3 AFFECTED ENVIRONMENT

This section provides a general description of the existing social, economic, natural, and physical environment for the project area.

3.1 LAND USE

Historically, land use in Benton and Washington counties has been agricultural. Early settlers subsistence farmed and hunted game. In the early 1900's, fruit orchards became prevalent. Through the latter half of the 1900's, most of the level land was converted to modern pasture.

Presently, rapid population growth in the area is occurring with the most recent census showing increases of 57.3% in Washington County and 39.1% in Benton County. The entire study area is experiencing high population growth associated with Fayetteville, Springdale, Rogers, Bentonville and the surrounding areas. See Section 1.4.5 in the Purpose and Need Section for further information relating to population growth.

Rapid expansion of city boundaries has left a relatively large percent of property zoned for agricultural use within the boundaries of incorporated areas. This property, primarily pastureland, is being converted to residential use to serve the expanding local population centers. Intense residential and commercial development is occurring within the Springdale city limits. The development trend is also occurring in Bethel Heights and Lowell, and to a lesser degree within the more rural towns of Elm Springs, Sonora, and Tontitown. Much of the land located outside of the incorporated areas is also agricultural and includes numerous poultry and cattle operations. However, the recent growth of residential neighborhoods into these rural areas is a direct result of the growing urbanization of the region. To illustrate how the land use of the area is currently designated for the future, the land use planning developed by cities in the project area is shown in Figure 3-1.

3.1.1 Visual Environment

The landscape in the project area consists of level plateaus with some steep valleys and rolling hills. Modest mountains rise to about 200 feet (60 meters) above the plateau in the eastern portion of the project area. Water resources in the immediate project area include

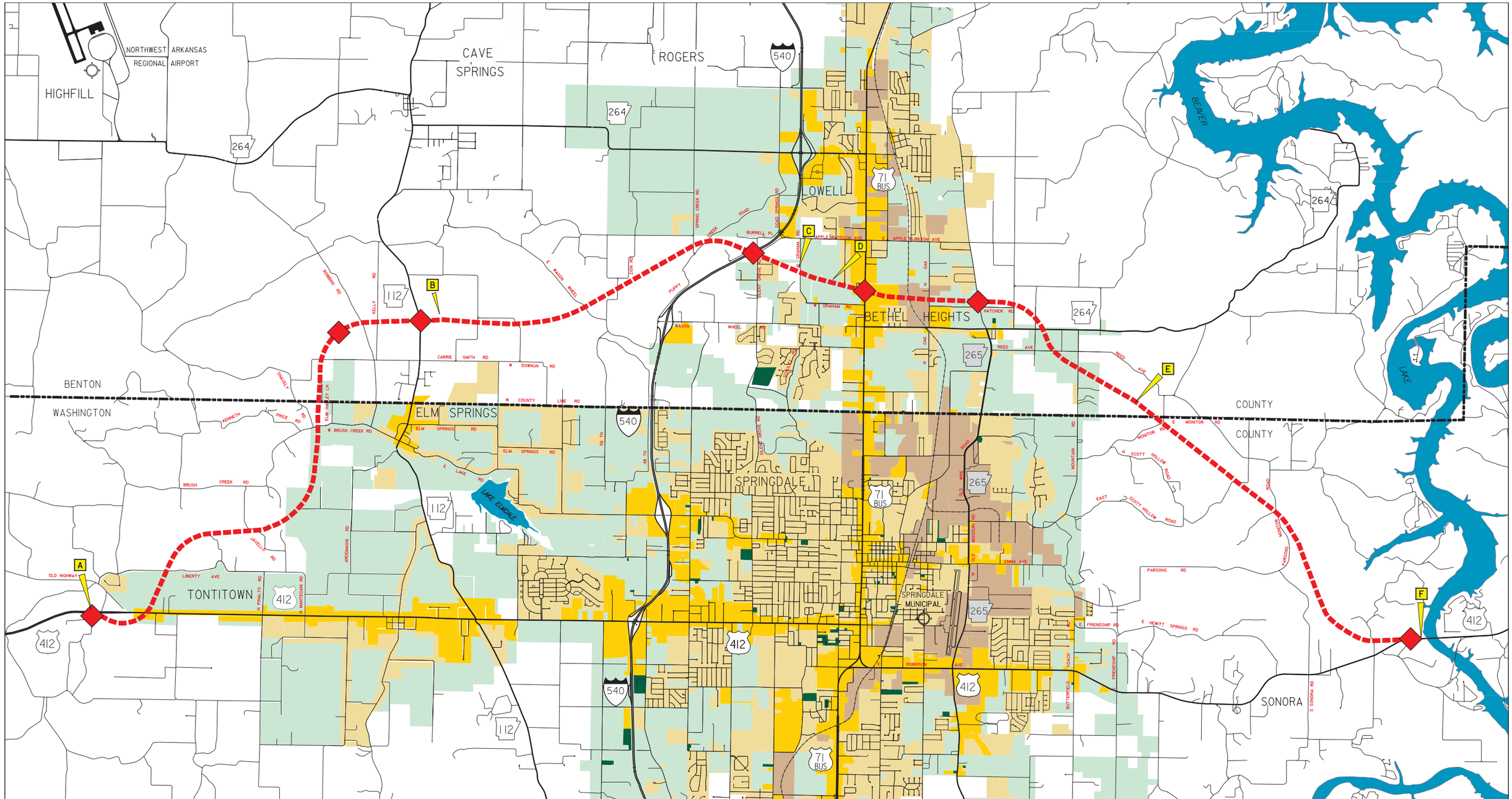
stream tributaries, farm ponds, and springs. Beaver Lake Reservoir is located just east of the project area and is an important recreational resource in the region. Lake Elmdale on the south side of Elm Springs also has some recreational use. The major primary land use found in the rural areas is cattle and poultry production. Vegetation cover consists primarily of pasture grasses. Oak-hickory forest covers the steep slopes of valleys and mountains and in the fall is known for its visual quality.

