfields used to support JSF pilot training. JSF operations in and around the area of concern could include low-level, day-night operations. People living or working in or near this area can expect noise, smoke, or dust generated from ground and air operations. Quality of life for those living near the airfield would be impacted.

Mission growth in this area together with new residential development presents a major concern for future military operations in the area. In addition, increased lighting from street lights, businesses, and homes in the proposed development area would interfere with low-level approach operations and undermine the military's ability to train.

In order to prevent incompatible military-community growth in the region north of Yellow River, south of US 90 and beneath the northwestern portion of restricted airspace R2915A, we recommend that Santa Rosa County place the same MAZ development restrictions on this area as have been implemented around Choctaw Field and NOLF Santa Rosa.

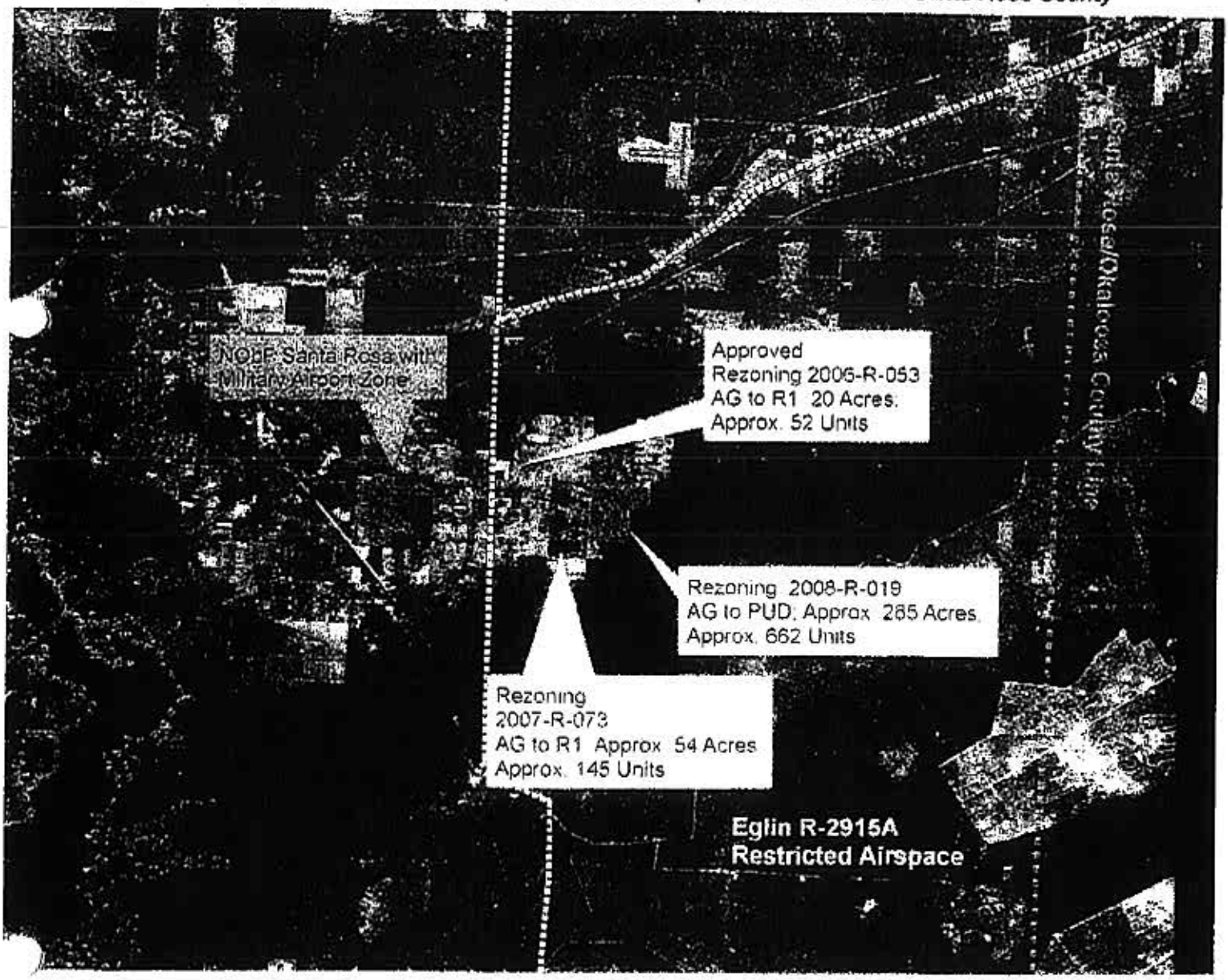
Thank you for considering our military concerns when rendering your decision regarding the proposed zoning changes in the area east of NOLF Santa Rosa. If you have any questions please contact Mr. Larry Greene at (850) 882-5362 or email larry.greene@eglin.af.mil.

Sincerely

ROBERT J. ARNOLD
Chairman

Attachment - Maps

Eglin Military Operation Areas (MOA's) & Restricted Airspace Located within Santa Rosa County



2.3.3 Land Uses in High Noise Areas

There are approximately 4,018 acres inside the maximum mission noise areas (greater than 65dB) and all are currently undeveloped. Existing land use within the high noise areas includes Agriculture, Military, and Residential (R1, RR1, and R1-APZ).

Land ownership within the maximum mission noise areas is presently established in large tracts typically hundreds of acres in size. Current population in the high noise areas is estimated at zero persons with no existing dwelling units.

Future land use designations include Agriculture (1 parcel, 176 acres), Conservation/Recreation (27 parcels, 1,724 acres), and Single Family Residential (10 parcels, 2,118 acres).

Population and housing estimates were determined by comparing land use records from Santa Rosa County with statistical data from the 2000 US Census. Statistical data pertaining to the average number of persons per household for Santa Rosa County were applied to the number of estimated occupied housing units.

Based on this analysis, there are no existing incompatible uses/structures in the high noise areas. For this study, the determination of an incompatible land use was defined as an existing use conflicting with the Federal Aviation Administration's Land Use Sensitivity Matrix. Based on zoning and future land use designations, there is great potential for residential development in the Choctaw Field High Noise Level Areas (>65 dB). Some of these areas are constrained by environmental conditions such as jurisdictional wetlands. *Figures 2-20 and 2-21* provide the existing zoning and future land use designations with respect to the F-35 Alternate 1 noise contours, respectively.

The Future Land Use Map designations for residential areas within the 75dB and greater noise contours are considered incompatible. For the residential areas within the 65-75 dB ranges, residential use is discouraged. If local conditions dictate the need for residential in the 65-75 dB area, single-family residential units should be constructed with noise level reduction materials and methodologies. Since the areas within the maximum mission noise contours are currently undeveloped, there is an opportunity to designate these areas as a compatible use other than residential such as, but not limited to, recreation, certain services, or conservation.

2.3.4 Supersonic Noise

The area included in the supersonic noise area is located in southern Santa Rosa County as previously shown in *Figure 2-10*. Development in this area can be expected to experience occasional sonic booms as a result of aircraft's supersonic speed in this area.

The predominant type of zoning in the Supersonic Flight Noise Zone includes Single Family Residential with some Highway Commercial, Planning Unit Development, and Planned Business District. The Future Land Use Map designations in this area include predominantly Single Family Residential with some Mixed-Residential Commercial, Industrial, and Commercial. the western portion of this area stretches beyond Santa Rosa County into Escambia County.

2.3.5 Controlled Firing Areas

The controlled firing areas in Santa Rosa County include the waterfront areas near Navarre as shown in *Figure 2-13*. The current zoning for parcels in the controlled firing areas include a broad range:

- Medium Density Mixed Residential
- Conservation
- Single Family
- Medium High Density
- High Density
- Commercial
- Industrial
- Planned Mixed Use
- Military-Eglin

2.3.6 Impulse Noise

The nature of the impulse noise in the County is in the low, moderate, and high ranges as previously shown in *Figure 2-5*. The effects in these areas is minimal on property owners and therefore does not include a detailed land use analysis. Notification of the high intensity areas that experience explosive impulse noise would help property owners understand the reason for the "booms" they hear and feel.

2.3.7 Low Level Helicopter and Tiltrotor Training

The low level helicopter and tiltrotor training area covers a large portion of the County and as a result influences a broad range of land uses. The result of land use in this area may be perceived as a temporary nuisance resulting from low level helicopters and tiltrotors flying overhead and the temporary sound and vibration increases associated with low flying helicopters and tiltrotors.

UNDERESTIMATED NUISSANCE

TETRA TECH

FALSE IMPRESSION, UNCLEAR

8

ATTACHMENT F

GENERAL PUBLIC COMMENTS

Eglin Joint Land Use Study (JLUS) Policy Committee Meeting

June 29, 2009

TETRA TECH

Bomar, Michael

From: Mark Griffith [mark.griffith@myzenyx.com]
Sent: Friday, June 05, 2009 10:21 AM
To: Bomar, Michael; PZDirector@santarosa.fl.gov
Cc: jfanto@co.okaloosa.fl.us; Gordon Goodin; comm-cole@santarosa.fl.gov; comm-lynchard@santarosa.fl.gov; comm-williamson@santarosa.fl.gov; Comm-Salter@santarosa.fl.gov
Subject: JLUS SRC 7 opposition
Attachments: image001.jpg

Michael and Beckie,

Thank you for holding the public meeting last night on the JLUS. It was very informative and well put together. Please note this is my input as an individual county resident and does not speak for any organizations I am affiliated with. I have written you separately to provide JLUS comments from the Navarre Beach Marine Sanctuary Committee

I am writing you to express my opposition to the SRC 7 recommendation in Section 2 of the JLUS. As I mentioned in last night's meeting, without some form of quantitative/economic analysis of the pros and cons for the county and the affected Eglin programs/missions it should not be recommended that Santa Rosa County commit to or implement the type of restrictions embodied in SRC 7. Before such a recommendation is made, my expectation is that at a minimum there would be the following supporting information provided:

- Estimate of the existing marine traffic.
- Current number of delayed or scrubbed missions/tests due to marine traffic and average costs.
- Current cost of monitoring/clearing marine traffic from controlled fire areas during missions/tests.
- Projected increase/decrease in marine traffic with and without a Navarre pass.
- Projected increase/decrease in number of delayed or scrubbed missions/tests due to marine traffic and average costs both with and without a Navarre pass.
- Projected increase/decrease in cost of monitoring/clearing marine traffic from controlled fire areas during missions/tests.
- Some indication of correlation (e.g. linear regression with accompanying statistics) between marine traffic and delayed or scrubbed missions/tests.
- Possible mitigation strategies and associated costs to manage any increased risk of delayed or scrubbed missions/tests due to increased boat traffic.
- Number of jobs potentially at risk (now and in the future) and the relative weight/importance of increased boat traffic on current/future decisions for command/job movement.

I am thankful for and strongly support the military presence in our area, and the good neighbor that Eglin is for Santa Rosa County. However, any recommendation that requires the county to put restrictions on the use of, what I view as one of its largest economic assets (the coastal waters), requires careful consideration. The BRAC process is continual and there is no guarantee that missions and commands that are here today will not change or be relocated based on a myriad of other factors beyond our control. To recommend such restrictions on the County's ability to use a pass at Navarre as a catalyst for economic growth based on less than completely vetted and verified data and analysis, would not reflect well on the study and could cast a negative shadow on the other areas of the study that seem to be well researched and received.

Please take these comments and concerns into consideration during your final deliberations before release of the final report and don't hesitate to contact me if you have any questions about my comments.

Best Regards,

Mark Griffith, PMP
6648 Castlewood St.
Navarre, FL 32566
email: mark.griffith@myzenyx.com
Office: (850) 677-1875
Mobile: (850) 207 - 2151

Zēnyx
Ready, Aim, Implement
www.myzenyx.com

1804 Lewis Turner Blvd, Suite 200
Fort Walton Beach FL 32547
Phone 850-609-3014
Fax 850-362-6471
Cell 850-259-1440

Okaloosa County Growth Project Coordinator

Fax

To:	Michael Bomar	**From:**	Jeff Fanto
Fax:	(850) 837-7269	**Pages:**	2
Phone:	850-837-9278	**Date:**	6/13/2009
Re:	JLUS Input	**CC:**	

☐ **Urgent** ☐ **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **Please Recycle**

- **Comments:**

Michael:

I received this input to the JLUS via the mail on June 9, 2009.

Jeff

EGLIN AIR FORCE BASE JOINT LAND USE STUDY (JLUS) DRAFT REVIEW COMMENT FORM

JUNE 2009

Name: _____

Representing: _____

Address: _____

_____

Phone #: _____

Fax #: _____

Email address: _____

Section:	Subsection Reference:
Comments: With increased military facilities and housing, have any plans been made for increased power generation?	
Section:	Subsection Reference:
Comments:	
Section:	Subsection Reference:
Comments:	
Section:	Subsection Reference:
Comments:	
Section:	Subsection Reference:
Comments:	

End of Document

MINUTES ARE NOT VERBATIM

JOINT LAND USE STUDY
POLICY COMMITTEE
June 29, 2009

MINUTES

The Joint Land Use Study Policy Committee meeting was held June 29, 2009 at 1:00 p.m. in the Third Floor Large Conference Room, Okaloosa County Water and Sewer Building, 1804 Lewis Turner Boulevard, Fort Walton Beach. Attendee list is provided below (Attachment 1).

Commissioner Bill Roberts, Policy Committee chairman, called the meeting to order and then went around the table and room for introductions. Mr. Rich Tenga, Office of Economic Adjustment, participated remotely in the meeting via speaker phone.

Chairman Roberts then turned the meeting over to Jeff Fanto, Growth Project Coordinator, with a couple of administrative announcements. He then turned the meeting over to Michael Bomar, Vice President, Tetra Tech Inc. for the formal presentation.

Mr. Bomar reviewed the agenda for the day's meeting. He reviewed the outcome of the last Policy Committee meeting where 20 recommendations passed in a vote by this body. Eight of the 20 were passed by a margin of 6-1, the remaining passed unanimously; two recommendations were removed from the document. The committee then authorized the release of the Draft JLUS document, plus added two more public meetings so that each county would have its own public forum. An additional Policy Committee was also directed to be held before the release of the final JLUS document. Since the JLUS began over two years ago, over 17 public meetings have been held, a variety have been specific Joint Land Use Study meetings, whether at the individual jurisdiction level or in a Policy Committee public forum.

Next was a review of the public comments received during this review period. Comments were received from the Navarre Beach Marine Sanctuary Committee, the City of Valparaiso, Eglin Air Force Base, American Farms Zoning Awareness Group, and two comments from the general public. Mayor Anderson asked if we had ever received the City of Fort Walton Beach comments as they were not mentioned. Mr. Bomar advised that we had already received their comments on the Interim Draft JLUS, but nothing since then. The Navarre Beach Marine Sanctuary Committee comments consisted of a 2-page e-mail input dealing with Recommendation #7 for Santa Rosa County, which reads "To implement Comprehensive Plan amendments discouraging additional marine navigation channels or land cuts, artificial reefs, or other proposed activities increasing marine traffic in controlled firing areas." The item of importance pulled from this comment was that this group suggested the recommendation be fine-tuned or at least recognized

to include specific exception for snorkeling and diving reefs, or fishing piers in Santa Rosa Sound that are accessible by swimmers and pedestrians from shore. Mr. Bomar said the focus here is not to increase boat traffic; their suggestion is that if there is this type of activity accessible from shore, that it is not included in such a recommendation. Mr. Fanto then asked if either Commissioner Salter or Beckie Cato from Santa Rosa County had any comment on this input. The Commissioner advised that he has discussed this with staff and that with regard to the snorkeling area, the new pier that the County is currently building, the snorkeling activity would take place in the general vicinity of that new pier and that he didn't see it sprawling to the east or west or the deeper water. He felt it was basically in the same footprint they have now. Ms. Cato agreed, but then posed another question about the controlled firing area as depicted in the study maps as compared with Eglin's RAICUZ maps. Mr. Bomar responded that they are the same maps in both this JLUS and the RAICUZ. Mr. Fanto then asked Commissioner Salter if he believed the wording of the JLUS recommendation was adequate for Santa Rosa County. The Commissioner deferred to Ms. Cato who advised the wording is adequate. Commissioner Salter interjected that the recommendation is adequate and that he is comfortable taking it back to the full Board for their consideration.

Mr. Bomar continued with the next comment from the City of Valparaiso. He advised that we received staff comments back when the draft was being reviewed and that the most recent comment from the City was a letter from the Mayor and subsequent response from PC Chairman Roberts, all provided for the Committee's review. Mr. Fanto interjected that in addition to these materials just referenced, staff has also included separate verbiage in response to concerns raised about the data being used in the study. The desire is for the Committee to endorse the inclusion of this statement in the JLUS to further clarify the data used, how it was used, and what its intent is. He further stated that during discussions as part of the staff's work, there is still concern over how the JLUS is being done. This statement is an effort to ensure clear delineation between Environmental Impact Statements and the Joint Land Use Study, along with all the supporting documentation received in support of the study. Mr. Bob Black commented that he doesn't necessarily have a problem with how this specific statement is written, but his question was at a higher level. His understanding is that this study is effectively a Phase I JLUS and that there will have to be a Phase II. From a Congressional standpoint as well as different conversations with the Air Staff, it is reality that the noise contours will change, we just don't know to what right now. His understanding was that Phase I was to look at those things that were rock solid and wouldn't be impacted by the Supplemental EIS (SEIS) or had a high probability they would not be affected by the SEIS. Conversely, those things that would be impacted, the value of doing this now and continuing on was that, not that anyone was going to put into play an acquisition program or noise attenuation program at this time, is that the noise contours in there right now (the current JLUS) is not that it is the area that has to be attenuated right now. Rather, as a worst case, it provides a basis to look at the demographics of the type of structures that would be impacted. This would provide enough detail such that the recommendations would provide for a study that would, in turn, provide standards that would address these facilities and structures and come up with a methodology of how to cost out. As a result, when the final lines were in the study, the methodology and knowledge would already be in place to rapidly do the cost estimate of what would be required, regardless of funding source. He then expressed his concern using the term "Final" JLUS, when in fact it will result in a Phase I/Phase II study. He thinks the clarification will help the citizens understand this better. Chairman Roberts responded that he

didn't have a problem with Mr. Black's suggestion. Mr. Black said he would be happy to work with whomever to craft such wording for the document. Mayor Anderson then asked if the title needed to be reworded as the "Phase I JLUS?" Mr. Rich Tenga, OEA, identified the concern in calling this what it is, a completed JLUS as opposed to calling it a Phase I and then a Phase II which was the original concept. He thought this could be complete enough and adopted where OEA could provide additional funding for implementation considering it as a finished product. Further, the fact that communities will have adopted noise contours and Military Influence Planning Areas from which to work within as far as additional areas to research, conduct additional analysis, and possibly would be the areas in which the recommendations would apply, technically that could all be done now if that is the decision each jurisdiction and the Policy Committee want to make. That was the concept for doing it this way instead of the original idea of the Phase I/Phase II idea where we would wait for a final AICUZ, which is years away. Mr. Black responded that he thinks they are in synch, with a little twist. The Phase I would have things that we do not think are AICUZ related, but noise is part of the AICUZ and we know that is going to change. In areas where there is high confidence that there will be nothing to come out of the SEIS to change the situation there such that the outcomes and recommendations (in the JLUS) are assured, those can be taken back to those government entities for consummation and "getting on with it." He stated his intent with the Phase I/Phase II was not to hold up those measures which can be done in the more immediate time frame. Mr. Tenga responded that this is why we have shied away from the two-phase approach. The idea is that we can do just about everything right now the way the recommendations are written up and go forward through implementation on all of them. The difference is where the final noise lines will be on the map and the final tally of properties affected. That can be adjusted when the SEIS noise contours are made known. Mr. Black then interjected to clarify that while he agrees with Mr. Tenga's ideas, the only issue he has is the recommendations actually become sort of omnibus recommendations. For instance, he cited the need to "get an acquisition program going on" or "get a noise attenuation program going on." He agreed they need to be done, but at this point there are other recommendations that should come first. Mr. Tenga agreed. Mr. Fanto commented that this is really the crux of the strategy staff has tried to look at as we move forward to implementation. That was also the basis for the recommendations to continue the JLUS structure as it currently exists (Policy Committee and Technical Advisory Group) and keep Okaloosa County as the lead agency for implementation so we can continue to work through these, working in the same collaborative fashion as we've done planning. Chairman indicated he felt there was consensus among the committee for the phased implementation of the study. Mr. Bomar returned to the clarification statement, saying he felt it made clear the intention of the committee as stated by Mr. Black. Mayor Arnold then stated he would like to see Valparaiso as the one most "hit" would need to see the total effect of the recommendations that are made in this study. He questioned if the city could survive when talking about re-zoning, land use, and acquisition programs. He further questioned if "there was enough left" so they can meet their bond obligations and continue as a city. He further advised that "we have some textbook solutions but we don't know how viable they are in this downturn in the economy and how long they would take." He further stated that "we don't believe the City of Valparaiso can exist" and that perhaps one of the solutions should have been to "appropriate $400 million to buy us." Mr. Fanto responded that staff didn't think that was the proper solution for his community. He went on to say that the recommendations for Valparaiso specifically with the idea in mind that Valparaiso would remain a viable entity. Mayor Arnold said he didn't believe that, when looking at total

effects, "we're not viable." Mr. Fanto said he appreciated where the Mayor was coming from, but offered a countering point of view that "looking at the different potentials for redevelopment since Valparaiso is a built environment, in lieu of and in light of acquisitions that will most likely have to be made, we believe at this time that the offsets are such that there could potentially be a gain. But those are things that we will have to do additional analysis on, which are part of our implementation strategy to take those and do them as studies, which is how it is worded in the JLUS." He further acknowledged that pending those studies, this JLUS does not give that level of detail. Mayor Arnold responded that "you quote redevelopment, enterprise zones, these kinds of things. We have no idea how successful these plans or programs could be, what the cost is to implement them, where the money is going to come from, and how long is it going to take? How is the city going to exist over this period of time as tax revenues will be almost zero. What do we do?" Mr. Black interjected that one of the implications of his recommendation for a Phase I/Phase II approach, the recommendations for redevelopment, while indeed may be the right thing to do long term, he would see Phase I as developing the knowledge that will allow a look at these recommendations. He believes there are steps that can be done now that will not get the "cart before the horse" so we can get the details first. Mr. Bomar commented that most of the recommendations just described are exactly what's in the document. Mr. Fanto then commented that "back to the redevelopment recommendation, our initial in the Interim Draft version for the City of Valparaiso, we picked an area, arbitrarily, and said we think this is the best potential for redevelopment in Valparaiso and recommend you go do this. The city objected to that, and we understand, and so we changed that recommendation to say in lieu of us arbitrarily picking the spot, let's do a study on redevelopment in Valparaiso and you guys work with whomever we help hire and you figure out where the best areas are in your community because redevelopment is the only potential to do anything for a built environment. So, that is why we tried to change that to give the community much more influence and much more say in how that recommendation is done; from 'do this' to 'study potentially doing this.' That's why we were trying to make it a recommendation that the community would accept and adopt, realizing that resources should come to help them with those types of analyses that will give them the better level of information they desire." Colonel Bruce McClintock commented that it appears to him the study is already written in that way, that already says "study" and others that specifically state other things. It is his understanding that any municipality can take a recommendation that says "implement" and decide to study it before implementation. He said he believes the Phase I/Phase II is already built in and that the document already captures that philosophy.

Mr. Bomar then introduced the next comments, received from Eglin AFB, notably the Community Planner and 46th Test Wing. All the comments were categorized as "Substantive" and "Administrative." He said he believes there is still additional information to be exchanged between the base and his firm, but he doesn't see it as a significant point in changing what the recommendations are. He further said that quite a few of these comments have already been implemented and that the remainder will be resolved before issuance of the final JLUS document.

The next group providing comments was the American Farms Zoning Awareness Group in Santa Rosa County. Specifically, it deals with expanding MAZ-III (MAZ designator used in Santa Rosa County as an already established overlay per their 2003 JLUS; MIPA is the designation for Okaloosa and Walton Counties) to coincide with some correspondence received from the Eglin

Mission Enhancement Committee. They want to expand the boundary north to US 90 and south to the Eglin boundary.

Lately, two comments were received from the public. One individual is in opposition to the same recommendation covered earlier (Santa Rosa County Recommendation 7). Specifically, they were in favor of the proposed pass being cut and felt like additional studies needed to be completed in order for this recommendation to be adopted. The last comment was by fax with no name attached but said "With increased military facilities and housing, have any plans been made for additional power generation?" Mr. Bomar commented this is outside the scope of the JLUS. Mr. Fanto added that this is an area being studied in the Comprehensive Growth Management Plan that has a full utilities subcommittee looking at this issue.

Mr. Bomar resumed his presentation, talking to moving forward. He said he is comfortable with a release of the final JLUS document in mid-July, with the group reconvening at or near the end of July/early August for the final public hearing.

Chairman Roberts then asked Mr. Fanto for his recommended direction. Mr. Fanto commented that staff feels, based on the comments reviewed today, the changes to the document are minimal and that the team can make the deadlines outlined by Mr. Bomar, pending the committee's direction on the phasing verbiage discussed earlier. Commissioner Salter commented, with regard to the phasing discussion, that he believes that a JLUS once implemented is a living document to some degree because the mission is subject to change, aircraft are subject to change, and that it would be foolish to think that approving this makes it final. Councilman Wood said that even calling it Phase I/Phase II, even when Phase II is completed, things are still going to happen and to think that it's done after Phase II, it is not. Mr. Fanto interjected his perception of concern about the finality of this "final" document. He cited Santa Rosa County as an example in that they are still working on implementing recommendations from their 2003 JLUS. He further stated that the most immediate need is for Policy Committee members to take the completed document back to their respective communities for discussion and adoption. He would like to see that happen within 60-90 days after the public hearing so more time is not lost in beginning some of the study work that will need to be done early in the implementation phase. He stressed that getting each of the recommendations implemented could take years for communities to do; and that even though the study may be finalized by the end of July, getting everything done as recommended could take years and years. Councilman Allen said he agreed with Councilman Wood in that even though we may call this a final document, final documents can always be supplemented.

Chairman Roberts said he feels the last sentence in the JLUS Clarification Statement (about the JLUS being supplemented) needs to be emphasized more perhaps at the beginning and not the last sentence. Mr. Black then offered his assistance in suggesting words to help clarify for the benefit of the citizen so to make it clear of the desire to supplement the study when new data becomes available. Mr. Bomar said he believes that at this point in the process, we are comfortable saying the study will be supplemented, versus a similar sentiment 12 months ago. Mr. Black suggested a "shotgun" coordination among the members to keep them aware of the updated wording. Mr. Fanto asked members to expedite their review once provided for their

awareness. Motion Commissioner Salter, second Councilman Smith to approve this action. Passed unanimously.

Mr. Bomar then asked for direction with regard to public comment received. Staff recommended no changes to the recommendations as written in light of the public comments. Mr. Fanto added he felt the comments were adequate for those affected jurisdictions to take and use as part of their work, but that no formal changes be made to the JLUS.

Mr. Fanto did ask for direction for a site for the Public Hearing to accept the study. He did recommend an evening meeting, around the 30th of July, at the Water and Sewer Building. Mayor Arnold asked it be held at Niceville High School or at the Niceville Community Center. The committee concurred with the suggestion.

The meeting was concluded at approximately 2:15 p.m.

