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Comprehensive Plan Supplement: Fort Hood and Military Land Use Compatibility



BENCHMARK

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I. Introduction

Fort Hood is the largest active-duty installation in the United States; one of three enduring US Army installations (the others being Fort Bragg and Joint Base Lewis McChord (Fort Lewis)); and a force structure and infrastructure priority for the Department of Defense and Headquarters, Department of the Army. Fort Hood is the largest employer in the State of Texas, with over 55,000 direct jobs and an additional 150,000 indirect jobs associated with the installation (Texas Comptroller 2018). The installation also contributed \$24.6 billion in GDP to the Texas economy in 2017, per the most recent economic impact study prepared by the Texas Comptroller of Public Accounts.

Fort Hood's growth over the past 60-years resulted in a corresponding population surge in the region (the Killeen-Temple-Fort Hood Metropolitan Statistical Area (MSA)). The 1960 US Census reflected an MSA population of 118,058. This increased to over 405,000 residents in the 2010 Census – a 243% increase over a 50-year period, with growth occurring in every direction around Fort Hood. Geographically situated in central Texas along the I-35 and I-14 corridors, Fort Hood is situated in two counties (Bell and Coryell), and has seven cities within close proximity to the installation boundary (Killeen, Temple, Copperas Cove, Harker Heights, Belton, Gatesville, Nolanville and Morgan's Point Resort).

The population growth that has accompanied the expansion of the military footprint at Fort Hood has led to a significant expansion of the urbanized area around the installation, with a nearly continuous stretch of cities and their extraterritorial jurisdictions (ETJs) now occupying the southern and eastern boundaries of Fort Hood from Copperas Cove in the west to Temple in the east. This urban growth, in turn, has added pressure to the installation as it seeks to sustain its training, testing and power projection missions in the face of future challenges related to encroachment from urban development that is potentially incompatible with the external impacts of its missions. Figure 1 on the following page, taken from the 2016 Fort Hood Joint Land Use Study, demonstrates the degree of urbanization around the installation as represented by census tract level population density at the time of the 2010 Census.

Recognizing the emerging challenge to the long term sustainability of its missions, US Army Garrison Fort Hood nominated itself for participation in the Joint Land Use Study (JLUS) program sponsored by the DOD's Office of Economic Adjustment (OEA). With the City of Killeen as the local grant sponsor, the communities around Fort Hood joined with the installation in a year-long process, beginning in December 2015, to evaluate growth patterns, areas of encroachment concern, and community plans and ordinances with the goal of developing strategic guidance for the civilian communities and Fort Hood to utilize as they continue to work together to foster compatible growth.

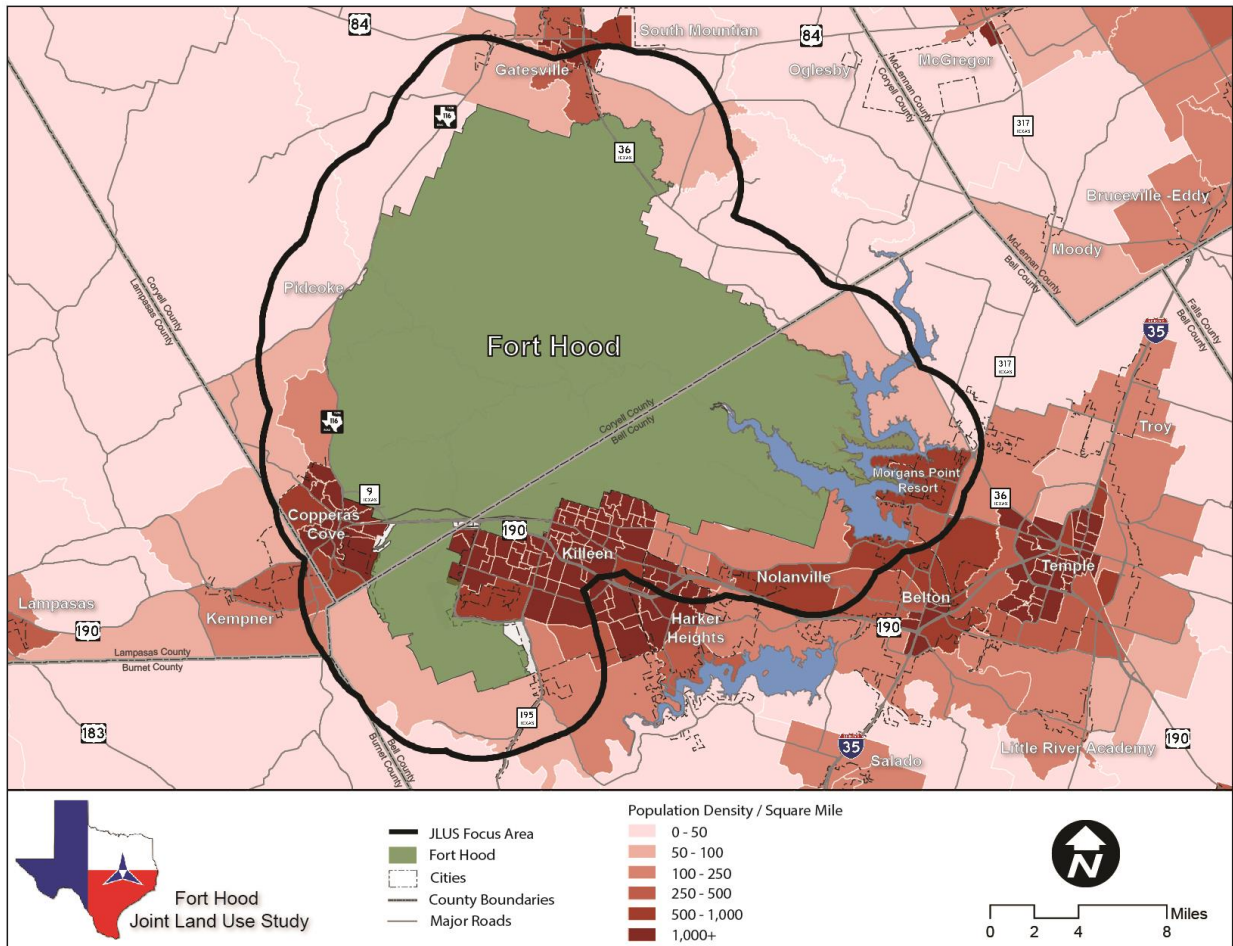


Figure 1: Population Density in the Fort Hood Region – 2010

When the JLUS process concluded in December 2016, the study partners had identified a total of 34 recommendations for the participating communities and Fort Hood to consider for further implementation. The recommendations focused on three primary areas: Regional Coordination, Planning for Compatible Growth, and Regulations to Support Compatible Growth. Several additional recommendations which did not fit in the three primary categories were included as well in a set of supplemental recommendations.

Following the conclusion of the study, the Central Texas Council of Governments (CTCOG) took the lead role in moving the recommendations forward into an implementation phase (JLUS-I), with the regional partners continuing their roles in the process through the previously established JLUS Policy and Technical Committees. CTCOG sought and received supplemental grant funding from OEA to work towards the JLUS recommendations that were viewed by the Department of Defense as the most critical to be implemented over the short-term. Among these high priority implementation strategies was the recommendation that local

governments should prepare updates to their comprehensive plans to incorporate information regarding areas of encroachment concern and amend their land use ordinances to include compatible growth policies identified in the JLUS.

As the implementation phase moved forward, it was determined that the most appropriate method of achieving the comprehensive plan updates was to provide standalone documents to each of the jurisdictions; focusing on encroachment concerns and compatible growth strategies that are locally applicable. To that end, this document is intended to provide the City of Copperas Cove with locally relevant information regarding these matters, along with a set of recommendations for the City to consider as it moves forward with its regional partners in implementing the JLUS and supporting the sustainability and viability of Fort Hood and its missions. This document and its companions that were prepared for the other jurisdictions in the region are intended as an intermediate source of information to supplement existing planning documents. Over the longer term, it is intended that the information and recommendations contained in the supplement be fully incorporated into future updates to local plans and help to inform each community's (and ultimately the region's) compatible growth strategy.

II. Fort Hood

A. Historical Context

In the earliest days of World War II, the United States Army needed wide-open space to organize a Tank Destroyer Testing and Training Center, and in 1942 chose 108,000 acres near Killeen, Texas to establish Camp Hood. Almost immediately, the Army expanded Camp Hood's mission to include a replacement and basic training center at North Camp Hood near Gatesville. As many as 100,000 Soldiers trained simultaneously at Camp Hood during the war.

In 1950, Camp Hood became a permanent installation and was renamed Fort Hood. In 1953, the post expanded to 207,557 acres, nearly doubling in size, and in the same year the Air Force turned over control of Killeen Base/Robert Gray Air Force Base to the Army. Fort Hood's current boundaries have remained essentially the same since this 1953 expansion.

B. Fort Hood Today

Today, Fort Hood is home to the III US Armored Corps Headquarters; the 1st Cavalry Division (consisting of a Headquarters, three Armored Brigade Combat Teams (ABCTs), Division Artillery, Combat Aviation Brigade, and Sustainment Brigade); the 3rd Cavalry Regiment; 1st Army-Division West (consisting of a Headquarters and the 120th Infantry Brigade which train mobilized Reserve Component forces at North Ft Hood); seven III Corps Separate Brigades (Medical, Signal, Engineer, Civil Affairs, Air Defense, Military Police, Chemical); the 13th

Sustainment Command (Expeditionary); the Army’s Operational Test Command, and the United States Air Force (USAF) 3rd Air Support Operations Group – which is the largest contingent of Airmen assigned to an installation other than an Air Force base.