Communities in the project area include Springdale, Elm Springs, Lowell, Bethel Heights, Sonora and Tontitown. The Preferred Line is located near several of these cities and communities, including Tontitown, Springdale, Elm Springs, Sonora, and Bethel Heights. These communities vary in character from the semi-urban community of Springdale, to the suburban communities of Bethel Heights, Tontitown and Lowell, and to the rural communities of Elm Springs and Sonora. However, even Elm Springs and Sonora are experiencing residential growth due to their proximity to the expanding metropolitan area. Additional residential developments and businesses are located along Wagon Wheel Road and other areas on the fringe of these communities.

Overall visual quality along the Preferred Line is moderate to good due to the somewhat pastoral setting of the western areas and the mountains in the eastern portion. The Preferred Line contrasts sharply with the congested existing Highway 412, which passes primarily through commercial areas in the heart of Springdale. There are no officially designated scenic areas. Visually sensitive areas include the communities themselves and wooded mountain slopes.

3.1.2 Air Quality

Ambient air monitoring is conducted at various locations throughout Arkansas by the National Air Monitoring System (NAMS) and the State and Local Air Monitoring System (SLAMS) program. The existing air quality of the counties in the project area (Benton and Washington) is designated as being in attainment for Carbon Monoxide (CO), Ozone (O_3) Particulate Matter (PM_{10}), and Nitrogen Oxides (NO_x) based on historical monitoring data. Attainment areas are those areas identified by the Environmental Protection Agency as being in compliance with the National Ambient Air Quality Standards (NAAQS). This proposed



Job Number - 001966
AHTD/Environmental - GIS - Pearson
04/30/2004

Figure 3 - 1

Current Land Use Designations as Zoned by Cities

This page is intentionally blank.

project is located in an area designated as being in attainment for the NAAQS pollutants CO, O_3, and PM_{10} and, therefore, is not subject to transportation conformity requirements.

3.1.3 Noise Quality

3.1.3.1 Noise Terminology

Noise is a form of vibration that causes pressure variations in elastic media such as air and water. The ear is sensitive to this pressure variation and perceives it as sound. The intensity of these pressure variations causes the ear to discern different levels of loudness. These pressure differences are most commonly measured in decibels (dB), the unit of measurement for noise.

The decibel scale audible to humans spans from zero to approximately 140 dB. A level of zero decibels corresponds to the lower limit of audibility, while 140 decibels produces a sensation more akin to pain than sound. The decibel scale is a logarithmic representation of the actual sound pressure variations. Therefore, a 26 percent change in the energy level only changes the sound level one dB. The human ear would not detect this change except in an acoustical laboratory. A doubling of the energy level would result in a three dB increase, which would be barely perceptible in the natural environment. A tripling in energy level would result in a clearly noticeable change of five dB in the sound level. This would be perceived as a doubling of the apparent loudness.