Prepared By _____

Jeff Fanto, Growth Project Coordinator
Okaloosa County Department of Growth Management

Attachment 1

Attendees

sign-in-062909-OKL.PDF

Attachment 2

Agenda

- Introductions
- Recap April 30 Policy Committee Meeting
- Summary of presentations to jurisdictions
- Summary of public comments
- Project closeout timeline

Attachment 3

JLUS PC 29 Jun 09

EGLIN JOINT LAND USE STUDY (JLUS)
POLICY COMMITTEE
SUMMARY OF PUBLIC MEETINGS & FINAL REPORT RELEASE MEETING

June 29, 2009
Okaloosa County Water & Sewer Building
Sign-In Sheet

Name	Representing	Ph #
Glenn Lafranz	1 SOW/CEAOS	884-[illegible]
Rich McDermott	USAF	882-8007
Kyle Hourby	AFZAS	712-8788
Mary Ann Vance	SRC P+Z	981.7081
Don Salter	SRC BOCC	983.1943
Beckie Faulkenberry Cato	SRC P+Z	981-7077
Stacie Morgan	Bay Beacon	678-1080
Elliot L. Kamperer	Okaloosa County GM	689-0251
Ken Gallander	CITY OF DESTIN	837-4242
Pat Blair Shea	Walton County	267-1955
Marion Cook	Eglin	882-8054

EGLIN JOINT LAND USE STUDY (JLUS)
POLICY COMMITTEE
SUMMARY OF PUBLIC MEETINGS & FINAL REPORT RELEASE MEETING

June 29, 2009
Okaloosa County Water & Sewer Building
Sign-In Sheet

Name	Representing	Ph #
Jim Wood	Destin	269-0196
Brucie Arnold	Valparaiso	729-5402
Jim Breitenfeld	Defense Support Initiative	598-119
Greg Scoville	City of Defuniak Springs	850.892.8571
Bill Rohorfs	Okaloosa Co	
Brick McClintock	Eglin AFB	882-9600
Bob Allen	Crestview	683-0987
Chris Sammelman	Walton Co	267-1955

EGLIN JOINT LAND USE STUDY (JLUS)
POLICY COMMITTEE
SUMMARY OF PUBLIC MEETINGS & FINAL REPORT RELEASE MEETING

June 29, 2009
Okaloosa County Water & Sewer Building
Sign-In Sheet

Name	Representing	Ph #
Terry D. Curry	NW FL Reg Airport	865-3544
Scott Scheno	1SOW	884-3198
BOB ARNOLD	96TW	882-5295
MIKE ANDERSON	CITY OF FWB	855-6683
MARISOL REINA	96 ~~ABW~~ / CEG (EGLIN)	882-8078
Jim Curry	OKA-CO	651-7515
Kimberly Steele	Okaloosa County GIS	

EGLIN JOINT LAND USE STUDY (JLUS) POLICY COMMITTEE - SUMMARY OF PUBLIC MEETINGS & FINAL REPORT MEETING

JUNE 29, 2009

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AGENDA

- INTRODUCTIONS
- RECAP 30-APR POLICY COMMITTEE MEETING
- SUMMARY OF PRESENTATIONS TO JURISDICTIONS
- SUMMARY OF PUBLIC COMMENTS
- PROJECT CLOSEOUT TIMELINE

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30–APR POLICY COMMITTEE MTG

- Reviewed Draft Eglin JLUS Recommendations:
  - 20 Recommendations Passed (12 Unanimously; 8 Passed 6-1)
  - 2 Recommendations Removed
- Authorized Release of Draft Eglin JLUS (Passed Unanimously)
- Directed One Public Meeting in Each County
- Directed Additional Policy Committee Meeting Prior to Release of Final Eglin JLUS
- Meeting Minutes Attached (Attachment A)

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PUBLIC PRESENTATIONS SUMMARY

22-May 07	Public Meeting #1
03-Oct-07	Public Meeting #2
01-Nov-07	Eglin Vector Check Presentation
08-May-08	Special Valparaiso City Commission
18-Jun-08	Public Meeting #3
23-Jul-08	Eglin JLUS Policy Committee
28-Sep-09	Destin City Council Meeting
05-Feb-09	Eglin JLUS Policy Committee
30-Apr-09	Eglin JLUS Policy Committee
18-May-09	Destin City Council Meeting
26-May-09	Crestview City Council Meeting
28-May-09	Freeport City Council Meeting
01-Jun-09	Public Meeting—Walton County
02-Jun-09	Okaloosa County Commissioners Meeting
02-Jun-09	Public Meeting—Okaloosa County
04-Jun-09	Public Meeting—Santa Rosa County
29-Jun-09	Eglin JLUS Policy Committee

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SUMMARY OF PUBLIC COMMENTS

- Navarre Beach Marine Sanctuary Committee (Attachment B)
- City of Valparaiso (Attachment C)
- Eglin AFB (Attachment D)
- American Farms Zoning Awareness Group (Attachment E)
- General Public (Attachment F)

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NAVARRE BEACH SANCTUARY COM.

- **SRC 7:** Implement Comprehensive Plan Amendments Discouraging Additional Marine Navigation Channels or Land Cuts, Artificial Reefs, or Other Proposed Activities Increasing Marine Traffic in Controlled Firing Areas *Santa Rosa, Gulf of Mexico, and USC & GS Stations*

- *"The Navarre Beach Marine Sanctuary committee requests that the wording of either the recommendation or the analysis that speaks to the recommendation, be changed to include a specific exception for snorkeling and diving reefs or fishing piers in the Santa Rosa Sound that are accessible by swimmers and pedestrians from shore, and those in the Gulf of Mexico that do not extend past 2,000 feet. This would ensure no future misinterpretation of the study's recommendations and also ensure no conflict with long held desires of the citizens and government of Santa Rosa County to establish a Marine Sanctuary with snorkeling and diving reefs at Navarre Beach. This public interest is manifested by Resolution 2009-13 passed by the Santa Rosa County Board of Commissioners in May of this year supporting the creation of the Marine Sanctuary and agreeing to apply for and hold required permits pending gathering of permit application information. "*

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CITY OF VALPARAISO

- 8 Apr 09 Response to Draft JLUS
- 9 Jun 09 Letter
- 24 Jun 09 Response Letter from Okaloosa County
- Attachment C

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EGLIN JLUS CLARIFICATION STATEMENT:

The F-35 Joint Strike Fighter (JSF) noise contours used in this study are derived from the Eglin AFB Final EIS of October 2008 and are intended to be used for initial land use planning purposes. These noise contours may change in the Supplemental EIS (SEIS), which is expected to be released in fall 2010, and could possibly change again when the Air Installation Compatible Use Zones (AICUZ) report is updated in several years based on information obtained from actual F-35 flight operations. The goal of this JLUS is to initiate compatible use planning now in preparation for rapid mission related personnel growth, before additional encroachment takes place.

Maximum Mission Contours (MMC), which should be considered maximum planning contours, are used in this study to maximize the scope of the planning area. The JLUS Policy Committee also voted to approve use of Military Influence Planning Areas (MIPA) to define the areas affected by the JLUS recommendations. MIPA lines are derived from the MMC lines. The MIPA boundaries are also useful for defining specific areas in which additional analyses such as small area studies and sound attenuation analysis could be conducted.

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EGLIN JLUS CLARIFICATION STATEMENT (cont):

Implementation of the JLUS recommendations should be initiated upon completion of this study with the understanding that the noise contour lines are designed for initial planning purposes. It's important to understand, this is a land use planning study conducted by the community, it is not the operational environmental impact study conducted by the Air Force. The MIPA lines on the overlay maps are provided for compatible land use planning and are not meant to define precise noise impact areas. This JLUS report will be supplemented, if necessary, with more precise noise contour lines after the SEIS is released.

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EGLIN AFB

- Received Comments from Community Planner and Test Wing
- All Comments Categorized as “Substantive” or “Administrative”
- Five Questions Included
- Some Comments Addressed in Public Release (May 2009) Version of Draft Eglin JLUS Report
- Attachment D

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AMERICAN FARMS ZONING AWARENESS GROUP

- Recommends Expanding MAZ-III Area in Santa Rosa County to Include Area Included in 19 Dec 07 Correspondence from Eglin AFB Mission Enhancement Committee (included in Attachment E)

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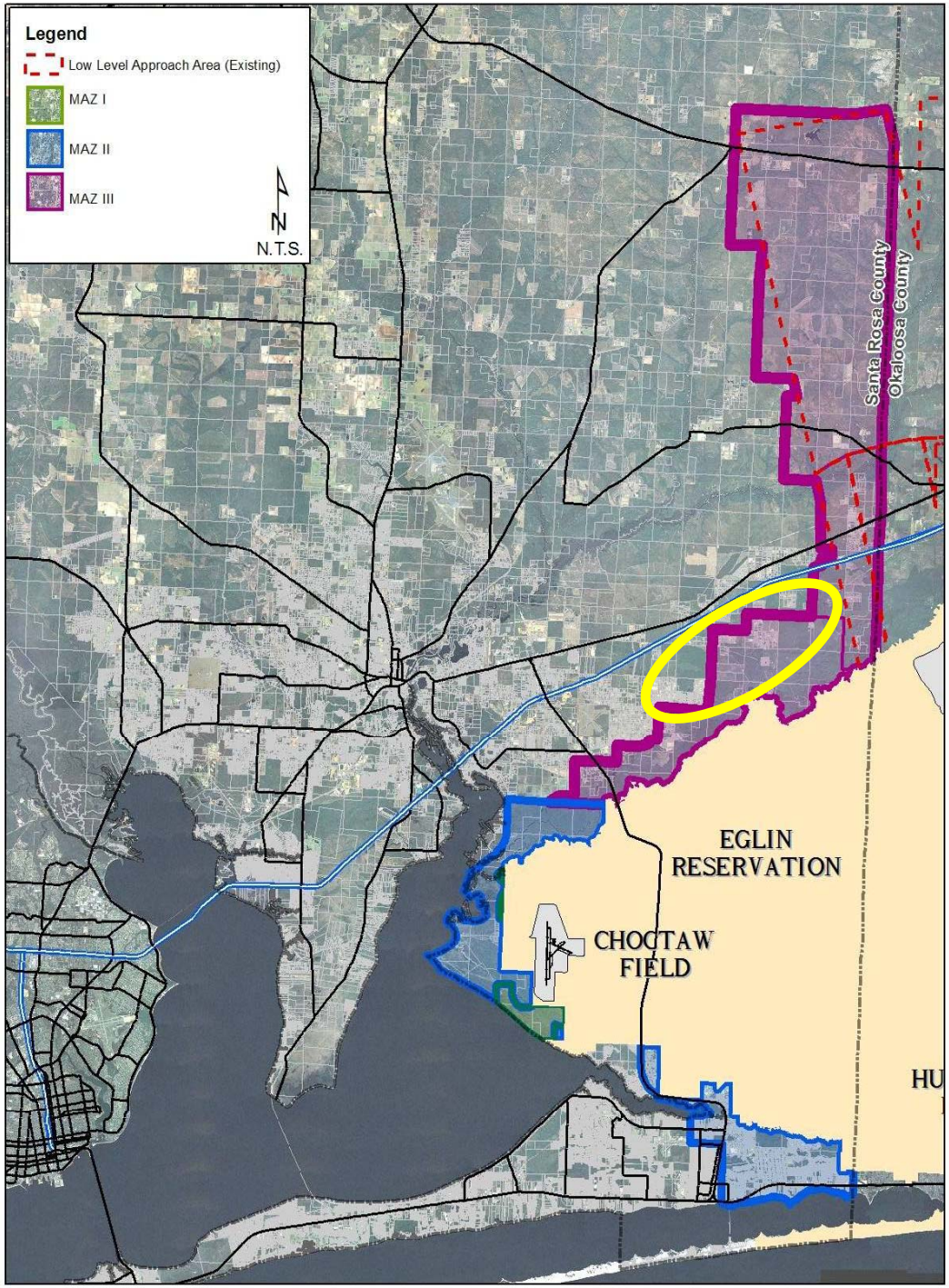
Military Influence Planning Areas (MIPAs) for Santa Rosa County



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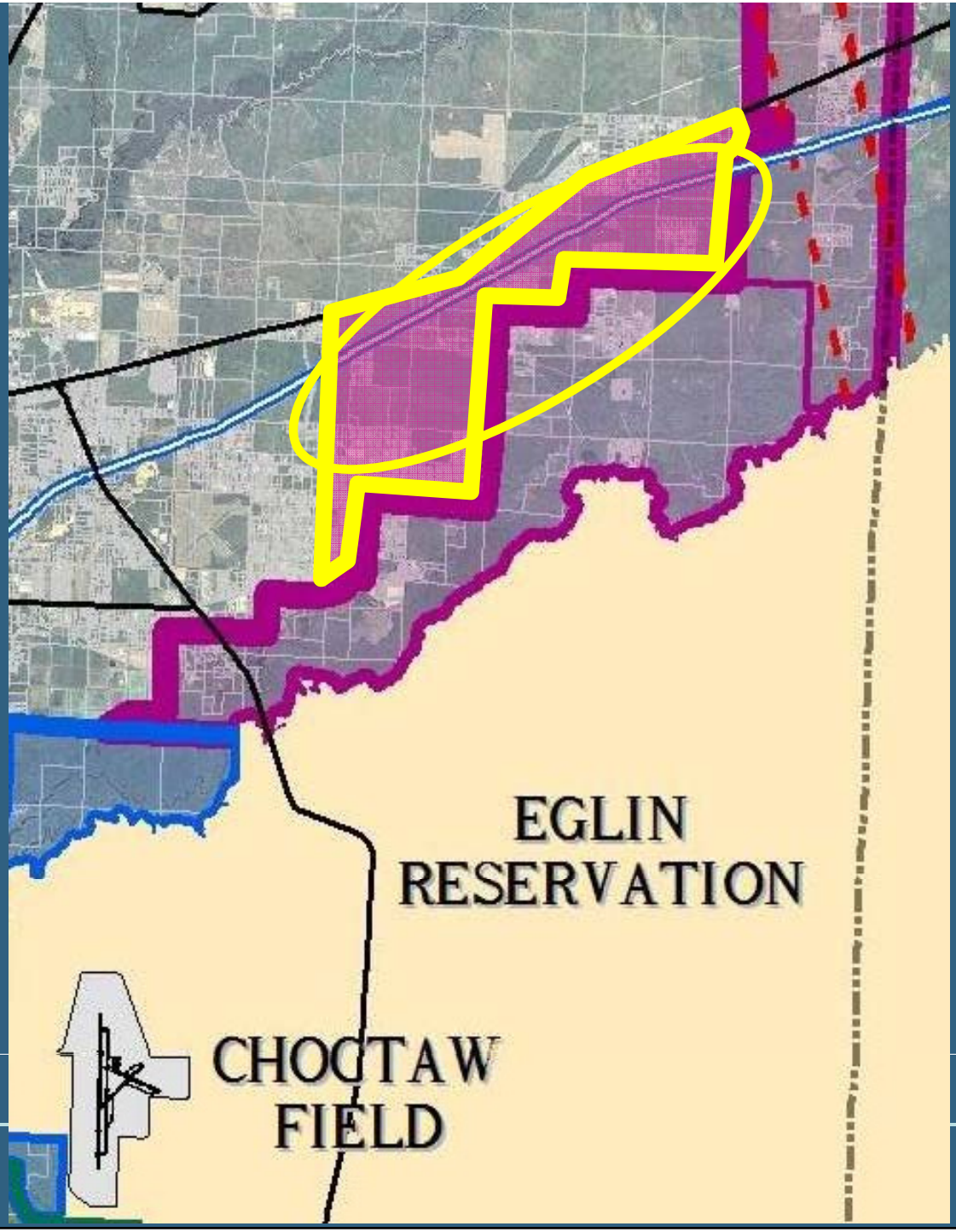

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GENERAL PUBLIC COMMENTS

- Received Two Comments (Attachment F):
  - Opposition to SRC 7 Until Additional Data & Studies Are Completed
  - Statement Received Via Fax: "With increased military facilities and housing, have any plans been made for increased power generation?"

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PROJECT TIMELINE

- Preliminary Draft JLUS to PC and TAG Members – 17 Mar 09
- TAG Meeting: Draft JLUS Review – 9 Apr 09
- PC Meeting: Draft JLUS Review – 30 Apr 09
- Draft JLUS Public Release – 15 May 09
- JLUS Public Workshops – 1-4 Jun 09
- PC Meeting: Public Comment Review – 29 Jun 09
- Final JLUS Public Release – 15 Jul 09
- PC Public Hearing – 30 Jul 09

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FINAL COMMENTS

JUNE 29, 2009

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Appendix E - Example MIA Land Development Code

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APPENDIX D - EXAMPLE MIA LAND DEVELOPMENT CODE

Appendix Contents

Section No.	Title	Date
1.0	Example - Airport Environs	Aug, 2004
2.0	Example - Overlay Districts	
3.0	Example - Airport Overlay Zone	Aug 23, 2007
4.0	Example - Approach Zone	

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SECTION 1.0

Airport Environs

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a. Santa Rosa County -- ARTICLE ELEVEN AIRPORT ENVIRONS

11.00.00 **FINDINGS**: The Board of County Commissioners of Santa Rosa County has considered, among other things, the character of the operations conducted and proposed to be conducted at the various airports in the applicable areas of Santa Rosa County, the nature of the terrain and the character of the area within the airport hazard area; the current uses of property and the uses for which it is applicable, and the Board finds as follows:

A. There exist airports within Santa Rosa County and in proximity to Santa Rosa County whose operations are potentially inimical to the health, safety and general welfare of the citizens of Santa Rosa County;

B. Airport hazards endanger the lives and property of users of airports and occupants and owners of property in their vicinity;

C. Airports produce noise which is not compatible with residential uses and certain commercial and industrial uses;

D. Obstructions reduce the size of the area available for the landing, taking off and maneuvering of aircraft, thus tending to destroy or impair the utility of the airport and the public investment therein;

E. The creation or establishment of an airport hazard injures the community served by the airport in question; and

F. In the interest of the public health, safety and general welfare, it is necessary that the creation or establishment of airport hazards be prevented.

11.01.00 **APPLICABILITY**: The regulations on land use set forth herein are applicable to all lands within the delineated zones set forth on Maps 1 (Airport Environs Zones) and 2 (Height Limitations), which are incorporated herein by reference and which are available for review and inspection in the Office of the Santa Rosa County Planning Director. The delineated zones shall be an overlay district onto the adopted zoning maps.

11.02.00 **CONFLICTING REGULATIONS**: In the event of conflict between any regulations in this article and any other regulations applicable to the same property, the more stringent limitation or regulation shall govern and prevail.

11.03.00 **HEIGHT LIMITATIONS**: In order to carry out the provisions of this article, there are hereby created and established certain airport zones and surfaces. These zones are shown and recorded as Airport Environs Zones and may be found in Official Record Book 807, Pages 62 - 86. The Zone Maps may also be found in Ordinance Book 2, Pages 122 - 146. These zones and maps are incorporated herein by reference and made a part hereof.

A. Any property or area located in more than one of the zones or surfaces described in this article shall be considered to be only in the zone or surface with the more restrictive height limitation.

B. Except as otherwise provided, no structure shall be constructed or maintained, or tree permitted to grow within any zone or surface created herein in excess of the height limitations established herein. In addition, no structure or obstruction will be permitted within Santa Rosa County that would cause a minimum obstruction clearance altitude, a minimum descent altitude or a decision height to be raised.

11.03.01 <u>Public Civil Airports</u>: The various zones and surface height limitations are hereby established for public civil airports:

A. <u>Primary Surface</u>: An area longitudinally centered on a runway, extending 200 feet beyond each end of that runway, with a width determined by the operational characteristics of each runway. No structure or obstruction will be permitted within the primary surface that is not part of the landing and takeoff area and is of a greater height than the nearest point on the runway center line.

B. <u>Runway Clear Zone</u>: A trapezoidal area at ground level, under the control of the airport authorities, for the purpose of protecting the safety of approaches and keeping the area clear of the congregation of people. The runway clear zone is the same width as the primary surface and begins at the end of the primary surface and is centered upon the extended runway centerline. The length and width are determined by the operational characteristics of each runway (FAA Circular 1500/5300-4B).

C. <u>Horizontal Surface</u>: The area around each civil airport, the perimeter of which is constructed by swinging arcs of specified radii from the center of each end of the primary surface of each runway and connecting the adjacent area by lines tangent to those arcs.

D. <u>Conical Surface</u>: The area extending outward from the periphery of the horizontal surface for a distance of 4,000 feet. Height limitations for structures in the conical surface are 150 feet above airport height at the inner boundary and increases one foot vertically for every 20 feet horizontally to a height of 350 feet above airport height at the outer boundary.

E. <u>Approach Surface</u>: An area longitudinally centered on the extended runway centerline and extending outward from each end of the primary surface. An approach surface is designated for each runway based upon the type of approach available or planned for at the runway end. The inner edge of the approach surface is the same width as the primary surface and expands uniformly to a width for each runway as set out hereinafter for each airport.

F. <u>Transitional Surface</u>: The area extending from the side of the primary surface and approach surfaces and connecting them to the horizontal surface. Height limits within the transitional surface are the same as the primary surface or

approach surface at the boundary line where it adjoins and increases at a rate of one foot vertically for every 7 feet horizontally with the horizontal distance measured at right angles to the runway centerline and the extended centerline, until the height matches the height of the horizontal surface or conical surface. Transitional surfaces for those portions of the precision approach surface which project through and beyond the limits of the conical surface, extend a distance of 5,000 feet measured horizontally from the edge of the approach surface and at right angles to the runway centerline.

11.03.02 **Military Airports**: The various zones and surface height limitations are hereby established for military airports:

A. Primary Surface: An area longitudinally centered on each runway and extending 200 feet beyond the runway end. The width of the primary surface varies for the type of aircraft accommodated as follows:

1. Jets and large turbo-prop aircraft - 1,500 feet.

2. Prop and small turbo-prop aircraft - 1,000 feet.

B. Clear Zone: The area adjacent to the landing threshold extending outward for 3,000 feet. The width varies as follows:

1. Jets and large turbo-prop aircraft - fan-shaped, the inner boundary is the same width as the primary surface and commencing 200 feet out from the threshold expands at an angle of 7 degrees 58 minutes and 11 seconds to a width of 2,284 feet.

2. Prop and small turbo-prop aircraft - 1,000 feet.

C. Inner-Horizontal Surface: The area encompassing the runway, primary surface and clear zone with an outer perimeter formed by swinging arcs from the end of each runway centerline and connecting adjacent arcs by lines tangent to these arcs. The radius of the arcs are 7,500 feet. No structure or obstruction will be permitted in the inner-horizontal surface of a greater height than 150 feet above airport elevation.

D. Conical Surface: A surface extending from the periphery of the inner horizontal surface outward and upward at a slope of 20:1 for a horizontal distance of 7,000 feet to a height of 500 feet above the established airfield clearance.

E. Outer-Horizontal Surface: The area extending outward from the outer periphery of the conical surface is 500 feet above airport elevation.

F. Approach Surface: The area longitudinally centered on each runway centerline, with an inner boundary 200 feet from the end of the runway and the same width as the primary surface then extending outward for a distance of 50,000 feet expanding uniformly in width to 16,000 feet at the outer boundary.

Height limits within the approach surface commence at the height of the runway end and increases at the rate of one foot vertically for every 50 feet horizontally for a distance of 25,000 feet at which point it remains level at 500 feet above airport elevation to the outer boundary.

G. Transitional Surface: The area with an inner boundary formed by the side of the primary surface and the approach surface then extending outward at a right angle to the runway centerline and extended centerline until the height matches the adjoining inner horizontal surface, conical surface and outer horizontal surface height limit. The height limit at the inner boundary is the same as the height limit of the adjoining surface and increases at the rate of one foot vertically for every seven feet horizontally to the outer boundary of the transitional surface, where it again matches the height of the adjoining surface.

11.03.03 Naval Helicopter Outlying Fields: The various zone and surface height limitations are hereby established for Naval helicopter outlying fields:

A. Primary Surface: An area horizontally centered on the helipad at the established elevation of landing, 150 feet wide and 150 feet in length.

B. Takeoff Safety Zone: The takeoff safety zone shall be used as the clear zone. It is an area which underlies the first 400 feet of the approach-departure surface [refer to 3].

C. Approach-Departure Surface: An inclined plane which flares upward and outward from the helipads longitudinally extended centerline which starts at the end of the primary surface with the same width as the primary surface and expands to a width of 500 feet, 4,000 feet from the primary surface. The slope ratio is 1 foot vertically for every 10 feet horizontally.

D. Transitional Surface: The area which extends outward and upward from the lateral boundaries of the primary surface and from the approach surface at a slope of 2 to 1 for a distance of 250 feet from the centerline of the landing area. E. Helicopter Traffic Pattern Airspace: No structure shall exceed 200 feet above ground level in the traffic pattern airspace. The area protected around each helicopter OLF is determined by the capacity limit of the OLF.

11.04.00 Use Restrictions: Notwithstanding any provision of Article 6 of this ordinance, the permitted land use for any property within the Airport Environs Area shall be modified as set forth in Table 11-1.

11.04.01 Key to Table 11-1

A. Accident Potential Zones (APZ's) are divided into three types along primary flight paths. The Clear Zone is an area which possesses a high potential for accidents. APZ 1 is the area normally beyond the Clear Zone which possesses a significant potential for accidents. APZ 2 is and are normally beyond APZ 1 which has a measurable potential for accidents.

B. Airport Noise Zones are hereby established as follows:

Airport Noise Zone	Ldn Values
1	Less than 65
2	65 to 75
3	Greater than 75

C. Airport Environs Zones are hereby established as follows:

Area	Characteristics
A	Clear Zone
B3	Accident Potential Zone 1 & Noise Zone 3
B2	Accident Potentiel Zone 1 & Noise Zone 2
B1	Accident Potentiel Zone 1 & Noise Zone 1
C3	Accident Potential Zone 2 & Noise Zone 3
C2	Accident Potential Zone 2 & Noise Zone 2
C1	Accident Potential Zone 2 & Noise Zone 1
3	Noise Zone 3
2	Noise Zone 2

D. Development

1. Acceptable Development: The provisions of Article Six are appropriate without modification.

2. Conditional Development: The land uses set forth in Article Six are appropriate; however, certain conditions or safeguards need to be imposed to protect the public interest.

3. Unacceptable Development: The land uses permitted by Article Six are incompatible with and prohibited by the airport environs zone in which the property is located.

11.04.02 Conditions for Development: This section is intended to be used with Table 11-1. For the purposes of this section, NLR means Noise Level Reduction.

A. No passenger terminals are permitted.

B. No structures (except airfield lighting), buildings or above ground utility communications lines shall be located in the Clear Zone.

C. Permitted only within height constraints.

D. Hunting and Fishing is permitted only for wildlife control.

E. Compatible development is conditioned on design and construction providing for a NLR of 30 dBA, A-weighted (dBA) reception, office, retail and employee lounge areas.

F. Compatible development is conditioned on design and construction providing for a NLR of 30 dBA throughout the facility.

G. Chapels are not permitted.

H. Development is subject to the condition that spectator stands are not built as part of this land use operation.

I. Development is subject to the condition that clubhouses are not built as part of this land use operation.

J. Development is subject to the condition that concentrated rings with classes larger that 25 are not built as part of this land use operation.

K. Residential structures are not permitted.

L. Compatible development is conditioned on design and construction providing for an NLR of 25 dBA in reception, office, retail and employee lounge areas.

M. Compatible development is conditioned on design and construction providing for an NLR of 25 dBA throughout the facility.

N. Compatible development is conditioned on design and construction providing for an NLR of 35 dBA throughout the facility.

O. Development is subject to the condition that concentrated rings with classes larger than 50 are not built as part of this land use operation.

P. Development is subject to the condition that maximum density not to exceed 2 dwelling units per acre.

Q. Compatible development is conditioned on dwelling design and construction providing for an NLR of 30 dBA and location of outdoor activity areas such as balconies and patios on the side of the building which is sheltered from the aircraft flight path.

R. Development is subject to the condition that meeting places, auditoriums and the like for gatherings of more than 25 people are not built as part of this land use operation.

S. Development is subject to the condition that the park is oriented toward forest trails and similar activities which do not concentrate groups of people greater than 50 within the park. Playgrounds are not permitted.

T. Development is subject to the condition that meeting places, auditoriums and the like for a gathering of more than 50 people are not built as part of this land use operation.

U. Compatible development is conditioned on residential unit design and construction providing for an NLR of 35 dBA and location of outdoor activity areas such as balconies and patios on the side of the building which is sheltered from the aircraft flight path.

V. Compatible development is conditioned on design and construction providing for an NLR of 30 dBA in the club house.

W. Compatible development is conditioned on design construction providing for an NLR of 35 dBA in permanent residential units and 30 dBA in other permanent structures.