C. Training, Testing and Power Projection Assets

Fort Hood encompasses 218,823 acres (342 square miles), with 87 live-fire ranges and maneuver training areas comprising 196,791 total acres – a land area capable of supporting brigade-sized maneuvers (see Figure 2, below. The installation also hosts the largest concentration of armored and mechanized combat capabilities in the United States Army, with three Armored Brigade Combat Teams (ABCTs) and one Stryker Brigade Combat Team (SBCT) assigned – currently the only Army installation with four assigned BCTs. During simultaneous operations in Iraq and Afghanistan, Fort Hood’s assigned strength surged to nearly 54,000 Soldiers and demonstrated its significant training and power projection capabilities.

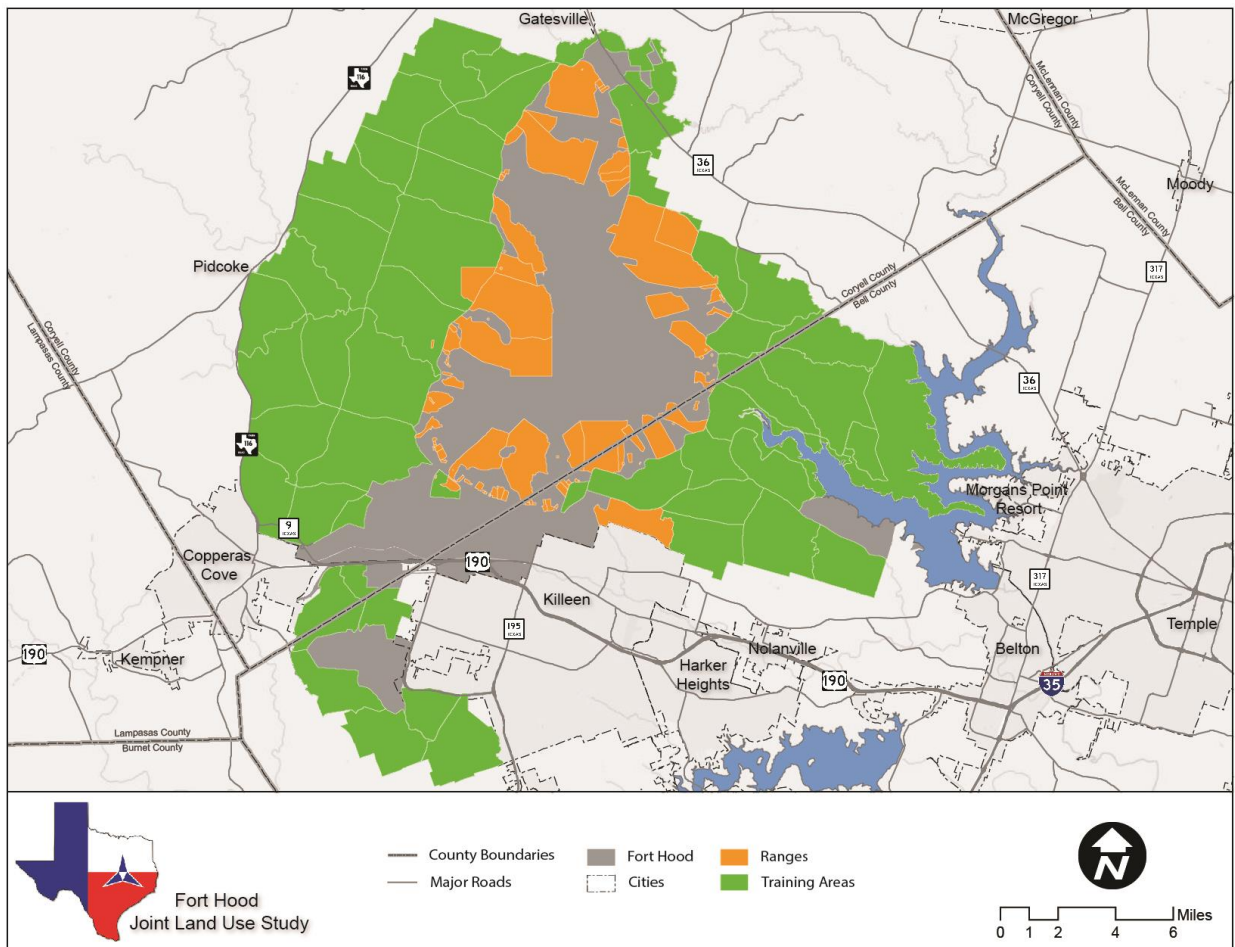


Figure 2: Fort Hood Ranges and Maneuver Training Area

Through cooperative agreements with ranchers and landowners, Fort Hood has training access to over 15,000 square miles of airspace in the Western Training Area (WTA) which extends over 150 miles to the west of the installation (see Figure 3, from the JLUS, below). American and NATO forces routinely deploy rotary and fixed wing aircraft, as well as unmanned aerial systems (UAS), to the WTA and are able to train at doctrinal depths and distances.

Until 2015, the 21st Cavalry Aviation Brigade conducted AH-64 Apache transition unit training at Fort Hood and in the WTA for all aviation units in the Army, as well as numerous allied nations who have purchased the Apache helicopter. Units leveraged this critical training space extensively and today it continues to provide critical capability for realistic training for both AH64 transition units and combined arms live fire exercises employing a myriad of UAS platforms. Other aviation training assets at Fort Hood include Hood Army Airfield, which is home to the 1st Cavalry Division’s Combat Aviation Brigade, and the Longhorn and Shorthorn airstrips, which accommodate rotary wing and UAS training activities at North Fort Hood.

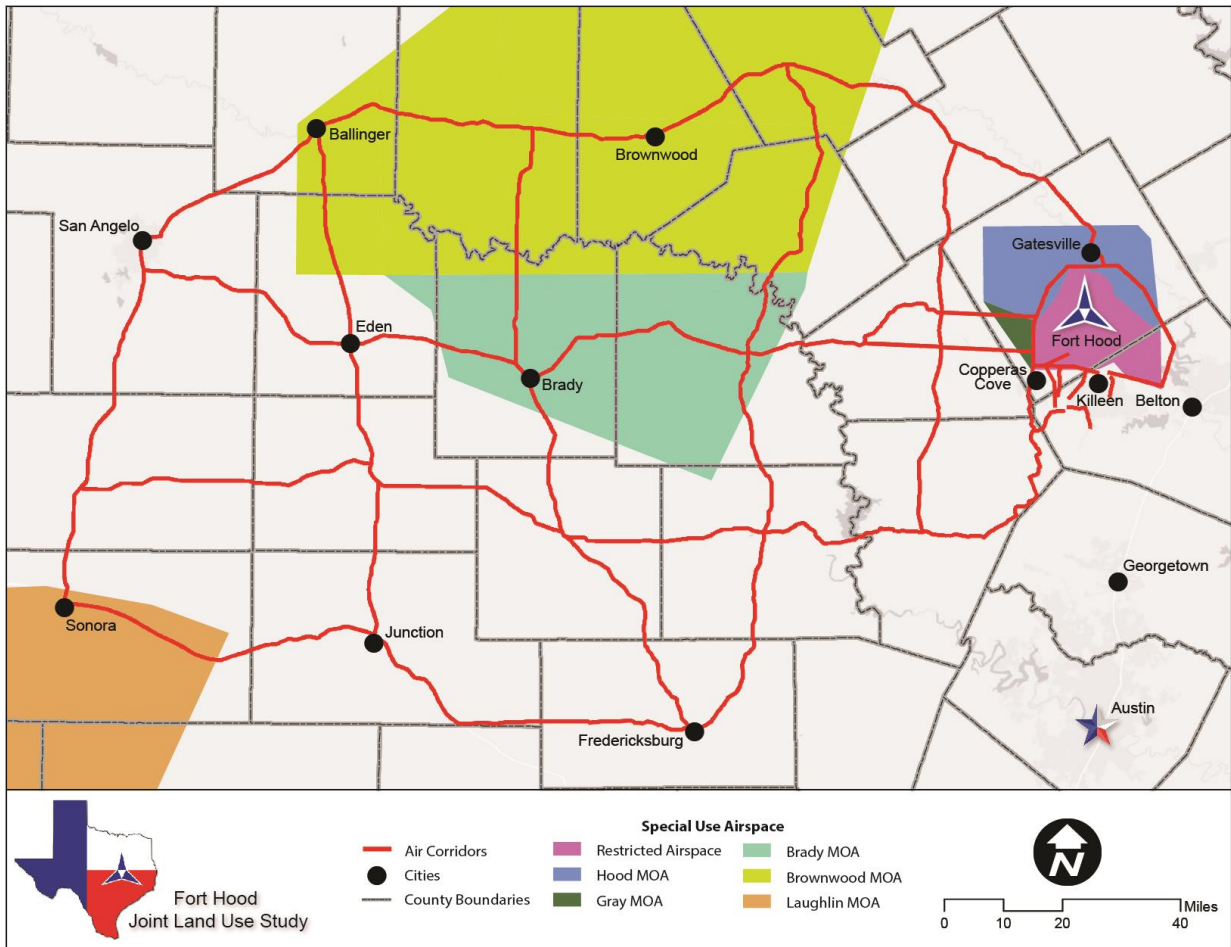


Figure 3: Western Training Area (Aviation)

Fort Hood's railroad operations complex is equipped with 12 loading spurs (capable of staging 600 cars and loading 240 cars per day) and is only a one-day transit time to the Gulf Coast ports of Beaumont and Corpus Christi. The Aerial Port of Embarkation (APoE) at Robert Gray Army Airfield (RGAAF) shares a 10,000-foot instrumented runway with the K-FHRA and consists of parking space for 11 wide-body aircraft, a 900-Soldier passenger terminal and modern crash-fire-rescue facilities.