The human ear has a non-linear sensitivity to noise. To account for this in noise measurements, electronic weighting scales are used to define the relative loudness of different frequencies. The "A" weighting scale is widely used in environmental analysis because it closely resembles the non-linearity of human hearing. The unit of A-weighted noise is dBA.

Time-varying characteristics of environmental noise are analyzed statistically to determine the duration and intensity of noise exposure. In an urban environment, noise is made up of two distinct parts. One is ambient or background noise. Wind noise and distant traffic noise make up the acoustical environment surrounding the project. These sounds are not readily recognized, but combine to produce a non-irritating ambient sound level. This background

sound level varies through the day, being lowest at night and highest during the day. The other component of urban noise is intermittent, higher in pitch, and louder than the background noise. Transportation noise and local industrial noise are examples of this type of noise. Sounds of this nature can be very disturbing, while brief and intense noises can interrupt, annoy or startle. It is for these reasons that environmental noise is analyzed statistically.

The L_{eq} is the equivalent steady-state sound having the same A-weighted sound energy as that contained in the time-varying sound over a specific period of time. The time period considered for traffic noise is one hour. The abbreviation then becomes $L_{eq}(h)$, which correlates reasonably well to the effects of noise on people. All traffic noise levels in this analysis will be expressed in dBA $L_{eq}(h)$.

