

4 NATURAL, HISTORIC & CULTURAL FEATURES

A. INTRODUCTION

This chapter provides an overview of the natural and historic features associated with the LSAAP and the RRAD-WEP properties. Brief information is provided regarding topography, soils, vegetation, timber resources, wildlife, hydrology, and historic and cultural features. Information found within this chapter is generated from several site visits taken in the fall of 2006, as well as from previous reports prepared for LSAAP and RRAD-WEP by other consultants.

B. SUMMARY OF MAJOR FINDINGS AND CONCLUSIONS

- The ±15,500-acre LSAAP and the ±3,835 acre RRAD-WEP are generally characterized as flat to slightly rolling terrain, ranging from approximately 290 feet to 450 feet above sea level with a typical slope ranging from 1 to 6 percent.
- Both LSAAP and RRAD-WEP are located in an oak-pine, broadleaf, deciduous, and needle green-evergreen forest, comprised primarily of loblolly and short-leaved pine, pine-hardwood, and mixed hardwood associations. No federally-listed or state-listed threatened and endangered plant species are known to be present on either installation.
- A variety of mammals and birds common to northeast Texas can be found on both installations. The alligator snapping turtle, a state-listed threatened species, is the only reported federally- and state-listed threatened or endangered species known to occur on either installation. Other federally- or state-listed species that may occur on the two installations include the American alligator, the bald eagle, the interior least tern, the red-cockaded woodpecker, the Louisiana black bear, the American peregrine falcon, and the arctic peregrine falcon.
- The LSAAP falls into two watershed areas: Red River Watershed to the north and Sulphur River Watershed to the south. RRAD-WEP falls entirely within the Sulphur River Watershed.

RRAD-WEP Development Alert!

A wetlands inventory survey was performed by the United States Fish and Wildlife Service (USFWS) in 1997 and 1998, showing ±2,500 acres of the RRAD and ±570 acres of the LSAAP to have wetlands present; however, no jurisdictional wetlands have been delineated at this time. Therefore, prior to any development activities that could potentially impact wetlands, project-specific field delineations of wetlands must be performed.

- A minimal area of 100-year floodplain is present on both installations. Although some minor flooding has occurred in the past, no damage has been reported to any material structures on either site. With land area high in each watershed area, flooding is not considered to be a significant concern for future development.

C. TOPOGRAPHY

The topography of the LSAAP is generally characterized as flat to gently rolling hills. The rectangular shaped $\pm 15,500$ -acre site covers an area measuring approximately 6.75 miles by 4.25 miles. Elevations vary from a maximum of approximately 450 feet above sea level (ASL) in the western half of the site to just under 300 feet (ASL) where the East Fork of Elliot Creek crosses the southern LSAAP property boundary. The major topographic feature within the installation is a drainage divide with five (5) distinct drainage areas (Flour Daniel, Inc. 1994)¹. In general, the western half of LSAAP is higher in elevation than the eastern half.

The horseshoe-shaped $\pm 3,835$ acre RRAD-WEP occupies an area measuring approximately 2.25 miles by 3.5 miles. Elevations within the site range from 290 feet (asl) along the southern boundary to 350 feet asl in the northeastern corner. The topography is very flat to the north and develops into slightly rolling terrain to the south. Overall the site slopes from north to south within the Sulphur River watershed. An estimated 75 percent of the installation has a slope ranging from one and six percent. Occasionally slopes near streams range up to 12 percent, but these steeper slopes are rare. (URS, November 2006)²

D. SOILS

The LSAAP and the RRAD-WEP sites are situated within the West Gulf Coastal Plain Physiographic Province, characterized by geologic formations that thin landward and form belts parallel to the coast. Resistant formations leave ridges within the province and easily eroded formations leave valleys.

The geologic strata of the area consist of clays, sandy clay, silt, and sand deposited during the Late Cretaceous, Tertiary, and Quaternary periods. Exposures of the Tertiary period, Eocene age sedimentary rocks belonging to the Midway and Wilcox Groups, are common in Bowie County. The groups either outcrop at the surface or underlie the project area. In the vicinity of LSAAP/RRAD-WEP, these rocks strike essentially east-west and dip gently to the south. The older Midway Group outcrops in the northern portions, while the younger Wilcox Group outcrops in the southern portions. Small isolated patches of Quaternary fluvial terrace deposits and recent alluvium can also outcrop.

These alluvial soils can generally be classified as follows:

- Recent alluvium - Light gray to reddish-brown, very fine to coarse sand interbedded with dark-colored clays and silts with a few gravels.
- Wilcox group - Predominantly a reddish tan to brown sandy and silty clay-shale with siltstone and ironstone concretions.

¹ U.S. Army BRAC 2005, Environmental Condition of Property Report, Lone Star Army Ammunition Plant, Texarkana, TX, page 3-20, URS, November 20, 2006.

² U.S. Army BRAC 2005, Environmental Condition of Property Report, Red River Army Depot, Texarkana, TX, page 3-7, URS, November 20, 2006.

- Midway group - Calcareous clay and clay-shale, gray to bluish gray in color with reddish brown iron stained lenses of sands and silts.

Exposures of Tertiary age Midway and Wilcox Groups predominate in Bowie County in roughly east-west parallel outcrop bands, with the Midway Group occurring in the central and northern section, and the Wilcox Group occurring in the southern section of the installations. Gently rolling lowlands have developed on areas underlain by the Midway Group and more hilly terrain has developed on areas underlain by the Wilcox Group. The difference in rates of erosion between the Midway and Wilcox Groups produces the east-west topographic ridge that forms the watershed drainage divide between the Red River Basin and the Sulphur River Basin. The Wilcox Group consists of mostly sands, silts, and clays that occur under sloping topography. Studies indicate that the Wilcox Group is as much as 700 feet thick where the entire unit occurs. The maximum thickness of the Wilcox Group for the area is probably not more than 100 feet.

The Midway Group consists of clay shale that is poorly bedded with thin discontinuous laminations of silt and fine silty sand. The Midway Group is weathered to a depth of about 42 feet. The weathered section of the formation is yellow brown jointed clay shale that is soft and moist and has iron oxide staining along joint planes. Crystalline gypsum is infrequently found lining joint planes near the base of the weathered zone. Below the weathered zone, the shale is dark gray and generally not jointed. The Midway Group represents the oldest and most laterally extensive unit to crop out for the area. The erosion of Wilcox sediments has completely exposed the Upper Midway section. The Midway extends across the northern two-thirds of area and is characterized as a thick sequence of fine-grain marine sediments. The Midway Group is principally composed of massive clay, interbedded with minor amounts of silt and sand in varying proportions. The thickness of the Midway Group is difficult to determine, but is believed to be approximately 600 feet.

There are two major surface soil units and one minor surface soil unit present at LSAAP. The major soil groups roughly correlate to the areas underlain by the Wilcox Group and the Midway Group. The Sawyer-Eylau-Woodtell soils cover approximately 60 percent of LSAAP. These soils are generally clayey to silty loams with low permeability. The Rushton-McKamie soils cover the remaining 40 percent of LSAAP. These soils are generally sandy loams with some clay and moderate to low permeability. The low permeability loam of the Annona-Alusa Soils is only present near the HEBG.