Fort Hood is one of two Army installations that support pre and post-mobilization of Reserve Component units from across the United States. Since September 2001, nearly 125,000 Army National Guard and Reserve Soldiers have trained at North Fort Hood prior to deploying for operational missions. An enduring mission, plans are in place for continued modernization and growth at North Fort Hood to accommodate future mobilization requirements to meet the needs of the demands of the Army.

One of the Army's largest Mission Command Training Complexes (MCTC) is located at Fort Hood, with an additional \$52 million military construction project for a new Mission Training Command (MTC) facility approved, with construction beginning in FY17.

Carl R. Darnall Army Medical Center (CRDAMC) was completed and opened in April 2016 and provides over 1 million square feet of space to provide full medical support and care for active duty and retired Soldiers and families across the central Texas region.

D. Future Missions

Prior to 2009, Fort Hood was the only Army installation with two assigned Heavy Divisions – the 1st Cavalry Division and the 4th Infantry Division. As a result of Base Realignment and Closure Commission (BRAC) recommendations in 2005, the 4th Infantry Division relocated to Fort Carson, Colorado and the 3rd Armored Cavalry Regiment (now the 3rd Cavalry Regiment) relocated from Fort Carson to Ft Hood. These moves provided Fort Hood the facilities to accommodate a surge of up to an additional 15,000 Soldiers, including another heavy or light infantry brigade, an additional combat aviation brigade, combat support and combat service support enablers, and a division headquarters.

In addition to the capacity of the installation to meet basing requirements for potential future changes in the size or location of the force, Fort Hood is continually evaluating its capacity to meet additional training, testing and power projection missions. Recent examples include the relocation of an Air Defense Artillery brigade from Fort Bliss to Fort Hood and the ongoing growth of the installation's UAS mission. Looking further into the future, Fort Hood has developed plans for the addition of a second runway at Robert Gray Army Airfield, which could theoretically lead to the basing of an Air Force wing at the expanded airfield. Fort Hood is also currently exploring opportunities to expand its intermodal (truck/rail) capabilities in support of its power projection mission through a potential partnership with local governments and economic development entities in the region.

Regardless of the specific missions that Fort Hood will be tasked to fulfill in the future, change is inevitable, as the region has experienced first-hand through nearly 80 years of transformation of Fort Hood from an isolated training base into the premier military asset that it is today. With changes in missions, weapons systems, training doctrine, force strength, and the types of units assigned to the installation there will be changes in the nature and extent of land use compatibility concerns. While this document, and the recently completed JLUS, provide insight into current conditions, it will be important for Fort Hood and its host communities to work together to address emerging compatible growth and encroachment issues as these inevitable changes occur.

III. Current Encroachment Concerns

This section of the report details the locally relevant types and spatial extent of encroachment concerns that the City of Copperas Cove is encouraged to consider as it develops and implements plans and policies related to land use, infrastructure, annexation, and other matters that influence land use compatibility around Fort Hood. At the present time, aviation training and operations in the airspace above the city and its ETJ, as well as the general proximity of urban growth in the city and its environs to Fort Hood's maneuver training areas are the primary encroachment concerns present in the city. These are not unique to Copperas Cove, as most of the other jurisdictions around the installation face similar land use compatibility issues. In each case, the local government has the final decision-making authority as to whether and to what extent it will address these encroachment concerns, and the timeframe in which it chooses to do so, if determined necessary.

The Joint Land Use Study, and follow-on research conducted during the JLUS implementation process relied on data and reports provided by Fort Hood to define areas of encroachment concern in the civilian communities around the installation. Due to the ongoing evolution of Fort Hood's mission, training requirements and operational tempo, there are differences in the data presented in the JLUS and the information later used in the implementation process, particularly with regard to noise contours, which Fort Hood recently updated (2017 Fort Hood Installation Compatible Use Zone Study). Noting this reinforces the necessity of maintaining constant vigilance to ensure that future updates to areas of encroachment concern are identified and noted in each community.

Following this section, additional information regarding potential future encroachment concerns is provided in Section IV. This is followed by a discussion of the tools that can be used to address encroachment concerns in Section V. The final section of the report contains recommendations that the city can consider implementing in support of the JLUS.

A. Installation Boundary Zone

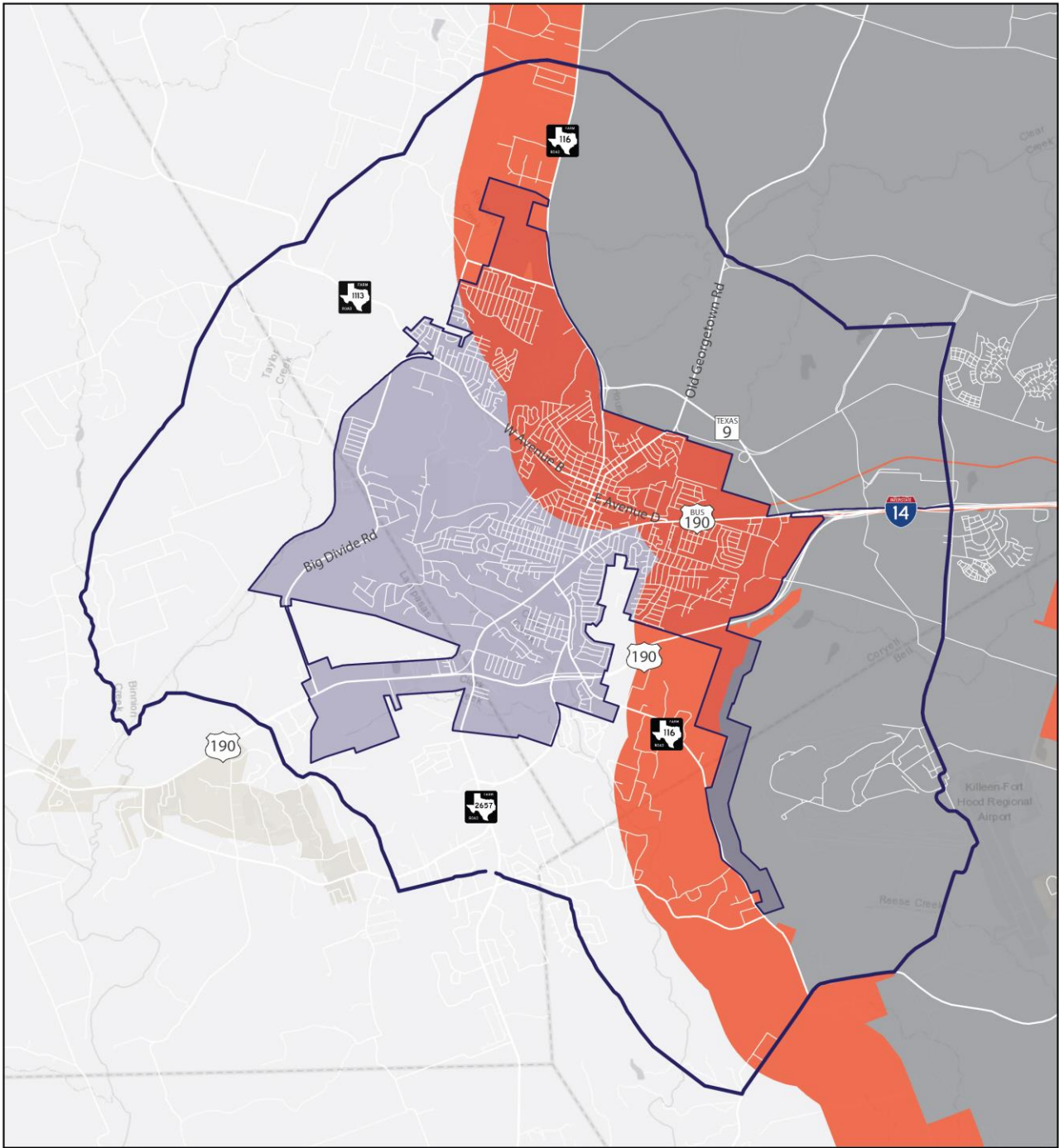
Urban development of any kind, while not inherently incompatible, can pose encroachment challenges when located in close proximity to the external boundary of Fort Hood, particularly in areas that are adjacent to maneuver training areas, firing ranges, aviation facilities, and similar training and operational infrastructure. Specifically, proximity to military training activities can bring exposure to noise, dust, smoke, and other types of military training impacts which can be incompatible with urban development, particularly residential development. The proximity of urbanized areas to training infrastructure brings concentrations of population, night lighting, traffic congestion, tall structures, such as cellular towers, and similar features of urban growth into areas that were formerly used for farming, ranching and similar uses that are generally compatible with military training. When encroachment by urban development into these areas occurs, it can constrain the ability of the installation to conduct training in the manner and to the extent necessary to meet military needs.

In order to guard against incompatible urban encroachment into sensitive areas adjacent to the installation boundary where well defined areas of encroachment concern, such as noise contours, low level flight corridors, aircraft accident

potential zones, and similar features are not present, the JLUS implementation process established an area (1 mile from the installation boundary – see Figure 4) where enhanced coordination is recommended between the civilian communities and Fort Hood. Many of these areas that are adjacent to the installation boundary are already urbanized, particularly along the southern boundary of Fort Hood, but a significant amount of Fort Hood’s western, northern and eastern boundary areas remain rural and undeveloped. Maintaining compatibility by limiting urban encroachment into these remaining rural and undeveloped portions of the installation boundary area will be critical to ensuring the long-term viability of Fort Hood’s training mission.

While heightened awareness about the consequences of incompatible urban encroachment in these areas is necessary, and close coordination with Fort Hood is encouraged to ensure that local government decisions related to zoning, subdivision activity, infrastructure improvements, annexation and similar actions that can lead to incompatible growth, it does not mean that these areas should be excluded entirely from community growth plans. The existing urbanized portions of Fort Hood’s external boundary area, for example, are for the most part compatible with the activities taking place on the installation since they tend to be adjacent to the main post / cantonment area, where few heavy training activities take place. Notable exceptions to this include the area around Robert Gray Army Airfield and Hood Army Airfield, which each have significant areas of encroachment concern which are addressed separately in this report.