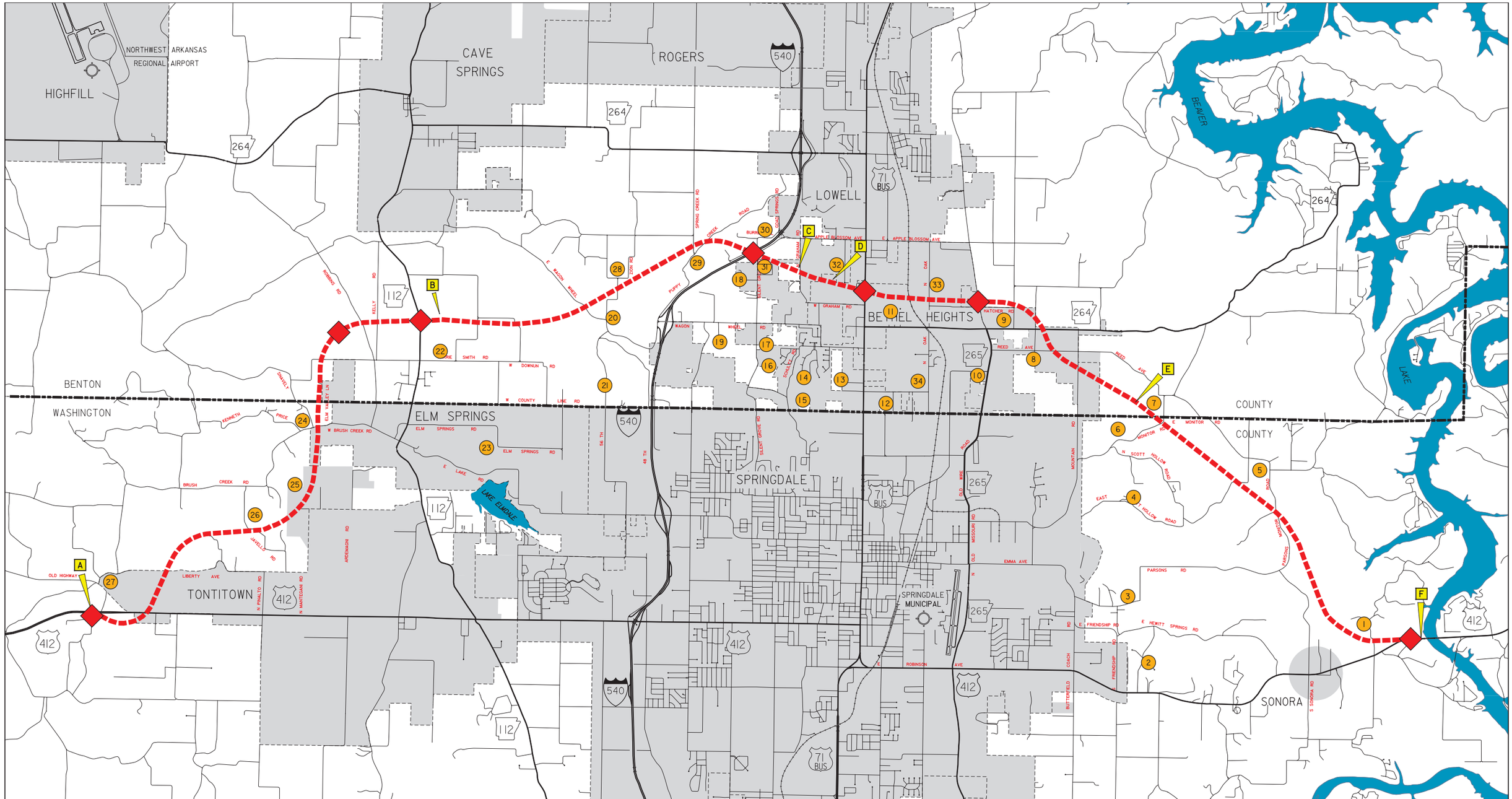
3.1.3.2 Current Noise Levels

Ambient noise levels in the study area are a function of traffic volume and daily activities of the general populace. The primary source of background noise is the traffic on I-540, Highway 71B, Highway 412, the local street network, and the local airports.

Ambient noise measurements were taken at 34 sites along the proposed alignments under consideration. These are shown in Figure 3-2. These sites were located to represent noise sensitive receptors that would likely be affected by the proposed project. Existing measured noise levels are presented in Table 3-1.

Noise measurement samples were ten minutes in length and were taken at peak and off-peak hours using a Larson-Davis 812 sound level meter. A log was kept noting time of day, calibration results and any unusual sound sources experienced during each measurement. The meter was calibrated as part of the noise measurement process.

The current aural environments of the study area vary considerably depending on location and proximity to the existing roadway system. Since existing I-540, Highway 71B and Highway 412 are the predominant roadways within the study area and have the highest traffic volumes and truck percentages, the areas adjacent to these roadways and the associated commercial activity centers have the highest ambient noise levels. The receptors located



Job Number - 001966
AHTD/Environmental - GIS/Pearson
04/18/2005

Figure 3 - 2
Existing (Ambient) Noise Measurement Locations

This page intentionally left blank

Table 3-1
Existing (Ambient) Noise Levels Within the Project Area

Measurement Location Number	Land Use	$L_{eq}(h)$ (dBA)	General Location
1	Residential	56	Coonskin Bluff-Hugh Sherry Lane
2	Residential	52	Rocky Drive
3	Residential	47	Parsons Road
4	Residential	49	Scott Hollow
5	Residential	59	Parsons-Monitor Road
6	Residential	50	E. Monitor (Wilson Cemetery)
7	Residential	49	Katie Lane area/Cloer Lane
8	Residential	52	Reed Ave. - Primrose Lane
9	Residential	51	Hatcher Road
10	Residential	62	Highway 265 (Old Wire Road)
11	Residential	53	Kimberly Place
12	Residential	52	Twin County-Morris Road
13	Residential/Commercial	52	Sunrise Lane
14	Residential	50	Tanglewood Drive
15	Residential	50	Edge of Development (Thornbury)
16	Residential	51	Adel Drive
17	Residential	56	Stonecrest Subdivision
18	Residential	50	George Lane
19	Residential	52	Twin Oaks Lane
20	Residential	51	Wagon Wheel @ Zion Road
21	Residential	50	N. 56th (S. of Hillbilly Lane)
22	Residential	49	Carrie Smith
23	Residential	50	Lakeview-South of Elm Springs Rd
24	Residential	50	Snavely Road @ Brush Creek Road
25	Residential	49	Churchill Subdivision
26	Residential	49	Javello Road
27	Residential	56	Brush Creek Subdivision
28	Rural	49	Zion Road
29	Residential	52	Puppy Creek Road
30	Residential	56	Burrell & Conrad Place
31	Residential	53	Belmont Estates Subdivision
32	Residential	49	Walden Street
33	Residential/Lt. Industrial	53	Chapel Ridge Apts on N. Oak St.
34	Residential	58	North Oak Street @ Morris Ave.

This page left intentionally blank

within the study corridor of the proposed bypass were evaluated for current noise levels in excess of the FHWA Noise Abatement Criteria (NAC) that is based on the AHTD interpretation of the NAC for noise sensitive receptors (Activity Group B of the FHWA Criteria). These sensitive receptors include residences, churches, schools, libraries, hospitals, nursing homes, apartment buildings, condominiums, and others. An hourly Leq NAC noise level of 67 dBA was used for the analysis. (A more detailed description of the AHTD noise impact criteria is presented in Section 4, Environmental Consequences.)