The LSAAP/RRAD area has three major soil associations within its boundaries:

- Sawyer-Eylau-Woodtell Association - gently sloping soils on uplands, moderately well drained, loamy soils with a low permeability. These soils are found along the southern two thirds of the LSAAP and southern half of the RRAD-WEP.
- Annona-Alusa Association - nearly level soils on uplands, somewhat poorly drained, loamy soils with a very low permeability. These soils are the most extensive in the area and are found on level upland areas on the north-central and northeast end of the RRAD-WEP (the developed area is underlain by the soil association) and near the high explosive burning ground on the LSAAP.
- Sardis-Thenas Association - deep, poorly to moderately well-drained, loamy soils formed in alluvial sediment in floodplains. These soils are found along the principal stream

bottoms along Rock, Big Caney, and Panther Creeks. (Fluor Daniel, Inc. 1994 and Woodward-Clyde 1996)³

E. VEGETATION

Both LSAAP and RRAD WEP are located in an oak-pine, broadleaf, deciduous, and evergreen forest, comprised primarily of loblolly and short-leaved pine, pine-hardwood, and mixed hardwood associations. Loblolly and short-leaved pine associations on both sites occur primarily on gravel ridges, slopes, and areas previously cleared, cultivated, or machine planted. The pine-hardwood association occurs on ridges, slopes, and bottomlands cultivated prior to the development of these facilities. The mixed hardwood association occurs in undisturbed bottomlands of creeks and drainage ways and in areas that are not well-drained. (Tetra Tech, 2006)⁴

Dominant tree species include red maple, black hickory, southern hackberry, persimmon, sweetgum, short-leaved pine, loblolly pine, southern red oak, and post oak. Common shrub species found on these sites include the American beauty berry, hawthorne, sumac, blackberry, and huckleberry tree. Common grass species include longleaf uniola, purple top, little bluestem, and broomsedge. Most grasses are located along roadsides, utility easements, demolition grounds, production areas, training areas, and food plots. Maintained lawn areas are found surrounding the buildings in the developed areas. (Tetra Tech, 2006)⁵

No federally-listed or state-listed threatened and endangered plant species are known to occur at either RRAD-WEP or LSAAP. (URS, November 2006)⁶

F. TIMBERLAND RESOURCES

Kingwood Forestry Services, Inc. estimates that there are approximately 14,474 total acres of timberland on the Lone Star and Red River-WEP properties. Approximately 76% of both the area and the timber volume consists of mature pine sawtimber predominantly 50 to 65 years old (Figure 4-1) while approximately 92% of the estimated value is accounted for in pine sawtimber. While difficult to measure, it is estimated that the pine sawtimber is only growing at a rate of 1% to 2% per year. All of the pine sawtimber is considered to be merchantable. There are approximately 400 acres, or 2% of the area, of pre-merchantable pine plantation 2 to 14 years old. Most of the hardwood acreage has been maintained with little to no harvest activity there. These hardwood stands are typically found on the northern end of the LSAAP and along the intermittent creeks and streams on both properties.

Of the 14,474 acres of timberland, most all of it is capable of commercial pine production. On a given acre, pine management will typically generate 5 to 10 times more income than hardwood management. The consultants estimate that 5% of the area would be maintained in Streamside

³ U.S. Army BRAC 2005, Environmental Condition of Property Report, Lone Star Army Ammunition Plant, Texarkana, TX, pages 3-22 and 3-23, URS, November 20, 2006; and U.S. Army BRAC 2005, Environmental Condition of Property Report, Red River Army Depot, Texarkana, TX, pages 3-9 and 3-10, URS, November 20, 2006.

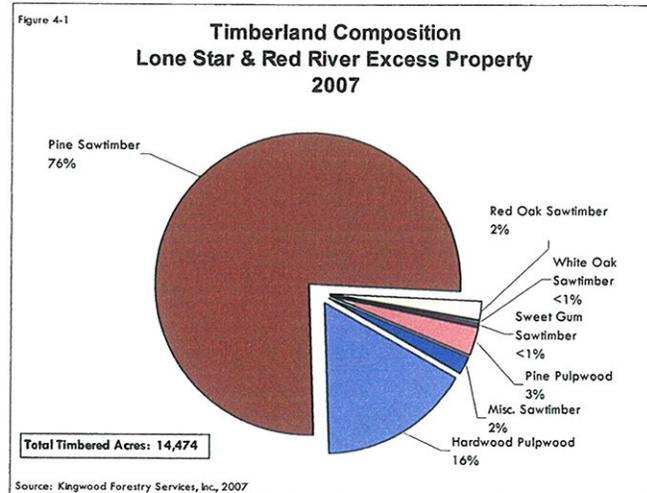
⁴ U.S. Army BRAC 2005, Environmental Condition of Property Report, Lone Star Army Ammunition Plant, Texarkana, TX, page 3-25, URS, November 20, 2006; and U.S. Army BRAC 2005, Environmental Condition of Property Report, Red River Army Depot, Texarkana, TX, pages 3-11 and 3-12, URS, November 20, 2006.

⁵ U.S. Army BRAC 2005, Environmental Condition of Property Report, Lone Star Army Ammunition Plant, Texarkana, TX, page 3-26, URS, November 20, 2006; and U.S. Army BRAC 2005, Environmental Condition of Property Report, Red River Army Depot, Texarkana, TX, page 3-12, URS, November 20, 2006.

⁶ U.S. Army BRAC 2005, Environmental Condition of Property Report, Lone Star Army Ammunition Plant, Texarkana, TX, page 3-26, URS, November 20, 2006; and U.S. Army BRAC 2005, Environmental Condition of Property Report, Red River Army Depot, Texarkana, TX, page 3-12, URS, November 20, 2006.

Management Zones (SMZs). These SMZs are designed to protect water quality by maintaining a buffer zone near creeks where limited harvest activity would occur. The reduced intensity and frequency of activities in an SMZ typically result in hardwood being the predominant feature. The remainder of the hardwood acreage on the properties could be converted to pine production if desired.

Neither of the subject properties are located in a major river floodplain, but it is uncertain that significant acreage would be considered wetlands under current definitions. During our inspection, Kingwood found no endangered species of plants or animals on any of the subject parcels. Topography on these properties is typical of Bowie County varying from gently rolling hills to generally flat woods. Equipment operation will generally be limited to the summer months in the flatwoods and to about 6 to 8 months on the rest of the property, assuming normal annual rainfall.



Internal roads and woods roads provide excellent access to virtually all of the acreage. The extensive system of maintained woods roads for hunting and timber management activities provide a network that will make future timber management activities easier to execute. The impact of security measures is the only limitation on the property. Near the demolition area on LSAAP, timber harvesting has been limited in order to maintain a sound buffer. Approximately 490 acres of buffer area have been set aside for the demolition grounds. It is assumed that no timbering will be allowed within this restricted area, which will be fenced off to protect the public.

G. WILDLIFE

Several species of mammals are commonly found on both LSAAP and RRAD-WEP, including whitetail deer, gray squirrel, fox squirrel, raccoon, bobcat, skunk, and armadillo. Common reptiles found at both facilities include the cottonmouth, copperhead, diamondback rattlesnake, box turtle, and snapping turtle. Amphibians include the Texas salamander, siren, great plain narrow-mouthed toad, and bullfrog. (Tetra Tech, 2006)⁷

The alligator snapping turtle (*Macrolemys temminckii*), a state-listed threatened species, was the only reported federally- or state-listed species found on either installation during a planning level survey in 2000. The Integrated Natural Resources Management Plan (INRMP) lists the American alligator (*Alligator mississippiensis*) as a federally listed threatened species known to occur in the area. However, the American alligator was delisted in 1987, although the legal trade of alligator skins is still regulated by the United States Fish and Wildlife Service (USFWS). No other state or federally listed threatened and endangered species are known to be present on these sites. (Tetra Tech, 2006)⁸

⁷ U.S. Army BRAC 2005, *Environmental Condition of Property Report, Lone Star Army Ammunition Plant, Texarkana, TX*, page 3-26, URS, November 20, 2006; and U.S. Army BRAC 2005, *Environmental Condition of Property Report, Red River Army Depot, Texarkana, TX*, page 3-12, URS, November 20, 2006.