Even in these generally compatible urbanized areas, however, it is recommended that ongoing coordination and consultation with Fort Hood take place to ensure that local government plans and policies align with the installation’s emerging training needs, and other issues, such as transportation, force protection (security) concerns, and similar matters are taken into consideration during the development and implementation of local plans. The expansion of urban development into currently undeveloped portions of the installation boundary area can also be compatible if the uses are of such a nature as to not pose an encroachment challenge, such as light industry, commercial development, and similar uses, when they are sited and developed in a manner that is compatible with military training activities. Limiting further urban development into areas that pose encroachment challenges, however, will always be the safest course of action.



Installation Boundary Zone



0 0.5 1 2 Miles

- Copperas Cove City Limits
- Copperas Cove ETJ
- Fort Hood
- Boundary Zone

Figure 4: Fort Hood Installation Boundary Zone

With specific regard to the City of Copperas Cove, the greatest challenge presented within the installation boundary zone area is the ongoing growth northward of the current city limits along FM 116. These areas are adjacent to Fort Hood's primary heavy maneuver training area, which, as mentioned previously, can host brigade-sized training exercises for armored and mechanized units, including combined arms training which adds aviation, artillery, and other supporting forces to the exercise. For a period of almost 15 years beginning in 2002, these areas were used less frequently for large scale training exercises due to the Army's pivot toward counterinsurgency warfare and training for low intensity conflicts, such as the wars in Afghanistan and Iraq. With the drawing down of these conflicts, however, Fort Hood's units have transitioned back toward their traditional training activities, focusing on preparing for large scale conflicts employing the full spectrum of combat capabilities.

The reemergence of intensive training activity has occurred following a period of significant growth for the city, including growth northward along the FM 116 corridor. While the degree of urbanization in close proximity to these critical maneuver training areas does not yet pose a significant encroachment threat, ongoing growth north of the city could begin to constrain certain types of training in the future. While it is also understood that the city has a limited degree of control over land use in its ETJ, other factors within its control, such as utility extensions and annexation, can be used to direct and shape growth in these areas, if necessary, to maintain a more compatible environment in the future. To that end, close coordination with Fort Hood when developing land use and infrastructure plans for the FM 116 corridor, in particular, is encouraged.

B. Low Level Flight Corridors

Fort Hood is the home to a significant amount of rotary wing (helicopter) aviation training activity, including by the 1st Cavalry Division's Combat Aviation Brigade, as well as Reserve Component, and allied aviation units which regularly train on and around the installation. To facilitate low level aviation traffic to, from, and around the installation, Fort Hood has established low level flight corridors (known as the Corridor Air Route Structure), with flight altitudes ranging from 500 – 1,000 feet above ground level. Within these aviation corridors, frequent aircraft overflights can be expected during both day and nighttime hours. While these routes were established to generally avoid urbanized areas, growth in the region over the years has led to portions of these routes now being located over areas that are now developed at urban densities.

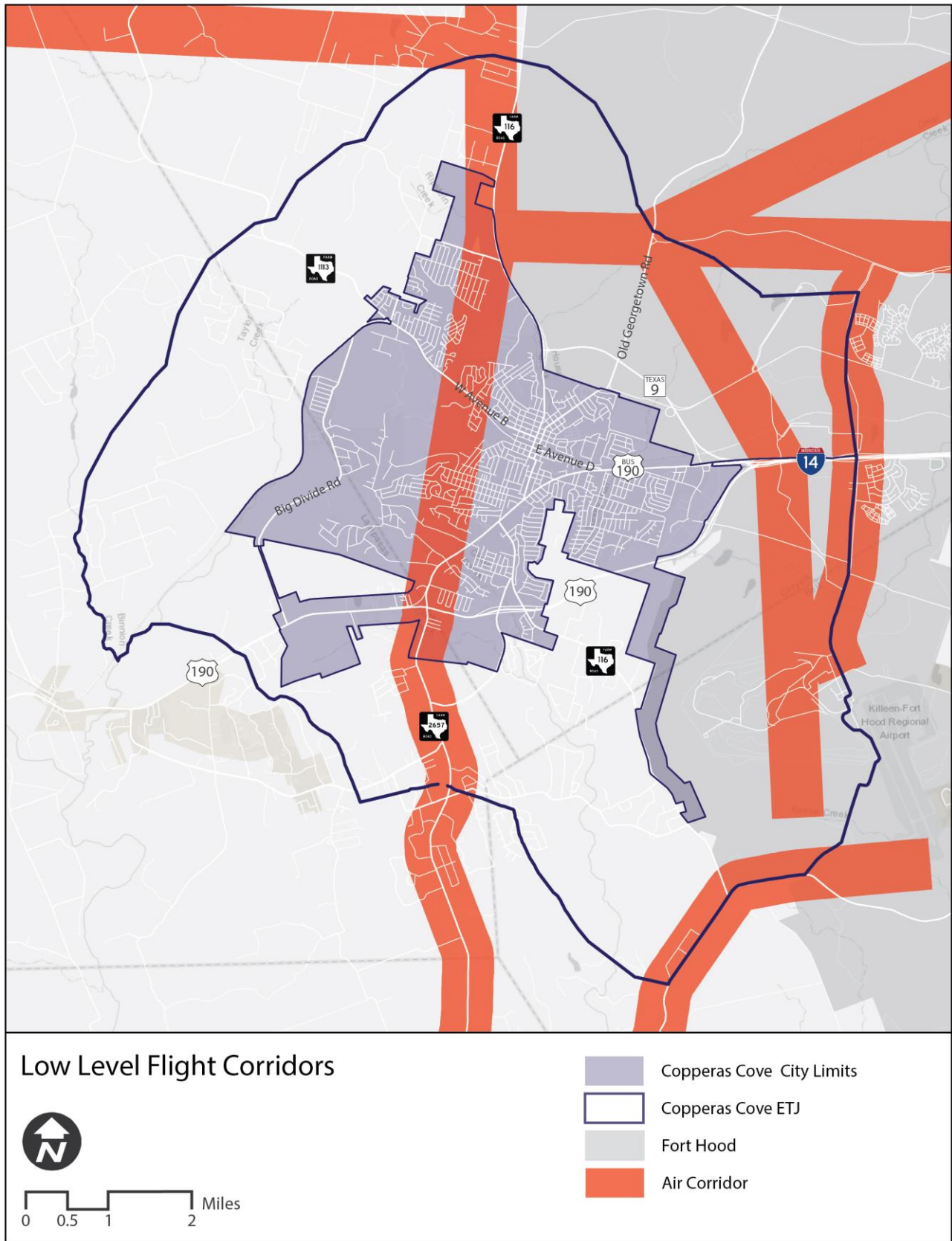


Figure 5: Low Level Flight Corridors

The primary encroachment concerns related to these low level flight corridors are tall structures and certain land uses that may pose a hazard to aerial navigation when located within, or in close proximity to, the corridor. Examples of potentially incompatible tall structures include wireless telecommunications towers, elevated water storage towers, broadcast antennas, high voltage electric transmission lines, and similar features. Even when these structures do not penetrate the floor, or lower altitude limit, of a flight corridor, their location in the route can require modifications to the flight altitude, or the route itself, to ensure a safe separation distance between the aircraft and a potential hazard. Examples of potentially incompatible land uses within, or in close proximity to, these areas include any use which generates significant emissions of smoke, steam, dust, or other obscurants, uses which produce glare or significant night lighting, heavy emissions of electromagnetic radiation, and uses which attract large concentrations of birds, such as landfills and open pit mines that collect water.

A secondary concern within these low level flight corridors is aviation noise exposure, particularly related to residential areas and other noise sensitive uses. While the frequency of traffic within these routes is not sufficient to generate noise contours using the Army's standard noise modeling software, the latest Fort Hood Installation Compatible Use Zone Study (2017) did include supplemental information regarding the potential for annoyance (and hence the potential for noise complaints) due to low level aircraft flight activity. Within these corridors, certain rotary wing aircraft (particularly CH-47s) can generate peak noise levels of over 90 decibels (approximately the level of exposure from operating a lawn mower or food blender) directly underneath its flight path when flying at 500 feet. Although this does not rise to the level of a significant encroachment concern, given the relative frequency of operations and variations in the absolute flight paths of each aircraft, the city should nonetheless be aware of the potential for noise sensitive land uses to generate noise complaints to Fort Hood when new / additional development occurs within these corridors.

With specific regard to Coppers Cove, one of Fort Hood's primary north/south air corridors that follows the western boundary of the installation and connects the local corridors to the southern portions of the WTA traverses the city and its ETJ along a path that connects (and roughly follows) FM 116 in the north to FM 2657 in the south (see Figure 5).

Protecting the integrity and viability of these flight corridors by coordinating closely with Fort Hood to ensure that development activity does not pose a hazard to aerial navigation is critical to the sustainment of Fort Hood's significant aviation training mission. To that end, all tall structures within, or close proximity to these corridors should be evaluated in coordination with Fort Hood, in addition to the standard FAA obstruction evaluation process for tall structures

since not all tall structures that may impact aviation operations at Fort Hood would necessarily fall within an area / altitude that would trigger FAA to declare the structure to be a hazard.