Areas farther away from existing I-540, Highway 71B and Highway 412 have lower ambient noise levels. Based upon ambient noise readings within the study area, background noise levels have a generalized noise level of approximately 47 to 62 dBA(h). Sites located closer to local roads would likely have ambient noise levels between 5 and 10 decibels higher than the surrounding background noise levels.

3.2 SOCIOECONOMIC

3.2.1 Population

As discussed in the Purpose and Need Section, Benton and Washington Counties are two of the fastest growing counties in Arkansas. Table 3-2 compares 1990 and 2000 populations for the State of Arkansas, Benton and Washington Counties, and cities within and around the proposed study area.

During the 1990s, the counties and their respective cities shown in Table 3-2 have experienced growth rates substantially higher than the state rate of 13.7%. In the 1990s, Benton County population growth was over 57% and Washington County population growth was over 39%. The small cities of Lowell, Bethel Heights, Tontitown, and Cave Springs more than doubled their population within the 1990s. Population growth in the larger cities of the metropolitan area was even greater; Bentonville increased by 8,474 (75%), Rogers increased by 14,137 (57%), and Springdale increased by 15,857 (53%).

3.2.2 Economic Characteristics

Northwest Arkansas continues to enjoy a strong economy. The current unemployment rate is 2.2%, well below the National and State rates of 4.1% and 4.4%, respectively. Poverty level

also indicates the strength of an area's economy. In 1995, only 9.3% of Benton County's population and 12.4% of Washington County's population were below the national poverty level. In fact, the 9.3% for Benton County in 1995 was the lowest percentage among all Arkansas counties. When compared to National and State percentages, 13.8 and 18.2% respectively, it is evident that these two counties have fewer persons living in poverty, thus exhibiting a thriving economy.

The major employment sectors in Benton and Washington Counties are retail trade, services, manufacturing and transportation, all of which may be directly associated with the population growth of the areas.

Poultry processing dominates employment within the manufacturing industry in both Benton and Washington Counties. The headquarters of Tyson Foods, Inc., the world's largest poultry producer, and George's, Inc., one of the nation's largest producers of poultry and eggs, are located within these counties.

3.2.2.1 Study Area Economy

The project's general study area includes six cities in the two counties. These cities are Bethel Heights, Cave Springs, Elm Springs, Lowell, Springdale and Tontitown. In addition to the poultry manufacturing companies, over 70 manufacturing firms are located in these six cities. Forty of the firms distribute commodities, such as poultry and egg products, canned vegetables, ceramic molds, trash compactors, and jet engine parts, to other states and countries.

The transportation industry group also employs a substantial number of persons in the corridor area. There are approximately 40 trucking firms in the project area, including some of the largest public and private trucking firms in the nation: J. B. Hunt Transport, PAM Transportation, Willis Shaw Express, and Tyson Foods. Wal-Mart, the nation's largest retailer, is headquartered in Bentonville, just north of the study area.

Most of the manufacturing companies within the project study area are located in Springdale, northeast of the Highway 71B/Highway 412 intersection. These companies are largely dependent on the highway system to transport their products. This dependence, which is

Table 3-2
Population Information*

Area	Population Total 1990	Population Total 2000	% Growth 1990-2000	Black or African American 2000	American Indian & Alaskan Native 2000	Asian 2000	Hispanic or Latino (of any race) 2000	Age 65 and Older 2000	Families Below Poverty Level 2000
STATE OF ARKANSAS	2,350,725	2,673,400	13.7%	418,950	17,808	20,220	86,866	374,019	88,478
BENTON COUNTY	97,499	153,406	57.3%	629	2,531	1,673	13,469	21,973	3,205
Bentonville	11,257	19,730	75.3%	174	262	473	1198	1,685	396
Bethel Heights	281	714	154.1%	0	11	18	24	79	4
Cave Springs	495	1,103	122.8%	1	39	3	24	102	23
Lowell	1,224	5,013	309.6%	39	44	136	448	256	59
Rogers	24,692	38,829	57.3%	184	407	556	7,490	4,576	967
WASHINGTON COUNTY	113,409	157,715	39.1%	3,539	1,972	2,421	12,932	15,596	3,756
Elm Springs	893	1,044	16.9%	4	10	16	45	140	25
Springdale	29,941	45,798	53.0%	377	431	772	9,005	4,692	1,057
Tontitown	460	1,689	367.28%	0	16	0	21	115	13
COUNTY TOTALS	210,908	311,121	47.5%	4,168	4,503	4,094	26,401	37,569	6,961

*Source: U.S. Census Bureau

likely to continue, mirrors the national trend of more and more commodities being transported by truck.