X. Development is subject to the condition that maximum density not exceed 1 dwelling unit per five acres.

Table 11-1

Land Use Objectives

Land Use Category Environmental Areas	Airport Environmental Areas								
	A	B3	B2	B1	C3	C2	C1	3	2
Residential									
Single Family Dwellings	No	No	*24,14	*24	No	*16,17	*16	No	*17
Two Family Dwellings; Multi-Family Dwellings; Mobile Home Parks or Courts	No	No	No	No	No	No	No	No	*17
Group Quarters; Residential Hotels; Transient Lodgings	No	No	No	No	No	No	No	*21	*17
Industrial/Manufacturing									
Food and Kindred Products; Textile Mill Products	No	No	No	No	*5	*12	Yes	*5	*12
Apparel; Chemical & Allied Products Activities; Petrol Refining & Related Rubber & Misc. Plastic Products	No	No	No	No	No	No	No	*5	*12
Lumber & Wood Products; Furniture & Fixtures; Paper and Allied Products; Printing & Publishing; Stone, Clay & Glass Products; Primary Metal Industries; Fabricated Metal Products; Product Assembly; Motor Freight; Warehousing	No	*5	*12	Yes	*5	*12	Yes	*5	*12
Professional, Scientific & Control Instruments	No	No	No	No	No	*12	No	*5	*12
Transportation, Communication and Utilities									
Railroad; Rapid Transit (on grade)	*1/3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Highway & Street Right-of-Way	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Automobile Parking	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Communications Utilities (except above ground transmission lines)	*3 *2	*5 *5	*12 *12	Yes Yes	*5 *5	*12 *12	Yes Yes	*5 *5	*12 *12
Above ground transmission lines)	No	No	No	No	Yes	Yes	Yes	Yes	Yes

Yes = Acceptable Development
***** = Conditional Development Permitted by Section 11.04.02
No = Unacceptable Development and Prohibitied

Table 11-1

Land Use Objectives (Continued)

Land Use Category Environmental Areas	Airport Environmental Areas								
	A	B3	B2	B1	C3	C2	C1	3	2
Commercial/Retail Trade									
Wholesale Trade; Building Material; Hardware; Farm Equipment (Retail); Auto, Marine, Aviation (Retail)	No	*5	*12	Yes	*5	*12	Yes	*5	*12
General Merchandise (Retail); Food Retail; Apparel and Accessories (Retail)	No	No	No	No	*6	*13	Yes	*6	*13
Furniture; Home Furnishings (Retai)	No	No	No	No	*6	*12	Yes	*6	*13
Eating and Drinking Establishments	No	No	No	No	No	No	No	*14	*6
Personal & Business Services									
Finance; Real Estate; Insurance; Personal Services; Business Services; Professional Services; Indoor Recreational Services	No	No	No	No	*14	*6	Yes	*14	*6
Repair Services; Contract Construction Services	No	*6	*13	Yes	*6	*13	Yes	*6	*13
Automobile Service Stations	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Public & Quasi-Public Services									
Government Services	No	No	No	No	No	*13,18	*20	*6	*13
Educational Services; Cultural Activities; Non-Profit Organizations	No	No	No	No	No	No	No	No	*14
Medical & Other Health Services	No	No	No	No	No	No	No	*6	*14
Cemetaries	No	*7	*7	*7	*7	*7	*7	Yes	Yes
Outdoor Recreation									
Playground; Neighborhood Parks	No	No	No	No	No	*19	*19	No	Yes
Community & Regional Parks	No	*8	*8	*8	*8	*8	*8	Yes	Yes
Nature Exhibits	No	*6	*13	Yes	No	*13	Yes	*6	Yes

Yes = Acceptable Development
***** = Conditional Development Permitted by Section 11.04.02
No = Unacceptable Development and Prohibitied

Table 11-1

Land Use Objectives (Continued)

Land Use Category Environmental Areas	Airport Environmental Areas								
	A	B3	B2	B1	C3	C2	C1	3	2
Outdoor Recreation (Continued)									
Spectator Sports Including Arenas	No	No	No	No	No	No	No	No	Yes
Golf Courses; Riding Stables	No	*9,10	*9,10	*9,10	*9,15	*9,15	*9,15	*22	Yes
Water Based Recreation Areas	No	*9	*9	*9	*9	*9	*9	*22	Yes
Resorts and Group Camps	No	No	No	No	No	No	No	*23	Yes
Entertainment Assembly; Amphitheater; Music Shell	No	No	No	No	No	No	No	No	No
Resource Production, Extraction & Open Land									
Agriculture Including Livestock Grazing	*2	*11	*24,17	*24	*11	*17	Yes	*21	*17
Livestock Farms; Animal Breeding	No	No	*24,17	*24	No	*17	Yes	No	*17
Agriculture Related Activities	No	*11	*24,17	*24	*11	*17	Yes	No	*17
Forestry Activities	*3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fishing Activities	*4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mining Activities	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Undeveloped Areas; Unused Land Areas; Permanent Open Space; Water Areas	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Yes = Acceptable Development
***** = Conditional Development Permitted by Section 11.04.02
No = Unacceptable Development and Prohibitied

11.05.00 **USES INTERFERING WITH AIRCRAFT:** It is unlawful to establish, maintain or continue any use within the airport hazard area in such a manner as to interfere with the operations of aircraft. The following requirements shall apply to all lawfully established uses within the airport hazard area:

A. All lights or illumination used in conjunction with street, parking, signs or use of land and structures shall be arranged and operated in such a manner that it is not misleading or dangerous to aircraft operating from an airport or in a vicinity thereof as determined by the airport operator.

B. No operations of any type shall produce smoke, glare or other visual hazards within three (3) statute miles of any usable runway or a designated airport.

C. No operations or any type shall produce electronic interference with navigation signals or radio communication between the airport and the aircraft.

D. No use of land shall be permitted which encourages large concentrations of birds or waterfowl within the vicinity of an airport.

E. Sanitary landfills will be considered as an incompatible use if located within areas established for the airport through the application of the following criteria:

1. Landfills located within 10,000 feet of any runway used or planned to be used by turbojet or turboprop aircraft.

2. Landfills located within 5,000 feet of any runway used only by piston type aircraft.

3. Landfills outside the above perimeters but within the conical surfaces described by FAR Part 77 and applied to an airport will be reviewed on a case-by-case basis.

4. Any landfill located that places the runways and/or approach and departure patterns of an airport between bird feeding, water or roosting areas.

11.06.00 LIGHTING: Notwithstanding the provisions of any other article, section or ordinance, the owner of any structure over 200 feet above ground level shall install lighting in accordance with Federal Aviation Advisory Circular 70-7460-1 Series and Amendments thereto on that structure. In addition, the owner shall construct high intensity white obstruction lights on a high structure which exceeds 749 feet above mean sea level.

11.06.01 Hazard Marking and Lighting: In granting any permit or variance under this article, the Building Inspection Department or the Board of Adjustment may, if it deems such action advisable to effectuate the purposes of this ordinance and reasonable under the circumstances, so condition such permit or variance as to require the owner of the structure or tree in question to permit Santa Rosa County or the United States Government, at its own expense, to install, operate and maintain thereon, such markers and lights as may be necessary to indicate to flyers the presence of an airport hazard.

11.07.00 NONCONFORMING USES: No provision of this article shall require the removal, lowering, or other change or alteration of any structure or tree not conforming to these regulations when adopted or amended, or otherwise interfere with the continuance of any nonconforming use, except as set forth herein.

11.07.01 No nonconforming structure or tree shall be increased, permitted to grow taller or otherwise become a greater hazard to air navigation than it was when it became nonconforming.

11.07.02 In the event that a nonconforming use or nonconforming structure has been abandoned for a period of one year or is more than eighty percent torn down, destroyed, deteriorated, or decayed, the structure or use shall not be resumed, repaired or reconstructed except in conformance with all applicable regulations.

11.07.03 Within zones A, B1 and C1 for OLF Holley, single family dwellings, up to a density of four units per acre, may be placed or constructed on any existing or future lot despite the fact that it does not conform with the minimum lot requirements set forth in paragraphs (B), (P) and (X) of Section 11.04.02.

11.08.00 PERMITS

11.08.01 No new structure or use may be constructed or established or any existing use or structure substantially changed or altered or repaired within the airport hazard area unless a permit has been granted by the Building Inspection Department. Each application for a permit shall indicate the purpose for which the permit is desired with sufficient particularity to permit a determination as to whether the resulting use, structure or growth would conform to the regulations herein prescribed. If the determination is affirmative, the permit shall be granted. No permit shall be granted that would allow the creation of an airport hazard.

11.08.02 No nonconforming structure or tree may be replaced, substantially altered or repaired rebuilt, allowed to grow higher or replanted within the airport hazard area unless a permit has been granted by the Building Inspection Department. No permit shall be granted that would permit a nonconforming structure or tree or nonconforming use to be made or become higher or become a greater hazard to air navigation than it was when the applicable regulation was adopted or when the application for a permit is made.

11.08.03 Whenever the Building Inspection Department determines that a nonconforming use or nonconforming structure or tree has been abandoned for more than one year or is more than eighty percent torn down, destroyed or deteriorated, or decayed, no permit shall be granted that would allow said structure or tree to exceed the applicable height limit or otherwise deviate from applicable regulations.

11.08.04 Except as provided herein, applications for permits shall be granted, provided the matter applied for meets the provisions of this article and the regulations adopted and in force hereunder.

11.09.00 **DISCLOSURE STATEMENT**: No person shall sell, lease, nor offer for sale or lease any property within the airport hazards area unless the prospective buyer or lessee has been given the following notice:

To: _____

The property at ____(address)_____ is located within the airport environs of ____(airport)_____ . Santa Rosa County has determined that this is an area of airport operations. The County has placed certain restrictions on the development and use of property within airport environs zones in addition to the restrictions in Article Six of the Land Development Code (the zoning code). Before purchasing or leasing the above property, you should consult Article Eleven of the Santa Rosa County Land Development Code to determine the restrictions which have been placed on the subject property.

Certification

As the owner of the subject property, I hereby certify that I have informed_____ _____ , as a prospective purchaser/lessee, that the subject property is located in an Airport Environs Zone.

Dated this _____ day of _____ , 19___ .

_____ _____

Witness Owner

As a prospective purchaser/lessee of the subject property, I hereby certify that I have been informed that the subject property is in an Airport Environs Zone and I have consulted Article Eleven of the Santa Rosa County Land Development Code to determine the restrictions which have been placed on the subject property.

Dated this ____day of _____, 19 ___ .

_____ _____

Witness Purchaser/Lessee

11.10.00 APPEALS

A. Any person aggrieved, or taxpayer affected, by any decision of an administrative official or agency made in its administration of the regulations adopted under this article, or any governing body of a political subdivision, which is of the opinion that a decision of such an administrative official or agency is an improper application of airport zoning regulations of concern to such governing body or board, may appeal to the Board of Adjustment the decisions of such administrative official or agency. Appeals shall be made and heard pursuant to Section 2.03.00 et. seq. of this ordinance.

B. An appeal shall stay all proceedings in furtherance of the action appealed from unless the agency or official from which the appeal is taken, certifies to the Board of Adjustment (BOA), after the notice of appeal has been filed with it, that by reasons of the facts stated in the certificate a stay would, in its opinion, cause imminent peril to life or property. In such cases, proceedings shall not be stayed otherwise than by an order of the BOA on notice to the agency from which the appeal is taken and on due cause shown.

11.10.01 Special Exception - Private Airports and Helicopter Landing Sites: In addition to the special exceptions which may be considered by the BOA pursuant to Section 2.04.000 of this ordinance, the Board may grant a special exception for a private airport or helicopter landing site if it finds the following:

A. That the applicant has obtained all necessary permits from state and federal agencies for the operation of the facility;

B. That the proposed use is consistent with the highest order of safety;

C. That the operation of the facility is compatible with surrounding land uses;

D. That the proposed use will not adversely affect the public interest.

The Board may prescribe appropriate conditions and safeguards to effectuate the purposes of this article.

11.10.02 Variances: In addition to the regulations, standards and procedures described in Section 2.04.00 et. seq. of this ordinance, the Board of Adjustment may consider variances to this article as follows:

A. Any person desiring to erect any structure, or increase the height of any structure, or permit the growth of any tree, or otherwise use his property in violation of the regulations set forth herein may apply to the Board of Adjustment for a variance from the regulations in question.

B. Any person desiring to erect, alter or modify any structure, the result of which would exceed the federal obstruction standards as contained in 14 C.F.R. Sec.

77 specifically 14 C.F.R. Sections 77.21 (scope), 71.23 (standards), 77.25 (civil airports), 77.28 (military airports), 77.29 (helicopters), FAA Handbook 7400.2C (Procedures for Handling Airspace Matters), and FAA circular 1500/5300-4B (zoning and grants) may apply to the Board of Adjustment for a variance from the regulations in question.

C. Such variances shall be allowed where a literal application or enforcement of the regulations would result in practical difficulty or unnecessary hardship and the relief granted would not be contrary to the public interest but do substantial justice and be in accordance with the spirit of regulations and this article. Provided, that any variance may be allowed subject to any reasonable conditions that the Board of Adjustment may deem necessary to effectuate the purposes of this ordinance.

11.11.00 <u>ADMINISTRATION AND ENFORCEMENT</u>: It shall be the duty of the Building Inspector or his duly appointed designee to implement and enforce the regulations prescribed herein within the territorial limits over which Santa Rosa County has jurisdiction. In the event that the Building Inspector finds any violation of the regulations contained herein, the Building Inspector shall give written notice to the person responsible for such violation. The Building Inspector shall order the discontinuance of any work being done or take such action which is necessary to correct violations and obtain compliance with the article.

11.11.01 <u>Remedies</u>

A. Whether an application is made for a permit or not, the Building Inspection Department may, by appropriate action, compel the owners of the nonconforming structure or tree that has been abandoned or is more than eighty percent torn down, destroyed, deteriorated or decayed, at the owner's expense, to lower, remove, reconstruct or equip such object as may be necessary to conform to the regulation.

B. If the owner of the nonconforming structure or tree shall neglect or refuse to comply with such order for ten days after notice thereof, the Planning Board (LPA) may report the violation to the Board of County Commissioners which may proceed to have the object so lowered, removed, reconstructed or equipped an assess the cost and expense thereof upon the object of land whereon it is or was located.

C. Unless such an assessment is paid within ninety days from the service of notice thereof on the owner or his agent, the sum shall be a lien on said land and shall bear interest hereafter at the rate of six (6) percent per annum until paid and shall be collected in the same manner as taxes on real property are collected, or, at the County's option, said lien may be enforced in the manner provided for the enforcement of liens by Chapter 85, F.S.

b. JLUS Implementation: Summary of Land Development Code Recommendations As of 8/11/2004

Article 11 Recommendations

Public Airports:

- Establishes Public Airport Zones (PAZ) and Public Airport Influence Areas (PAIA) and defines airport surfaces
- Establishes height limits for each zone
- Establishes a Public Airport Overly District encompassing the PAZ and PAIA and identifies specific use restrictions within the overlay district
- Recommends applying the overly district to new public or private airports

Military Airfields:

- Establishes Military Airport Zones (MAZ) and Military Airport Influence Areas (MAIA) and defines military airport zones including noise contours, clear zones, and accident potential zones.
- Establishes height limits for each zone
- Establishes a Military Airport Overly District encompassing the MAZ and MAIA and identifies specific use restrictions within the overlay district
- Establishes setbacks for structures from clear zones and airfield boundaries.

Disclosure:

- Requires the following disclosure methods:
  - Disclosure with Sale or Lease Contract within 1 mile for fixed wing airfields, and ½ mile for helicopter fields. Copies of signed disclosure statements to be forwarded to Whiting Field.
  - Realty Sales Offices and Marketing, and
  - Codes, Covenants, and Restrictions with residential plats.

Subdivision Recommendations

- Navy will have opportunity to comment on preliminary plat in MAZ
- APZ, clear zones, runway protection zone, etc. to be shown on plat
- Large parcel subdivision exemption (20 acres) does not apply to APZ or Clear Zone
- Notification Requirements: Subdivision development required to have Covenants that address notification
- Subdivision Design Standards:

Table A4-36

JLUS Implementation Summary of Recommendations

Area	Cluster Requirement	Exemption/Other
Whiting Field MAZ	Cluster Required - 50% AG or Cons easement - Density clustering - Cluster outside MAZ boundary if possible	-Minimum 5 acre lot size
Harold or Pace MAZ	Cluster Required - 50% AG or Cons easement - Density clustering - Cluster outside MAZ boundary if possible	-Minimum 5 acre lot size
Santa Rosa MAZ	Cluster Required - 50% AG or Cons easement - Density clustering - Cluster outside MAZ boundary if possible	-Minimum 4 acre lot size
Choctaw MAZ	If in SW MAZ, Clustering Requied - 50% AG or Cons easement - Density clustering - Cluster outside MAZ boundary if possible	-Minimum 5 acre lot size for SW MAZ
Peter Prince PAZ	Cluster Required - 50% AG or Cons easement - Density clustering - Cluster outside MAZ boundary if possible	-Minimum 4 acre lot size
ALL		1 dwelling unit allowed per lot of record
Holley and Spencer		No New Requirements

Summary of Lighting Recommendations

- Prohibits some light sources county-wide except through special event permit (fireworks, light shows, beacons, high intensity promotional lights, etc.)
- Prohibits certain lighting within MAZ or PAZ (patterns common to aviation, neon on bldg exterior or roof, flood lights above horizontal plane, internally lit awnings, etc.)

- Establishes lighting standards within MAZ or PAZ
    - Limited to minimum necessary for safety and security
    - No lighting of outdoor recreation facilities
    - Parking lot lights not to exceed 24’
    - Low-pressure sodium lighting only
    - Limited decorative lighting
    - Shielding required
- Limits reflected solar glare
- Limits advertising sign lighting
- Provides for exemptions and temporary permits

c. PROPOSED (JLUS) COMPREHENSIVE PLAN POLICIES FOR SANTA ROSA COUNTY, FL

Goal 3.3: To protect the current and long-term viability of military and public airfields for purposes of promoting a diverse local economy that supports rewarding jobs and quality of life for County residents, and support effective and safe training environments for the Nation's military forces while protecting the health and safety of the County's citizens.

Objective 3.3.A: The County will ensure that future development within adopted Military Airport Zones (MAZs) and Public Airport Zones (PAZs) will not negatively impact current and long-term viable use of the airfield, will promote health and welfare by limiting incompatible land uses, and allow compatible land uses within such areas.

Policy 3.3.A.1: The County hereby establishes military airport zones (MAZ) and public airport zones (PAZ) that will serve as overlay districts, within which growth management policies and regulatory techniques shall guide land use activities and construction in a manner compatible with the long-term viability of airports and military installations and the protection of public health and safety.

For Naval Air Station Whiting Field North and South, and for Naval Outlying Landing Fields Spencer, Harold, Santa Rosa, Holley, and Pace, the MAZ boundaries extend approximately one half mile from the perimeter of each airfield and encompass all Air Installation Compatible Use Zones (AICUZ) and noise zones. For NOLF Choctaw, MAZ boundaries encompass that area west of State Road 87, north and east of East Bay, and south of the Yellow River.

For Peter Prince Airport, the PAZ boundaries extend one half mile from the runway.

MAZ and PAZ boundaries appear on Map ### of the Future Land Use Map Series and are consistent with the study area boundaries of the Santa Rosa County Joint Land Use Study (September 2003).

Policy 3.3.A.2: Future Land Use Map amendments and rezonings within the MAZs that would allow for increased gross residential densities are prohibited.

Policy 3.3.A.3: Conservation and agriculture uses adjacent to military airfields provide a buffer between the airfield and incompatible development; therefore, the County will, whenever feasible, support efforts to purchase conservation lands, conservation easements or agriculture easements, and will encourage the establishment of conservation or agriculture easements as part of development plans.

Policy 3.3.A.4: The County shall encourage the location of compatible commercial and industrial uses adjacent to or within MAZ and PAZ boundaries at locations where roads, water, and sewer are available and such uses will not adversely impact existing established residential neighborhoods.

Policy 3.3.A.5: The County shall review Comprehensive Plan amendments for compatibility with the Whiting Field Air Installation Compatible Use Zone program. The Santa Rosa County Board of County Commissioners may deny a petition for a Comprehensive Plan amendment if determined that such amendment is incompatible with the AICUZ program.

Objective 3.3.B: Continue to foster meaningful intergovernmental coordination between the County, the military, and the Federal Aviation Administration to ensure that land use decisions are not in conflict with military operations or federal aviation standards, and that such decisions promote the health and safety of the County's public.

Policy 3.3.B.1: The County shall further protect the current and long-term viability of military installations and airports through effective coordination and communication with NAS Whiting Field and the U.S. Department of Defense.

Policy 3.3.B.2: The Local Planning Board will include, as ex-officio members, appropriate local Department of Defense representatives to advise on land use issues with the potential to impact military facilities or operations.

Policy 3.3.B.3: All applications for site plan or subdivision review, variances, conditional uses and special exceptions located within an MAZ shall be referred to the appropriate local Department of Defense officials for review and comment.

Policy 3.3.B.4: The location of a telecommunications tower will require written evidence that the tower meets the approval of the appropriate local Department of Defense officials.

Policy 3.3.B.5: The County shall require applicants of development within the Peter Prince PAZ or other areas of the County to obtain necessary approvals from the Federal Aviation Administration (FAA) for development encroaching jurisdictional airspace controlled by the FAA.

Policy 3.3.B.6: The County will continue to coordinate with NAS Whiting Field representatives regarding the County's economic development program. Such coordination will occur primarily through TEAM Santa Rosa and may include such things as ex-officio membership on the TEAM Santa Rosa Board of Directors and joint use of military facilities for commercial, industrial, or community activities when appropriate.

Objective 3.3.C: Inform prospective residents and property owners within a MAZ or PAZ of the impacts inherent to military installations and airports, including but not limited to noise and other similar nuisances and accident potential risks.

Policy 3.3.C.1: Within MAZs and PAZs, the proximity of property to an airfield must be disclosed by the seller at the earliest possible stage of any land sales activity

Policy 3.3.C.2: The County will facilitate the provision of information to the public regarding the location of military and public airfields and impacts typically associated with these facilities through such means as posting maps on the County's website, installing signage near airfields where appropriate, and requiring MAZ and PAZ, accident potential zone, and noise zone information on site plans and subdivision plats.

SECTION 2.0
Overly Districts

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Article 8 Overlay Districts

DIVISION 1, AIRPORT DISTRICTS, IN GENERAL

Sec. 800 Airport Districts.

There are certain areas within the city that are subject to high aviation noise levels and possible crash hazards generated by aviation activities that endanger the lives and property of occupants of land in the vicinity of four airports:

Buckley Air Force Base – military airport
Centennial Airport – general aviation airport
Front Range Airport – general aviation airport
Denver International Airport – commercial airport

Airport districts are created in and around these airports for the following purposes:

1. To minimize exposure of residential and other land uses to aircraft noise;

2. To minimize risks to public safety from potential aircraft accidents;

3. To protect property values;

4. To promote sound land use planning and zoning practices in areas encompassed by airport influence districts;

5. To restrict incompatible land use within the airport influence districts; and

6. To promote and protect the public health, safety, and welfare.

The city council finds and determines that there are certain areas within the city that are subject to high aviation noise levels and possible crash hazards generated by aviation activities which endanger the lives and property of occupants of land in the vicinity of airports. The city council intends to maintain an open process of negotiation and interpretation of airport influence districts and to inform citizens of potential impacts of airport influence districts on them and their properties. The council recognizes that a number of factors must be evaluated in determining whether proposed uses in affected areas are acceptable.

Figure A4-8.1

Airport Influence Districts

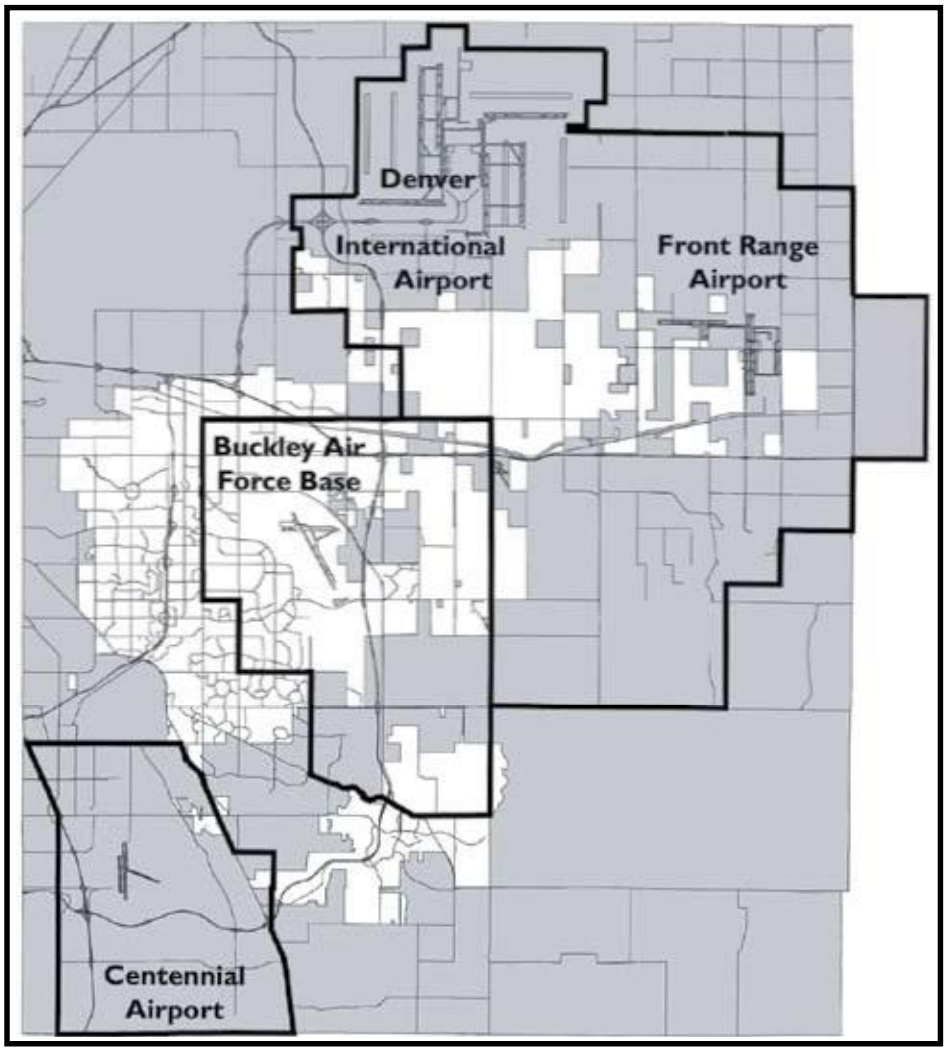
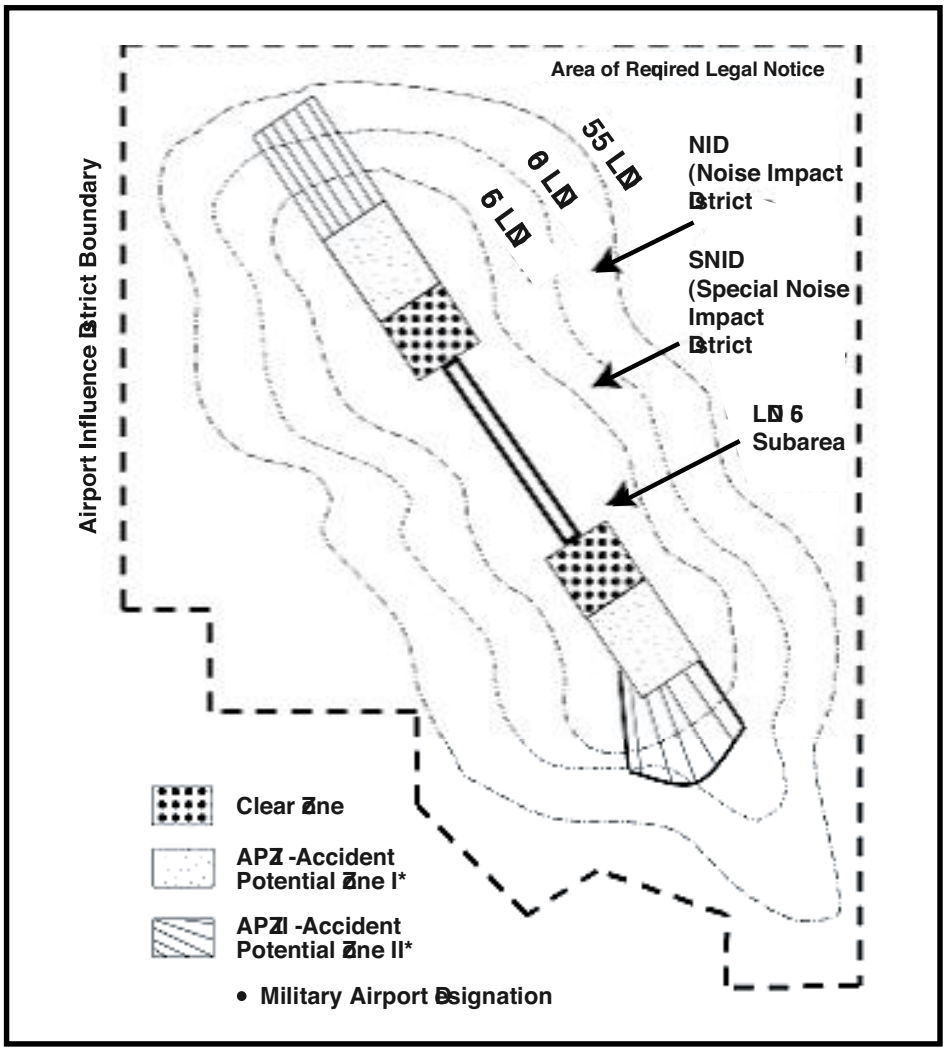


Figure A4-8.2

Components of Typical Airport Influence District



DIVISION 2, BUCKLEY AIR FORCE BASE DISTRICT

Sec. 801. Regulations.

(A) Nothing contained in these district regulations shall require any change or alteration in:

1. A lawfully constructed building or structure in existence at the time of the adoption of the ordinance from which this district derives.