C. Airfield Imaginary Surfaces

Airports, including military airfields, such as Robert Gray Army Airfield, Hood Army Airfield, and Longhorn and Shorthorn landing strips on Fort Hood, are surrounded by “Imaginary Surfaces” established under Part 77 of the Code of Federal Regulations to limit encroachments into airspace where tall structures could pose obstructions, and thus hazards, to aerial navigation. The surfaces, as defined by Part 77 CFR, establish minimum clear heights that coincide with flight patterns around the airfields with which they are associated (see example in Figure 6, below). Although the FAA is tasked with reviewing tall structures within these areas to evaluate whether they penetrate the established imaginary surfaces and would create a hazard to aerial navigation, the FAA does not have any land use regulatory authority, which is vested in state and local governments. Therefore, the protection of these critical airspace areas is the responsibility, if accepted, of the local governments over which the imaginary surfaces are located.

Figure 6: Part 77 CFR Imaginary Surfaces for Military Airfields (Fixed Wing)

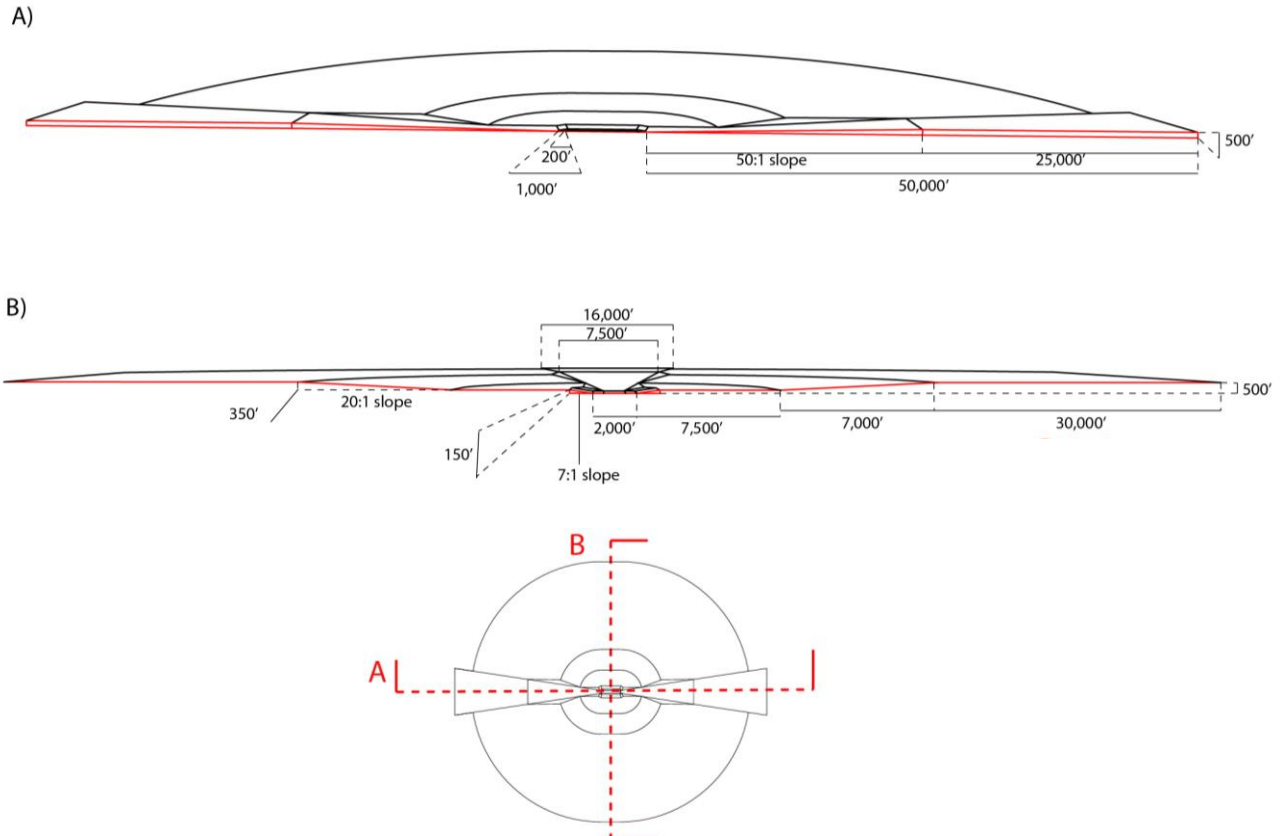
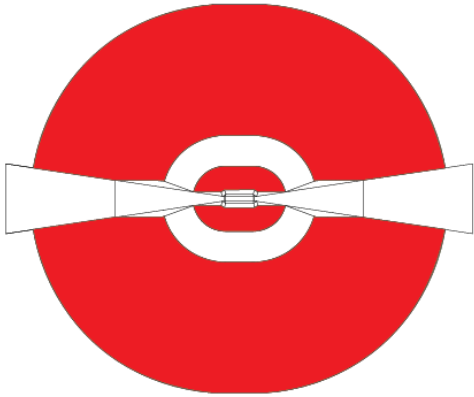


Figure 6A: Part 77 CFR Imaginary Surfaces for Military Airfields (Fixed Wing)

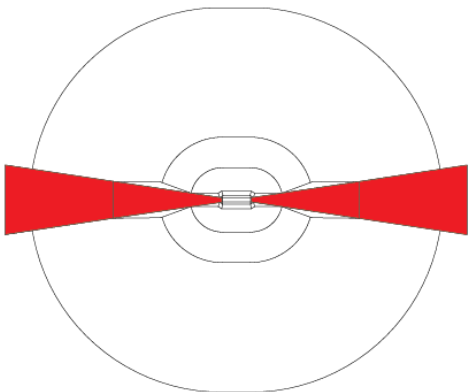
HORIZONTAL SURFACES



Inner Horizontal Surface: a horizontal plane, the perimeter of which is constructed by swinging arcs of a specified radii (defined in each section) from the center of each end of the primary surface of each runway of each airport and connecting the adjacent arcs by tangent lines

Outer Horizontal Surface: a plane located above the established airfield extending outward from the outer periphery of the conical surface

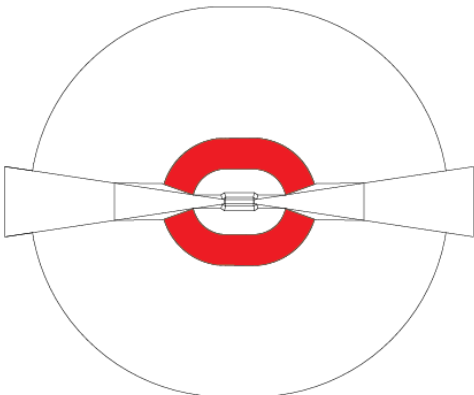
APPROACH SURFACES



Approach Surface: a surface longitudinally centered on the extended runway centerline and extending outward and upward from each end of a primary surface. Applied to each end based upon the type of approach available or planned for that runway end

**The inner edge is the same width as the primary surface and expands uniformly to a specified width*

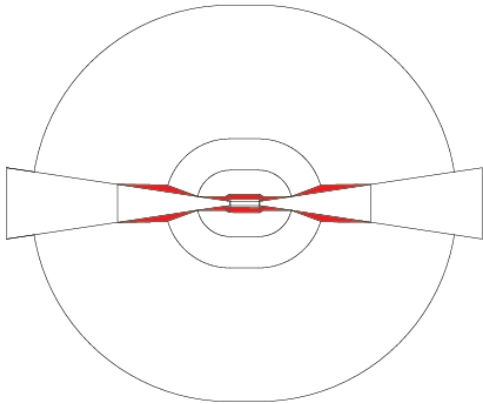
CONICAL SURFACES



Conical Surface: a surface extending up and out from the periphery of the horizontal surface

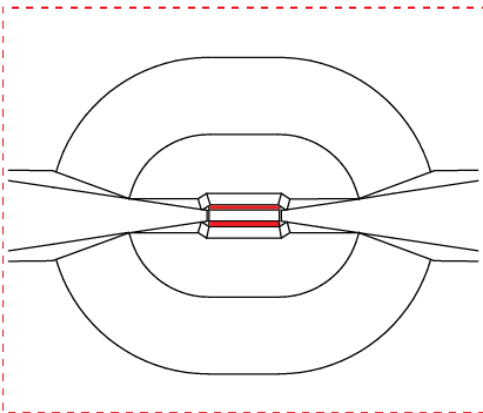
Figure 6B: Part 77 CFR Imaginary Surfaces for Military Airfields (Fixed Wing)

TRANSITIONAL SURFACES



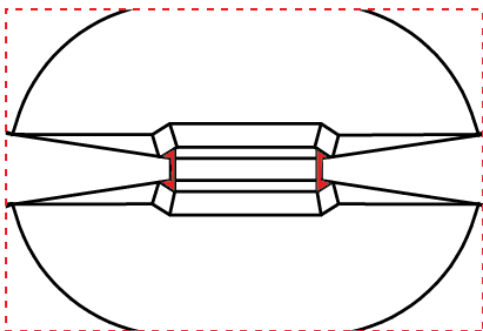
Transitional Surface: These surfaces extend outward and upward at right angles to the runway centerline and the runway centerline extended from the sides of the primary surface and the approach surfaces. Transitional surfaces on the precision approach surface which project through and beyond the limits of the conical surface extend a distance of 5,000' horizontally from the edge of the approach surface and at right angles of the runway centerline