Proposed economic developments include increased airfreight at the NWARA and a new Wal-Mart Distribution Center, both located to the northwest of the study area. This economic growth will likely continue in the retail, wholesale and service sectors. The growth should also expand into the large open tracts of land in the north and northwest parts of the study area.

3.2.3 Communities

There are several communities that the proposed project could impact. These communities are shown on Figure 3-3. A description of each community is given in the following narrative.

3.2.3.1 Bethel Heights

Bethel Heights is located on the southern edge of Benton County between the cities of Springdale and Lowell. The town filed for incorporation in May of 1967. Bethel Heights has its own street department, police department, and water department.

A large number of the residents are widowed or retired. According to the 2000 census, 79 residents are 65 years and over. Land use in Bethel Heights is primarily residential, consisting mainly of single-family owners.

Four churches are located in Bethel Heights: Gospel Tabernacle, Bethel Heights Church of The Nazarene, Living Savior Lutheran Church, and Faith Full Gospel Church. Students who live in Bethel Heights attend public schools in the Springdale School District.

There are approximately sixty businesses in Bethel Heights consisting of retail, automotive, trucking, communications, beauty shops, florists, building and construction. There is one retirement facility, Bethel Heights Retirement Center.

3.2.3.2 Elm Springs

Elm Springs' current population is 1,044. It has a Mayor/City Council form of government and its own Police Department. The Tontitown Volunteer Fire Department provides fire