⁸ U.S. Army BRAC 2005, *Environmental Condition of Property Report, Lone Star Army Ammunition Plant, Texarkana, TX*, page 3-26, URS, November 20, 2006; and U.S. Army BRAC 2005, *Environmental Condition of Property Report, Red River Army Depot, Texarkana, TX*, page 3-12, URS, November 20, 2006.

Over 400 species of birds may be found on both LSAAP and RRAD-WEP. Migratory waterfowl passing over the Mississippi Valley migration route use these facilities as a temporary refuge. Game birds found on site include the mourning dove, wild turkey, and bobwhite quail. Other common birds seen on these facilities include the Eastern bluebird and the green heron. Several raptor species forage on the properties, including the American kestrel, the red-tailed hawk, and the red-shouldered hawk. (Tetra Tech, 2006)⁹

The only federally listed bird species that may occur in the area are the threatened bald eagle (*Haliaeetus leucocephalus*), the endangered interior least tern (*Sterna antillarum*), the red-cockaded woodpecker (*Picoides borealis*), and the threatened Louisiana black bear (*Ursus americanus*). Other state-listed bird species that may migrate through the area include the endangered American peregrine falcon (*Falco peregrinus anatum*) and the threatened arctic peregrine falcon (*Falco peregrinus tundruis*) (Tetra Tech, 2006)¹⁰. None of these species are likely to inhabit LSAAP due to the lack of quality habitat found on this site, yet no surveys have been completed for these species or their habitats. (URS, November 2006)¹¹

Table 4-1 provides a listing of the threatened and endangered species observed or potentially occurring in Bowie County. (Tetra Tech, 2006)

⁹ U.S. Army BRAC 2005, Environmental Condition of Property Report, Lone Star Army Ammunition Plant, Texarkana, TX, page 3-26, URS, November 20, 2006; and U.S. Army BRAC 2005, Environmental Condition of Property Report, Red River Army Depot, Texarkana, TX, page 3-12, URS, November 20, 2006.

¹⁰ U.S. Army BRAC 2005, Environmental Condition of Property Report, Lone Star Army Ammunition Plant, Texarkana, TX, page 3-26, URS, November 20, 2006; and U.S. Army BRAC 2005, Environmental Condition of Property Report, Red River Army Depot, Texarkana, TX, pages 3-12 and 3-13, URS, November 20, 2006.

¹¹ U.S. Army BRAC 2005, Environmental Condition of Property Report, Lone Star Army Ammunition Plant, Texarkana, TX, page 3-26, URS, November 20, 2006.

Table 4-1
Threatened and Endangered Species
Bowie County

Common Name	Scientific Name	Federal Status	State Status
Flora			
Arkansas meadow-rue	<i>Thalictrum arkansanum</i>	-	R
Birds			
American peregrine falcon	<i>Falco peregrinus anatum</i>	-	E
American swallow-tailed kite	<i>Elanoides forficatus</i>	-	T/NIB
Arctic peregrine falcon	<i>Falco peregrinus tundruis</i>	-	T
Bachman's sparrow	<i>Aimophila aestivalis</i>	-	T
Bald eagle	<i>Haliaeetus leucocephalus</i>	T/PDL	T
Cerulean warbler	<i>Dendroica cerulea</i>	SOC	-
Henslow's sparrow	<i>Ammodramus henslowii</i>	-	R
Interior least tern	<i>Sterna antillarum athalassos</i>	E	E
Red cockad woodpecker	<i>Picoides borealis</i>	E*	E
White-faced ibis	<i>Plegadis chihi</i>	SOC	T/NIB
Wood stork	<i>Mycteria americana</i>	-	T
Mammals			
Black bear	<i>Ursus americanus</i>	T/SA	T
Louisiana Black bear	<i>Ursus americanus luteolus</i>	T	T/NIB
Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>	-	T
Red wolf	<i>Canis Rufus (extirpated)</i>	E	E
Southeastern myotis	<i>Myotis austroriparius</i>	SOC	-
Reptiles			
Alligator snapping turtle	<i>Macrolemys temminckii</i>	-	T
American alligator	<i>Alligator mississippiensis</i>	T/SA	-
Northern scarlet snake	<i>Cemophora coccinea</i>	-	T/NIB
Texas horned lizard	<i>Phrynosoma cornutum</i>	SOC	T
Timber rattlesnake	<i>Crotalus horridus</i>	-	T
Fish			
Blackside darter	<i>Percina maculata</i>	-	T
Blue sucker	<i>Cycleptus elongatus</i>	-	T
Creek chubsucker	<i>Erimyzon oblongus</i>	-	T
Goldeneye	<i>Hiodon alosides</i>	-	R
Paddlefish	<i>Polyodon spathula</i>	SOC	T
Shovelnose sturgeon	<i>Scaphirhynchus platyrhynchus</i>	-	T
Western sand darter	<i>Ammocrypta clara</i>	-	R
Mussels			
Fawnsfoot	<i>Truncilla donaciformis</i>	-	R
Pimpleback	<i>Quadrula pustulosa</i>	-	R
Pistolgrip	<i>Tritogonia verrucosa</i>	-	R
Plain pocketbook	<i>Lampsilis cardium</i>	-	R
Rock-pocketbook	<i>Arcidens confragosus</i>	-	R
Wabash Pigtoe	<i>Fusconaia flava</i>	-	R
White heelsplitter	<i>Lasmigona complanata</i>	-	R
Insects			
American burying beetle	<i>Nicrophorus americanus</i>	E	R

* Although Bowie County is part of the historic range of the red-cockdad woodpecker, the species is not considered to occur in the county

Notes (Definition of Federal and State Status):

E = Endangered

PDL = Proposed for delisting

R = Rare. No regulatory listing status is associated with this classification

SA = Similarity of appearance

SOC = Species of concern. This federal classification no longer exists. No other federal classification exists for these species

T = Threatened

T/NIB = State threatened species that were formerly identified as occurring in Bowie County. Given new information, it has been determined to be unlikely that these species occur in Bowie County

Source: Tetra Tech EM, Inc., 2006

H. SURFACE HYDROLOGY, FLOODPLAINS, AND WETLANDS

1. Lone Star Army Ammunition Plant

The LSAAP falls into two watershed areas: the Red River Watershed on the northern third of the site, and the Sulphur River Watershed on the southern two-thirds of the site. Five major on-site drainage areas are associated with these two watersheds. The on-site area within the Red River Watershed drains into several small unnamed intermittent streams that exit the site on the northern boundary and eventually flow into perennial Barkman Creek. Surface flow within the Sulphur River Watershed of LSAAP eventually drains into one of the three significant reservoirs located near the site, including Elliott Creek Reservoir to the south (on RRAD), Caney Creek Reservoir to the west (on RRAD), and Wright Patman Lake to the south (Flour Daniel, Inc. 1994)¹².

In general, runoff from rainfall follows the slope of the land into drainage ditches, then into creeks and streams leaving LSAAP and eventually emptying into either the Red River or Sulphur River. Fifteen areas on the LSAAP property are located within 100-year floodplains (URS, November 2006)¹³, though these are generally very small and confined mostly within the banks of the streams draining the property. (Staubach, 2006)¹⁴ Exhibit 4-1 shows the stream and floodplain delineation of LSAAP.