PRIMARY SURFACES

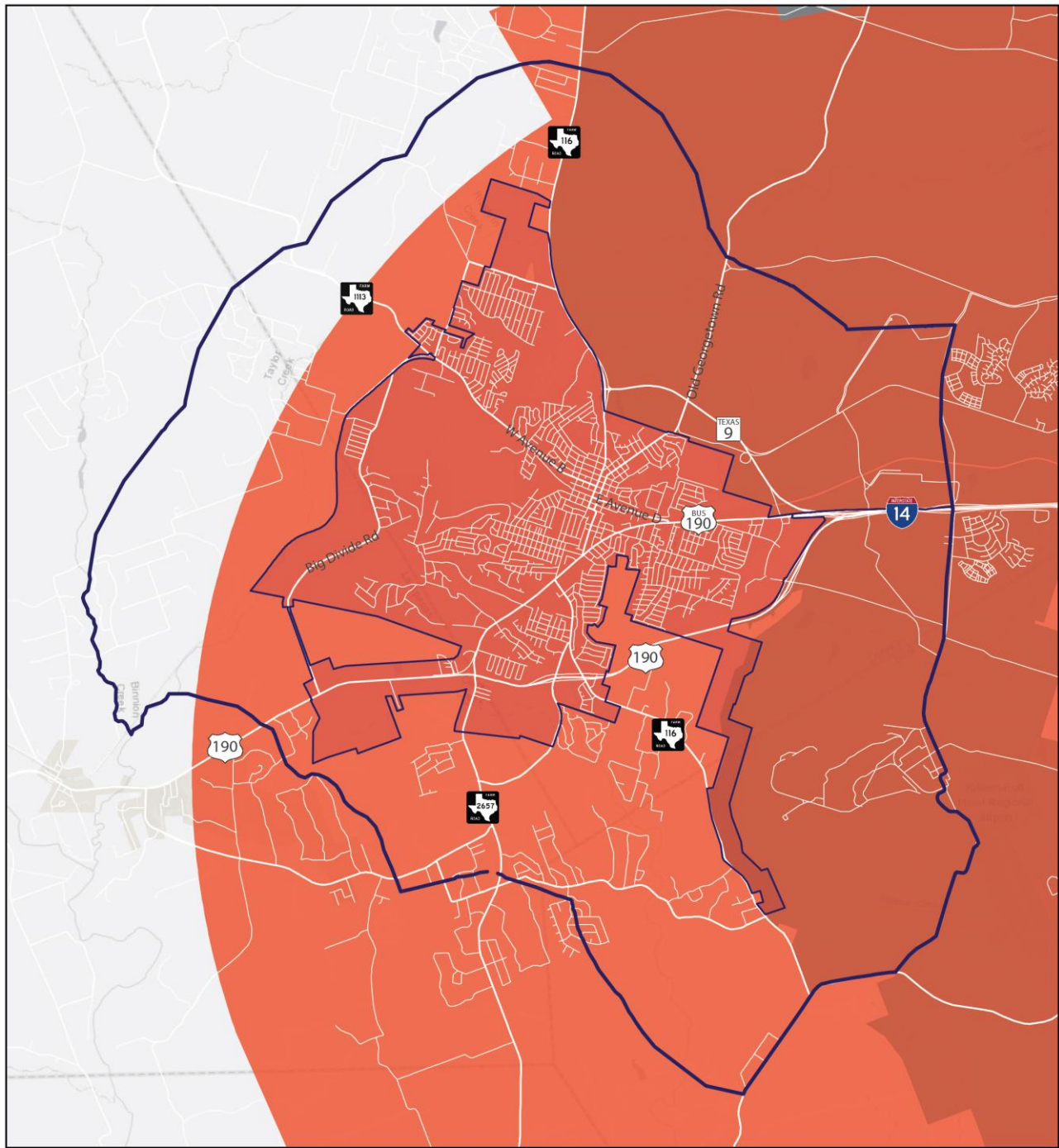


Primary Surface: a surface longitudinally centered on a runway;. The elevation at any point is the same as the elevation on the nearest point of the runway centerline

CLEAR ZONE SURFACES



Clear Zone Surface: a surface located on the ground or water at each end of the primary surface



**Robert Gray Army Airfield
Imaginary Surface Area**



0 0.5 1 2 Miles

- Copperas Cove City Limits
- Copperas Cove ETJ
- Fort Hood
- Imaginary Surface

Figure 7: Robert Gray Army Airfield Imaginary Surfaces

As the map shown in Figure 7 on the previous page demonstrates, the entirety of the City of Copperas Cove and the majority of its ETJ fall within the imaginary surface areas associated with the existing runway at Robert Gray Army Airfield. The “floor” – or lower altitude – of these imaginary surfaces within the city’s jurisdiction are typically 500 feet, as measured from the elevation of the primary surface (in this case the threshold at the end of the runway at RGAAF), although there is a portion of the conical surface in the ETJ that would have a slightly lower elevation. In order to protect this airspace the city will need to closely coordinate the review of tall structures with Fort Hood to ensure that aircraft arriving to and departing from RGAAF can utilize the full amount of airspace that is necessary to safely navigate around the airfield.

Like the low level flight corridors, imaginary surface areas are also subject to encroachment from land uses that can interfere with aerial navigation due to the emission of obscurants (smoke, steam, etc.), creation of glare and night lighting, electromagnetic radiation, and the attraction of birds (such as landfills). Given the geographic coincidence of these two areas of encroachment concern, any regulatory or coordination actions taken by the City of Copperas Cove to protect imaginary surfaces from incompatible land uses, should also help to protect the low level flight corridors.

IV. Emerging / Future Encroachment Concerns

In addition to the current areas of encroachment concern that were identified during the JLUS and further refined during the JLUS implementation process, there are a number of additional encroachment concerns that should be taken into consideration by the city as it prepares and executes plans and policies related to growth and development. Among these emerging and future compatibility concerns that could cause compatibility concerns in and around Copperas Cove:

- The potential for the construction of a second runway at RGAAF:
 - New imaginary surface areas associated with a new runway.
 - High noise potential from aviation operations with a new runway.
- Changes in weapons systems or doctrine that increase the level of noise exposure in the city and its ETJ.
- Increased training tempo that leads to more large scale combined arms maneuver training exercises in close proximity to the FM 116 corridor.
- An increase in the number, type and autonomous operational capabilities of Unmanned Aerial Systems at Fort Hood.
- Potential growth in the size and/or composition of the force structure stationed at Fort Hood.

While none of the previously mentioned scenarios is guaranteed to occur, the city should take these matters into account and be prepared to respond to changes as they occur.

A. RGAAF Second Runway

The potential for a second runway has been under consideration for some time, and the installation has developed plans detailing the most likely location and layout of a new runway. If constructed, this would lead to the establishment of a duplicate set of imaginary surfaces for the new runway, which would overlap with the current surfaces and extend to the south and west based on the proposed location of the second runway. As currently designed, the new runway would not create any areas of high aircraft accident potential (Accident Potential Zones) within the city, but it would likely lead to more frequent fixed wing (and potentially rotary wing) aircraft operations over the city given the alignment of the runway, as currently envisioned. This, in turn, could lead to encroachment concerns from aviation related noise if the runway's noise contours extend off of the installation.

If a second runway is constructed, it also raises the possibility of the stationing of an Air Force wing at RGAAF. While this is speculative, it could lead to significant changes in the number of fixed wing aircraft operations at RGAAF, and lead to an even higher potential for noise compatibility issues in areas where urban development encroaches toward the airfield. If this project comes to fruition, it will be important for Copperas Cove to coordinate with Fort Hood and its regional partners to access the most accurate information about potential encroachment concerns and incorporate these into its land use plans.

B. Weapons Training Noise

At the time of the JLUS implantation process, there are no defined noise contours that fall within the City of Copperas Cove or its ETJ, based on the most recent (2017) Fort Hood Installation Compatible Use Zone Study. While it is likely that noise from weapons training activity (particularly artillery and demolitions training) can be heard in Copperas Cove on a regular basis, the ICUZ indicated that the lowest measure of potential compatibility concern, the 115+ dB PK15 noise contour (single event peak noise levels expected to be exceeded 15% of the time) extend toward, but did not go past the installation boundary (see Figure 8 on the following page).