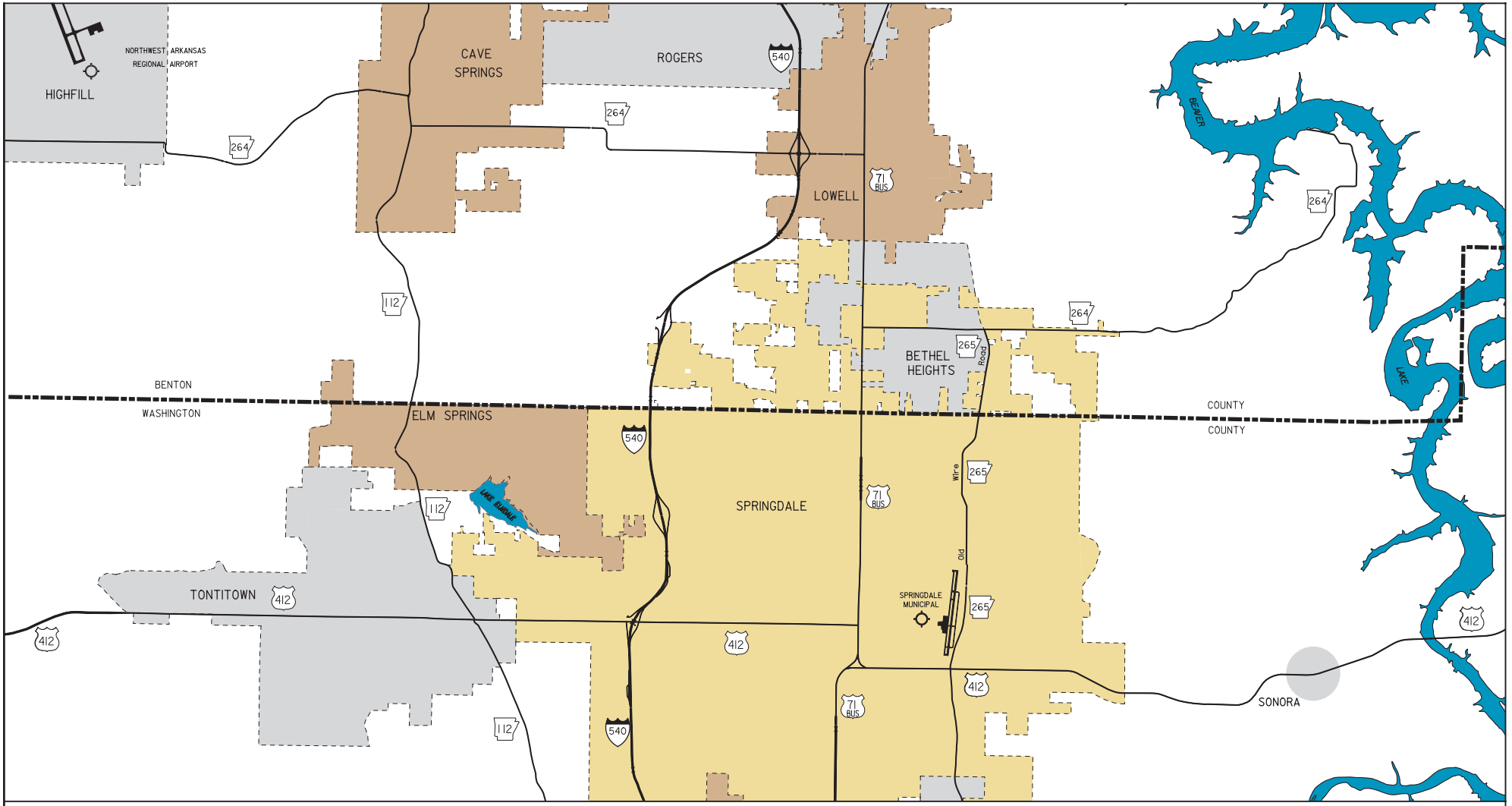


Figure 3 - 3

Community Locations and Boundaries in Study Area

Job Number - 001966
AHTD/Environmental - GIS - Pearson
03/30/2004

protection. Emergency services are provided by EMSI Medical Services. Public drinking water is supplied by the City of Springdale, electricity by SWEPCO and gas by Arkansas Western Gas.

There are several denominations represented by the many churches in Elm Springs. The Elm Springs Cemetery existed before the Civil War. Elm Springs has one public elementary school and is a part of the Springdale School District. An educational academy, Youth With A Mission, was originally established at Elm Springs in 1849 and has mission programs worldwide.

Lake Elmdale, an Arkansas Game and Fish Commission property offering fishing and picnic facilities, is located within the city limits.

There are several industries ranging from poultry houses and dairy farms to large trucking companies; most notably Willis Shaw Express. Elm Springs has several small businesses that are service oriented for the local residents. These businesses consist of clothing boutiques, barber and hair salons, gift shops, fabric shops, art studios, and auto service stations.

3.2.3.3 Sonora

Sonora is an unincorporated small community located two miles (3.2 km) east of Springdale along Highway 412. Students who live in this community attend public schools in the Springdale School District. There is one church, Sonora Baptist Church, and one cemetery. Sonora has a volunteer fire department. The main businesses in Sonora are located along Highway 412.

There are two identifiable neighborhoods in Sonora. The neighborhoods are Santa Rosa Heights located on Santa Rosa Drive south of Highway 412 and Sonora Acres located north of Highway 412 on Sonora Acres Road.

3.2.3.4 Springdale

Over 45,000 residents live in one of the fastest growing cities in Arkansas. With the advent of new and enlarged water and sewer systems, and with the Beaver Lake development

providing water for municipal, industrial, and recreational use, the growth and development of Springdale is expected to continue at a rapid rate.

Diversified agriculture is the base economy of Springdale. Poultry (breeding, hatching, feeds, eggs, broiler/turkey raising, medical services, supplies, equipment and poultry processing) is the number one industry in Springdale. Fruit and vegetable growing and processing also contribute to the economy. Other industries include the manufacturing of furniture, plastic products, concrete blocks, sheet metal products, aluminum extrusion, airplane engine repair, small hand tools, copper tubing, horse trailers, batteries, and shipping containers. Springdale is also a distribution and wholesale center for a variety of agricultural products and supplies.

Many denominations are represented in Springdale's more than thirty churches. Springdale's large school system serves some of the nearby cities as well as their own.

Springdale has world-renowned medical facilities. Northwest Medical Center is a 222-bed JCAHO accredited acute care hospital offering complete patient care services and utilizing modern technologies normally available only in larger, more metropolitan settings. It offers the region's only complete cardiac care program, including open-heart surgery. Northwest Arkansas Radiation Therapy Institute opened in October of 1985. The referral type facility offers outpatient services to the public and has the latest in radiation therapy equipment. The Ozark Guidance Center offers outpatient services. This is a private, non-profit, comprehensive community mental health center, which provides affordable services.