A wetlands inventory survey was performed at LSAAP by the U.S. Fish and Wildlife Service (USFWS) in 1997 and 1998 (Exhibit 4-2). The wetlands survey found that there are approximately 570 acres of wetlands and deepwater habitats on LSAAP (Tetra Tech, 2006)¹⁵. Table 4-2 summarizes the wetland type and associated acreage found on LSAAP during the USFWS inventory survey. However, no work has been done to delineate jurisdictional wetlands from this total. In the survey that was conducted at LSAAP, it was determined that no wetland restrictions apply to the main installation or to the ranges. Project-specific field delineations, consistent with current USACE protocols for determining the presence of jurisdictional wetlands, must be conducted prior to implementing activities that could potentially impact wetlands. (URS, November 2006)¹⁶

Table 4-2
Wetland Acreage and Summary
Lone Star Army Ammunition Plant

Wetland Type	Acreage
Aquatic Bed	0.0
Emergent	4.6
Deciduous Scrub-Shrub	0.0
Evergreen Scrub-Shrub	3.3
Mixed Shrub/Emergent	0.0
Deciduous Forested	485.5
Evergreen Forested	61.1
Mixed Forested	7.3
Forested - Cypress	0.0
Forested - Dead	0.0
Unconsolidated Bottom/Shore (ponds)	7.9
Total	569.7

Source: Tetra Tech EM, Inc., 2006

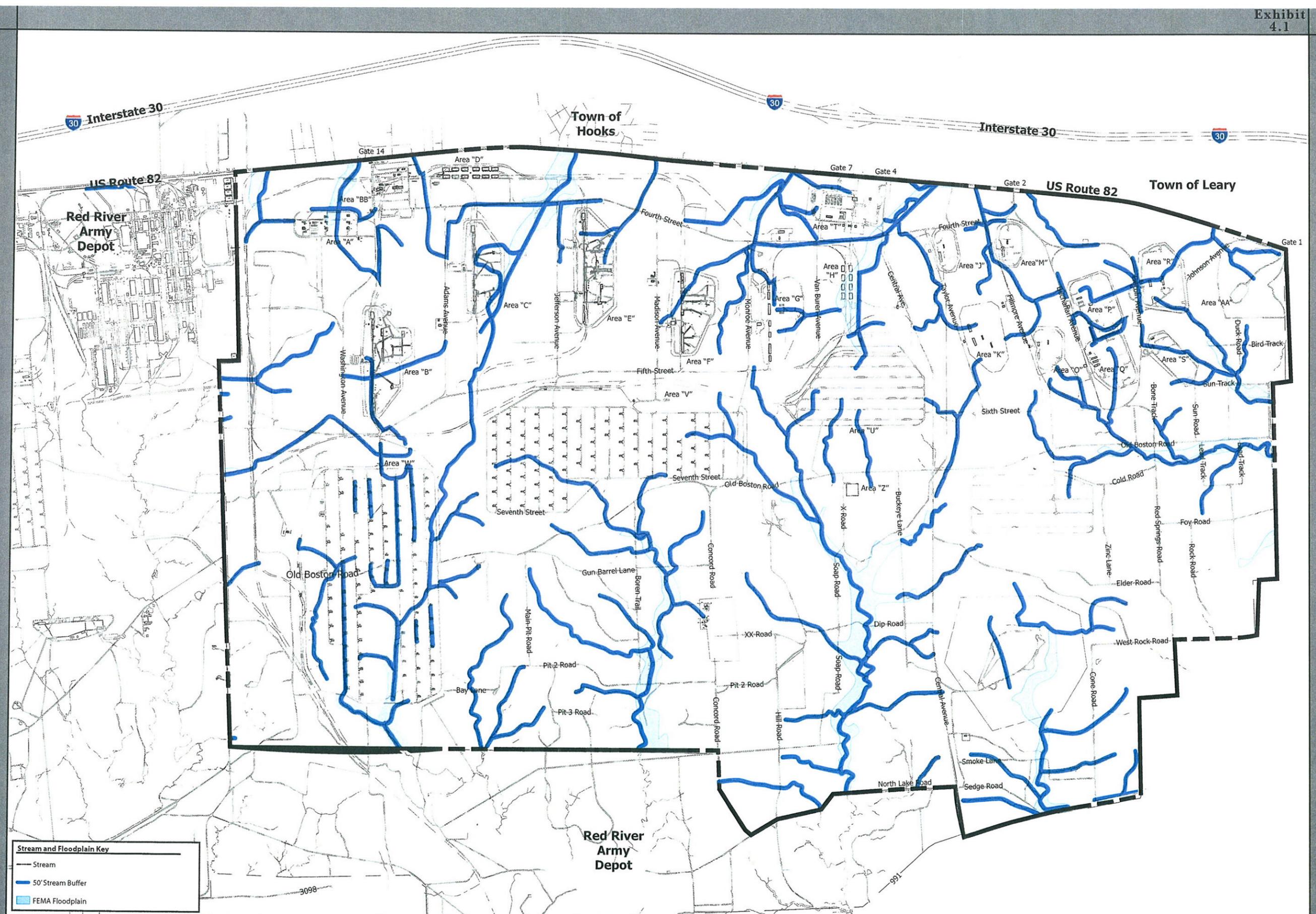
¹² U.S. Army BRAC 2005, *Environmental Condition of Property Report, Lone Star Army Ammunition Plant, Texarkana, TX*, page 3-21, URS, November 20, 2006.

¹³ U.S. Army BRAC 2005, *Environmental Condition of Property Report, Lone Star Army Ammunition Plant, Texarkana, TX*, page 3-22, URS, November 20, 2006.

¹⁴ *Lone Star Army Ammunition Plant, Texarkana Texas, Site Assessment Report, Transition from the Army to the Community*, page 18, Staubach, May 2, 2006.

¹⁵ U.S. Army BRAC 2005, *Environmental Condition of Property Report, Lone Star Army Ammunition Plant, Texarkana, TX*, page 3-26, URS, November 20, 2006.

¹⁶ U.S. Army BRAC 2005, *Environmental Condition of Property Report, Lone Star Army Ammunition Plant, Texarkana, TX*, page 3-26, URS, November 20, 2006.