2. Site plans, or residential subdivision plats, or amendments thereto that were formally approved by the city prior to the adoption of this district, provided such plans, use, and construction are commenced, pursued, and completed in compliance with all other provisions of this Code.

(B) This district is intended to regulate the following:

1. The erection or establishment of any new building or use.

2. The addition or expansion to an existing structure, when such addition is greater than 1,000 square feet.

3. The moving or relocation of any building or structure to a new site or new location.

4. The change from one use to another of any building, structure, or land, or the re-establishment of a nonconforming use after its discontinuance for a period of one year or more from the effective date of the ordinance from which this district derives.

(C) Overlay Zone. This district shall be applied as an overlay zone. The application of this district is in addition to the provisions of the underlying zone districts. Where the provisions of this overlay district conflict with those of the underlying zone district, the requirements of this overlay district shall control.

Sec. 802 FAR Part 77 Surfaces.

All development within the city shall comply with any and all height restrictions in the underlying zone, together with FAR part 77 standards and procedures for determining and avoiding obstructions and eliminating hazards to air navigation.

Sec. 803 Interpretation of District Boundaries.

The boundaries of the district shall be determined by scaling distances on the AICUZ map. Where interpretation is needed as to the exact location of the boundaries of the airport districts, as shown on the AICUZ map, the director of planning shall make the necessary determination of the boundary. A property owner contesting the location of a district boundary affecting his or her property shall be given a reasonable opportunity to present his or her case to the director of planning, and to submit his or her own evidence if he or she so desires. The decision of the director of planning may be appealed to the city council, provided notice of such appeal shall be filed with the city manager within 10 calendar days after the director's decision. The city council shall have the power to overrule the director's decision by a vote of a majority of the council members present and voting.

Sec. 804 Variances.

The city council may, after receiving a recommendation from the planning and zoning commission and after conducting a public hearing, grant variances from the provisions for this district. The planning and zoning commission shall submit its recommendation on the requested variance after conducting a public hearing on the request.

Such a variance shall be granted only if the spirit of this section is observed, public welfare and safety secured, and substantial justice done. The basis of such variance may be one or more of the following:

(A) Unique, unnecessary, or unreasonable hardships that would be imposed on the property owner by strict enforcement of the requirements of this district.

(B) Reliance by the applicant on preexisting terms and conditions of development, expressed in the form of deed restrictions, agreements with the air force, or other binding documents.

(C) Demonstrable evidence that failure to obtain a variance will significantly undermine the ability to repay bonded obligations and assessments.

(D) The low number of public customers or visitors to any particular facility.

Sec. 805 Sub areas.

To carry out the purpose of this district, the air installation compatible use zone (AICUZ), as bounded and defined on the map entitled "Air Installation Compatible Use Zone Map" (exhibit A), is on file in the office of the director of planning, together with all references, notations, and other information shown thereon which is adopted by reference and declared to be a part of this section. The AICUZ consists of the following overlay sub areas:

(A) CZ, clear zone sub area

(B) APZ I, accident potential zone I sub area

(C) APZ II, accident potential zone II sub area

(D) LDN 65 sub area, areas contained within the LDN 65 noise contour line.

(E) Special noise impact district, areas contained between the LDN 60 and LDN 65 noise contour lines.

(F) Noise impact district, areas contained within the noise impact boundary

(G) Airport influence district, being that area located within the city, which lies east of the following described line: commencing at the southeast corner of section 26, T3S, R66W, County of Adams, State of Colorado; thence westerly along the southern section line of sections 26, 27, 28, and 29 to Chambers Road; thence south along Chambers Road to Jewell Avenue extended; thence east along Jewell to South Buckley Road; thence south along Buckley Road to East Hampden Avenue; thence east along East Hampden Avenue to South Himalaya Road; thence south on Himalaya to Smoky Hill Road; thence east along Smoky

(H) Hill Road to the south line of section 19, T5S, R65W; thence east along sections 19, 20, and 21 to the southeast corner of section 21; thence north along the east line of section 21, 16, 9, and 4 of T5S, continuing north along the east line of sections 33, 28, 21, 16, 9, 4 of T4S, and section 33, T3S, to the northeast corner of section 33, T3S, 65W; thence west along the north section lines of section 33, 32, 31, 36, 35 to the point of beginning.

Sec. 806 Clear Zone.

(A) *Description.* The clear zone sub area is composed of lands in which accident potential is so great that all land uses shall be prohibited, except those necessary for the continued operation of airports and aircraft.

(B) *Permitted Uses.* Only airports and aircraft operations are permitted uses in any clear zone sub area, provided that such uses are permitted in the underlying zone district:

Sec. 807 Accident Potential Zones I and II (APZ I, APZ II).

(A) *Description.* These sub areas are designated to regulate land use and reduce hazards in an area characterized by high noise levels and a significant accident potential resulting from aircraft operations. Residential uses shall be highly restricted.

(B) *Development Standards.* The following development standards shall be used as criteria for evaluating site plans in any APZ I. Applications and uses that do not meet these standards may apply for a variance from the standards as a part of the site plan. Such variances shall be considered by the city council in its review of the site plan.

1. *APZ I-A lot coverage.* The maximum lot coverage of structures and buildings within APZ I-A shall be as permitted by the graph in Fig. 8.3.

2. APZ I-B lot coverage. The maximum lot coverage of structures and buildings within APZ I-B shall be as permitted by the graph in Fig. 8.4.

3. *APZ II-A lot coverage*. The maximum lot coverage of structures and buildings within APZ II-A shall be as permitted by the graph in Fig. 8.5.

4. *APZ II-B lot coverage.* The maximum lot coverage of structures and buildings within APZ II-B shall be as permitted by the graph in Fig. 8.6.

Figure A4 8-3

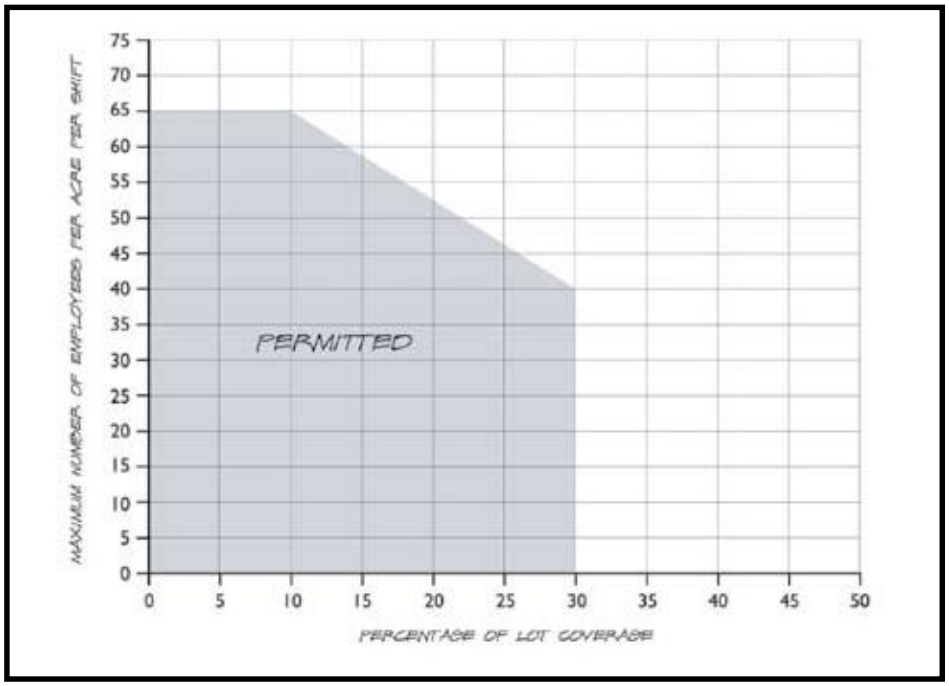


Figure A4 8-4

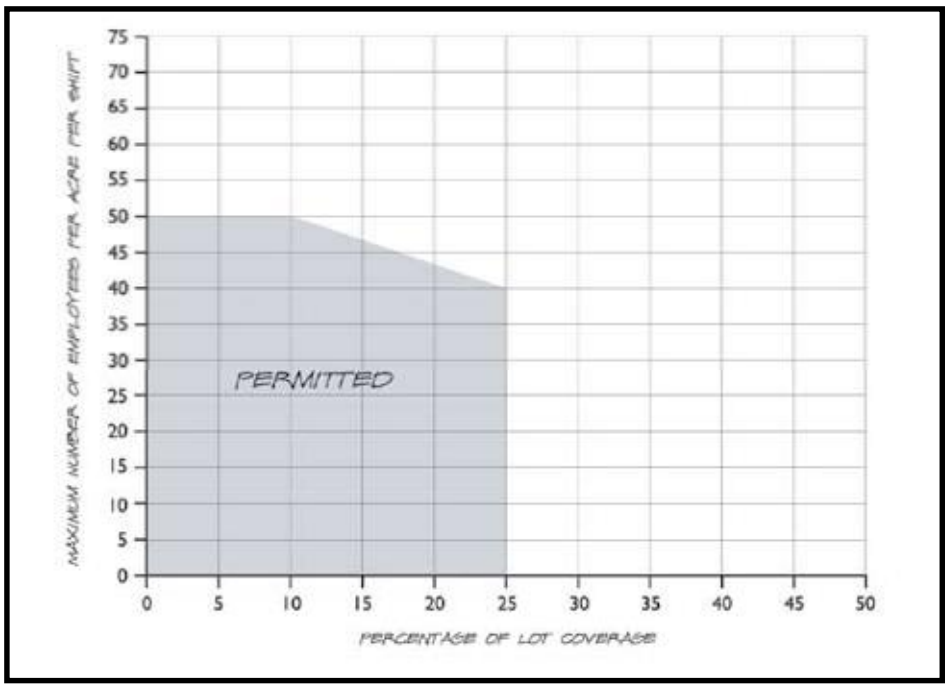


Figure A4 8-5

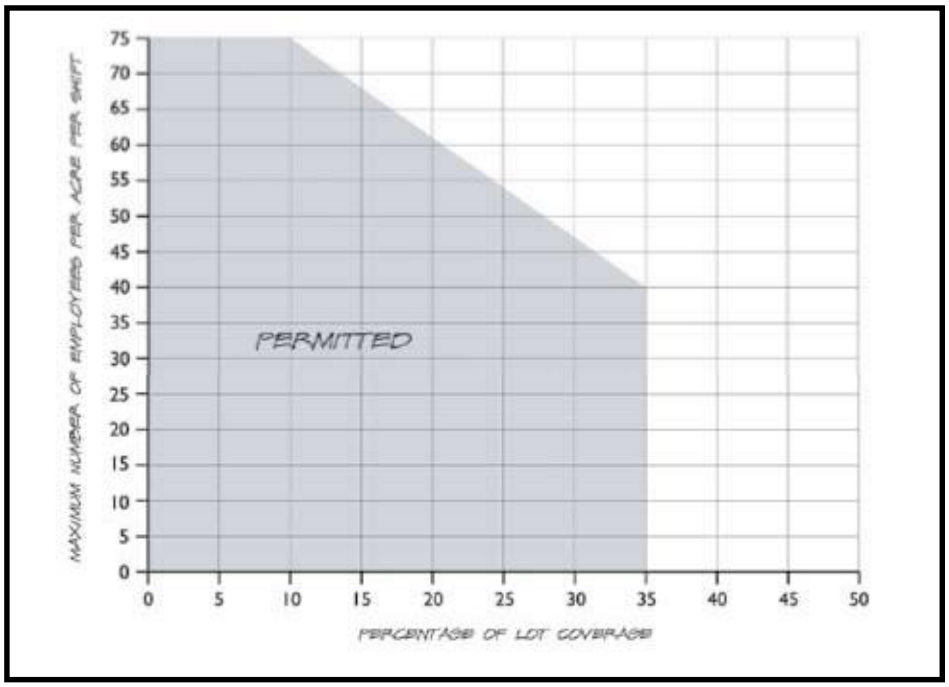
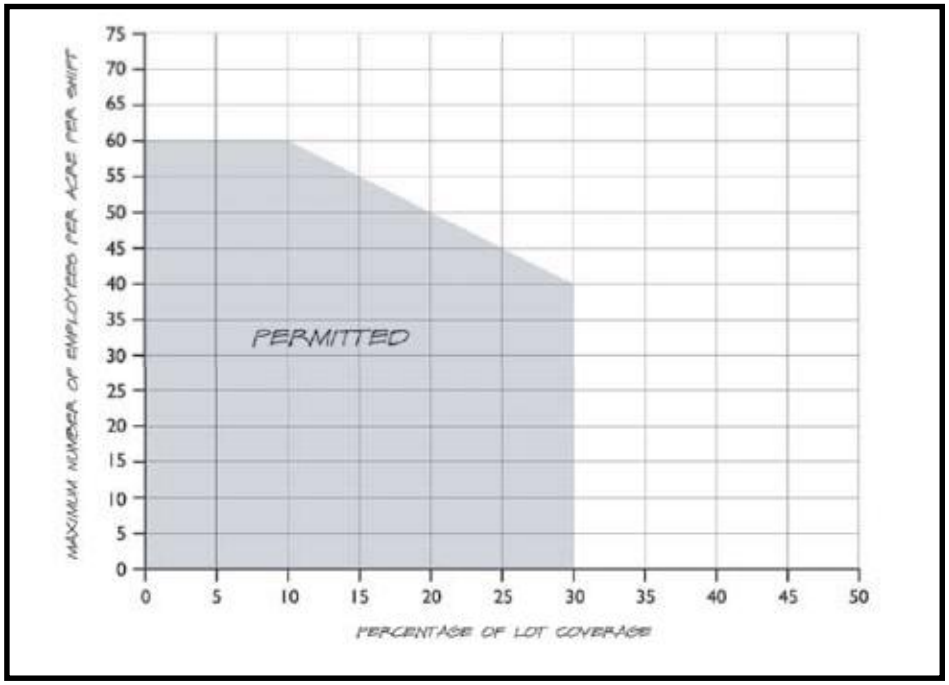


Figure A4 8-6



5. *Height restrictions.* Height restrictions shall be as set forth in the underlying zone districts, provided the permitted height does not exceed that established by FAR part 77 surfaces for military airports.

6. *Crash corridor.* To the greatest extent practicable, the centerline area of the APZ I shall be maintained in an open condition. Structures and human activity, as permitted by this district, shall be placed toward the perimeter of the APZ area.

7. *Emissions.* The development shall not:

    a. Release into the air any substance that would impair visibility or otherwise interfere with the operation of the aircraft;

    b. Produce substantial light emissions, either direct or indirect (reflective) which would interfere with pilot vision; or

    c. Produce emissions that would interfere with aircraft communication systems or navigational equipment.

8. *Hazardous materials.* The development shall not involve the use or storage of significant amounts of materials which are explosive, flammable, toxic, corrosive, or otherwise exhibit hazardous characteristics, except as permitted by this subdivision.

9. *Other prohibitions.* The development shall not:

    a. Have high people density characteristics or promote population concentration;

    b. Involve utilities and services required for area-wide population upon which disruption would have an adverse impact (telephone, gas, etc.);

    c. Concentrate people who are limited in their ability to respond to emergency situations such as children, elderly, the handicapped; or

    d. Pose hazards to aircraft operations.

(C) *Prohibited Uses in an Accident Potential Zone.* The following uses shall be prohibited in any APZ zone district:

Table 8.1

Schedule of Uses in APZ Subareas

	(A) Uses	(B) X-Prohibited
1	Aboveground bulk storage of flammable liquids or gases	X
2	Child Care Facilities	X
3	Dog Kennels	X
4	Handicapped Care Facilities	X
5	Hospitals and Health Care Facilities	X
6	Hotels and Motels	X
7	Indoor Recreational Facilities	X
8	Museums, Theaters and similar establishments	X
9	Nursing and Rest Homes	X
10	Outdoor Recreational Facilities and Activities	X
11	Places of Worship	X
12	Public and Fraternal Meeting Facilities	X
13	Residential Uses[1]	X
14	Restaurants and other eating and drinking establishments, except such establishments that provide seating, customer service counter space or any combination thereof for no more than 12[2] persons. For Purposes of this subsection, three feet of customer service counter space shall equal customer service counter space for one person	X
15	Retail and wholesale operations and facilities which may concentrate people	X
16	Schools	X
17	Spectator Sport Stadium	X
18	Storage or sale of explosives, other than small caliber ammunition	X

[1] Except that in APZII, residential housing shall be permitted at one unit per acre outwside the LDN 65 contour

[2] 16 persons in APZ II

Sec. 808 LDN 65 Sub area.

(A) *Description.* The LDN 65 sub area is composed of areas located within the LDN 65 noise contour, as shown on the air installation compatible use zone map, which are subjected to noise levels of duration and frequency creating hazard to both physical and mental health.

(B) *Prohibited Uses.* Residential uses are prohibited in the LDN 65 sub area.

(C) *Development Standards.* The following development standards shall apply to uses permitted in LDN 65 sub area:

1. A habitable building addition to existing residential structures within the LDN 65 sub area may be permitted. However, any such addition greater than 1,000

square feet shall provide and include noise level reduction measures in the design and construction of all such building additions to achieve an interior noise level reduction of 30 dB in A-weighted levels, as determined or calculated in accordance with article 11 of chapter 22 of this Code.

2. Within the LDN 65 sub area, any permitted office, commercial or other nonresidential structures where the public is received shall provide and include noise level reduction measures in the design and construction of all such areas to achieve an interior noise level reduction of 25 dB in A-weighted levels, as determined or calculated in accordance with article 11 of chapter 22 of this Code.

Sec. 809 Special Noise Impact District (SNID).

(A) *Description.* The special noise impact district (SNID) is composed of those areas located between the LDN 60 and LDN 65 noise contour lines as shown on the air installation compatible use zone map.

(B) *Permitted Uses.* Provided that it is allowed in the underlying zone, new residential uses or structures may be permitted within the special noise impact district. However, such uses or structures shall not be permitted unless and until there has been a public hearing, approval, and authorization by the city council for such uses or structures.

(C) *Noise Level Reduction Measures.* New residential uses or structures authorized by the city council within the special noise impact district shall provide and include noise level reduction measures in the design and construction of all such habitable structures to achieve the interior noise level reduction established by the city council. Such noise reduction shall in no event be less than a 30-decibel reduction in A-weighted levels, determined or calculated in accordance with article 11 of chapter 22 of this Code. Noise reduction measures shall include central air conditioning or an equivalent thereof.

Sec. 810 Noise Impact District (NID).

(A) *Description.* The noise impact district (NID) is composed of those areas located within the noise impact boundary contours as shown on the air installation compatible use zone map.

(B) *Noise Level Reduction Measures.* New residential uses or structures permitted by the underlying zone and within the noise impact district shall provide and include noise level reduction measures in the design and construction of all such habitable structures to achieve an interior noise level reduction of 25 decibels in A-weighted levels, as determined or calculated in accordance with article 11 of chapter 22 of this Code. Noise reduction measures shall include central air conditioning or an equivalent thereof.

Sec. 811 Airport Influence District.

(A) The airport influence district is composed of that area designated by section 805 of this district. Development in the airport influence district shall comply with height restrictions in the underlying zone district, which do not intrude into FAR part 77 surfaces for military airports.

(B) An avigation easement with the city as sole grantee shall be conveyed to the city by any person subdividing lands or initiating construction of any structure on already subdivided lands within the airport influence area.

(C) Vendors of real property located within the airport influence area shall provide the following notice to prospective purchasers and cause such notice to be recorded with the clerk and recorder of the appropriate county:

NOTICE

The property known as (legal description and address) is located within an area that has been officially designated as an airport influence district by the City of Aurora. As a result of this designation the property is subject to one or more of the following:

(1) An avigation easement granted to the City of Aurora recorded in book _____, at page _____, _____ County, Colorado, which allows for the unobstructed passage of aircraft above the property, and provides for the waiver of any right or cause of action against the City of Aurora due to noise, vibrations, fumes, dust, fuel particulates caused by aircraft or airport operations.

(2) The use and enjoyment of the property may be affected by aircraft noise, vibrations, fumes, smoke, dust, or fuel particulates from aircraft operation.

(3) The noise to which the property may be subject from aircraft operation may exceed 65 LDN, the maximum acceptable level set by the Federal Department of Housing and Urban Development for residential land use (only if located <u>within</u> the LDN 65 contour).

(4) The involved property is located within an area that has been designated as an accident potential zone II. Such property may be characterized by high noise levels and accident potential resulting from aircraft operations (only if located within APZ II).

(5) The involved property is located within an area that has been designated as an accident potential zone I. Such property may be characterized by high noise levels and significant accident potential resulting from aircraft operations (only if located within APZ I).

SECTION 3.0

Airport Overlay Zone

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SECTION 3.920 AIRPORT OVERLAY ZONE (AO)

Section 3.921. Purpose.

In order to carry out the provisions of this overlay zone, there are hereby created and established certain zones which include all of the land lying beneath the Airport Imaginary surfaces as they apply to the airport in the (city/county). Such zones are shown on the current airport Airspace and Runway Approach Zone drawings.

Further, this overlay zone is intended to prevent the establishment of airspace obstructions in airport approaches and surrounding areas through height restrictions and other land use controls as deemed essential to protect the health, safety, and welfare of the people of the (city/county).

Section 3.923. Special Definitions.

AIRPORT APPROACH SAFETY ZONE. The land that underlies the approach surface, excluding the RAZ

AIRPORT HAZARD. Any structure, tree, or use of land which exceeds height limits established by the Airport Imaginary Surfaces.

AIRPORT IMAGINARY SURFACES. Those imaginary areas in space which are defined by the Approach Surface, Transitional Surface, Horizontal Surface, and Conical Surface and in which any object extending about these imaginary surfaces is an obstruction.

APPROACH SURFACE. A surface longitudinally centered on the extended runway centerline and extending outward and upward from each end of the Primary Surface. The inner edge of the approach surface is the same width as the Primary Surface and extends to a width of: 1,250 feet for utility runway having only visual approaches; 1,500 feet for a runway other than a utility runway having only visual approaches; 2,000 feet for a utility runway having a non-precision instrument approach; 3,500 feet for a non-precision instrument runway other than utility, having visibility minimums greater than three-fourths of a statute mile; 4,000 feet for a non-precision instrument runway having visibility minimums as low as three-fourths statute mile; and 16,000 feet for precision instrument runways. The Approach Surface extends for a horizontal distance of 5,000 feet at a slope of 20 feet outward to each foot upward (20:1) for all utility and visual runways; 10,000 feet at a slope of 34 feet outward for each foot upward (34:10 for all non-precision instrument runways other than utility; and for all precision instrument runways extends for a horizontal distance of 10,000 feet at a slope of 50 feet outward for each foot upward (50:1); thence slopes upward 40 feet outward for each foot upward (40:1) an additional distance of 40,000 feet.

CONICAL SURFACE. Extends 20 feet outward for each one foot upward (20:1) for 4,000 feet beginning at the edge of the horizontal surface (5,000 feet from the center of each of the Primary Surface of each visual and utility runway or 10,000 feet for all non-precision instrument runways other than utility at 150 feet above and airport elevation) and upward extending to a height of 350 feet above the airport elevation.

HORIZONTAL SURFACE. A horizontal plane 150 feet above the established airport elevation, the perimeter of which is constructed by swinging runways 5,000 feet from the center of each end of the Primary Surface of each visual or utility runway and 10,000 feet from the center of each end of the Primary Surface of all other runways and connecting the adjacent arcs by lines tangent to those arcs.

NOISE SENSITIVE AREA. Within 1,500 feet of an airport or within established noise contour boundaries exceeding 55 DNL.

NON-PRECISION INSTRUMENT RUNWAY. A runway having an existing instrument approach procedure utilizing air navigation facilities with only horizontal guidance, or area type navigation equipment, for which a straight-in non-precision instrument approach procedure has been approved, or planned, or indicated on an FAA or state planning document or military service airport planning document.

PLACE OF PUBLIC ASSEMBLY. Structure of place which the public may enter for such purposes as deliberation, education, worship, shopping, entertainment, amusement, awaiting transportation, or similar activity.

PRECISION INSTRUMENT RUNWAY. A runway having an existing instrument approach procedure utilizing an Instrument Landing System (ILS), Microwave Landing System (MLS), Global Positioning Satellite (GPS) or a Precision Approach Radar (PAR). It also means a runway for which a precision approach system is planned and is not indicated by a FAA approved airport layout plan; any other FAA or state planning document, or military service airport-planning document.

PRIMARY SURFACE. A surface longitudinally centered on a runway. When the runway has a specifically prepared hard surface, the Primary Surface extends 200 feet beyond each end of that runway. When the runway has no specially prepared hard surface, or planned hard surface, the Primary Surface ends at each end of that runway. The width of the primary Surface is 250 feet for utility runways having only visual approaches, 5,000 feet for utility runways having non-precision instrument approaches, 5,000 feet for other than utility runways having only visual approaches or non-precision instrument approaches with visibility minimums greater than three-fourths of a mile and 1,000 feet for non-precision instrument runways with visibility minimums of three-fourths of a mile or less and for precision instrument runways.

RUNWAY APPROACH ZONE (RAZ). An area off the runway end (formerly the clear zone) used to enhance the protection of people and property on the ground. The RAZ is trapezoidal in shape and centered about the extended runway centerline. It begins 200 feet (60m) beyond the end of the arcs usable for takeoff or landing. The RAZ dimensions are functions of the type of aircraft and operations to be conducted on the runway.

TRANSITIONAL SURFACE. Extend seven feet outward for each one foot upward (7:1) beginning on each side of the Primary Surface which point is the same elevation as the runway surface, and from the sides of the approach surfaces thence extending upward to a height of 150 feet above the airport elevation (Horizontal Surface)

UTILITY RUNWAY. A runway that is constructed for and intended to be used by propeller driven aircraft of 12,500 pounds maximum gross weight or less.

VISUAL RUNWAY. A runway that is intended solely for the operation of aircraft using visual approach procedures when no instrument approach procedures have been approved, or planned, or indicated on an FAA or state planning document or military service airport planning document.

Section 3.924 Permitted Uses Within the Runway Approach Zone (RAZ).

While it is desirable to clear all objects from the RAZ, some uses are permitted, provided they do not attract wildlife, are below the approach surface and do not interfere with navigational aids.

(1) Agricultural operations (other than forestry or livestock farms.)
(2) Golf courses (but not club houses).
(3) Automobile parking facilities

Section 3.925 Conditional Uses Within the Airport Approach Safety Zone.

(1) A structure or building accessory to a permitted use.
(2) Single family dwellings, mobile homes, duplexes, and multifamily dwellings, when allowed by the underlying zone, provided the landowner signs and records in the deed and mortgage records of (city/county) a Hold Harmless Agreement and Aviation and Hazard Easement and submits them to the airport sponsor and the (city/county) Planning Departments.
(3) Commercial and industrial uses, when allowed by the underlying zone, provided the use does not result in:
(A) Creating electrical interference with navigational signals or radio communication between the airport and aircraft.
(B) Making it difficult for pilots to distinguish between airport lights and lighting from nearby land uses.
(C) Impairing visibility.

(D) Creating bird strike or other wildlife hazards.
(E) Endangering or interfering with the landing, taking off or maneuvering of aircraft intending to use airport
(F) Attracting a large number of people

(4) Buildings and uses of public works, public service, or public utility nature.

Section 3.926 Procedures.

An applicant seeking a conditional use shall follow procedures set forth in the urban growth management plan/agreement between the (city/county). Information accompanying the application shall also include the following:

(1) Property boundary lines as they relate to the Airport Imaginary Surfaces.

(2) Location and height of all existing and proposed buildings, structures, utility lines, and roads.

In accordance with OAR Chapter 738 Division 100, City or County Planning Authority shall notify the owner of the airport and Aeronautics Section on land use permits or zone changes within 5,000 feet of a visual and 10,000 feet of instrument airport so as to provide Oregon Aeronautics Section an opportunity to review and comment.

Section 3.927 Limitations.

(1) To meet the standards established in FAA Regulations, Part 77 and OAR Chapter 738 Division 70, no structure shall penetrate into the Airport Imaginary Surfaces as defined above.

(2) No place of public assembly shall be permitted in the Airport Approach Safety Zone or RAZ.

(3) No structure or building shall be allowed within the RAZ.

(4) Whenever there is a conflict in height limitations prescribed by this overlay zone and the primary zoning district, the lowest height limitation fixed shall govern; provided, however, that the height limitations here imposed shall not apply to such structures customarily employed for aeronautical purposes.

(5) No glare producing materials shall be used on the exterior of any structure located within the Airport Approach Safety Zone.