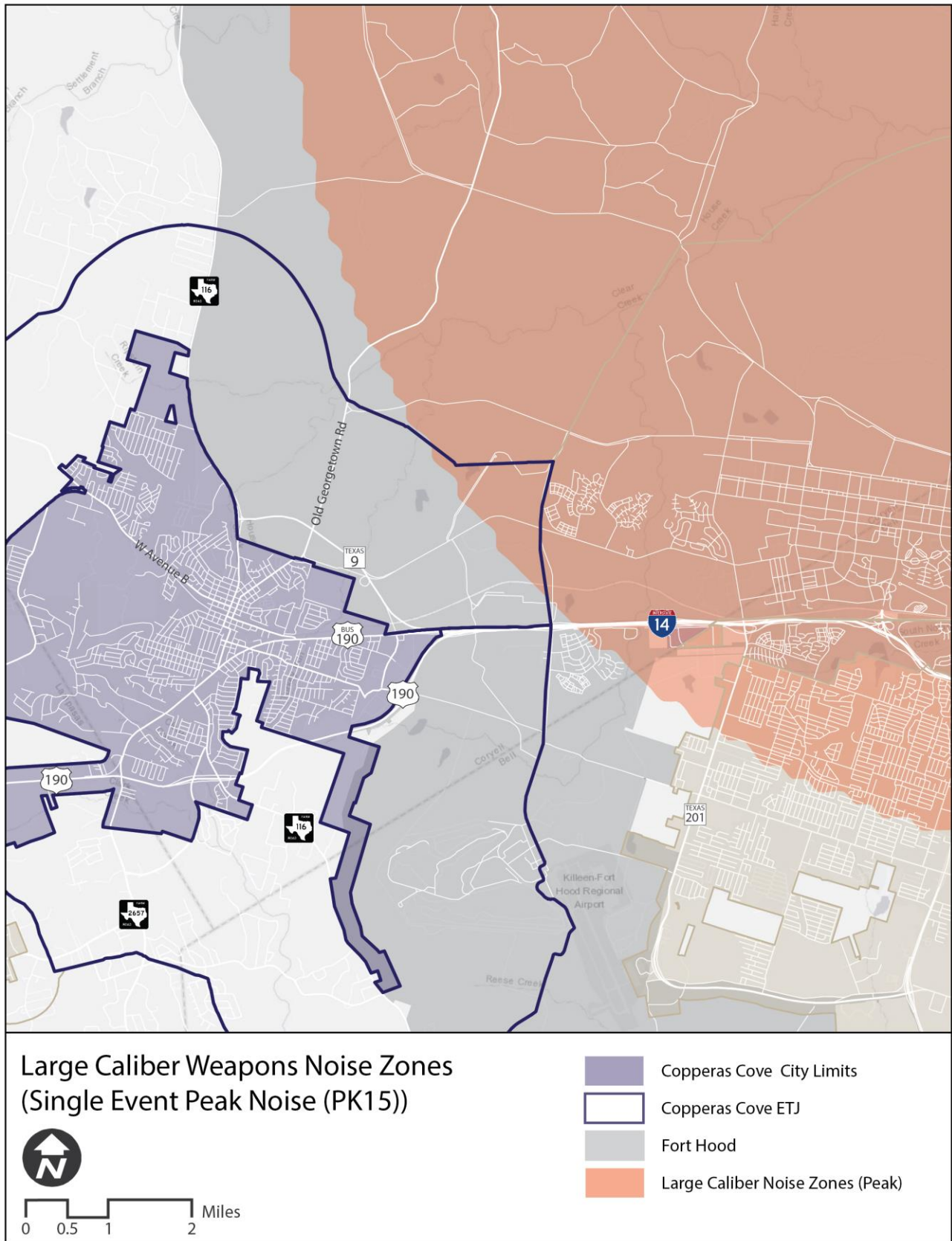


Figure 8: 115+ dB PK15 Single Even Large Caliber Noise Zone

If weapons systems or the location of artillery firing points / demolition ranges change in the future, it is possible that these peak single event noise contours could shift in a manner that could create encroachment issues in and around Copperas Cove. Therefore, it is important to maintain vigilance and work closely with Fort Hood and the regional partners to ensure that the city is fully apprised of planned changes and new data related to this type of encroachment concern, should changes occur to the current noise environment.

C. Increased Training Tempo / Force Structure Changes

As the region has already noticed, there has been an increase in the amount of large scale combined arms training occurring in the installation's maneuver training areas as the Army moves back toward a more conventional / decisive action training doctrine following over a decade of training primarily for low intensity conflicts and counterinsurgency warfare. If these trends continue to increase, additional encroachment concerns could emerge in the installation boundary area in addition to those noted in the previous section of the report.

Even if the units currently stationed at Fort Hood do not increase their training tempo, future changes to the force structure at the installation, whether through a future BRAC process or other changes dictated by the Army, could lead to similar increases in the utilization of training space in areas where encroachment concerns exist. This would especially be true if additional armored or other mechanized / heavy forces are stationed at Fort Hood, as they once were when the installation hosted two combat divisions.

Again, closely working with Fort Hood and the regional partners to maintain situational awareness about potential training and force structure changes will help the city be prepared to respond and shape its plans and policies to meet any emerging challenges.

D. Unmanned Aerial Systems

In recent years, Fort Hood has seen a significant increase in the use of Unmanned Aerial Systems (commonly referred to as "drones"). It is expected that as the technology matures, that the Army will become even more reliant on these systems and they will be deployed to operational units on a greater basis. Even at the point of significant maturity of the systems, there will likely still be operational restrictions on where UAS overflight are permitted to occur outside of restricted airspace, given the military's sensitivity to the potential for accidents involving these remotely piloted (and likely soon to be autonomous) systems in civilian areas.

The ability of these systems to be used in training in the same manner that they will be used on the battlefield is critical, though, to their viability as a tool in the Army's arsenal and to ensure readiness on the units that will be tasked with taking them to war. Therefore, it is critical that the conditions exist for them to be able to access as much of the aviation training airspace as possible, particularly the low level flight corridors and other special use airspace off of the post. It is also critical that they have sufficient maneuver area around the airfields where they are based.

The primary limiting factor with respect to off-post areas where these systems might be permitted to operate in the future is the degree and density of urban growth around the installation and its airfields. If urban growth exceeds certain limits, UAS overflights could be restricted or prohibited, potentially leading to greater competition for increasingly crowded training airspace. As new systems are fielded, or new UAS operating units are gained by Fort Hood, it will be critical for Copperas Cove to closely monitor and work with Fort Hood to ensure that it retains viable access to airspace that is free from encroachment from dense urban development so that UAS operations are not unreasonably constrained.

V. Land Use Compatibility Tools

The following is a summary of the tools that are available for the City of Copperas Cove to consider utilizing as it moves forward with its regional partners to plan for and address compatible growth and encroachment issues around Fort Hood.

A. Regional Land Use Compatibility Efforts

As a region, the communities that partnered together to prepare the 2016 JLUS have begun to implement many of the recommended strategies contained in the study report. Chief among these early actions was the establishment of an agreement between Fort Hood and the Central Texas Council of Governments to cooperate on regional land use compatibility matters, with CTCOG taking the lead role in coordination between the civilian communities and Fort Hood. The Joint Use Agreement (JUA), as it is termed, provides for a coordination mechanism that will allow local governments to submit land use related matters to Fort Hood for review and comment when proposed action could affect land use compatibility or otherwise pose an encroachment challenge. Examples of issues that local governments may request comments from Fort Hood on include zoning map amendments in areas of encroachment concern, proposals for tall structures, and similar matters.

The JUA is an outgrowth of the JLUS implementation process, which identified the establishment of this type of formal land use coordination protocol as a critical component of ensuring ongoing cooperation between Fort Hood and its civilian partners. As the process matures, CTCOG will be working with each local government in the region to establish formal coordination mechanisms in support of the regional coordination protocol. The JUA also establishes a number of other regional coordination responsibilities for CTCOG, with which it will need assistance from its local government partners to fulfill. Among these are:

- The establishment, administration and ongoing maintenance of a regional GIS database focused on compatible growth and encroachment awareness related data
- Promoting the awareness of compatible growth issues in the communities in the region through public outreach programs and materials.
- Assisting local governments with updating plans and policies to promote compatible growth and mitigate encroachment around Fort Hood.
- Serving as a conduit for disseminating information between Fort Hood and local governments (and the reverse).
- Seeking the involvement of technical experts from Fort Hood, as needed, to assist and provide advice to local governments on the development of plans and policies related to compatible growth.

As a party to the JUA, Fort Hood has also agreed to undertake a number of measures to assist local governments in the region with planning for compatible growth, with CTCOG serving as the primary conduit for coordinating these actions. Among Fort Hood's ongoing responsibilities are:

- Providing analysis and input on land use matters that are submitted to it through the CTCOG.
- Providing data, reports, and studies to CTCOG to share with local governments related to Fort Hood's mission and training activities, including areas of encroachment concern and associated military training impacts.

- Inviting potentially affected local governments to participate in and comment on internal planning projects, as appropriate.
- Participate in local government planning processes, when invited.
- Provide command briefings to the CTCOG Executive Committee on a regular basis to ensure that elected officials are informed about what is occurring at Fort Hood.
- Assisting CTCOG with the development and distribution of promotional materials related to compatible growth issues.

While these are not exhaustive lists of the actions that are being taken by CTCOG and Fort Hood to support local governments in the region with compatible growth efforts, it shows the depth of the commitment that has been formally agreed to by these entities to move forward with the implementation of the JLUS. With these significant support tools at hand, it will still be the responsibility, and option, of each local government to take advantage of the support being offered and move forward with their own implementation efforts at the local level.

In addition to the JUA, it should be noted that the JLUS implementation process is carrying forward with standing Policy and Technical committees, and a JLUS project manager embedded with CTCOG. Each local government in the region has been invited and is encouraged to continue their participation in these committees that are guiding the regional implementation efforts. In the future, it is likely that an update to the JLUS will be prepared, although no nomination is currently pending. It will be critical for all local governments in the region to continue their participation through future regional planning efforts.

Other organizations at the regional and state level are also working to support military land use compatibility as part of their missions. Among the organizations that local governments may seek to support, join or participate with include:

- Heart of Texas Defense Alliance (HOTDA)
- Cen-Tex Sustainable Communities Partnership
- Texas Military Preparedness Commission (TMPC)
- Texas Mayors of Military Communities (TMMC)

B. Local Government Planning

Perhaps the most effective tool for local governments to use to support the ongoing compatible growth of the region around Fort Hood is the authority granted to local governments to adopt comprehensive plans (Texas LGC Chapter 213), and other related plans to guide the growth and development of their communities (note that no similar authority to adopt such plans exists for counties, but they may still maintain studies and reports related to related matters, such as the JLUS). By incorporating data related to compatible growth and areas of encroachment concern into their local comprehensive plans, infrastructure plans, annexation plans and similar documents, municipal governments can set conditions in which incompatible urban development is less likely to occur around Fort Hood.

Municipalities also have the authority to set standards for the consistency of their land use ordinances with the adopted comprehensive plan, which, if compatible growth strategies are included, can serve as an additional backstop to the likelihood of incompatible urban development occurring. In order to ensure that the most relevant information is included in local planning documents, coordination with the regional partners and Fort Hood should be an ongoing task for each local government in the region. As new information becomes available, plans should be updated to reflect changing circumstances. Ultimately, each governing board will then need to take action to ensure that, where necessary and desired, that the local compatible growth strategy is incorporated further into land use regulations, capital improvement plans, and other implementation mechanisms.

C. Municipal Zoning

Municipal governments in Texas are authorized by statute (Texas LGC Chapter 211) to adopt and implement zoning ordinances to regulate growth in their communities. The zoning statutes provide significant authority for municipalities to regulate the location, type and character of development within their communities (note that zoning authority, with certain exceptions, does not extend to a city's ETJ). This authority is generally sufficient for the regulation of land uses in a manner that is consistent with compatible growth issues present in a community.