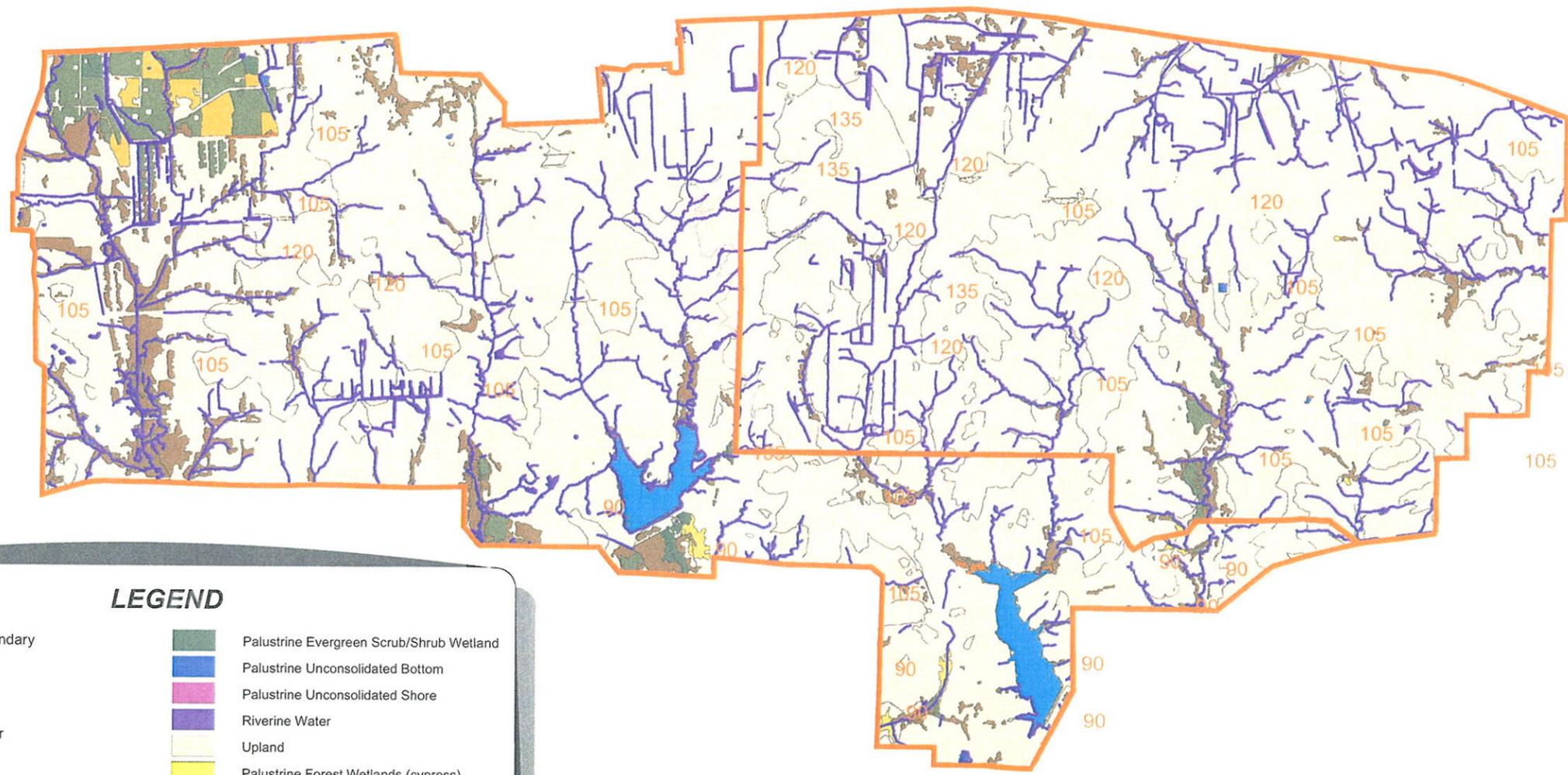
Lone Star Army Ammunition Plant
 Stream / FEMA Floodplain Delineation
 Bowie County, Texas

Red River Redevelopment Authority
 May 08, 2007



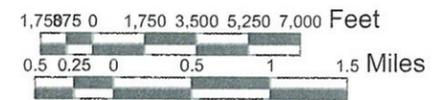
RED RIVER ARMY DEPOT

LONE STAR ARMY AMMUNITION PLANT



LEGEND

- Installation Boundary
- Stream
- Contours
 - 15-Foot Contour
 - 135 Contour Label
- Wetland Designation
 - Lacustrine Water
 - Palustrine Aquatic Bed
 - Palustrine Emergent Wetland
 - Palustrine Deciduous Forested Wetland
 - Palustrine Evergreen Scrub/Shrub Wetland
 - Palustrine Unconsolidated Bottom
 - Palustrine Unconsolidated Shore
 - Riverine Water
 - Upland
 - Palustrine Forest Wetlands (cypress)
 - Palustrine Evergreen Forest Wetland
 - Palustrine Dead Forest II
 - Palustrine Mixed Forest Wetland
 - Palustrine Deciduous Scrub-Shrub Wetland
 - Palustrine Mixed Shrub/Emergent Wetland



RED RIVER ARMY DEPOT AND LONE STAR ARMY AMMUNITION PLANT TEXARKANA, TEXAS

FIGURE 5 PRIMARY WETLANDS

Tetra Tech EM Inc.

SOURCE: MODIFIED FROM U.S. ARMY CORPS OF ENGINEERS, 1994.

2. Red River Army Depot-West Excess Property

RRAD-WEP is located in the Sulphur River watershed area. Several small streams and a large creek flow within the boundaries of the property. Surface drainage on this site is toward the south in a typical dendritic pattern, which is characteristic of the Sulphur River Basin (Woodward-Clyde 1996)¹⁷. All of the small streams are intermittent tributaries of Big Creek, which becomes a perennial stream less than 1 mile from the northern border of the RRAD-WEP. Big Creek flows southward for ±3.5 miles from the northern border of RRAD-WEP until it leaves the site at its southern border. Big Creek continues to flow south and then east for approximately 9 miles before emptying into Wright Patman Lake (URS November 2006)¹⁸.

Some areas within the RRAD-WEP are located within the 100-year floodplain for Big Creek and its tributaries (FEMA 2006)¹⁹. Although some minor flooding damage has occurred over time along Big Creek, no damage has been reported to any material or structures on the site. Because of its proximity to a watershed divide and confinement of the 100-year floodplain within the streambanks, flooding is not a significant concern on the RRAD-WEP (Woodward-Clyde 1996)²⁰. Exhibit 4-3 shows the stream and floodplain delineation at RRAD-WEP.

A wetlands inventory survey was performed for the entire RRAD-WEP by the USFWS in 1997 and 1998. This survey found that there are approximately 2,500 acres of wetlands and deepwater habitats at RRAD-WEP (Exhibit 4-2). (URS, November 2006)²¹ Table 4-3 summarizes the wetland type and associated acreage found on RRAD-WEP during the USFWS inventory survey. However, no work has been undertaken to delineate jurisdictional wetlands from this total. In an Information Paper on Wetlands at RRAD-WEP prepared by Tetra Tech (dated April 23, 1998), it was determined that development within the RRAD-WEP will require a wetland delineation study to determine the extent of wetlands, and that any disturbance of wetlands resulting from development activities will require mitigation of the wetlands to occur. (Tetra Tech 2006)²² Project-specific field delineations on sites within the RRAD-WEP, consistent with current USACE protocols for determining the presence of jurisdictional wetlands, must be conducted prior to implementing activities that could potentially impact wetlands. (URS, November 2006)²³

Table 4-3
Wetland Acreage and Summary
Red River Army Depot

Wetland Type	Acreage
Aquatic Bed	0.6
Emergent	26.8
Deciduous Scrub-Shrub	7.0
Evergreen Scrub-Shrub	100.3
Mixed Shrub/Emergent	155.9
Deciduous Forested	1,618.8
Evergreen Forested	551.4
Mixed Forested	64.8
Forested - Cypress	1.1
Forested - Dead	2.2
Unconsolidated Bottom/Shore (ponds)	24.2
Total	2,553.1

Source: Tetra Tech EM, Inc., 2006

¹⁷ U.S. Army BRAC 2005, *Environmental Condition of Property Report, Red River Army Depot, Texarkana, TX*, page 3-8, URS, November 20, 2006.

¹⁸ U.S. Army BRAC 2005, *Environmental Condition of Property Report, Red River Army Depot, Texarkana, TX*, page 3-8, URS, November 20, 2006.

¹⁹ *Flood Insurance Rate Map, Bowie County, Texas, Unincorporated Areas*, Community -Panel Numbers 481194 0200 B, 481194 0210 B, 481194 0220 B, and 481194 0225 B, Federal Emergency Management Agency, September 27, 1991.

²⁰ U.S. Army BRAC 2005, *Environmental Condition of Property Report, Red River Army Depot, Texarkana, TX*, page 3-8, URS, November 20, 2006.

²¹ U.S. Army BRAC 2005, *Environmental Condition of Property Report, Red River Army Depot, Texarkana, TX*, page 3-13, URS, November 20, 2006.