(6) In noise sensitive areas (within 1,500 feet of an airport or within established noise contour boundaries of 55 DNL and above for identified airports) where noise levels are a concern, a declaration of anticipated noise levels shall be attached to any building permit, land division appeal, deed, and mortgage records. In areas where the noise level is anticipated to be 55 DNL and above, prior to issuance of a building permit for construction of noise sensitive land use (real property normally used for sleeping or normally used as schools, churches, hospitals, or public libraries), the permit application shall be required to demonstrate that a noise abatement strategy will be incorporated into the building design which will achieve an indoor noise level equal to or less than 55 DNL. The planning and building department will review building permits or noise sensitive developments.

(7) No development that attracts or sustains hazardous bird movements from feeding, watering, or roosting across the runways and/or approach and departure patterns of aircraft. Planning authority shall notify Oregon Aeronautics of such development (e.g., waste disposal sites and wetland enhancements) within the airport overlay zone so as to provide Oregon Aeronautics Section an opportunity to review and comment on the side in accordance with FAA AC 150/5200-33.

Section 3.928 State and Federal Permits.

If any state or federal permit is required for a development or use, an applicant, prior to issuance of a development permit or action, shall submit to the Planning Department a copy of the state or federal permit

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SECTION 4.0
Approach Zone

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2.17 Airport Approach Zone (AA)

2.17:1 Purpose and Function

The purpose and function of the Airport Approach Zone is to safeguard the public safety and welfare and properties in, adjacent to, and surrounding aircraft landing fields by placing height restrictions and other regulations thereon. The AA zone shall be superimposed upon the zoning district applied and in effect for the land upon which is located the aircraft landing field and for adjacent and surrounding land coming under the regulations of this section. The zone shall regulate the various types of air space obstructions and other hazards which may interfere with safe landing and taking off of aircraft, including:

1. The height of structures and objects of natural growth.

2. Conditions and activities which may cause electronic interference with air navigation communication systems.

3. Lights which may interfere with airport lighting system.

4. Conditions or activities which produce levels of smoke, dust and glare that would interfere with safe operations.

5. Conditions or activities creating bird strike hazards.

2.17:2 Principal Uses Permitted Outright

1. Any use permitted outright or as an accessory use, or as a conditional exception in the zoning district on which is superimposed an AA Zone and the adjacent and surrounding land coming under the regulations imposed by this section.

2. Aircraft landing field.

2.17:3 Area of Jurisdiction

The area(s) of jurisdiction for this ordinance lies within the boundaries of all general aviation airports of Klickitat County, WA, existing or future, and all of the area adjacent and surrounding the same, with any and all additions thereto and extensions thereof, hereby is established as within the boundaries of the

zone described as:

AA Airport Approach Zones - One (1) foot in height for each twenty (20) feet in horizontal distance beginning at a point two hundred (200) feet from and at the centerline elevation of the end of the runway and extending to a point 5,200 feet from the end of the runway; the AA approach zone is 250 feet wide at the point of beginning (200 feet past the end of the runway), broadening to 700 feet wide at a distance of 2,250 feet from the point of beginning, continuing at 700 feet wide therefrom to the end of the zone, this zone being bisected by the centerline of the runway.

All of the foregoing zoning distances, elevations, and details being set forth upon the drawing and map thereof which is attached to this ordinance and expressly incorporated herein by reference.

2.17:4 Restrictions

1. No building, pipe, chimney, tower, steeple, stand, platform, pole, wire or structure or erection or object of natural growth, or obstruction of any kind or nature whatsoever, shall be built, placed, hung or permitted to grow or allowed to be built, placed or hung which shall at any point or part thereof exceed the heights as provided in the zone area so established. The said restrictions shall apply to the area surrounding all runways and approaches situate to any utility airport open to public use.

2. No searchlight, beacon light, or other glaring light shall be used, maintained, or operated within one-half (1/2) mile of said airport, so that the same shall reflect, glare, or shine upon or in the direction of said airports.

3. No glare producing materials shall be used on the exterior of any structure located within the airport approach district.

4. Any electromagnetic radiation that would interfere with normal aircraft communication is prohibited.

5. Any land use or activity that produces smoke or haze to a degree that would interfere with normal aircraft operations is prohibited.

6. Any land use or activity that produces excessive

bird strike hazard in the air space zones designated in Section 2.17:3 of this ordinance is prohibited.

7. All new airports, heliports or land fields shall be designed so that the incidence of aircraft passing in the vicinity of dwellings or places of public assembly is minimized. They shall be located so that air traffic shall not constitute a nuisance to neighboring uses. The proponents shall show that adequate controls or measures will be taken to reduce noise levels, vibrations, dust or bright lights.

2.17:5 Application

This designation may be superimposed over any of the zone districts and its restrictions shall take precedence.

Appendix F - Potential Strategies to Mitigate Impacts

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POTENTIAL STRATEGIES TO MITIGATE ADVERSE IMPACTS OF CIVILIAN LAND USES/ACTIVITIES ON MILITARY OPERATIONS

Check Marks (√) Indicate that Adoption of Respective Strategies Summarized Below May Potentially Mitigate Adverse Impacts on Military Operations and/or Adverse Impacts of Military Operations on Civilian Land Uses/Activities	Eglin AFB Facilities and Operations Potentially Impacted by Civilian Land Use and Activities																							
					Military Aircraft: High Noise Concentrations					Sonic Boom	Danger Zones for Munitions Firing/ Drop Zones				Operations Impacted by Excessive Heights of Bldgs/Structures							Outdoor Lighting Impacts Certain Missions	Communication Impacted by Certain Radio Frequency Spectrum Waves	Development of NW FL Region's Major Conservation Resources
	Perimeter Boundary Security	Clear Zone Incompatibilities	APZ I Incompatible Uses/Structures	APZ II I Incompatible Uses/Structures	≥ 65-69 decibels	70-74 decibels	75-79 decibels	80-84 decibels	≥ 85 decibels	Supersonic Flight Corridor	Higher Impulse Intensity & Frequency	Moderate Impulse Intensity & Frequency	Lower Impulse Intensity & Frequency	Firing Areas and/or Bay Area Strikes	Low Level Helicopter Training (Eglin)	Low Level Helicopter Training (Whiting)	Line of Sight for Reference Radars/TERPs	Cruise Military Testing Corridors	Other Military Training Routes	Height Restrictions by Okaloosa Co.	FAA Height Requirements	Night Vision Training	Bandwidth between 5.4 to 5.9 GHz	Public Safety on- and Off the Eglin Reservation is Threatened by Potential Loss of Portions of the NW FL Greenway and/or Other High Priority Conservation Areas Scheduled for Acquisition or Purchase of Development Rights
Military Encroachment. Comp Plan Element	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
Military Influence Area(MIA) in LDC																								
• Establish MIA																								
• Adopt Maps of Areas Impacted																								
• Uses Permitted & Prohibited	√	√	√	√							√	√	√	√										
• Height Regs for Impacted Sub Areas														√	√	√	√	√	√	√	√			
• Noise Insulation Standards					√	√	√	√	√															
• Outdoor Lighting Standards																						√		
• Radio Frequency Spectrums Regs																							√	
• Revise Admin Procedures																								
○ Improve Notice Procedures	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
○ Eglin Rep as Member of Plg. Board	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
Disclosure of Military Encroachments		√	√	√	√	√	√	√	√															
Public Awareness																								
• MIA Website incl. maps, regs, & public Info	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
• Signs in Areas with CZs, APZs, Excess Noise		√	√	√	√	√	√	√	√															
• Special Forum on Encroachment Issues	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
Special or Small Area Studies	√	√	√	√	√	√	√	√	√		√			√			√	√		√			√	
Land Acquisition/Purchase of Dvlpt. Rts.	√	√	√	√			√	√	√															
Transfer of Development Rights	√	√	√	√			√	√	√															
Partner to Purchase NW FL Greenway/Shoal River and Join Partnerships to Obtain Development Rights to Greenway Connecting FL Panhandle Military Airways Spanning from Pensacola to Panama City.																								√

MILITARY OPERATIONS POTENTIALLY IMPACTED BY CIVILIAN LAND USE/ACTIVITIES IN OKALOOSA, SANTA ROSA, AND WALTON COUNTIES (INCLUDING MUNICIPALITIES)

Check Marks (√) Indicate that Listed Facilities or, Operations are Impacted by Land Uses or Activities within Local Governments Cited Below.	Eglin AFB Facilities and Operations Potentially Impacted by Civilian Land Use and Activities																							
	Perimeter Boundary Development	Clear Zone Incompatibilities	APZ I Incompatible Uses/Structures	APZ II I Incompatible Uses/Structures	Military Aircraft: High Noise Concentrations					Sonic Boom	Danger Zones for Munitions Firing/ Drop Zones				Operations Impacted by Excessive Heights of Bldgs/Structures							Outdoor Lighting Impacts Certain Missions	Communication Impacted by Certain Radio Frequency Spectrum Waves	Removal or Development of NW FL Region's Major Conservation Resources
					≥ 65-69 decibels	70-74 decibels	75-79 decibels	80-84 decibels	≥ 85 decibels	Supersonic Flight Corridor	Higher Impulse Intensity & Frequency	Moderate Impulse Intensity & Frequency	Lower Impulse Intensity & Frequency	Firing Areas and/or Bay Area Strikes	Low Level Helicopter Training (Eglin)	Low Level Helicopter Training (Whiting)	Line of Sight for Reference Radars/TERPs	CruiseMissile Testing Corridors	Other Military Training Routes	Height Restrictions by Okaloosa Co.	FAA Height Requirements	Night Vision Training	Bandwidth between 5.2 to 5.9 GHz	Public Safety on- and Off the Eglin Reservation is Threatened by Potential Loss of Portions of the NW FL Greenway and/or Other High Priority Conservation Areas Scheduled for Acquisition or Purchase of Development Rights
Uninc. Okaloosa County	√			√	√	√					√	√	√	√	√	√	√	√	√	75-210'	√	√	√	NW FL Region's Major Natural Conservation Corridors are designated for conservation i n NW FL Region's Sustainable Growth Plan adopted by the FL Legislature. These resources should also include the Shoal River Floodway located NW of Duke Field & extends due E. in front of the Field's APZ II. The JLUS participating governments support acquisition of these lands to conserve lasting habitats and prevent encroachment.
Cinco Bayou												√			√		√			120-130'	√	√	√	
Crestview	√											√			√				√		√	√	√	
Destin					√							√	√		√		√			190-210'	√	√	√	
Fort Walton Beach	√											√		√	√		√			80-120'	√	√	√	
Mary Esther	√											√		√	√		√			80-90'	√	√	√	
Niceville	√		√	√	√	√	√	√	√			√			√		√			100-130	√	√	√	
Shalimar												√			√		√			130-140'	√	√	√	
Valparaiso	√	√	√	√	√	√	√	√	√			√			√		√			100-110	√	√	√	
Uninc. Santa Rosa County	√		√	√	√	√	√	√		√	√	√	√	√	√	√	√		√		√	√	√	
Gulf Breeze																					√			
Milton																√					√			
Uninc. North Walton Co.	√										√	√	√	√	√		√	√	√		√	√	√	
Uninc. South Walton Co.												√	√	√	√		√	√			√	√	√	
DeFuniak Springs													√		√			√	√		√	√	√	
Freeport	√											√	√		√			√	√		√	√	√	

Appendix G - Public Information Handout - June 2008

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Program Products and Benefits

The Eglin Tri County JLUS will result in a report identifying existing environment in the study area, any current conflicts between land uses and Base operations, and potential future impacts. The report will also present strategies to minimize current problems, encourage compatible future development and prevent incompatible future development.

Anticipated benefits include:

- Improved intergovernmental relationships with respect to land use planning and development regulations.
- Improved communications among local governments, Eglin Air Force Base, and local neighborhoods.
- Increased awareness of potential conflicts between land development and Eglin Air Force Base.
- Improved local land development regulations.
- Protection of future military missions at Eglin.
- Health, safety, and welfare concerns addressed.

For More Information

Jeff Fanto
Okaloosa County
Department of Growth Management
Growth Project Coordinator
1804 Lewis Turner Blvd, Suite 200
Fort Walton Beach, FL 32547
850.609.3014
850.651.7706 fax
www.co.okaloosa.fl.us

Submit feed back and question online at www.co.okaloosa.fl.us. From the home page, simply click on "Customer Service" and sign in as anonymous, register for an online account, or sign-in using your existing account.

Okaloosa, Walton, Santa Rosa County

Joint Land Use Study

Eglin Air Force Base

June 2008

Eglin Air Force Base Joint Land Use Study (JLUS):

What is a Joint Land Use Study (JLUS) ?

The Joint Land Use Study (JLUS) program managed by the Office of Economic Adjustment (OEA), Office of the Secretary of Defense, is a Department of Defense initiative that provides grants to state and local governments to participate with military installations in developing land use plans compatible with their mission.

The JLUS program encourages cooperative land use planning between military installations and the adjacent communities so that future community growth and development are compatible with the training and operational missions of the installation. It is more inclusive in scope than just noise and accident potential, and is more public in nature than the Air Installations Compatible Use Zones (AICUZ) program. Similar to the AICUZ program, the JLUS is a cooperative land use planning effort between the affected local government(s) and neighboring military installation(s). The difference is that a local or regional agency takes the lead in conducting the JLUS. The JLUS process typically involves various local community interests along with the military installation, and the study is a locally-produced product. Under this arrangement, there is a greater assurance that compatible land use controls will be adopted.

AAC Land Ranges

Why Do We Need a Joint Land Use Study?

The primary purpose of the JLUS is for the local governments to develop a compatible land use plan and set of land development regulations for the properties adjacent to and affected by Eglin Air Force Base and its operations.

Eglin Air Force Base is situated among three counties – Santa Rosa, Okaloosa, and Walton. Eglin is composed of 724 square miles of land and 123,000 square miles of water space, with 36 range test areas.

As part of 2005 Base Realignment and Closures (BRAC), the Department of Defense reported to Congress a recommended personnel and mission realignment to Eglin Air Force Base resulting in the addition of almost 5,000 military and civilian workers to the Base starting in 2009. There is a need for a systematic evaluation of a larger study area of the properties adjacent to and affected by Eglin's operations. Eglin Tri County JLUS will fulfill the need for a comprehensive study which brings both regulatory and non-regulatory minds together to protect existing and future development/operations.

AAC Water Ranges

Program Goals and Actions

The Eglin Tri County JLUS has the following goals:

- Involve local cities and counties within the project study area that will include portions of Okaloosa, Santa Rosa, and Walton Counties.
- Protect the health, safety and welfare of the civilian and military communities.
- Identify appropriate regulatory and non-regulatory measures to ensure compatibility between existing and future land uses.
- Increase communication and cooperation between Eglin Air Force Base and neighboring counties.
- Protect and promote the present and future operational capabilities of Eglin's areas.

To achieve these goals, the following general steps have been identified:

- Establish a Policy Committee comprised of officials from local governments, Eglin Air Force Base, State of Florida, and other appropriate agencies to review and approve specific planning methodologies and implementation strategies.
- Establish a Technical Advisory Group comprised of professionals and citizens from local communities. The Group provides technical expertise and advises the Policy Committee.
- Evaluate existing and future operations and requirements of Eglin's operations.
- Evaluate existing and future land uses adjacent to and affected by Eglin's operations.
- Evaluate existing and proposed land use regulations to determine how conflicts are currently addressed, and identify gaps.
- Identify new land use regulations to ensure compatibility between existing and future land uses and air operations.

Appendix H - Example Letter of Special Use Agreement

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LETTER OF AGREEMENT (LOA) BETWEEN

ALBUQUERQUE INTERNATIONAL SUNPORT AIR TRAFFIC CONTROL TOWER, CITY OF ALBUQUERQUE AVIATION DEPARTMENT
AND
KIRTLAND AIRFORCE BASE 58TH SPECIAL OPERATIONS WING(SOW), AND 150TH FIGHTER WING

EFFECTIVE: January 30, 2004

SUBJECT: Noise Abatement

PURPOSE: This agreement describes procedures to be used to aid in reducing Aircraft noise over the City of Albuquerque.

CANCELLATION: This agreement cancels previous Letter of Agreement, Subject: Noise Abatement, dated 30 January 2003

---

1. RESPONSIBILITIES.

   a. Albuquerque International Sunport Air Traffic Control Tower shall:

      (1) Apply the runway use provisions of this agreement.

      (2) Request aircrew compliance with the in-flight procedures in this agreement.

      (3) Circulate a Letter to Airmen detailing informal noise abatement procedures.

   b. Aviation Department shall:

      (1) Serve as the focal point for citizens' comments concerning aircraft noise. Noise comments concerning military aircraft will be logged into the airport's database; however, all comments will be forwarded to the respective wing(s).

      (2) Inform all commercial and tenant FBOs of the procedures contained herein.

2. RUNWAY USE RESTRICTIONS: Turbojet and turboprop aircraft shall not use runway17/35 for departure unless the crosswind component on other available runways exceeds 20 knots (runway dry), or 15 knots (runway wet), and runway 17 for arrival unless the crosswind component on other available runways exceeds 15 knots. If other runways are not available or an emergency

requires use of runway 17/35 by turbojet/turboprop aircraft, these restrictions are not applicable. See Table 1.

3. IN-FLIGHT PROCEDURES.

   a. All military aircraft classified as heavy or fighter-type aircraft departing runway 8 shall turn right on departure.

   b. Military helicopters shall comply with established arrival and departure corridors.

   c. When weather conditions are 5,000-foot ceiling and seven miles visibility or greater, the Control Tower shall request all turboprop and turbojet aircraft (except STOL-type aircraft) making left turns from runway 8 to delay their turn until 13.5 DME from the Albuquerque VORTAC.

   d. All other aircraft, not included in paragraphs a, b, or c making left turn departures from runway 8 will, unless otherwise instructed by ATC, delay their turn until the east field boundary and climb as expeditiously as possible so as to overfly any residential areas at or above 6,500 MSL. When weather conditions are below 5000 feet MSL, the visibility is less than seven miles, or the mountaintops are obscured, this procedure will also include turboprops and turbojets.

   e. These procedures may be altered as safety considerations (wind, movement area closures, weather, etc.) dictate; the procedures shall not be altered for the sole purpose of expediting traffic.

4. 2100 TO 0700 CURFEW PROCEDURES.

   a. All aircraft departing runway 8 shall be instructed to turn right after takeoff. Turbojet and Turboprop aircraft may be kept on a southbound heading until leaving 8000 feet before being given a westbound heading.

   b. Runway 17 shall not be used for landing nor runway 35 for takeoff by any type aircraft unless conditions in table 1 are met.

   c. By separate agreement, the south 4800 feet of runway 17/35 is used for night operations by the 58th SOW so long as their traffic pattern remains south of the airport.

   d. Military helicopters inbound from the north shall be vectored for an approach to runway 8.

Page 2

e. Except for a West or Southwest flow, runway 21 and runway 3 departures are discouraged. If runway 21 is required because of operational requirements, turboprops and turbojets may be assigned a heading of 190 degrees or farther east until leaving 8000 feet, or 5 miles south of the airport. Non turbine-powered aircraft turning northbound should be turned ASAP to avoid noise sensitive areas Southwest of the airport. During a West or Southwest flow, apply this when traffic permits. If departing runway 3 because of operational requirements, turboprops and turbojets may be instructed to fly runway heading until leaving 6500 feet.

f. Engine run- ups for maintenance purposes, both on and off the aircraft, are restricted by City Ordinance (Chapter 9, Article 9, Section 11) and base regulation (KAFBI 202) between the hours of 10:00 pm and 7:00 am. Exceptions to this policy can be made on an individual basis, in which case operational necessity, urgency, and the noise impact residential neighborhoods are considered. When exceptions are made, noise impact will be minimized by conducting run- ups at the south end of runway 35 or south end of taxiway C. Exceptions should be coordinated through the City Aviation's Operations Officer (OPS 60), if available. If OPS 60 is not available the Albuquerque Tower OSIC/OCIC will make the decision.

g. These procedures may be altered as safety considerations (wind, movement area closures, weather, etc.) dictate; these procedures shall not be altered for the sole purpose of expediting traffic.

5. 0700 to 0900 (DAYTIME) WEEKEND and CERTAIN HOLIDAY CURFEW.

   a. On weekends and certain holidays (listed below) the curfew for turbojets and turboprops shall be extended from 0700 to 0900 am local.

   b. The effected holidays include New Years Day, Thanksgiving Day, and Christmas Day

6. This agreement shall remain in effect unless terminated in writing by either party.

DAVE AUSHERMAN
Air Traffic Manager
Albuquerque ATC Tower
(505) 856-4900

ERIC FIEL, Col, USAF
Commander 58th Special Operations Wing (AETC)
4249 Hercules Way
Kirkland AFB, NM, 87117-5861
(505)853-5800

John D. "Mike" Rice, Director,
Aviation Department
City of Albuquerque
(505) 244-7700

STEVE KULIFAY, Major, USAF
Chief, Airfield management
Kirtland AFB, NM, 87117-5861
(505) 846-8338

Kim Hunter, Lt. Col, NMANG
Commander,150FW
Kirtland AFB, NM, 87117-5861
(505) 846-9172

Page 4

Table 1. Runway 17/35 Operational Use Criteria

	Light aircraft	Turbojet/turboprop
Runway 17, Take off	Daytime. Nighttime if crosswind component>20K (15K wet) on other runways	Crosswind component>20K (15K wet) on other runways*
Runway 17, Landing	Daytime. Nighttime if crosswind component>15K on other runways or emergencies	Crosswind component>15K on other runways, or emergencies
Runway 35, take Off	Daytime. Nighttime if crosswind component>20K (15K wet) on other runways	Crosswind component>20K (15K wet) on other runways
Runway 35, Landing	Anytime	Anytime

* 58th SOW special use agreement

FAA Order 8400.9 specifies the maximum crosswind component (see Table 2), of 20 knots (dry runway) and 15 knots (wet runway). When conditions require turbojet and turboprop use of runway 17 for arrivals or 17/35 for departures, the Control Tower shall inform the City Aviation Department immediately. Should the terms of this restriction be abused, the Aviation Department retains the right to terminate this agreement.

Table 2. Maximum Wind Values (from FAA Order 8499.9)

Wind Angle from Runway	Max Wind(Dry)	Max Wind (Wet)
10	114	86
20	58	44
30	40	30
40	31	23
45	28	21
50	26	19
60	23	17
70	21	16
80	20	15
90	20	15

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Appendix H - Example Letter of Special Use Agreement

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      (1) Serve as the focal point for citizens' comments concerning aircraft noise. Noise comments concerning military aircraft will be logged into the airport's database; however, all comments will be forwarded to the respective wing(s).

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   a. All military aircraft classified as heavy or fighter-type aircraft departing runway 8 shall turn right on departure.

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   c. When weather conditions are 5,000-foot ceiling and seven miles visibility or greater, the Control Tower shall request all turboprop and turbojet aircraft (except STOL-type aircraft) making left turns from runway 8 to delay their turn until 13.5 DME from the Albuquerque VORTAC.

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   c. By separate agreement, the south 4800 feet of runway 17/35 is used for night operations by the 58th SOW so long as their traffic pattern remains south of the airport.

   d. Military helicopters inbound from the north shall be vectored for an approach to runway 8.

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e. Except for a West or Southwest flow, runway 21 and runway 3 departures are discouraged. If runway 21 is required because of operational requirements, turboprops and turbojets may be assigned a heading of 190 degrees or farther east until leaving 8000 feet, or 5 miles south of the airport. Non turbine-powered aircraft turning northbound should be turned ASAP to avoid noise sensitive areas Southwest of the airport. During a West or Southwest flow, apply this when traffic permits. If departing runway 3 because of operational requirements, turboprops and turbojets may be instructed to fly runway heading until leaving 6500 feet.

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50	26	19
60	23	17
70	21	16
80	20	15
90	20	15

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Appendix I - Model Lighting and Sandy Dark Sky Ordinances

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SECTION 1.0

Model Lighting Ordinance (MLO)

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Model Lighting Ordinance (MLO)

Developed by the International Dark-Sky Association (IDA) and the Illuminating Engineering Society (IES)

60% Public Review

NOT FOR ADOPTION OR USE

February 7, 2009
Modifications Published March 2, 2009

- Added "-" to page 1: International Dark-Sky Association
- Added Reference to page 21 of text/22 of PDF "Addendum A for IESNA TM-15-07: Backlight, Uplight, and Glare (BUG) Ratings http://www.iesna.org/PDF/Erratas/TM-15-07BUGRatingsAddendum.pdf"
- Change to page 23 of text/24 PDF two references to "Table E" changed to "Appendix A: Table A"
- Added to page 24 of text/25 of PDF "Appendix A: Table A –" to Skyglow Multiplier of Exitant Lumens (interpreted from Baddiley)
- Added to page 25 of text/26 of PDF "Appendix A: Table B –" to Maximum Line of Sight Illuminance at Any Vertical Plane Boundary
- Added to page 25 of text/26 of PDF "Appendix A: Table C –" to Minimum Modified DeBoer Rating Viewed from Any Boundary

IDA-IESNA Model Lighting Ordinance (MLO)

FOR PUBLIC REVIEW

NOT INTENDED FOR PUBLIC ADOPTION AT THIS TIME

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PUBLIC REVIEW ONLY

I. Preamble

The purpose of this Ordinance is to provide regulations for outdoor lighting that will:

Permit reasonable uses of outdoor lighting for night-time safety, utility, security, productivity, enjoyment and commerce.

a. Conserve energy and resources to the greatest extent possible.
b. Minimize adverse offsite impacts including, light trespass, and obtrusive light.
c. Curtail light pollution and preserve the nighttime environment.
d. Help preserve the dark night sky for astronomy and enjoyment.
e. Help protect the natural environment from the adverse effects of night lighting from electric sources.

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II. Definitions

Authority	The adopting municipality, agency or other governing entity having jurisdiction.
Astronomic Time Switch	An automatic lighting control device that operates as an on/off switch for outdoor lighting relative to time of solar day with time of year correction.
Adjacent Grade	Grade directly below luminaire on a plumb line or, nearest grade thereto.
Backlight	For an exterior luminaire, light emitted in the quarter sphere below horizontal and in the opposite direction of the intended orientation of the luminaire. For luminaires with symmetric distribution, backlight will be the same as frontlight.
BUG	A luminaire classification system that is used in the Prescriptive method for evaluating optical distribution of outdoor luminaires that denotes levels of backlight (B), uplight (U) and glare (G).
Canopy	A covered, unconditioned structure with at least one side open for pedestrian and/or vehicular access..
Common Outdoor Areas	One or more of the following: a common parking lot for three or more domiciles or buildings; a common parking garage or covering entrance intended to be used by three or more domicile or buildings; a common entrance for three or more domiciles or buildings.
Curfew	A time defined by the authority when outdoor lighting is reduced to a specified maximum level or extinguished.
Emergency conditions	Loss of electrical power, fire, security alarm, or other situation requiring uninterrupted illumination for the path of egress.
Fully Shielded Luminaire	A residential luminaire with opaque top and sides, capable of only emitting light in the lower photometric hemisphere as installed.
Frontlight	For an exterior luminaire, light emitted in the quarter sphere below horizontal and in the direction of the intended orientation of the luminaire.
Glare	Light entering the eye directly from luminaires that causes visual discomfort or reduced visibility.
Hardscape	Permanent improvements to a site, including but not limited to parking lots, drives, entrances, curbs, ramps, stairs, steps, and similar construction.
Hardscape Area	Area in square feet of all hardscape including any medians, walkways, landscape areas 10 feet or less in width within the hardscape area used to calculate complete site method allowed lumens.
Hardscape Perimeter	Perimeter in linear feet of all hardscape outside perimeter plus perimeter around buildings and structures greater than 10 feet in width used to calculate complete site method allowed lumens.
IDA	International Dark-Sky Association, Tucson, AZ USA
IES	Illuminating Engineering Society, New York, NY USA
Illuminated area	An exterior area for which lighting of reasonable uniformity and illumination is provided; not incidentally lighted or partially lighted.
Improved area	The area of a specific use, measured in plan view.
Initial Lamp Lumens	Lumen rating of a lamp when the lamp is new and has not depreciated in light output (rated lamp lumens) Lamp lumen depreciation equals 1.0.