Zoning regulations adopted to address military land use compatibility issues are most often implemented as “overlay districts” which are supplementary districts that impose additional restrictions than those associated with the underlying general use district (such as a commercial or industrial district). Specific examples of military land use compatibility issues that are frequently addressed through the use of overlay zones are:

- Aircraft accident potential zones (APZs), in which zoning restricts the types of uses and density of development in these areas.
- Airport imaginary surface areas, in which zoning restricts the height of structures and prohibits certain land uses that can interfere with aerial navigation.
- Noise attenuation districts, which restrict certain noise sensitive land uses and/or impose construction standards to achieve certain levels of interior noise level reduction.
- Coordination districts, which are often used to define an area in which statutes require the notification and coordination with a military installation on plans, ordinances, and development proposals. In the case of Texas, such a district could be used to establish the (not well defined) mandatory coordination area established by Section 397.005 of the Texas LGC.
- Military lighting districts, in which there are additional regulations governing the installation and operation of outdoor lighting fixtures that interfere with military training activities.

This is only a representative sample of some of the ways in which overlay districts can be utilized to implement policy recommendations regarding land use compatibility in a city’s comprehensive plan. This versatile tool can be modified to fit most circumstances, provided that they meet other statutory and constitutional requirements.

Another way that cities can implement compatible growth recommendations through its zoning power is through the application of general use districts that are more compatible with the nature of the external training impacts. Examples

of this can include applying industrial zoning districts in areas that are subject to high noise levels, where single family residences would not be compatible. Another example would be the application of a very low density residential zoning district to an area where there are general encroachment concerns, such as in an area adjacent to a maneuver training area, and thereby limiting the number of potential residential dwellings that can be constructed in such areas, if no other alternative exists to preserve some economically viable use of the land.

In addition to the general statutory zoning authority that municipalities have, the Airport Zoning Act (Texas LGC Section 241) also authorizes additional zoning authority for cities *and counties* to regulate land use around airports. The statute further authorizes the creation of joint airport zoning boards (JAZBs) to administer adopted regulations when two or more units of local government desire to act jointly. An additional provision of the statute permits cities with populations of greater than 45,000 residents to extend their airport compatible use regulatory area outside of their municipal jurisdiction to include any land within 5 miles of the end of each runway of an airport operated for the benefit of the public.

D. Regulation of Subdivisions

Both counties and municipalities are authorized by statute (Texas LGC Sections 232 and 212, respectively) to regulate the subdivision of land within their jurisdictions (including the authority of cities to regulate subdivisions in their ETJs). While subdivision regulatory authority is generally not as strong of a tool to promote compatible growth as zoning is, there are certain regulatory and coordination mechanisms that can be built into a subdivision ordinance that can help to ensure public awareness about the presence of military training and preserve the ability of military aviation operations to continue.

Among these tools are requirements for the local government to provide notice to a military installation of a proposed subdivision in an area of encroachment concern, and the transmission of comments or concerns regarding the proposed development to the subdivider, if the installation chooses to provide such. Subdivision ordinances often require a number of notices to be provided on the final plat before it is approved and recorded. In keeping with this practice, military communities can choose to require a plat notification regarding the presence of military training impacts to help ensure that buyers within the

subdivision are made aware of potential compatibility issues. With regard to military aviation training and facilities, subdividers can also be required to grant “avigation” easements that release the operators of aircraft from any nuisance or potential hazard that the continuation of operations above or in the vicinity of the subdivision might create after it is developed.

While there is no general statutory authority to deny the approval of a subdivision that meets all of the standards set out by an adopted ordinance, measures such as those described above can help to dissuade landowners from developing in areas where encroachment concerns exist, and ensure that buyers within the subdivision are made aware, to the extent possible about the presence of compatible use issues prior to investing in a property.

E. Municipal Building Codes

Municipalities are authorized by Section 214 of the Texas Local Government Code to adopt and enforce regulations for the construction of buildings within their jurisdictions. There are also statutory provisions for local governments to adopt modifications to the building codes for application in their jurisdiction. The most applicable potential modification that a city near a military installation might consider is the adoption of building standards that require interior noise level reduction in certain areas of high noise potential, such as in low level flight routes, or within airfield noise contours. The use of such construction standards can only be applied to new buildings, and so existing noise sensitive uses in inadequately soundproofed structures would still be subject to compatibility issues.

VI. Recommendations

The following is a detailed list of recommendations for the City of Copperas Cove to consider implementing both on the local level, and in concert with its regional partners to promote compatible growth in the city and throughout the wider region. While not all of the recommended strategies may be immediately implementable, and not all may be “ripe” for implementation given the realities of governing at the local level, their inclusion in the Copperas Cove’s overall long-term strategic land use guidance will ensure that they are ready for implementation if the need or desire emerges for their use.

The majority of the recommended strategies contained in this section have similar counterparts in the comprehensive plan supplements provided to the other

communities in the region, with some variation due to local needs or conditions, including the recognition of the significant difference in the amount of influence that counties currently have over land use matters. Like the JLUS recommendations, which helped to inspire the development of the recommendations for local governments, these are divided into the categories of: Coordination, Planning for Compatible Growth, and Regulations to Support Compatible Growth, along with supplemental recommendations that do not fit well within the first three categories.

A. Coordination

1. Continue to engage in regional efforts to enhance the compatibility of future growth and development around Fort Hood, including the participation of local government staff and elected officials on the JLUS Policy and Technical Committees.
2. Actively participate in future updates to the Joint Land Use Study and other regional plans related to compatible growth around Fort Hood.
3. Adopt standard operating procedures for the transmission of land use and development proposals within areas of encroachment concern for review and comment by Fort Hood, per the Joint Use Agreement.
4. Where discretionary decisions are permitted with regard to land use and development proposals within areas of encroachment concern, incorporate input received from Fort Hood regarding land use compatibility into the decision-making process.
5. Participate in planning processes initiated by Fort Hood, as requested by the garrison.
6. Share plans, data, and other relevant information with Fort Hood and regional partners.
7. Assist in regional efforts to enhance public awareness about compatible growth issues, including providing access to the current (and future) Joint Land Use Study document on the local government website.
8. Assist in the promotion of public notifications by Fort Hood regarding training activities that exceed the level or type of typical training activities on the installation.

9. Establish formal protocols for the transmission of community complaints related to noise, aircraft overflight and similar training activity to Fort Hood.
10. Work with the Central Texas Council of Governments to establish protocols that ensure timely updates of data are transferred for use in the regional GIS database.
11. Support regional efforts to secure legislative authorization to provide local governments in the region, and throughout the state, with the tools to support compatible growth in areas of encroachment concern.
12. Continue to work with Fort Hood to identify opportunities to establish partnerships that provide mutual benefit to the community and installation.
13. Support ongoing regional efforts to secure funding for infrastructure projects that enhance the military value of Fort Hood through the Defense Economic Adjustment Assistance Grant program.
14. Coordinate infrastructure improvement projects with Fort Hood (such as road improvements, utility upgrades, and stormwater improvements) to ensure that potential external impacts and future plans are taken into account in the design and implementation of the projects.

B. Planning for Compatible Growth

1. Incorporate military land use compatibility information into future updates to the Comprehensive Plan.
2. Incorporate compatible growth factors into the development of infrastructure plans to ensure that utilities and transportation infrastructure do not increase the likelihood of encroachment by incompatible land uses into areas of encroachment concern.
3. Invite relevant Fort Hood garrison staff to participate and provide input on technical matters related to compatible growth in the process of the development of land use and infrastructure plans.

4. Work with Fort Hood and regional partners to incorporate updates related to areas of encroachment concern into local plans and ordinances as new/updated information becomes available.
5. Work with Fort Hood to identify and mitigate potential encroachment issues related to ongoing growth along FM 116 north of the city limits in the current ETJ area and beyond.
6. Extend assistance to other local government agencies, such as school systems, to assist them with siting facilities and developing long range plans that take compatible growth and encroachment concerns into consideration.

C. Regulations to Support Compatible Growth

1. Adopt and implement land use and development regulations to address potentially incompatible development in areas of encroachment concern and update the extent of these regulations as areas of encroachment concern change.
2. Adopt and enforce regulations associated with the siting of small cell wireless facilities within rights-of-way under local government control that includes a discretionary review criteria that the facility may be denied a permit if it poses a hazard to aerial navigation.
3. Adopt and enforce regulations that prohibit the siting of wind energy facilities in such numbers or locations that would impact the functionality of the Airport Surveillance Radar located at Robert Gray Army Airfield.
4. Adopt and implement land use compatibility regulations that prohibit the establishment of tall structures or other land uses that pose a hazard to aerial navigation within low level flight corridors.
5. Adopt and implement land use compatibility regulations that prohibit the establishment of tall structures or other land uses that pose a hazard to aerial navigation within the imaginary surface areas associated with Robert Gray Army Airfield.
6. Amend the subdivision ordinance to require the inclusion of a statement on final subdivision plats that references the potential for land within the

subdivision to be subject to impacts from military training and operational activity.

- 7.** Amend the subdivision ordinance to require the dedication of aviation easements in the vicinity of low level flight corridors and within imaginary surface areas.
- 8.** Adopt and implement regulations for formal coordination and notification of land use and development proposals that may have an impact on military training and operations within defined areas of encroachment concern, including any area within one mile of the installation boundary, regardless of the presence of a defined encroachment concern.
- 9.** Review current outdoor lighting regulations, and amend as necessary to incorporate standards that are designed to reduce the amount of background lighting to enhance night training on Fort Hood and eliminate potential glare hazards for nighttime aviation operations.