²² U.S. Army BRAC 2005, *Environmental Condition of Property Report, Red River Army Depot, Texarkana, TX*, page 3-13, URS, November 20, 2006.

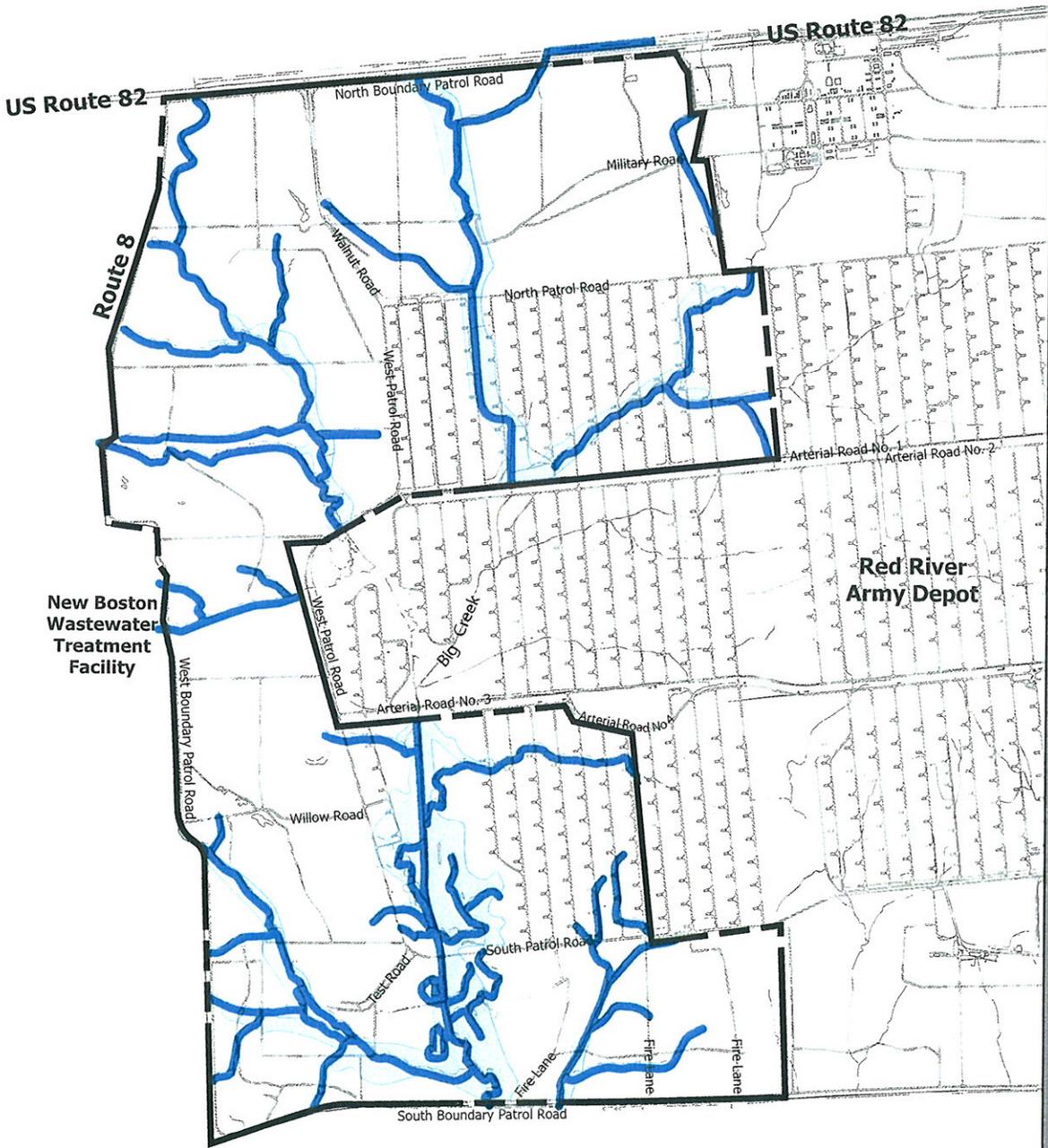
²³ U.S. Army BRAC 2005, *Environmental Condition of Property Report, Red River Army Depot, Texarkana, TX*, page 3-13, URS, November 20, 2006.

Stream and Floodplain Key

-  Stream
-  50' Stream Buffer
-  FEMA Floodplain

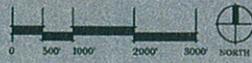
Town of New Boston

International Paper Sawmill



Red River Army Depot
 Stream / FEMA Floodplain Delineation
 Bowie County, Texas

Red River Redevelopment Authority
 May 08, 2007



PKG **EDSA**

3. Wetland Mitigation Requirements

In the event that wetland areas or critical habitat within the LSAAP and the RRAD-WEP are disturbed due to development activities, mitigation requirements are generally processed through the US Army Corps of Engineers (USACE). Typically neither the state of Texas, Bowie County, nor local surrounding jurisdictions has requirements to mitigate for disturbance to wetlands, leaving that responsibility to the USACE. If impacts should occur, mitigation ratios are determined at the discretion of the Fort Worth USACE District / East Texas sub region. These ratios can range from a "best-case scenario" for temporary impacts to low quality wetlands of 2:1 to a "worst-case scenario" of 10:1 for permanent impacts to high quality wetlands.

Mitigation can be achieved by using several methods, including on-site, near-site, and off-site wetland replacement and/or creation, mitigation banking, or payment of a fee-in-lieu. The USACE prefers wetland replacement and/or creation techniques, with on-site and in-kind mitigation receiving the highest priority. At this time there are not any wetland mitigation banks available in Bowie County. Payment of a fee-in-lieu represents the lowest priority for meeting mitigation requirements, and involves issuing a check to the Nature Conservancy who in turn assumes responsibility for providing wetland mitigation. Due to high cost fee structure associated with the fee-in-lieu option, this program has not been viewed as a viable option in Texas.²⁴

Wetland Mitigation Requirements

- low quality wetlands, temporary impacts – 2:1
- medium quality wetlands, temporary impacts – 3:1
- high quality wetlands, temporary impacts – 4:1
- low quality wetlands, permanent impacts – 6:1
- medium quality wetlands, permanent impacts – 8:1
- high quality wetlands, permanent impacts – 10:1

I. HISTORIC AND CULTURAL FEATURES

1. Cultural and Archaeological Sites

a.) Lone Star Army Ammunition Plant

In 2002 an Integrated Cultural Resources Management Plan was prepared for the LSAAP. Fifty-two percent of LSAAP was surveyed for cultural resources from 1980 through 1993. These surveys concluded that there are 29 historic localities and 75 historic sites on LSAAP. Of these 53 may be eligible for the National Registry of Historic Places (NRHP), but none have been included on the NRHP.

Several archaeological investigations have been conducted at LSAAP. They have resulted in the recording of 127 archaeological sites. These sites consist of single component historic or prehistoric resources as well as multi-component resources. While the majority of the cultural resource sites have been determined to be ineligible for the NRHP, there are several individual archaeological sites that are potentially eligible for inclusion in the NRHP and 38 sites have yet to be evaluated to determine eligibility for the NRHP.

²⁴ Ms. Brandy Smart, Project Manager, PBS&J, Tyler, TX

The only paleontological resources identified within the boundaries of LSAAP are scattered concentrations of petrified wood within the Williams Formation. These sites have not been evaluated for their significance.²⁵

b.) Red River Army Depot-West Excess Property

The Red River Army Depot (RRAD) maintains an Integrated Cultural Resources Management Plan that was done by TetraTech in 2005. Approximately 340 to 350 acres have yet to be surveyed at RRAD, of which about 183 acres are located in the RRAD-WEP that will be declared excess and surplus by the government. This area is west of the igloos on the southern portion of the property.