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Intended manner	The manner of use of the product generally as listed, advertised and/or per manufacturer's standard installation instructions.
Lamp	A generic term for a source created to produce optical radiation (i.e. "light"), often called a bulb or tube.
Lamp Watts	The rated watts of the lamp, not including the watts of external auxiliaries.
Landscape Lighting	Lighting not mounted to poles or buildings, for the purpose of illuminating trees, shrubbery and other natural external elements.
Light Pollution	Light scattered by the atmosphere that interferes with the appreciation or observation of night skies
Light Trespass	Unwanted light that falls on neighboring properties or produces glare or distraction for observers away from the area for which the light is intended (also called "nuisance glare")
Lighting	Light produced by man-made sources, including electric lamps, gas lamps, and similar sources.
Lighting Equipment	Equipment specifically intended to provide electric illumination, including but not limited to, luminaire(s), poles, posts, and related structures, electrical wiring, and other necessary or auxiliary components.
Lighting System	On a site, all exterior man-made lighting sources, associated infrastructure and controls.
Low Voltage Landscape Lighting	Electric lighting powered at less than 15 volts and limited to lamps of 50 watts or less, not mounted to poles or buildings, for the purpose of illuminating trees, shrubbery and other natural external elements.
Lumens (lm)	International unit of luminous flux; light power corrected for V_λ, the human photopic sensitivity function.
Lighting Zone (LZ)	A designation assigned by the Authority for specified parcels, areas or districts within its jurisdictional boundaries defining allowable ambient lighting levels, operational characteristics and other control criteria.
Luminaire	The complete lighting unit assembly (fixture), consisting of a lamp, or lamps and ballast(s) (when applicable), together with the parts designed to distribute the light (reflector, lens, diffuser), to position and protect the lamps, and to connect the lamps to the power supply.
Mounting height	The height of a luminaire above grade level. The horizontal spacing of poles is often measured in units of "mounting height". Example: "The luminaires can be spaced up to 4 mounting heights apart."
New lighting	Lighting for areas not previously illuminated; newly installed lighting of any type except for replacement lighting or lighting repairs.
Obtrusive light	Light that produces sky glow, light trespass, glare or other undesirable environmental impacts.
Opaque	A solid material allowing no light to pass through.
Ornamental lighting	Lighting that is not a sign and does not impact the function and safety of an area but is purely decorative, or used to illuminate architecture and/or landscaping, and installed for aesthetic effect.
Partly Shielded Luminaire	A residential luminaire in which the lamp is shielded by a translucent shade so as to prevent light from being directly emitted by the lamp or reflector into the upper photometric hemisphere

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Photoelectric Switch	A control device employing a photocell or photodiode to detect daylight and automatically switch lights off by day.
Project	Installation of a lighting system under a single electrical permit or for a specific construction project, multiple permits when required for phased construction.
Property line	The edges of the legally-defined extent of privately owned property
Public Right of Way	Any sidewalk, planting strip, alley, street, or pathway, improved or unimproved, that is dedicated to public use.
Radiosity	A method for calculating lighting system performance that accounts for direct and reflected light by using Fourier coefficients to describe the transfer of radiative energy from sources to surfaces and among surfaces.
Ray Tracing	A method for calculating lighting system performance that accounts for direct and reflected light by tracing each ray from sources to surfaces and among surfaces until dissipated.
Replacement Lighting	Lighting installed specifically to replace existing lighting equipment that is sufficiently inoperable to be beyond repair(s).
Repair(s)	The reconstruction or renewal of any part of an existing luminaire for the purpose of its on-going operation, including but not limited to relamping or replacement of components such as; capacitor, ballast or photoelectric control.
Residential Luminaire	Luminaires used solely for compliance with Section V.
Sales area	Uncovered area used for sales of retail goods and materials, including but not limited to automobiles, boats, tractors and other farm equipment, building supplies, and gardening and nursery products.
Seasonal lighting	Temporary lighting installed and operated in connection with holidays, community celebrations or traditions.
Service yard	Uncovered hardscape specifically used for vehicular, marine or aviation service or for outdoor storage and/or loading of goods and materials
Shielded Directional Luminaire	A fully shielded residential luminaire with an adjustable mounting device allowing aiming in a direction other than straight downward.
Sign	Advertising, directional or other signs (governed by the sign ordinance)
Site	A geographic area within the jurisdiction of the Authority delineated by specific dimensions and coordinates or a complete land parcel defined by designated property boundaries as recorded by the Authority..
Skyglow	The illumination of clouds, moisture and airborne matter by lighting
Temporary lighting	Lighting installed and operated for periods not to exceed 60 days, completely removed and not operated again for at least 30 days.
Third Party	A party contracted to provide lighting, such as a utility company.
Time Switch	An automatic lighting control device that operates as an on/off switch for outdoor lighting according to time of day.
Translucent	A material allowing light to pass through while obscuring or diffusing the lamp.
Uplight	For an exterior luminaire, light emitted in the hemisphere at or above the horizontal plane.
Urban Park	A publicly accessible park in or near a town or city and not specified as a wildlife refuge or nature preserve.

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III. General Requirements for All Outdoor Lighting

A. Conformance with All Applicable Codes

All outdoor lighting shall be installed in conformance with the provisions of this Ordinance, applicable Electrical and Energy Codes, and applicable sections of the Building Code.

B. Applicability

Except as described below, all outdoor lighting installed after the effective date of this Ordinance shall comply with these requirements. This includes, but is not limited to, new lighting, replacement lighting, or any other lighting whether attached to structures, poles, the earth, or any other location, including lighting installed by any third party.

Exemptions to III.(B.) The following are not regulated by this Ordinance:

a. Lighting equipment within public right-of-way or easement for the principal purpose of illuminating streets, roadways and/or other areas open to public transport by vehicle or pedestrian traffic. No exemption shall apply to any lighting equipment within the public right of way or easement when the purpose of the luminaire is to illuminate areas outside the public right of way or easement.

b. Lighting equipment for roadway rest areas without gas stations, restaurants or retail stores.

c. Lighting equipment for public monuments and statuary.

d. Lighting equipment solely for signs, (as this lighting is regulated by the Sign Ordinance).

e. Repairs to existing lighting equipment.

f. Temporary lighting equipment for theatrical, television, performance areas and construction sites.

g. Lighting equipment in swimming pools and other water features.

h. Temporary lighting equipment and seasonal lighting equipment provided that individual lamps are 10 watts or less.

i. Lighting equipment that is only used during emergency conditions.

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j. Lighting equipment used solely for security and controlled by a motion sensor with photoelectric switch.

k. In Lighting Zones 2, 3 and 4, low voltage landscape lighting equipment controlled by a photoelectric switch or programmable time switch.

Exceptions to III. (B.) When the requirements herein conflict with specific lighting provisions of any of the following, only those specific provisions shall take precedence and all other requirements herein shall remain in force:

a. Lighting equipment specified or identified in a specific special use permit.

b. Lighting equipment required by laws and/or regulation of a government, authority or entity having applicable jurisdiction.

C. Use of Lighting Zones

The Authority shall establish Lighting Zones (LZ) within its jurisdictional boundaries. The Lighting Zone shall define the limitations for outdoor lighting as specified in this ordinance. The descriptive criteria for each Lighting Zone shall be as follows:

LZ0: No ambient lighting

Areas where the natural environment will be seriously and adversely affected by lighting. Impacts include disturbing the biological cycles of flora and fauna and/or detracting from human enjoyment and appreciation of the natural environment. Human activity is subordinate in importance to nature. The vision of human residents and users is adapted to the total darkness, and they expect to see little or no lighting. When not needed, lighting should be extinguished.

LZ1: Low ambient lighting

Areas where lighting might adversely affect flora and fauna or disturb the character of the area. The vision of human residents and users is adapted to low light levels. Lighting may be used for safety, security and/or convenience but it is not necessarily uniform or continuous. After curfew, most lighting should be extinguished or reduced as activity levels decline.

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LZ2: Moderate ambient lighting

Areas of human activity where the vision of human residents and users is adapted to moderate light levels. Lighting may typically be used for safety, security and/or convenience but it is not necessarily uniform or continuous. After curfew, lighting may be extinguished or reduced as activity levels decline.

LZ3: Moderately high ambient lighting

Areas of human activity where the vision of human residents and users is adapted to moderately high light levels. Lighting is generally desired for safety, security and/or convenience and it is often uniform and/or continuous. After curfew, lighting may be extinguished or reduced in most areas as activity levels decline.

LZ4: High ambient lighting

Areas of human activity where the vision of human residents and users is adapted to high light levels. Lighting is generally considered necessary for safety, security and/or convenience and it is mostly uniform and/or continuous. After curfew, lighting may be extinguished or reduced in some areas as activity levels decline.

D. Lighting Controls and Curfews

1. Automatic Control Requirements

Controls shall be provided that automatically extinguish all outdoor lighting by day using a switching device such as a photoelectric switch, astronomic time switch or a control system such as a programmable lighting controller, building automation system, lighting energy management system or equivalent.

Exceptions to III.(D.) 1. Automatic lighting controls are not required for the following:

a. Lighting under canopies.

b. Lighting for tunnels, parking garages, garage entrances, and similar conditions.

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2. Curfews and Automatic Lighting Reduction Requirements

The Authority shall establish curfew time(s) specific to each Lighting Zone designation after which the total outdoor lighting lumens shall either be extinguished or at a minimum reduced by 30%.

Exceptions to III.(D.) 2. Lighting reductions are not required for any of the following:

a. When there is only one (1) conforming luminaire on the property.
b. Code required lighting for steps, stairs, walkways, and points of ingress and egress to building and other facilities.
c. When in the opinion of the Authority, lighting levels must be maintained.
d. Motion activated lighting.
e. Lighting governed by special use permit in which times of operation are specifically identified.
f. Residential lighting

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IV. Requirements for Non-Residential Outdoor Lighting

For all non-residential properties, and for multiple residential properties having common outdoor areas, all outdoor lighting shall comply either with Part A or Part B of this section.

A. Prescriptive Method

An outdoor lighting system for applications in this section shall comply with this Ordinance if it meets the requirements as defined in subsections 1 and 2, below.

1. Total Site Lumen Limit

   The total installed initial lamp lumens of all outdoor lighting on the site shall not exceed the total site lumen limit. The total site lumen limit shall be determined using any one of the three methods listed in Table A, (Allowed Total Lumens per Site for Non-residential Outdoor Lighting). Only one method shall be used per permit application. For sites with existing lighting, the existing lighting shall be included in the calculation of total installed lumens.

2. Limits to Off Site Impacts

   All luminaires shall be rated and installed according to Table C, (Maximum Allowable Backlight, Uplight and Glare (BUG) Ratings).

B. Performance Method

An outdoor lighting system for applications in this section shall comply with this Ordinance if when analyzed by the appropriate software it meets the specifications in Appendix A.

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V. Requirements for Residential Outdoor Lighting

For all residential properties including multiple residential properties not having common areas, all outdoor lighting shall comply with Table D, (Residential Lighting Total Wattage Limits). Lighting not listed in Table D shall not be permitted unless exempt according to Section III (B.).

Exceptions to Section IV and Table D.

a. Open flame gas lights (without mantle) are exempt.

b. If located more than 75 feet from all property lines, a fully shielded luminaire may be mounted up to 25 feet above adjacent grade.

c. Outdoor lighting for sports, agriculture and other uses/activities which exceed the limits defined in this section shall only be permitted by a special use permit.

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VI. Lighting by Special Use Permit Only

A. High Intensity and Special Purpose Lighting

The following lighting systems are prohibited from being installed or used except by special use permit:

1. Temporary lighting in which any single luminaire exceeds 250 watts or the total lighting load exceeds 2000 watts.
2. Aerial Lasers.
3. Searchlights.
4. Other very intense lighting defined as having a light source exceeding 200,000 lumens or an intensity in any direction of more than 2,000,000 candelas.

B. Complex and Non-Conforming Uses

Upon issuance of a special use permit by the Authority, lighting not complying with the technical requirements of this ordinance but consistent with its intent may be installed for complex sites/uses or special uses including, but not limited to, the following applications:

1. Sports facilities, including but not limited to unconditioned rinks, open courts, fields, and stadiums.
2. Construction lighting.
3. Lighting for industrial sites having special requirements, such as petrochemical manufacturing or storage, shipping piers, etc.
4. Parking structures.
5. Bridges, public monuments, public buildings and urban parks.
6. Theme and amusement parks.

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To obtain such a special use permit, applicants shall demonstrate that the proposed lighting installation:

a. Has been analyzed using the Performance Method and for which Sky Glow, Light Trespass and Glare values have been calculated.

b. Has sustained every reasonable effort to mitigate Sky Glow, Light Trespass and Offensive Glare supported by a signed statement describing the mitigation measures. Such statement shall be accompanied by computer calculations indicating the light trespass levels (horizontal and vertical at ground level) at the property line.

c. Employs lighting controls to reduce lighting at a Project Specific Curfew ("Curfew") time to be established in the special use permit.

d. Complies with the Prescriptive or Performance Method after Curfew.

The Authority shall review each such special use permit application. A special use permit may be granted if, upon review, the Authority believes that the proposed lighting will not create unwarranted glare, sky glow, or light trespass.

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VII. Existing Lighting

Lighting installed prior to the effective date of this ordinance shall comply with the following.

A. Amortization

On or before [amortization date], all outdoor lighting shall comply with this Code.

B. New Uses or Structures, or Change of Use

Whenever there is a new use of a property (zoning or variance change) or the use on the property is changed, all outdoor lighting on the property shall be brought into compliance with this Ordinance before the new or changed use commences.

C. Additions or Alterations

1. Major Additions.

   If a major addition occurs on a property, lighting for the entire property shall comply with the requirements of this Code. For purposes of this section, the following are considered to be major additions:

   a. Additions of 50 percent or more in terms of additional dwelling units, gross floor area, seating capacity, or parking spaces, either with a single addition or with cumulative additions after the effective date of this Ordinance.

   b. Single or cumulative additions, modification or replacement of 50 percent or more of installed outdoor lighting luminaires existing as of the effective date of this Ordinance.

2. Minor Modifications, Additions, or New Luminaires for Non-residential and Multiple Dwellings

   For non-residential and multiple dwellings, all additions, modifications, or replacement of less than 50 percent of outdoor luminaires existing as of the effective date of this Ordinance shall require the submission of a complete inventory and site plan detailing all existing and any proposed new outdoor lighting.

   Any new lighting shall meet the requirements of this Ordinance.

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3. Resumption of Use after Abandonment

   If a property with non-conforming lighting is abandoned for a period of six months or more, then all outdoor lighting shall be brought into compliance with this Ordinance before any further use of the property occurs.

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VIII. Enforcement and Penalties (Reserved)

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IX. Tables

Non-Residential Prescriptive Method

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Residential Lighting

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Table A - Non-residential Outdoor Lighting Prescriptive Method - Allowed Total Lumens per Site

Only one (1) method may be used for each project.

Per Parking Space Method					
	Lighting Zone 0	**Lighting Zone 1**	**Lighting Zone 2**	**Lighting Zone 3**	**Lighting Zone 4**
May only be applied to projects up to 12 parking spaces (including handicapped accessible spaces).	500 lm/space (lumens per parking space)	700 lm/space	900 lm/space	1200 lm/space	1500 lm/space

Simple Hardscape Method					
	Lighting Zone 0	**Lighting Zone 1**	**Lighting Zone 2**	**Lighting Zone 3**	**Lighting Zone 4**
May be used for any project	1.5 lm/ ft^2 of hardscape*	2.5 lm/ ft^2 of hardscape*	4.0 lm/ ft^2 of hardscape*	8.0 lm/ ft^2 of hardscape*	12.0 lm/ ft^2 of hardscape*

Complete Site Method						
		Lighting Zone 0	**Lighting Zone 1**	**Lighting Zone 2**	**Lighting Zone 3**	**Lighting Zone 4**
May be used for any project *The total allowance is the sum of each of the Basic, Perimeter, Area and Specific Use Allowances*	Basic Allowance	N/A	22,000 lm per site	33,000 lm per site	55,000 lm per site; plus	80,000 lm per site; plus
	Perimeter Allowance	10 lm per linear foot of hardscape perimeter	20 lm per linear foot of hardscape perimeter	30 lms per linear foot of hardscape perimeter	65 lm per linear foot of hardscape perimeter	100 lm per linear foot of hardscape perimeter
	Area Allowance	1 lm/ft^2 of hardscape	2 lm/ft^2 of hardscape	3 lm/ft^2 of hardscape	7 lm/ft^2 of hardscape	10 lm/ft^2 of hardscape
	Specific Use Allowance	Reference Table B (LZ 0)	Reference Table B (LZ 1)	Reference Table B (LZ 2)	Reference Table B (LZ 3)	Reference Table B (LZ 4)

**When lighting intersections of site drives and public streets or roads the effective property line for the purpose of this section may be extended to the center line of the public right of way up to 5 times the width of the drive or site road on either side of the centerline of the intersecting drive or site road.*

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Table B - Additional Lumen Allowance for Specific Applications

All of the following are "use it or lose it" allowances. All area and distance measurements in plan view unless otherwise noted.

Lighting Application	Lighting Zone 0	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
Building Entrances or Exits. This allowance is per door. In order to use this allowance, luminaires must be within 20 feet of the door.	750 lm	2,000 lm	4,000 lm	6,000 lm	8,500 lm
Entrances at Senior Care Facilities, Police Stations, Hospitals, Fire Stations, and Emergency Vehicle Facilities. This allowance is lumens per primary entrance. To use this allowance, luminaire(s) must be installed within 100 feet of the entrance door.	N/A	4,000 lm	8,400 lm	12,000 lm	16,500 lm
Building Facades. This allowance is lumens per square foot of building façade that is illuminated. To use this allowance, luminaires must be aimed at the façade and capable of illuminating it without obstruction.	N/A	N/A	12 lm/ft^2	25 lm/ft^2	40 lm/ft^2
Outdoor Sales Lots. This allowance is lumens per square foot of uncovered sales lots used exclusively for the display of vehicles or other merchandise for sale, and may not include driveways, parking or other non sales areas. To use this allowance, Luminaires must be within 10 mounting heights of the sales lot area.	N/A	10,000 lm plus 10 lm/ft^2	10,000 lm plus 40 lm/ft^2	15,000 lm plus 60 lm/ft^2	22,000 lm plus 125 lm/ft^2
Outdoor Sales Frontage. This allowance is for linear feet of sales frontage immediately adjacent to the principal viewing location(s) and unobstructed for its viewing length. A corner sales lot may include two adjacent sides provided that a different principal viewing location exists for each side. In order to use this allowance, luminaires must be located between the principal viewing location and the frontage outdoor sales area.	N/A	N/A	1,650 lm/ft	2,850 lm/ft	4,500 lm/ft
Hardscape Ornamental Lighting. This allowance is in lumens per square foot of the total illuminated hardscape area. In order to use this allowance, luminaires must be rated for 100 watts (3000 lumens) or less.	N/A	N/A	1.2 lm/ft^2	2.4 lm/ft^2	3.6 lm/ft^2
Drive Up Windows. This allowance is lumens per window. In order to use this allowance, luminaires must be within 2 mounting heights of the sill of the window.	N/A	2,700 lm	4,000 lm	8,000 lm	13,000 lm

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Guard Stations. This allowance is lumens per square foot of guardhouse area plus 2,000 sf per vehicle lane. In order to use this allowance, luminaires must be within 2 mounting heights of a vehicle lane or the guardhouse.	N/A	10 lm/ft^2	25 lm/ft^2	50 lm/ft^2	80 lm/ft^2
Outdoor Dining. This allowance is lumens per square foot for the total illuminated hardscape of outdoor dining area. In order to use this allowance, luminaires must be within 2 mounting heights of the hardscape area of outdoor dining.	N/A	1 lm/ft^2	10 lm/ft^2	15 lm/ft^2	25 lm/ft^2
Special Security Lighting for Retail Parking and Pedestrian Hardscape. This allowance is lumens per square foot for the total area of illuminated retail parking and pedestrian hardscape identified as having special security needs. This allowance shall be in addition to the building entrance or exit allowance.	N/A	0.2 lm/ft^2	2 lm/ft^2	3 lm/ft^2	N/A
Vehicle Service Station Hardscape. This allowance is lumens per square foot for the total illuminated hardscape area less any area of buildings, area under canopies, area off property, or areas obstructed by signs or structures. In order to use this allowance, luminaires must be illuminating the hardscape area and must not be within a building, below a canopy, beyond property lines, or obstructed by a sign or other structure.	N/A	5 lm/ft^2	10 lm/ft^2	25 lm/ft^2	40 lm/ft^2
Vehicle Service Station Canopies. This allowance is lumens per square foot for the total area within the drip line of the canopy. In order to use this allowance, luminaires must be located under the canopy.	N/A	30 lm/ft^2	60 lm/ft^2	80 lm/ft^2	150 lm/ft^2
Vehicle Service Station Uncovered Fuel Dispenser. This allowance is lumens per fueling side (2 max) per dispenser. In order to use this allowance, luminaires shall be within 2 mounting heights of the dispenser.	N/A	7,500 lm	15,000 lm	20,000 lm	40,000 lm
All Other Sales Canopies. This allowance is lumens per square foot for the total area within the drip line of the canopy. In order to qualify for this allowance, luminaires must be located under the canopy.	N/A	10 lm/ft^2	40 lm/ft^2	65 lm/ft^2	100 lm/ft^2
Non-sales Canopies. This allowance is lumens per square foot for the total area within the drip line of the canopy. In order to qualify for this allowance, luminaires must be located under the canopy.	N/A	5 lm/ft^2	12 lm/ft^2	25 lm/ft^2	45 lm/ft^2

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Table C Prescriptive Method - Maximum Allowable Backlight, Uplight and Glare (BUG) Ratings

A luminaire may be used if it is rated as follows according to the Lighting Zone of the Site. If the luminaire is installed in other than the intended manner, the rating shall be determined to account for the actual photometric geometry. Luminaires equipped with adjustable mounting devices permitting alteration of luminaire aiming in the field shall not be permitted.

	Lighting Zone 0	**Lighting Zone 1**	**Lighting Zone 2**	**Lighting Zone 3**	**Lighting Zone 4**
Allowed Backlight Rating					
>2 mounting heights from property line	B0	B1	B2	B3	B4
1 to 2 mounting heights from property line and properly oriented*	B0	B1	B2	B3	B3
0.5 to 1 mounting height to property line and properly oriented*	B0	B0	B1	B2	B2
<0.5 mounting height to property line adjacent to a street and properly oriented*	B0	B0	B1	B2	B2
<0.5 mounting height to property line and properly oriented*	B0	B0	B0	B1	B2
Allowed Uplight Rating	U0	U1	U2	U3	U4
Allowed Glare Rating	G0	G1	G2	G3	G4

** The luminaire must be mounted with backlight towards the property line.*

Note: Backlight, Uplight, and Glare ratings are defined based on specific lumen limits for IESNA TM-15-07 solid angles.

Addendum A for IESNA TM-15-07: Backlight, Uplight, and Glare (BUG) Ratings http://www.iesna.org/PDF/Erratas/TM-15-07BUGRatingsAddendum.pdf

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Table D - Residential Lighting Total Wattage and Lumen Limits for each Luminaire

Each luminaire shall not exceed the lower of either the allowed Watts or Lumens.

Allowable Lamp Wattages	Lighting Zone 0	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
Allowed Total Lamp Watts or Lumens for General Exterior Lighting**	25 watts plus .05 watts per ft^2 of site structures*	75 watts plus .05 watts per ft^2 of site structures*	150 watts plus .05 watts per ft^2 of site structures*	200 watts plus .05 watts per ft^2 of site structures*	200 watts plus .05 watts per ft^2 of site structures*
	750 lumens plus 0.45 lumens per ft^2	2250 lumens plus 0.45 lumens per ft^2	4500 lumens plus 0.45 lumens per ft^2	6000 lumens plus 0.45 lumens per ft^2	6000 lumens plus 0.45 lumens per ft^2
Maximum Allowed Lamp Watts or Lumens Each for Fully Shielded Luminaires	25W	40W	60W	100W	100W
	750 lumens	1200 lumens	1800 lumens	3000 lumens	3000 lumens
Maximum Lamp Watts or Lumens Each for Partly Shielded Luminaires	N/A	15W	40W	40W	40W
	N/A	450 lumens	1200 lumens	1200 lumens	1200 lumens
Maximum Lamp Watts or Lumens each for Low Voltage Landscape Lighting	N/A	N/A	50W	50W	50W
	N/A	N/A	1500 lumens	1500 lumens	1500 lumens
Maximum Watts or lumens each for Shielded Directional Flood Lighting	N/A	N/A	60W	100W	100W
	N/A	N/A	1800 lumens	3000 lumens	3000 lumens

** The sum of the land area of residential buildings on the site including habitable structures, garages, recreational buildings, and storage and equipment structures.*

*** For sites exceeding one acre, an additional allowance of 100 watts per acre is allowed.*

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Appendix "A" Performance Method

The Performance Method requires the use of computer software that employs either radiative transfer (radiosity) and/or ray tracing methods to predict lighting system performance. Such software is typically used for lighting design and illuminating engineering, and most current programs include CAD interfaces to enable rapid and accurate data input. For the purposes of this analysis, input data shall include all buildings, structures and significant topography and may, at the option of the analyst, include trees and minor topography.

The software must be modified to perform the following tests and then return a "pass" rating only if all three tests are passed for the Lighting Zone of the Project. In addition, the software should provide the analyst with feedback to aid in interpreting the results and correcting deficiencies.

Test 1: Analysis of Off-site Lumen Impact (or "Light Pollution" or "Skyglow")

1. Calculate the ***allowed*** offsite lumens as follows:
    a. Determine the total allowed on-site lumens using the "Complete Site Method" under the Prescriptive Method (Section IV (A.))
    b. Multiply by 0.1. This is the allowed offsite lumens.
2. Calculate the ***relative skyglow*** produced by off-site lumens as follows:
    a. Establish the worst-case condition: Multiply the allowed offsite lumens calculated in step 1b by the skyglow multiplier for the 90-100° range of exitant angles from Appendix A–Table A. This is the ***maximum relative average sky luminance*** that would be produced by the allowed offsite lumens.
    b. (This calculation includes direct and reflected light.) Determine the amount and exitant angles of all lumens leaving the site using the vertical angular increments in the following Table. Multiply the lumens leaving the site in each of these angular zones by the corresponding multiplier from Appendix A–Table A. These products are the ***relative average sky luminance*** produced by the lumens leaving the site. Lumens that are emitted downward and not blocked (that is between 0° and 90°) are counted only if they leave the site. All lumens emitted upward and not blocked are counted.

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(NOTE: the reference document (B.)(1.) below shall be consulted as shall new data from this and other sources. At such time as additional data warrants, the table shall be modified to account for location, climate and other conditions.)

c. Add the relative average sky luminances from all solid angles. This is the total relative average sky luminance ("skyglow") produced by all the offsite lumens.

Appendix A: Table A – Skyglow Multiplier of Exitant Lumens
(interpreted from Baddiley)

Vertical exitant angles	Skyglow Multiplier
0-10°	0.002
10-20°	0.002
20-30°	0.003
30-40°	0.003
40-50°	0.005
50-60°	0.009
60-70°	0.015
70-80°	0.029
80-90°	0.337
90-100°	1.000
100-110°	0.774
110-120°	0.587
120-130°	0.436
130-140°	0.236
140-150°	0.170
150-160°	0.134
160-170°	0.102
170-180°	0.033

3. The design passes Test 1 if the ratio of the total relative average sky luminance produced by all the offsite lumens calculated in step 2b is less than or equal to ***TBD***% of the worst case relative average sky luminance calculated in step 2a.

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Test 2: Analysis of Light Trespass Impact

Calculate line of sight illuminance at or above grade on a vertical plane at the property line, up to the highest point of structures or luminaires. Calculate the direct light from individual luminaires and light reflected from all solid surfaces on the site. Assume the reflecting surfaces are diffuse. If no point illuminance exceeds defined threshold values for each lighting zone, then the design passes Test 2.

Appendix A: Table B – Maximum Line of Sight Illuminance at Any Vertical Plane Boundary

Maximum Illuminance	Lighting Zone 0	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
	0.5 lux (0.05 fc)	1.0 lux (0.10 fc)	3.0 lux (0.30 fc)	8.0 lux (0.8 fc)	15.0 lux (1.5 fc)

Test 3: Analysis of Glare Impact

Calculate the modified DeBoer glare rating according to the reference document (B.)(2.) below for El and Es at or above grade (within 55 degrees above horizontal and 75 degrees below horizontal) on a vertical plane at the property line, up to the highest point of structures or luminaires within the site. The design passes if the rating is higher than or equal to the following ratings:

Appendix A: Table C Minimum Modified DeBoer Rating Viewed from Any Boundary

	Lighting Zone 0	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
Minimum DeBoer Rating	TBD	TBD	TBD	TBD	TBD

Reference Papers

1. Skyglow Impact (Reserved for Baddiley paper)
2. Modified DeBoer Method for Rating Glare (Reserved for LRC Paper)

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SECTION 2.0

Sandy Dark Sky Ordinance

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Chapter 15.30
Dark Sky Ordinance
(Ord. 2002-11)

15.30.000 Purpose
15.30.010 Definitions
15.30.020 Scope and Applicability
15.30.030 Exemptions and Exceptions
15.30.040 Approved materials and methods of installation
15.30.050 Submittals
15.30.060 General Standards
15.30.070 Non-Permitted Lighting
15.30.080 Appeals
15.30.090 Violations
15.30.100 Penalties
15.30.110 Severability

15.30.000 PURPOSE

The purpose of the Sandy Dark Sky Ordinance is to regulate outdoor lighting in order to reduce or prevent light pollution. This means to the extent reasonably possible the reduction or prevention of glare and light trespass, the conservation of energy, and promotion of safety and security. (Ord. 2002-11)

15.30.010 DEFINITIONS

The "IES" (Illuminating Engineering Society of North America) Lighting Handbook, most recent edition, the City of Sandy Development Code, and Building Code, shall be used for the definition of terms used in this ordinance but not defined herein. In the case where a definition of a term of this ordinance is found to be in conflict with a definition of a term of any other ordinance, "IES" handbook or regulation, the more restrictive definition will apply.