The cultural resource survey concluded that there are no architectural properties or archaeological sites at RRAD-WEP that have been formally nominated or are eligible to be included in the NRHP. However, the culturally surveyed acreage at RRAD-WEP has not been inventoried to determine their archaeological significance.

Within the RRAD-WEP excess and surplus property area, 27 archaeological sites were recorded in a survey conducted in January 1989 and two additional sites were added in 1990, making a total of 29 archaeological sites. Five of these sites are considered prehistoric resources, 20 sites are historic and four of the sites have both prehistoric and historic components. The RRAD and the Texas State Historic Preservation Office (SHPO) have agreed that nine of these sites should be protected from further disturbance until additional testing can be planned and completed to determine eligibility for the NRHP.²⁶

2. Cemeteries

a.) Lone Star Army Ammunition Plant

Nine cemeteries are located within the boundaries of LSAAP, covering a total area of approximately 256,474 square feet. They are Elliot Cemetery, Antioch Cemetery, Mullins Cemetery, Tiller Cemetery, Reed Cemetery, Bob Lane Cemetery, Red Springs Cemetery, Piney Grove Cemetery, and Willis W. Langford Cemetery. At this time these cemeteries are not eligible for inclusion on the NRHP. Recently, however, members of the Tiller family have raised issues concerning the possible burial of slaves to the south of the Tiller Cemetery. Future investigations will have to address this issue. Exhibit 4-4 shows the location of all the cemeteries located at LSAAP.²⁷

b.) Red River Army Depot-West Excess Property

While there are six cemeteries located at the RRAD, only one, Hays Cemetery is located within the property proposed for transfer. A late 19th century burial plot, its location is in the far southwestern corner of the property. The cemetery is approximately 270 square feet in size and it is estimated that it contains 10 individual burial plots. The cemetery is of a typical rural design for that period. No persons buried at the cemetery are considered to be historically famous and no known historic event is associated with this site. Therefore, Hays Cemetery is not

²⁵ U.S. Army BRAC 2005, Environmental Condition of Property Report, Lone Star Army Ammunition Plant, Texarkana, TX, page 3-28, URS, November 20, 2006.

²⁶ U.S. Army BRAC 2005, Environmental Condition of Property Report, Red River Army Depot, Texarkana, TX, page 3-14, URS, November 20, 2006.

²⁷ U.S. Army BRAC 2005, Environmental Condition of Property Report, Lone Star Army Ammunition Plant, Texarkana, TX, page 3-29, URS, November 20, 2006.

eligible for inclusion on the NRHP. Exhibit 4-5 shows the location of the cemeteries located at RRAD.²⁸

3. Native American Sites

a.) Lone Star Army Ammunition Plant

LSAAP has no known human remains or funerary objects subject to the Native American Graves Protection and Repatriation Act. However, no specific studies have been conducted for the identification and evaluation of traditional cultural properties. This area of Texas along the Red River is rich in Native American history and there is a potential that some of the already identified archaeological sites would also be considered traditional cultural properties or would contain traditional cultural property elements.

b.) Red River Army Depot-West Excess Property

A study and inventory conducted to comply with the Native American Graves Protection and Repatriation Act was completed at RRAD in 1995. No human remains or funerary objects were found at the site. The study did indicate that there were possible objects of cultural "patrimony" at the site. As a result RRAD did initiate a consultation to determine if any repatriation was required. RRAD received no significant response from potentially concerned Native American tribes and groups. There are currently no known Traditional Cultural Properties or Native American sacred places within the RRAD-WEP property proposed for transfer.

4. Buildings and Structures

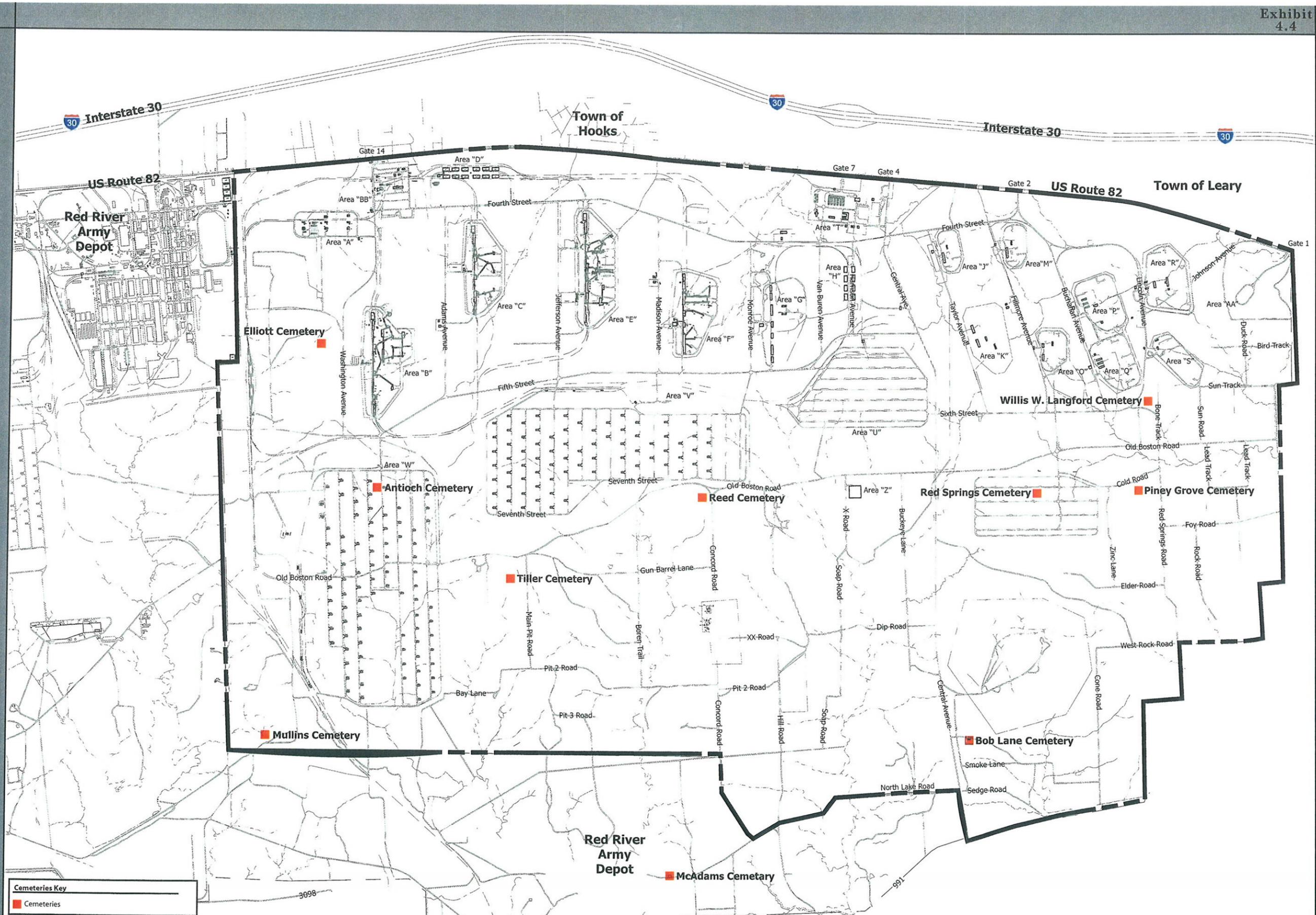
a.) Lone Star Army Ammunition Plant

Of the 1,160 buildings at LSAAP, four buildings have been identified as potentially eligible for nomination to the NRHP. Building E-1 was built in 1942 and is considered to be a good example of a warehouse at LSAAP and its development in support of WWII. Building E-16 was constructed in 1942 and is eligible for the NRHP as a well-preserved example of an inert warehouse used in WWII. Building E-17 was built in 1942 and is eligible for the NRHP as a well-preserved example of a propellant charge building used during WWII. Building Z-1, which also includes the concrete pond, is eligible under Category C for the NRHP. All of these buildings are eligible due to their association with the development of LSAAP as a whole. They retain the integrity of their setting, location, design, materials, workmanship, feeling and association.

b.) Red River Army Depot-West Excess Property

Consultation is currently underway between RRAD and the Texas SHPO to determine the eligibility of the storage igloos at RRAD-WEP for potential eligibility on the NRHP. There are no other building structures present on the excess property at RRAD-WEP.

²⁸ U.S. Army BRAC 2005, Environmental Condition of Property Report, Red River Army Depot, Texarkana, TX, page 3-18, URS, November 20, 2006.



Lone Star Army Ammunition Plant
 Cemeteries
 Bowie County, Texas

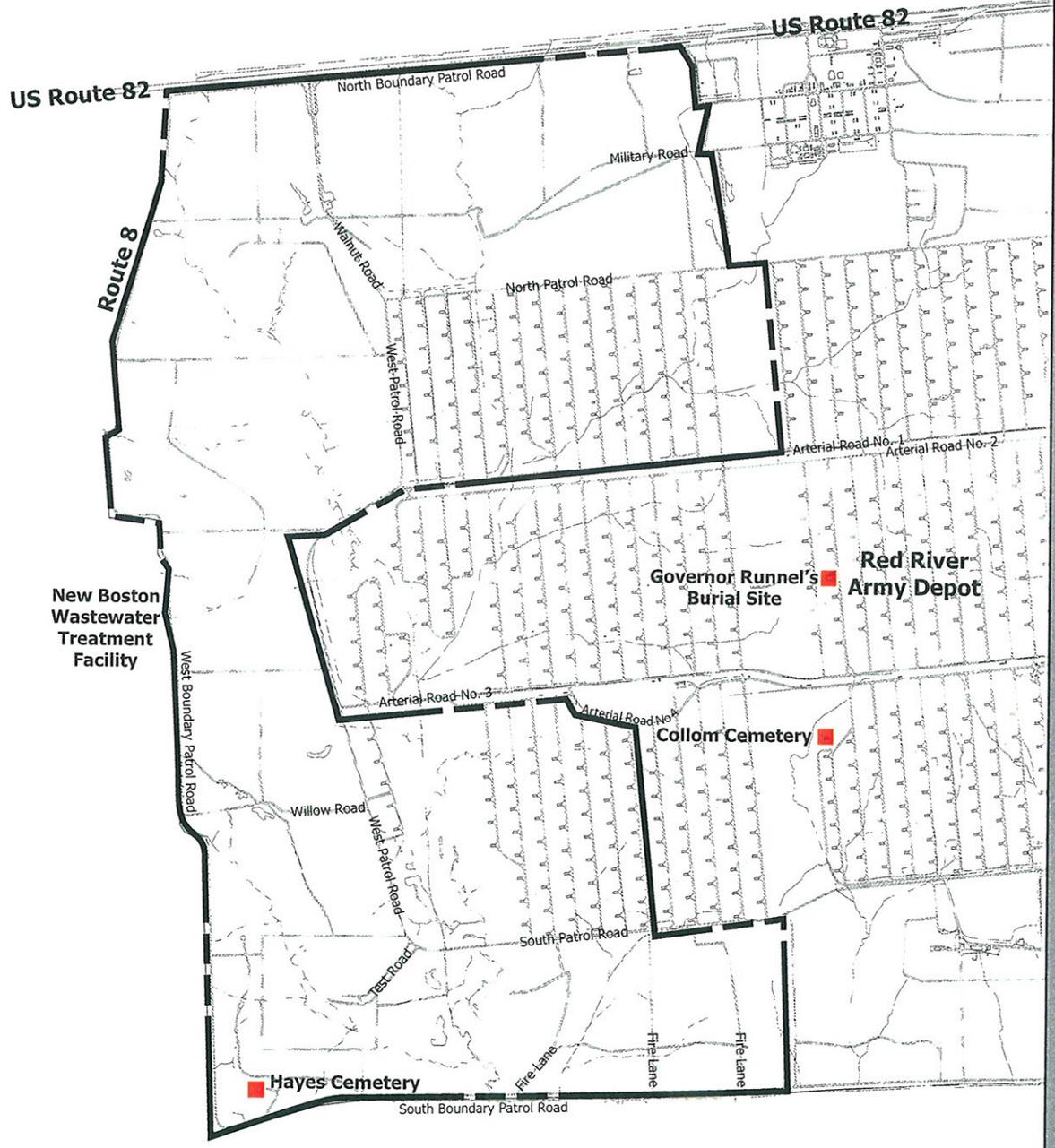
Red River Redevelopment Authority
 May 08, 2007

Cemeteries Key

■ Cemeteries

Town of New Boston

International Paper Sawmill



Red River Army Depot
 Cemeteries
 Bowie County, Texas

Red River Redevelopment Authority
 May 08, 2007

0 500 1000 2000 3000 NORTH

RKG **EDSA**

5. Section 106

In order to comply with the National Historic Preservation Act (Section 106) and the Archaeological Resources Protection Act, consultation with the Texas SHPO must occur if an activity or project is planned that might have the potential to impact historic or cultural resources. This consultation determines if any further action is necessary to remediate this activity. Potential actions may require an archaeological survey. If potential NRHP sites are discovered, further excavation work may be required. If historic structures are involved, the Texas SHPO must approve any proposed modifications or demolition to the structures.

Any artifacts collected during the course of archaeological excavations or during construction or any form of soil disturbance must be catalogued in accordance with the Curation of Federally-Owned and Administered Archaeological Collection, 36 CFR Part 79. Associated documentation must also be preserved.

In August 2006 a Programmatic Agreement between DoD and the Advisory Council on Historic Preservation was signed regarding compliance with Section 106 as it concerns World War II and Cold War Era Army Ammunition Production Facilities and Plants and Ammunition Storage Facilities. These two documents should facilitate agreements with the Texas SHPO and make it easier to redevelop lands and buildings at both RRAD-WEP and LSAAP.

J. CONCLUSIONS

There are several natural, cultural, and historic features that could potentially impact the redevelopment of the Lone Star and Red River facilities. Potential wetlands and blast arcs from RRAD could limit development in some areas of RRAD-WEP, but additional investigation is required. LSAAP appears to have fewer natural constraints, but much greater environmental remediation needs.

The most significant natural feature on both properties is the presence of large timber resources that cover a majority of the two properties. The underlying value of this timber, more than 14,000 acres, is critical to the long-term redevelopment potential of these properties, as the revenues realized from selective harvesting of timber will underwrite the cost of investing in roads, utilities, and other economic development infrastructure.

FACTORS INFLUENCING THE ACHIEVEMENT OF BASE REUSE GOALS

- **Preserve and Protect Important Natural and Manmade Features** – The RRRRA will pursue a redevelopment strategy for LSAAP/RRAD-WEP that preserves cemeteries, cultural and heritage sites and avoids federally designated wetlands. The reuse strategy will also incorporate large forest management areas in order to properly manage thousands of acres of timber forest. This will help maintain natural habitats and stream corridors on both properties.