Area Light: Light that produces over 2050 lumens (See Table 2 for Light Output of Various Lamps). Area lights include, but are not limited to, street lights, parking lot lights and yard lights.

Automatic timing device: A device that automatically controls the operation of a light fixture or fixtures, circuit or circuits. Photocells and light and or motion sensors shall be considered automatic-timing devices

Average Footcandle: The level of light measured at an average point of illumination between the brightest and darkest areas. The measurement can be made at the ground surface or at four to five feet above the ground.

Bulb: The source of electric light. To be distinguished from the whole assembly (See Luminaire).

Candela (cd): Unit of luminous intensity.

Eighty-five (85) Degree Full Cut-Off Type Fixtures: Fixtures that do not allow light to escape above an 85-degree angle measured from a vertical line from the center of the lamp extended to the ground.

Exterior Lighting: Temporary or permanent lighting that is installed, located or used in such a manner to cause light rays to shine outside. Fixtures that are installed indoors that are intended to light something outside are considered exterior lighting for the intent of this Ordinance.

Fixture: The assembly that holds the lamp in a lighting system. It includes the elements designed to give light output control, such as a reflector (mirror) or refractor (lens), the ballast, housing, and the attachment parts.

Flood Light: Light that produces up to 1800 lumens (See Addendum 1 for Light Output of Various Lamps) and is designed to "flood" a well-defined area with light. Generally, floodlights produce from 1000 to 1800 lumens.

Foot-candle: Illuminance produced on a surface one foot from a uniform point source of one candela. Measured by a light meter.

Full cutoff fixture: A fixture which, as installed, gives no emission of light above a horizontal plane.

Glare: Intense light that results in discomfort and/or a reduction of visual performance and visibility.

Holiday Lighting: Festoon type lights, limited to small individual bulbs on a string, where the output per bulb is no greater than 15 lumens.

IESNA - Illuminating Engineering Society of North America (IES or IESNA): The professional society of lighting engineers, including those from manufacturing companies, and others professionally involved in lighting.

Illuminance: Density of luminous flux incident on a surface. Unit is foot-candle or lux.

Illuminating devices:

1. Light fixture types
   a. Full cutoff fixture types - A fixture which, as installed, gives no emission of light above a horizontal plane.
   b. Floodlights and Spotlights - Fixtures defined as having a full beam width or beam spread of less then 110 degrees.
2. Lamp types
   a. Incandescent lamps - Lamps which produce light via an electrically heated metallic filament.
   b. Fluorescent lamps - Lamps that use fluorescence of a phosphor to produce visible light.
   c. High Intensity Discharge Lamps - Lamps, which produce visible light directly by the electrical heating or excitation of a gas. Examples of such lighting include, but are not limited to, Metal Halide, High Pressure Sodium, Low Pressure Sodium and Mercury Vapor. For purposes of this Ordinance, fluorescent lights are not considered HID lighting.

Lamp or Bulb: The light-producing source installed in the socket portion of a luminaire.

Light Pollution: Any adverse effect of manmade light including, but not limited to, light trespass, uplighting, the uncomfortable distraction to the eye, or any manmade light that diminishes the ability to view the night sky. Often used to denote urban sky glow.

Light trespass: Light emitted by a luminaire falls where it is not wanted or needed or shines beyond the property on which the luminaire is installed.

Lighting: Any or all parts of a luminaire that function to produce light.

Lumen: Unit of luminous flux; the flux emitted within a unit solid angle by a point source with a uniform luminous intensity of one candela. One foot-candle is one lumen per square foot. One lux is one lumen per square meter.

Luminaire: The complete lighting unit, including the lamp, the fixture, and other parts.

Luminance: At a point and in a given direction, the luminous intensity in the given direction produced by an element of the surface surrounding the point divided by the area of the projection of the element on a plane perpendicular to the given direction. Units: candelas per unit area. The luminance is the perceived brightness that we see, the visual effect of the illuminance, reflected, emitted or transmitted from a surface.

Measurement:

1. Lamp output
   a. Total output: Measurement of total output is in lumens. This should be understood to be the initial lumen value for the lamp.
   b. Illuminance: Measurements of illuminance are expressed in initial lumens per square foot. (A desktop illuminance of twenty (20) initial lumens per square foot is adequate for most purposes.)

In measuring illuminance, the light detector should be pointed directly at the light source or sources. The intervening light path should be free of obstruction.

Outdoor light fixture: An outdoor illuminating device, outdoor lighting or reflective surface, luminous tube, lamp or similar device, permanently installed or portable, used for illumination, decoration, or advertisement. Such devices shall include, but are not limited to lights used for:

A. parking lot lighting;
B. roadway lighting;
C. buildings and structures;
D. recreational areas;
E. landscape lighting;
F. billboards and other signs (advertising or other);
G. product display area lighting;
H. building or structure decoration;
I. building overhangs and open canopies.

Recessed: When a light is built into a structure or portion of a structure such that the light is fully cut-off and no part of the light extends or protrudes beyond the underside of a structure or portion of a structure.

Partially Shielded: The bulb of the fixture is shielded by a translucent siding and the bulb is not visible at all. Light may be emitted at the horizontal level of the bulb.

Shielded: When the light emitted from the fixture is projected below a horizontal plane running through the lowest point of the fixture where light is emitted. The bulb is not visible with a shielded light fixture, and no light is emitted from the sides of the fixture. Also considered a full cut-off fixture.

Spotlight or Floodlight: Any lamp that incorporates a reflector or a refractor to concentrate the light output into a directed beam in a particular direction (see definition for floodlight).

Temporary Lighting: Lighting that is intended to be used for a special event for seven (7) days or less.

Uplighting: Lighting that is directed in such a manner as to shine light rays above the horizontal plane.

15.30.020 SCOPE & APPLICABILITY

A. New Lighting. All exterior outdoor lighting installed after the effective date of this Chapter in any and all zones in the City shall conform with the requirements established by this Chapter and other applicable ordinances unless otherwise exempted. This ordinance does not apply to indoor lighting.
B. Existing Lighting. All existing lighting located on a subject property that is part of an land use application or building permit, dependent on the value of the project, shall be brought into conformance with this Ordinance. The value of the project will determined in accordance with Chapter 15.20.040 and 15.20.050. If the value exceeds the threshold in Chapter 15.20.020 and 15.20.030, all lighting on the property must be brought into full compliance before reoccupation or reuse.
C. Nonconforming Uses or Structures. If a nonconforming use or structure has been abandoned for more than twelve months all lighting on the property must be brought into full compliance before reoccupation or reuse.
D. Conformity shall occur prior to issuance of Certificate of Occupancy, Final Inspection, or Final Plat Recordation, when applicable. For other permits, the applicant shall have a maximum of thirty days from date of permit issuance to bring the lighting into conformance.
E. Preferred Source - Low-pressure Sodium (LPS) lamps are the preferred illumination source throughout the city and their use is encouraged.
F. When an existing fixture is replaced, the replacement fixture shall meet the requirements of this chapter.
G. Architectural design, site planning, landscaping and lighting may be further restricted elsewhere in the Sandy

Municipal Code.

H. All governmental agencies, federal, state or county, which operate within the city limits of Sandy - should experience no difficulty meeting the requirements of this ordinance and are encouraged by the city to comply with its provisions.

I. In the event of a conflict with any other chapter of the Sandy Municipal Code, the more stringent requirement shall apply.

15.30.030 EXEMPTIONS AND EXCEPTIONS

A. Residential fixtures consisting of lamp types of 2050 lumens and below (the acceptability of a particular light is decided by its lumen output, not wattage. Check manufacturer's specifications). Examples include:

1. 100 Watt Standard Incandescent and less
2. 100 Watt Midbreak Tungsten-Halogen (quartz) and less
3. 25 Watt T-12 Cool White Fluorescent and less
4. 18 Watt Low Pressure Sodium and less

B. Federally funded and state funded roadway construction projects, are exempted from the requirements of this division only to the extent it is necessary to comply with federal and state requirements.

C. Fossil Fuel Light. Fossil fuel light produced directly or indirectly by the combustion of natural gas or other utility-type fossil fuels is exempt from the provisions of this article.

D. Full cutoff street lighting, which is part of a federal, state, or municipal installation.

E. Holiday lighting.

F. Lighting of sports facilities or stadiums prior to 11:00 p.m. Illumination after 11:00 p.m. is also permitted if it is necessary in order to conclude a recreational, sporting or other scheduled activity, which is in progress prior to that time.

G. Specialized lighting necessary for safety, such as navigated or runway lighting of airports, or temporary lighting associated with emergency operations, road hazard warnings, etc.

H. Traffic control signals and devices.

15.30.040 APPROVED MATERIALS AND METHODS OF INSTALLATION

The provisions of this chapter are not intended to prevent the use of any design, material or method of installation or operation not specifically prohibited by this chapter, provided such alternative design, material or method conforms with the intent of this division and has been approved by the building official.

The Building Official administrator may approve an alternative design provided he finds that:

A. It complies with the applicable specific requirements of this division; or

B. It has been designed or approved by a registered professional engineer and complies with the purpose of this division.

15.30.050 SUBMITTALS

All applications for building permits or land use planning review which include installation of outdoor lighting fixtures shall include lighting plans conforming to the provisions of this Ordinance. The Planning Director and/or Building Official shall have the authority to request additional information in order to achieve the purposes of this Ordinance.

A. The submittal shall contain the following information and submitted as part of the site plan to the Planning and Building departments for approval.
   1. Plans indicating the location, type, intensity, and height of luminaries including both building and ground-mounted fixtures;
   2. A description of the luminaries, including lamps, poles or other supports and shielding devices, which may be provided as catalogue illustrations from the manufacturer;
   3. Photometric data, such as that furnished by the manufacturer, showing the angle of light emission and the foot-candles on the ground; and
   4. Additional information as may be required by the city in order to determine compliance with this Ordinance.

B. Applications for single/multi-family residential or other projects where any single outdoor light fixture exceeds (2050 lumens output) shall be required to comply with paragraph A above.

15.30.060 GENERAL STANDARDS

The following general standards shall apply to all outdoor lighting installed after the effective date of this ordinance, which is not exempted above:

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A. Area Lights: All area lights, including street lights and parking area lighting, shall be full cut-off fixtures and are encouraged to be eighty-five (85) degree full cut-off type fixtures. Street lights shall be high-pressure sodium, low-pressure sodium, or metal halide, unless otherwise determined by the city that another type is more efficient. Street lights along residential streets shall be limited to a 70-watt high-pressure sodium (hps) light. Street lights along nonresidential streets or at intersections shall be limited to 100 watts hps, except that lights at major intersections on state highways shall be limited to 200 watts hps. If the city permits a light type other than high-pressure sodium, then the equivalent output shall be the limit for the other light type.

B. Canopy Lights: All lighting shall be recessed sufficiently so as to ensure that no light source is visible from or causes glare on public rights-of-way or adjacent property.

C. Illumination Levels: Illumination levels and uniformity shall be in accordance with current recommended practices of the Illuminating Engineering Society. Recommended standards of the illuminating engineering society shall not be exceeded.

D. All outdoor lighting systems shall be designed and operated so that the area 10 feet beyond the property line of the premises receives no more than .25 (one quarter) of a foot-candle of light from the premises lighting system.

E. Temporary Lighting: Temporary lighting that conforms to the requirements of this Ordinance shall be allowed. Nonconforming temporary exterior lighting may be permitted by the Building Official only after considering 1) the public and/or private benefits which will result from the temporary lighting; 2) any annoyance or safety problems that may result from the use of the temporary lighting; and, 3) the duration of the temporary nonconforming lighting. The applicant shall submit a detailed description of the proposed temporary nonconforming lighting to the Building Official.

F. Towers: All radio, communication, and navigation towers that require lights shall have dual lighting capabilities. For daytime, the white strobe light may be used, and for nighttime, only red lights shall be used.

15.30.070 NON-PERMITTED LIGHTING

A. Newly installed fixtures, which are not full-cutoff fixtures.

B. Lighting which presents a clear hazard to motorists, cyclists, or pedestrians.

C. Laser Source Light. The use of laser source light or any similar high intensity light for outdoor advertising or entertainment is prohibited.

15.30.080 APPEALS

If an application is denied, an individual shall have the right of appeal to the City Council. The fee for an appeal shall be the same as a Type III review (Section 2-Master Fee Resolution).

15.30.090 VIOLATIONS

This section may be enforced on the basis of a formal complaint filed in writing with the city.

15.30.100 PENALTIES

See Section 1.16.010 of the Sandy Municipal Code.

15.30.110 SEVERABILITY

The provisions of this ordinance are severable and if any paragraph, section, subsection, or part of this ordinance is held to be invalid, unenforceable, unconstitutional, or inapplicable to any person or circumstance, such illegality, invalidity, unconstitutionality, or inapplicability shall not affect or impair the remainder of this ordinance.

TABLE 1: CODE REQUIREMENTS TABLES FOR SHIELDING

WATTAGE - SEE SECTION 1 BELOW

Lamp Type	25	30	35	40	50	60	75	100	110 OR MORE
LOW PRESSURE SODIUM	UNSHIELDED	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTE SHIEI
HIGH PRESSURE SODIUM	UNSHIELDED	UNSHIELDED	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTE SHIEL
METAL HALIDE	UNSHIELDED	UNSHIELDED	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTE SHIEL
FLUORESCENT	UNSHIELDED	UNSHIELDED	UNSHIELDED	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTE SHIEL
QUARTZ	UNSHIELDED	UNSHIELDED	UNSHIELDED	UNSHIELDED	UNSHIELDED	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTE SHIEL
TUNGSTEN HALOGEN	UNSHIELDED	UNSHIELDED	UNSHIELDED	UNSHIELDED	UNSHIELDED	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTE SHIEL
MERCURY VAPOR	UNSHIELDED	UNSHIELDED	UNSHIELDED	UNSHIELDED	UNSHIELDED	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTED SHIELD	DIRECTE SHIEL
INCANDESCENT	UNSHIELDED	UNSHIELDED	UNSHIELDED	UNSHIELDED	UNSHIELDED	UNSHIELDED	UNSHIELDED	UNSHIELDED	DIRECTE SHIEL

1. For the purpose of this section wattage ratings for lamp types will be for either a single lamp source or multiple lamp sources when installed in a cluster.
2. Lamp types not listed in the table may be approved for use by the building official providing installation of these lamps conforms to the lumen limits established in this section.
3. Glass tubes filled with argon, neon or krypton do not require shielding.

Table 2: TYPICAL LUMEN VALUES FOR VARIOUS LAMP WATTAGE **

WATTAGE	LOW PRESSURE SODIUM	HIGH PRESSURE SODIUM	METAL HALIDE	FLUORESCENT	QUARTZ	MERCURY VAPOR	INCANDESCENT
9				600			
18	1,800						
35	4,725	2,250					
40		4,000		2,250			480
50					1,400	1,140	480
55	7,925						
60							870
70		5,800	5,500				
75						2,800	1,190
90	14,400						
100		9,500	8,000			4,300	1,750
110				6,600			
150		16,000					2,850
175			14,000			8,600	
200		22,000					4,010
250		27,500	20,500			12,100	
300							6,360
400		50,000	36,000			22,500	
500							10,850

**** Taken from data supplied by Portland General Electric - Energy Resource Center**

Building Code | Mobile Homes | Dangerous Buildings | Moving Buildings | Curbs, Sidewalks
House Numbering | Development Fees | Dark Skies | Signs | Construction Debris
Clean Up | Lien Searches | Enforcement | Erosion Control

Appendix J - Interim Draft Comment Tracking

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EGLIN JLUS
INTERIM DRAFT COMMENT TRACKING
TETRA TECH
FEBRUARY 16, 2009

ID	Date	Source	Section	Sub-Section	Reviewer Comment	Response
1	8/22/2008	DeFuniak Springs	1	Page 1-1	Last paragraph under Program Goals and Actions: "Identify new land use regulations..." Will model regulations be provided for lighting, land use, height, etc? Small towns with limited to no budget for accomplishing these proposed regulations will have a difficult time getting this work accomplished.	Noted.
2	8/22/2008	DeFuniak Springs	1	1.1.5	Page 1-4, Section 1.1.5, 3rd paragraph "Coups" should be "Corps".	Spelling will be corrected.
3	8/22/2008	DeFuniak Springs	1	1.4.7	Page 1-11, Section 1.4.7, Last paragraph: "criterion" is singular. Do you mean "criteria" which would be multiple criterions?	Correction will be made.
4	8/22/2008	DeFuniak Springs	13	13.3.5	Page 13-12, Section 13.3.5, Radio Frequency Interference, 2nd paragraph, "city" should be "county" throughout the paragraph.	Correction will be made.
5	8/22/2008	DeFuniak Springs	14	Page 14 - 8	Implement property sales and lease disclosure....how is the city expected to implement this recommendation? If by ordinance, can you provide a model?	Noted.
6	8/22/2008	DeFuniak Springs	14	Page 14 - 8	Implement lighting ordinance....can you provide a model?	Noted.
7	8/22/2008	DeFuniak Springs	14	Page 14 - 8	Educate developers and builders on RF....do you have a suggested brochure?	Noted.
8	8/22/2008	DeFuniak Springs	14	Page 14 - 8	Implement public awareness measures...any suggestions on how to accomplish this? Any funds available for implementing?	Noted.
9	8/22/2008	DeFuniak Springs	14	Page 14 - 8	Identify cruise missile routes on maps...this we can do.	Noted.
10	8/22/2008	DeFuniak Springs	14	Page 14 - 8	Limit residential density away from cruise missile corridor... this we can do.	Noted.
11	8/22/2008	DeFuniak Springs	14	Page 14 - 8	Promote state, federal assistance with land acquisition....Would appreciate changing this recommendation to read: "Support (or promote) state and federal land acquisition in the cruise missile corridor". The City does not have the staff or the resources to pursue land acquisition nor maintain if it did acquire such lands.	Noted.
12	8/22/2008	DeFuniak Springs	14	Page 14 - 8	Implement MIA ordinance...we can do this if a model is provided.	Noted.
13	1/23/2009	Eglin AFB	General	---	Universal recommendatins that apply to the entire study area and that are not unique to the local government should be provided in a summary section in the beginning. A universal recommendation section also may make individual local govenermnts feel less singled out.	Noted.
14	1/23/2009	Eglin AFB	General	---	The Draft JLUS recommendations need to give local govenments enough guidance for implementation.	Noted.
15	1/23/2009	Eglin AFB	General	Recommendations	Implement Construction Standards. The specific construction standards to decrease noise levels in noise zones should be reference. Most Flroida Building Officails only have the authority to enforce the Florida Biuilding Code.	Noted.
16	1/23/2009	Eglin AFB	General	Recommendations	Implemnt Property Sales and Lease Disclosure. Florida Cities do not have direct involvement in real estate transactions. This comment should be directed at Countyies who have jurisdiction of the County Property Appraiser and County Clerk of the Court where real estate transactions are recorded.	Noted.

EGLIN JLUS
INTERIM DRAFT COMMENT TRACKING
TETRA TECH
FEBRUARY 16, 2009

ID	Date	Source	Section	Sub-Section	Reviewer Comment	Response
17	1/23/2009	Eglin AFB	General	Recommendations	Limit Object Heights and Implemtn MIA Ordinance. Thris recommendation could be incuded under the MIA Ordinance. More guidance should be provided to the local governments by provideding specific requirements by including a model MIA Ordinance or including an example MIA Ordinance such as the Santa Rosa County Land Development Code (SRCLDC). The SRCLDC states, "No structure or obstruction will be permitted in the inner-horizontal surface of a greater height than 150 above ariport elevation." This is a useful requirement that can be implemented with more ease than "limit object heights".	This recommendation refers to the Eglin height study which provides specific height limits.
18	1/23/2009	Eglin AFB	General	Recommendations	Implemtn Outdoor lighting Standards. Provide model language and possibly include with the MIA.	Noted.
19	1/23/2009	Eglin AFB	General	Recommendations	Doscourage increases in density and intensity within one mile of Eglin Boundary & MIA Ordiannce. This recommendation should also include a mechanism for implementation. For instance requiring that maps of the Clears Zone, Accident Potential Zones, and noise zones be included in the Comprehensive Plan Futrue Land Use Map series. Add a policy to Future Land Use Element that location in these zones will be considered when the local govnment is hearing amendments that inclrease density. In additiona in the MIA Ordinance shoul require that these zones will be delineated on siste plans that have been submitted for approval.	The intent of this recommendation is to minimize development in existing undeveloped lands surrounding Eglin's reservation.
20	1/23/2009	Eglin AFB	General	Recommendations	Educate Developers & Builders on Radio Frequency. Providing local governments with a sample handout will help them implent this recommendation.	Noted.
21	1/29/2009	Eglin AFB	General	Recommendations	General Comment. Recommend including an Executive Overview at the beginning of document to describe purpose, content and recommendations. Rationale: This will provide quick, top-level view of the JLUS without having to read entire document.	Executive Summary will be added to Draft version of report.
22	1/29/2009	Eglin AFB	General	Recommendations	General Comment: Recommend that rather than placing Section Number at the bottom of each page on the left, place it at the top left. Rationale: Clarity and ease of use while viewing document on computer screen.	Noted.
23	1/29/2009	Eglin AFB	General	Recommendations	Cultural Resources Comment. Archaeological sites, sensitive areas and historic structures should be included in resource protection and conservation measures for all land acquisition, land swap and enhanced use lease and planning activities. Rationale: Accuracy and completeness.	Noted.
24	1/29/2009	Eglin AFB	General	Recommendations	Throughout. On the first page of Sections 3, 8 & 15, the image has been designated a figure #. On the first page of Sections 2, 4-7 & 9-14, the image has NOT been given figure #. It should be consistent one way or the other. Rationale: Consistency.	Correction will be made.
25	1/29/2009	Eglin AFB	General	Recommendations	Throughout. In all but a few of the sections, the identified issue items are not listed in the same order that they are described throughout the section. Rationale: Proper formatting & Consistency.	Redistribution of Issues & Analysis to coincide in same order will be made.

EGLIN JLUS
INTERIM DRAFT COMMENT TRACKING
TETRA TECH
FEBRUARY 16, 2009

ID	Date	Source	Section	Sub-Section	Reviewer Comment	Response
26	1/29/2009	Eglin AFB	General	Recommendations	Throughout. For each issue item, there is not always a corresponding analysis item. Rationale: Consistency.	Noted.
27	1/29/2009	Eglin AFB	1	1	P. 1-2, Reference bullets under "Anticipated benefits include:" - Rewrite "Protection of future military missions at Eglin to be "Protection of current and future military missions at Eglin." Rationale: Completeness - Rewrite "Health, safety, and welfare concerns of the community Addressed" to be "Addresses community's health, safety, and welfare concerns" Rationale: Consistency	Correction will be made.
28	1/29/2009	Eglin AFB	1	1.1.1	P. 1-2, Para. 1.1.1, Units for square miles are not consistent (sq. mi. -vs- mi2). Rationale: Format consistency.	Correction will be made.
29	1/29/2009	Eglin AFB	1	1.1.2	P. 1-2, Para. 1.1.2, Units for square nautical miles are not consistent (NM2 -vs- sq. NM). Rationale: Format consistency.	Correction will be made.
30	1/29/2009	Eglin AFB	1	1.1.2	P. 1-2, Para. 1.1.2, "Eglin exercises daily air traffic control over a total of 26,901 square nautical miles (NM2), of which 9 percent (2,479 sq. NM) is over land and 91 percent (24,422 sq. NM) is over water." Modify this information to accurately reflect Eglin's profile. Rationale: Accuracy.	Correction will be made based on Eglin Profile provided by the base.
31	1/29/2009	Eglin AFB	1	1.1.3	P. 1-4, Para. 1.1.3, Second sentence, "It supports the following associate units:" Remove the work associate. Rationale: Several of the organizations included in the list (46TW and 96ABW) are not associate units.	Correction will be made.
32	1/29/2009	Eglin AFB	1	1.1.4	P. 1-4, Para. 1.1.4, Second sentence, "AAC is responsible for the development, acquisition, testing, deployment, and sustainment of all air-delivered weapons." Add "conventional" to the phrase to make it "air-delivered conventional weapons." Rationale: Accuracy.	Correction will be made.
33	1/29/2009	Eglin AFB	1	1.1.5	P. 1-4, Para. 1.1.5, Joint Strike Fighter is defined as JSF, no need to spell it out again. Check for other occurrences. Rationale: Format consistency.	Noted.
34	1/29/2009	Eglin AFB	1	1.1.5	P. 1-4, Ref. Para. 1.1.5, Properly align descriptions of 3 F-35 variants under each variant title. Rationale: Format consistency.	Correction will be made.
35	1/29/2009	Eglin AFB	1	1.1.5	P. 1-4, Para. 1.1.5, The acronym for Short Takeoff and Vertical Landing is STOVL vs. STOVAL. Update as required. Rationale: Accuracy.	Correction will be made.
36	1/29/2009	Eglin AFB	1	1.1.5	P. 1-5, Ref. first complete sentence, "Then F-35C is the Navy's first stealth aircraft." Should be rewritten to be "The F-35C is ...". Rationale: Correct typo. P. 1-5, Ref. first sentence of first complete paragraph, need space between "7th SFG(A)" and "will". Rationale: format.	Correction will be made.

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37	1/29/2009	Eglin AFB	1	1.1.5	P. 1-5, Replace second sentence of first complete para. with the following: "The last new mission to be located at Eglin AFB is the Defense Threat Reduction Agency's (DTRA) Conventional Armament Research Organization. This organization is responsible for developing, testing and fielding conventional weapons technologies for our warfighters to counter Weapons of Mass Destruction (WMD). DTRA's move from Fort Belvoir, Virginia to Eglin creates an Air Integrated Weapons and Armaments Research, Development and Acquisition, Test and Evaluation Center. " Rationale: Accuracy and completeness.	Revision will be made.
38	1/29/2009	Eglin AFB	1	1.1.5	P. 1-5, Para. 1.2.3, JLUS is spelled out in 1.1, no need to spell it out again. Check for other occurrences. Rationale: Format consistency.	Correction will be made.
39	1/29/2009	Eglin AFB	1	1.1.7	P. 1-7, Under "Base Planners," replace "John Santee" with "Marisol Reina." Under "Resources," delete Col Janice Vincent. Rationale: Accuracy.	Correction will be made.
40	1/29/2009	Eglin AFB	1	1.1.8	P. 1-8, Para. 1.3.5 Radio Frequency Spectrums, RF at Eglin includes TM as well as Communication. Update para. as required. Rationale: Accuracy.	Revision will be made.
41	1/29/2009	Eglin AFB	1	1.4.8	P. 1-10, Para. 1.4.8, add CV-22 as fleet replacement for H-53s under Hurlburt Field section. Rationale: Accuracy.	Revision will be made.
42	1/29/2009	Eglin AFB	1	1.5.2	P. 1-12, Para. 1.5.2, Remove underline in text in this paragraph. Rationale: Format.	Correction will be made.
43	1/29/2009	Eglin AFB	1	1.5.7	P. 1-13. Para. 1.5.7, Second paragraph, 1st sentence should be modified as follows, "SRI has 20 test sites, all are actively used in support of the test and training mission at Eglin." Rationale: Accuracy.	Correction will be made.
44	1/29/2009	Eglin AFB	1	1.5.5	P. 1-13, Para. 1.5.5 makes reference to Pino and Sontay Drop Zones. Need to include a map that shows these zones. Rationale: Completeness.	Noted
45	1/29/2009	Eglin AFB	1	1.5.7	P. 1-13, Para. 1.5.6, The "Cruise Missile Corridors" subsection has the number 4000 without a ",". Rationale: Proper formatting.	Correction will be made.
46	1/29/2009	Eglin AFB	1	Table 1-1	P. 1-14, Ref. Table. Need to include notes. Rationale: Clarity.	Add'l info will be added.
47	1/29/2009	Eglin AFB	1	1.6.7	P. 1-19, Para. 1.6.7, The "Cruise Missile Corridors" subsection has the number 4000 without a ",". Rationale: Proper formatting.	Correction will be made.
48	1/29/2009	Eglin AFB	1	1.7	P. 1-20, Para. 1.7, 7SFG (A) is spelled out in 1.1.5, no need to spell it out again. Check for other occurrences. Rationale: Format consistency.	Revision will be made.
49	1/29/2009	Eglin AFB	2	2.1	P. 2-1, Para, 2.1, Recommend including a paragraph about SRC's JLUS and its success in managing compatible military/community growth. Rationale: Completeness	Add'l info will be added.
50	1/29/2009	Eglin AFB	3	---	P. 3-1. Include reference to Navy and Marine STOVL flight patterns to, from and around runways. These flight patterns are different from Air Force flight patterns. Rationale: Completeness.	Correction will be made based on information provided by the base.

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51	1/29/2009	Eglin AFB	3	—	P. 3-2, "Controlled Firing Areas" listed as an issue, but not described in the subsection. Either delete the bullet identifying "controlled firing areas" as an issue or include a description. Rationale: Completeness.	Noted.
52	1/29/2009	Eglin AFB	3	3.2.5	P. 3-6, Para. 3.2.5, Fix font spacing. Rationale: Format consistency.	Correction will be made.
53	1/29/2009	Eglin AFB	3	Fig 3-5	P. 3-7 and P. 3-8, Figures on these pages are both labeled Fig. 3-5. Update Figure labels as required. Rationale: Format.	Correction will be made.
54	1/29/2009	Eglin AFB	3	3.3.2	P. 3-18, Para. 3.3.2, Fix font spacing. Rationale: Format consistency.	Correction will be made.
55	1/29/2009	Eglin AFB	6	—	P. 6-1, Para. 6.2, "Impulse Noise" identified twice as an issue, eliminate last bullet. Rationale: Eliminate redundancy.	Correction will be made.
56	1/29/2009	Eglin AFB	6	6.2	P. 6-1, Para. 6.2 identifies "Terminal Instrument Procedures" as an issue but no paragraph is included describing this as an issue. Need to delete this as an issue or include a paragraph describing it. Rationale: Completeness.	Noted.
57	1/29/2009	Eglin AFB	6	6.3.3	P. 6-11, Para. 6.3.3 makes reference to "(Table _)." Need to reference appropriate table. Rationale: Format.	Correction will be made.
58	1/29/2009	Eglin AFB	8	8.2.4	P. 8-3, Para. 8.2.4 should be labeled as 8.2.3. Rationale: Proper format.	Correction will be made.
59	1/29/2009	Eglin AFB	8	8.4	P. 8-5, Para. 8.4, identifies recommendations for "Outdoor Lighting Ordinance", however, there is no issue description or analysis description on lighting. Need to delete this as a recommendation or include an issue/analysis paragraph describing it. Rationale: Completeness.	Noted.
60	1/29/2009	Eglin AFB	10	—	P. 10-3, 1st Para, Sentence 6: Replace "has" with "as." P. 10-3, 3d Para, Sentence 2: Replace "landing" with "land."	Correction will be made.
61	1/29/2009	Eglin AFB	10	10.2.7	P. 10-7, Modify 1st sentence of Para. 10.2.7 to make a complete sentence. Rationale: Format.	Correction will be made.
62	1/29/2009	Eglin AFB	10	Table 12-1 & 10-1	P. 10-17. Rename Table 12-1 to Table 10-1. Rationale: Format.	Correction will be made.
63	1/29/2009	Eglin AFB	11	11.2	P. 11-1, Para. 11.2 identifies "Terminal Instrument Procedures" as an issue but no paragraph is included describing this as an issue. Need to delete this as an issue or include a paragraph describing it. Rationale: Completeness.	Noted.
64	1/29/2009	Eglin AFB	11	11.2.3	P. 11-5. Para. 11.2.3, paragraph 11.2.3 is missing, re-label accordingly. Rationale: Proper formatting.	Correction will be made.
65	1/29/2009	Eglin AFB	11	11.2.4	P. 11-5, Para. 11.2.4, The three paragraphs prior to the concluding paragraph discuss potential TERPS and ILS height conflicts. Concluding para states adherence to Building Height Study recommendations should be recommended to avoid conflicts with TERPS & ILS activities. (1) Shalimar is not in path of ILS and (2) Bldg Hgt Study was developed to preclude Line-of-Sight blockage of range radars. Update para. to reflect this information. Rationale: Accuracy.	Noted.
66	1/29/2009	Eglin AFB	11	11.2.5	P. 11-5, Para. 11.2.5, Para. discusses potential lighting conflicting with Army helo training. At this time, Army does not plan to conduct night helo training over Shalimar. Update this para. to reflect this information. Rationale: Accuracy.	Noted.

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67	1/29/2009	Eglin AFB	12	11.3.3	P. 12-19, Two paragraphs on this page labeled 12.3.3, need to re-label. Rationale: Proper formatting.	Correction will be made.
68	1/29/2009	Eglin AFB	13	11.2.8	P. 13-9, Para. 13.2.8, "see Section 3.6" This is an incorrect reference. Correct the reference. Rationale: Completeness.	Correction will be made.
69	1/29/2009	Eglin AFB	13	11.2.9	P. 13-9, Para. 13.2.8, The "Cruise Missile Corridors" subsection has the number 4000 without a ",". Rationale: Proper formatting.	Correction will be made.
70	1/29/2009	Eglin AFB	14	—	P. 14-1, "Eglin Perimeter Boundary Development" should be identified as an issue for Defuniak Springs. Rationale: Completeness.	Incorporated limits of the City do not touch the Eglin Boundary.
71	1/29/2009	Eglin AFB	14	—	P. 14-3, Why is there not a map similar to Figure 2-2 and 3-2 for Walton County? Rationale: Completeness	Noted.
72	1/29/2009	Eglin AFB	14	14.2.5	P. 14-4, Para. 14.2.5, "see Section 3.6" This is an incorrect reference. Correct the reference. Rationale: Completeness.	Noted.
73	1/29/2009	Eglin AFB	14	14.2.5	P. 14-4, Para. 14.2.5, The "Cruise Missile Corridors" subsection has the number 4000 without a ",". Rationale: Proper formatting.	Correction will be made.
74	1/29/2009	Eglin AFB	15	—	P. 15-1, "Eglin Perimeter Boundary Development" should be identified as an issue for Freeport. Rationale: Completeness.	Noted.
75	1/29/2009	Eglin AFB	15	15.2.5	P. 15-3, Para. 15.2.5, "see Section 3.6" This is an incorrect reference. Correct the reference. Rationale: Completeness.	Correction will be made.
76	1/29/2009	Eglin AFB	15	15.2.5	P. 15-3, Para. 15.2.5, The "Cruise Missile Corridors" subsection has the number 4000 without a ",". Rationale: Proper formatting.	Correction will be made.
77	1/29/2009	Eglin AFB	1	1.1.2	Page 1-2, para 1.1.2, list: Add "(site of Air Force Space Command phased array space surveillance radar)" after "Site C-6". Rationale: standardization and clarity.	Add'l info will be added.
78	1/29/2009	Eglin AFB	1	1.3.3, 1.3.5, 1.6, 1.8, 1.8.1	There are several sections that discuss "height of objects" and "radio frequency spectrum" (e.g., 1.3.3, 1.3.5, 1.6, 1.8, 1.8.1, , but they focus solely on their relation to flight operations and range instrumentation. There is no reference to the impact of tall objects or radio frequency transmissions on the operation of the AN/FPS-85 phased array space surveillance radar at Site C-6, or its potential impact on tall objects and other radio frequency transmissions. (The AN/FPS-85 radar has a combined output power of 32 million watts and an effective tracking range of more than 22,300 nautical miles.) Recommend adding such data to include an expanded radio frequency spectrum range to cover radar operating frequencies. Rationale: comprehensiveness.	Add'l info will be added based on information provided by Eglin.
79	1/29/2009	Eglin AFB	13, 14, and 15	—	Chapter 13, 14, and 15 cover information related to Walton County, DeFuniak Springs, and Freeport. The AN/FPS-85 phased array space surveillance radar at Site C-6 is located in Walton County, near the cities of Freeport and DeFuniak Springs. However, there is no mention of the site or the radar. (The AN/FPS-85 radar has a combined output power of 32 million watts and an effective tracking range of more than 22,300 nautical miles.) Recommend including it in these sections.	Add'l info will be added based on information provided by Eglin.
80	7/16/2008	Ft Walton Beach	7	7.4	Adjacent to Hurlburt Field is the Industrial Park which is typically considered an intense use, however, it is appropriate adjacent to Hurlburt Field, as it is compatible with the uses on Hurlburt Field.	Noted.

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81	7/16/2008	Ft Walton Beach	7	7.4	The City does not object to this recommendation, and in fact is in agreement with it. However, it should be coordinated with the Board of Realtors, Economic Development Council and the Tourist Development Council.	Noted.
82	7/16/2008	Ft Walton Beach	7	7.4	The City was the first jurisdiction within Okaloosa County to adjust its height restrictions to be in synch with the recommendations of the Military.	Noted.
83	7/16/2008	Ft Walton Beach	7	7.4	The City would request a sample ordinance that would address the concerns of the military.	A sample Lighting Ordinance can be included in Draft version of the JLUS report which could be used as a template for an ordinance drafted by the City to suit its particular needs.
84	7/16/2008	Ft Walton Beach	7	7.4	The City would provide a copy of an informational brochure/sheet/etc. provided by the military with each building permit.	Noted.
85	7/16/2008	Ft Walton Beach	7	7.4	The City would implement a public awareness campaign upon provision of such.	Noted.
86	7/16/2008	Ft Walton Beach	7	7.4	Implement Military Influence Area (MIA) Ordinance - Response: The City would review and consider a sample ordinance if provided by the military.	A sample Military Influence Area Ordinance will be included in Draft version of the JLUS report which can be used as a template by the City to draft a version suited to its own particular needs.
87	7/16/2008	Ft Walton Beach	7	7.4	Comprehensive Plan Goals - Response: The City is in the process of revising its comprehensive plan and would include any input from the military on these issues.	The JLUS can serve as one avenue of input for the military, as can the military liaison(s) appointed to the City's Local Planning Agency as required byu the Growth Management Act
88	7/16/2008	Ft Walton Beach	7	7.4	Identify Objectives to Resolving Encroach Issues - Response: The City is in the process of revising its comprehensive plan and would include any input from the military on these issues.	See response to previous comment.
89	7/16/2008	Ft Walton Beach	7	7.4	Identify Policies to Implement each Objective - Response: The City is in the process of revising its comprehensive plan and would include any input from the military on these issues.	See response to previous comment.
90	7/16/2008	Ft Walton Beach	7	7.4	In conclusion, the city has coordinated with the Military in the land development code on land use compatibility issues and heights. The city would be willing to continue to work with the military on outdoor lighting and electronic transmissions as well as other issues that are more general in nature mentioned above.	Noted.
91	7/16/2008	Ft Walton Beach	General	-	Thank you for the opportunity to review the draft which I thought was well organized and informative.	Noted.
92	7/10/2008	Santa Rosa County	1.1	1.1.2	Mentions Site C-6 but does not show it on Figure 1-1.	Figure showing Site C-6 can be added as part of Draft JLUS report.
93	7/10/2008	Santa Rosa County	1.5	1.5.2	Discussion includes Field 6, Field 1, Pino and Sontay Drop Zones, and approach routes but none are depticted on any maps	Map(s) showing locations can be added as part of Draft JLUS report.

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94	7/10/2008	Santa Rosa County	1.6	1.6.3	Military Training Routes are not depicted on any maps.	Maps such as Figure 3-10 can be added.
95	7/10/2008	Santa Rosa County	2	2.1	Jay is an incorporated Town. Bagdad, Navarre, Navarre Beach, and Pace are unincorporated communities. Note that there are a number of other uniciorporated communities in the County.	Noted.
96	7/10/2008	Santa Rosa County	2	-	Reference is made to Figure 2-20. Figure on Page 2-27 is mislabeled as Figure 2-18.	Correct label will be used.
97	7/10/2008	Santa Rosa County	2	2.2.5	Discussion states "Noise contours for Alternative 2 will be greater in the unincorporated parts of the County..." Figure 2-6 shows Alternaitive 1 with the greater impact.	Correct noise with F-35 Alternative with greatest impact on Santa Rosa County will be used.
98	7/10/2008	Santa Rosa County	2	2.3.2	Land Use/Structures in APZ not true - some land owned by JTL that is why some of the land is zoned R-1.	R-1 land is noted as vacant in the report.
99	7/10/2008	Santa Rosa County	2	2.3.3	Subsection indicates 1 SFD within the 65 db area. County records do not indicate the presence of any structures. Verify the location.	Land use description will be verified as part of the Draft JLUS report.
100	7/10/2008	Santa Rosa County	2	2.3.4	Figure 2-10 depicts the corridor over Pensacola Beach which has higher development density than Santa Rosa County. Recommend consulting Escambia County concerning the document.	Relevant information will be conveyed to Escambia County.
101	7/10/2008	Santa Rosa County	Table 1-1	-	Notes are missing.	Notes will be added.
102	7/23/2008	Santa Rosa County	2	2.4	New construction standards to decrease noise: This recommendation is consistent with the Santa Rosa County JLUS, although we have yet to implement that recommendation. Note that the recommendation addresses impact of noise within structures only and does not mitigate	Noted.
103	7/23/2008	Santa Rosa County	2	2.4	Sales & Lease Disclosures. The concept is consistent with the Santa Rosa County JLUS; however, the areas identified are too broad for the recommendation to be practical.	Noted.
104	7/23/2008	Santa Rosa County	2	2.4	Lighting Ordinance. The concept is consistent with the Santa Rosa County JLUS; however, it should be more specific with regard to areas impacted. The wording should use the term "avoid" rather than "reduction" as the JLUS draft does not identify an area where existing light levels are a problem and in need of reduction.	Noted.
105	7/23/2008	Santa Rosa County	2	2.4	Educate Developers & Builders on Radio Frequency. The local governments have no background in Radio Frequency Interference; therefore it would be incumbent on the Air Force to provide appropriate materials and/or programs. Local government PIO's might provide assistance in distribution of information. Also, based on the examples noted in the JLUS, working with providers of specific interfering (or interfered with) mechanisms, rather than with developers and builders, might be more effective.	Noted.

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106	7/23/2008	Santa Rosa County	2	2.4	Public Awareness Measures. Initially, it is unclear if this recommendation is meant to address positive or negative impacts on the region. Assuming the recommendation refers to positive economic impacts, this needs to be a joint effort with Eglin providing economic information as well as their perspective on how operations support or impact local neighborhoods.	Noted.
107	7/23/2008	Santa Rosa County	2	2.4	Identify Low Level Training AReas on County Maps and Public Records & Reports. As with other recommendations, the area referred to in this recommendation is too broad to be practical. Figure 2.5 identifies ½ of Santa Rosa County as being within Low Level Training areas. Critical Approach Areas are not clearly identified. The purpose of the recommendation should be clear so that specific types of maps can be annotated, rather than showing these areas on "all county maps or public reports". For example, Santa Rosa County already requires Military Airport Zones to be shown on preliminary plats to ensure lot layout is consistent with MAZ requirements.	Noted.
108	7/23/2008	Santa Rosa County	2	2.4	Record and Disclose Low Level Training Areas. Again, the areas referred to should be more specific. The purpose of the recommendation should be clear and consider the specific constitutional responsibilities of the agencies mentioned. Consider tasking the Eglin PIO with producing informational brochures for distribution at County Clerk and Property Appraiser offices.	Noted.
109	7/23/2008	Santa Rosa County	2	2.4	Implement Comp Plan Amendments Discouraging Boat Traffic & Facilities. The JLUS text, derived from the Eglin RAICUZ, refers specifically to possible conflicts arising from high-impact changes such as construction of a pass or installation of an artificial reef. With that in mind, this recommendation seems too restrictive.	Noted.
110	7/23/2008	Santa Rosa County	2	2.4	Limit Residential Density or Allow Clustering Away from Low Level Approach Patterns. The concept is consistent with Santa Rosa JLUS recommendations; however, the since Low Level Approach Patterns are not mapped in the Eglin JLUS, it's difficult to determine if the recommendation is appropriate in those area. Ideally, the JLUS would identify those low level approach patterns, analyze the land use patterns and ownership, and develop options for developing/restricting development for the appropriate areas.	Noted.
111	7/23/2008	Santa Rosa County	2	2.4	Land Acquisition Program. This is a good recommendation, but it's unclear why the focus in on areas around Choctaw Field.	Noted.
112	7/23/2008	Santa Rosa County	2	2.4	Access Management Agreement. This recommendation should be re-worded clarify the intent. The Interlocal Agreement referred to deals with limiting access to land-locked parcels on southwest side of Choctaw Field to avoid incompatible development.	Noted.
113	7/23/2008	Santa Rosa County	2	2.4	Conduct Small Area Study. This would be a massive undertaking as the identified LLTA covers the majority of the developed portion of Santa Rosa County. Again, the recommendation is too broad to be practical or meaningful.	Noted.

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114	7/23/2008	Santa Rosa County	2	2.4	Limit Object Heights. Santa Rosa County already limits heights within MAZ's. The recommendation should specify how and where those restrictions should be modified.	Noted.
115	7/23/2008	Santa Rosa County	2	2.4	Update Military Environs Ordinance. Our Military Environs Ordinance (LDC Article 11, Airport Environs) already includes identified MIA's. The recommendation should specify what changes are needed to protect Eglin range operations.	Noted.
116	7/23/2008	Santa Rosa County	2	2.4	Implement Comp Plan Military Influence Area Goals, Objectives, & Policies. The recommendation should specify how Santa Rosa's Comp Plan policies related to military encroachment should be modified to protect Eglin range operations.	Noted.
117	7/23/2008	Santa Rosa County	2	2.4	The draft utilizes the least impacting alternative from the BRAC EIS for noise impacts of the Joint Strike Fighter. Staff recommends using the most impacting alternative for planning purposes.	Noted.
118	7/23/2008	Santa Rosa County	2	2.4	The draft does not address the specific request from the Eglin AFB Mission Enhancement Committee related to adoption of an MAZ for the northwest portion of restricted airspace R2915A (letter from Bob Arnold; December 19, 2007)	Noted.
119	7/10/2008	Valparaiso	Not Provided	Not Provided	In accordance with the Sunshine Laws of the State of Florida, the Valparaiso City Commission will convene a public meeting to discuss the contents of the JLUS interim draft report and solicit feedback from our citizens who are all affected by these BRAC actions. Based upon the decision and concerns resulting from the meeting, the City of Caplaraiso will prepare written comments. The City will provide the comments to the Okaloosa County JLUS Program Manager, and appropriate Goverment and legislative officials and organizations.	Noted.
120	7/10/2008	Valparaiso	Not Provided	Not Provided	City Officials take exception to the fact that no similar Section on issues, analysis and recommendations of Eglin AFB mission activities on the City of Valparaiso or other areas in the three counties was included in this document. We were told by the JLUS Program Manager and the contractor, Tetra Tech, that a section on Eglin AFB responsibilities and mitigations would be included in this document.	The Eglin section will be added to Draft version of the JLUS report.
121	7/10/2008	Valparaiso	Not Provided	Not Provided	DoD is bringing about these issues on our community and in particular on our city, based upon the change of the mission at Eglin AFB.	The purpose of the JLUS is to provide the military an avenue to inform local governments of their plans and missions so affected local governments can ensure their land use plans and regulations do not result in conflicts with militay operations. A JLUS cannot undo the Federal legislation that brings the F-35, Special Forces, and other operations to Eglin Air Force Base.

ID	Date	Source	Section	Sub-Section	Reviewer Comment	Response
122	7/10/2008	Valparaiso	Not Provided	Not Provided	The report implies that it is the responsibility of the City to provide the money and effort to start programs and obtain grants to mitigate the issues, rather than have Eglin AFB/ASAF to mitigate the problems that this mission change is causing our communities!	JLUS recommendations are typically the responsibility of the local community to adopt and implement. The same holds true for the Eglin JLUS. Funding to implement the recommendations is not implied to be solely from the affected jurisdiction. Some of the recommendations in the Eglin JLUS address securing funding from outside sources. However, those sources normally require local affected jurisdictions to take a substantive role in the process.
123	7/10/2008	Valparaiso	Not Provided	Not Provided	Eglin AFB/USAF needs to specify a sound mitigation plan that includes what property they are willing to purchase, whether they will make available Eglin Properties in Valparaiso and other communities for trade, and the grants the Government will pursue to offset the effects to the citizen (moving of households, sale of property, soundproofing of buildings, cost of modifying lighting/limitations of lighting, cost of mitigating radio frequency issues (cable, internet, businesses, homeowners), inability to participate in outdoor activities).	The JLUS recommendations include the creation of both Property Acquisition and Sound Attenuation programs. The specifics are best left to local community leaders to determine the best courses of action in creating programs that best benefit that community. This forms the basis for discussions and negotiations with Eglin AFB to determine their role in these new initiatives.
124	7/10/2008	Valparaiso	Not Provided	Not Provided	The quality of living will be severely diminished by the noise anticipated in our City.	This comment would be more effective directed at the on-going EIS which is specifically intended to identify issues such as this. The JLUS can include a statement refecting the City's position.
125	7/10/2008	Valparaiso	Not Provided	Not Provided	An example of a Letter of Special Use Agreement between Kirkland AFB and the City of Albuquerque to abate noise in Albuquerque, NM was provided in the report; however, we request a specific solution for Valparaiso and Eglin AFB.	It is premature to identify specific elements of Special Use Agreement at this time since the USAF is currently developing the F-35 program and can not committ to any special use provisions until program is finalized and tested. We will assume City concurs with developing a Special Use Agreement.
126	7/10/2008	Valparaiso	Not Provided	Not Provided	Some of the proposed recommendations are unrealistic.	Notwithstanding, it is important the JLUS present as many options as possible; what may seem unrealistic at the present can be feasible as economic, social or other circumstances change.

EGLIN JLUS
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TETRA TECH
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ID	Date	Source	Section	Sub-Section	Reviewer Comment	Response
127	7/10/2008	Valparaiso	Not Provided	Not Provided	The redevelopment plan to transfer development rights from the APZ areas to Plat 1 is unthinkable. Plat 1 consists of historic homes as well as our historic district. The redevelopment plan would totally change the character of our city by creating high density development. Since there exists little undeveloped land in Plat 1 this solution would require the purchase of existing dwellings and the razing and rebuilding of multi-family units on these properties. The city recently conducted a visioning process and the overwhelming response was to maintain the small town atmosphere. The proposed redevelopment plan is a complete contradiction to the desire of its citizens.	The redevelopment and revitalization of historic downtowns with mixed uses as proposed in the Interim Draft JLUS is occurring across the United States. The history and location of the area identified for redevelopment are ideal to increase property values, solidify the City's tax base, reestablish a once vibrant downtown area, and create Valparaiso as a destination not only the community but the region can be proud of.
128	7/10/2008	Valparaiso	Not Provided	Not Provided	The proposed program to retrofit private properties with sound attenuation puts the burden on the city. Why should it be the city's responsibility to find funding and provide staff to implement this program? Shouldn't Eglin be responsible? In addition, the program only addresses indoor noise. The noise contours are totally unacceptable for Valparaiso and limit not just in-home habitation, but outdoor activities which are the reason most people live in this area. The JLUS draft needs to address this issue.	A funding source for this program is addressed and identified in the recommendation. The noise contours are noted as an EIS-related item.
129	7/10/2008	Valparaiso	Not Provided	Not Provided	Implementing new construction standards for new construction is not the City's responsibility. The city has adopted the Florida Building Code. The recommendation should put the burden on the State to amend the Florida Building Code.	The City has the authority to require development standards above what the State requires. By adopting this recommendation, the City can dictate how they prefer to implement either through City Ordinance or through the State.
130	7/10/2008	Valparaiso	Not Provided	Not Provided	In regard to the real estate disclosure, again the city is not responsible. Valparaiso has no regulatory authority over the real estate industry. Nor does the city have the staff or resources to monitor the real estate industry. The recommendation should put the burden on the State to appropriately require disclosures.	idea of implementing disclosure requirements, though there is disagreement on how it can be achieved. Additional information on how to implement can be provided in the Draft version of the JLUS.
131	7/10/2008	Valparaiso	Not Provided	Not Provided	Valparaiso will gladly hand out literature to developers on radio frequency, provided that Eglin AFB prepares and produces the literature. It is not the responsibility of Valparaiso to produce the literature nor should it be our financial burden	With the understanding that the issue of funding needs to be worked out, it is assumed the City concurs with this recommendation.

ID	Date	Source	Section	Sub-Section	Reviewer Comment	Response
132	7/10/2008	Valparaiso	Not Provided	Not Provided	We have been told by Okaloosa County JLUS Officials and the contractor, Tetra Tech, that the JLUS would be a community effort – community including affected the Counties, Cities, as well as Eglin AFB 0 and issues would be identified and mitigation solutions recommended. However, no separate chapter on the Eglin AFB mission implications on local communities was included in this report	The Eglin section will be added to Draft version of the JLUS report.
133	7/10/2008	Valparaiso	Not Provided	Not Provided	issues and concerns and the severity of the impact of the F-35 missions to our community have been minimized in this report. When this process began we expressed our concerns about the lack of certain data in the study. We then submitted a grant application for a JLUS Phase 2. At that point, the county, consultant, and OEA representative assured us that everything in our application could be included in the current JLUS. The only thing we see different in this interim report is the F-35 noise data. Our city will again revisit a JLUS Phase 2	Impact of all of the missions at Eglin have been identified in the JLUS, not minimized.
134	7/10/2008	Valparaiso	Not Provided	Not Provided	Valparaiso City Officials are extremely disappointed with the interim draft JLUS report and do not accept the recommendations included within Section 12 for Valparaiso. The City will has no intention of accepting any JLUS recommendations until the USAF/Eglin AFB participates in the mitigation discussions, accepts responsibility for issues affecting the cities due to mission changes, and provides mitigation solutions to the issues which should be included in a separate section of the JLUS report	The City's concerns are noted; however, this JLUS cannot obligate the Air Force (or the US Congress which adopted the BRAC legislation) to any financial commitments. The JLUS Report will be an effective tool to foster continued dialogue between the City and Eglin AFB and form the basis of long-term strategies for solving the impacts of the new F-35 mission. Disassociating itself from the study would provide a potential disservice to the residents of Valparaiso as diminishing the possible effectiveness of this study due to a lack of staff or City leadership participation.

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ID	Date	Source	Section	Sub-Section	Reviewer Comment	Response
135	7/10/2008	Valparaiso	Not Provided	Not Provided	It is a concern of the City of Valparaiso that the timeframe for completion of the JLUS is too short to do a thorough investigation of issues and possible remedies, and put a plan together and in place. The Study needs to be extended until after the BRAC EIS is complete. It appears that the Eglin AFB wants to get feedback from the cities/communities/county before they address specific mitigation issues in the EIS and it appears that the County and its consultants are complying with Eglin at the expense of the cities/communities/county	The JLUS will not over-ride the EIS, nor will the EIS over-ride the JLUS. If anything, having a JLUS recognizing the issues associated with the BRAC changes will add weight to any similar issues raised in the EIS. This JLUS should be viewed as a proactive opportunity to identify and address potential impacts, not as an ending point after which all discussions will cease. It should be used as a tool to approach policy makers and our fiscal stewards to provide funding or whatever measures are necessary to make the Air Force's transition to the F-35 as painless as possible for surroundiong communities.
136	7/10/2008	Valparaiso	Not Provided	Not Provided	The operative word in JLUS is joint. This study is flawed and unacceptable to Valparaiso. When Eglin becomes part of this study, Valparaiso will give consideration to the recommendations	Noted.
137	2/12/2009	Walton County	13	13.1	Replace "Include" with "are" and replace "are" with "include"	Correction will be made.
138	2/12/2009	Walton County	13	13.2.3	By how much? Are the flight levels to be moved upward. Recommended density limits?	Noted.
139	2/12/2009	Walton County	13	13.2.4	Lower? Refering to population densities underneath the low level MTRs. Can we get GIS maps to use in overlays?	Noted.
140	2/12/2009	Walton County	13	13.2.5	Check Rec's with lighting ordinance	Noted.
141	2/12/2009	Walton County	13	13.2.6	Does the county have authority and ability to do this?	Noted.
142	2/12/2009	Walton County	13	13.2.8	Add limit for tall structures. E.g. cell towers anr or wind turbines.	Noted.
143	2/12/2009	Walton County	13	13.3.5	Change "city" to "County"	Correction will be made.
144	2/12/2009	Walton County	13	13.2.8	How Low? Referring to Pop. Density in criuse missle corridor. "No density increase in zone above ___units per acre.	Noted.
145	2/12/2009	Walton County	13	13.4	"Done" referring to lighting ordinance implementation. "info?" educating developers about radio interference. Provide "info" for public awareness measures.	Noted.
146	2/12/2009	Walton County	13	13.4	"Done" referring to lighting ordinance bullet item under the MIA ordinance.	Noted.