Springdale has an active Youth Recreation program. Two Youth Centers are located in Springdale, one in Murphy Park and the other on Park Street, where all types of supervised recreational activities are available for the area youth.

The Arts Center of The Ozarks is a multi-purpose arts organization, which includes theatre, music, and visual arts and crafts. The award winning Shiloh Museum was established by the city in 1965 and exhibits the history of northwest Arkansas.

3.2.3.5 Tontitown

Tontitown is an incorporated town that was settled in 1908 by a group of approximately forty Italian families led by a Roman Catholic priest. Tontitown has a strong ethnic background and social cohesiveness that is a result of several generations of Italian families.

The only church in Tontitown is Roman Catholic. There are no schools located there. Students attend the nearby Springdale School District.

A mixed residential-commercial strip runs along Highway 412 and the remainder of the town consists of rural farms and homesteads.

The remaining vineyards are a trademark of the town. Vineyards in the area grow concord grapes for the open market, Welch's Company, and the Wiederkehr Winery in Altus, Arkansas. The farms in Tontitown are mainly livestock and poultry. The livestock farms raise cattle and hogs and the poultry farms raise broilers, laying hens, and turkeys. Generally, farm income is not self-sustaining, and must be supplemented by income from non-farm sources, such as manufacturing or service jobs in the urban areas of Springdale and Fayetteville.

3.3 NATURAL ENVIRONMENT AND RESOURCES

3.3.1 Physiography

Arkansas contains parts of three physiographic provinces; the Coastal Plain, and the Ouachita and Ozark Plateaus. Uplands of the Ouachita and the Ozark Plateaus Provinces occupy the northwestern one-half of Arkansas. The Fall Line, a physiographic boundary that marks the inner margin of the Coastal Plain, separates the two provinces from the lowlands of the Coastal Plain Province.

The Ozark Plateaus Province can be separated into the Boston Mountains Section to the south and the Springfield and the Salem Plateaus Sections to the north. The Springfield Plateau lies west and south of the Salem Plateau. The surface of the Western Springfield Plateau, which is the intermediate level plateau, varies from gently rolling prairies to dissected terrain that ranges from 1,000 to 2,000 feet (305 to 610 meters) above sea level along its northern and southern margins. Topographic relief within this plateau area ranges

from less than 100 feet (30 meters) in the prairie areas to more than 400 feet (120 meters) where streams have incised a north-facing escarpment that borders the Salem plateau. In some areas of the Springfield Plateau, straight solution valleys intersect one another at 90-degree angles. (U.S.G.S. 1998)

The proposed project is in the Springfield Plateau Section of the Ozark Plateaus Province (Ozark Mountains). The landform in the project area is part of an uplifted plateau cut by ancient to recent erosional processes into rolling hills with steep valley sides. In the project area, named stream tributaries on the plateau include Brush Creek, Spring Creek, and Puppy Creek. Stream tributaries that flow to the east toward the White River include Friendship and Phillips Creek. Natural springs are common in the area.

Local elevations on the plateau range from about 1120 feet (340 meters) above mean sea level (msl), to about 1400 feet (430 meters) msl. In the eastern half of the project area, outliers of the Boston Mountains rise about 200 feet (60 meters) above the plateau to form flat-topped mountains of approximately 1600 feet (490 meters) msl. These include Callahan Mountain, Fitzgerald Mountain, Weber Mountain, and Price Mountain. These erosional remnants are more geologically recent by origin and thus lie above the surrounding landscape, illustrating the local geological progression. Beaver Lake, a dammed reservoir, lies on the White River at the eastern edge of the project area.

3.3.1.1 Geology

Rocks of Ordovician to Pennsylvanian age underlie the outcrop areas of the Ozark Plateaus Province, and are, in turn, underlain by dolomite and sandstone beds of Cambrian age. The rocks of Cambrian age form the basal part of the Paleozoic sedimentary sequence, but are not exposed in northern Arkansas. The Ozark uplift is a structurally high area that affects the attitude of Paleozoic rocks in northern Arkansas. In general, the rocks in northern Arkansas crop out as annular bands around the center of the Ozark uplift, which is located in southern Missouri. Rocks of Ordovician to Mississippian age in the Ozark Plateaus Province that dip gently southward from northern Arkansas are dominated by shallow-water carbonate-shale sequences and contain some prograding deltaic sandstones, all of which were deposited on a cratonic shelf of Precambrian age. (U.S.G.S. 1998) Surface rock is primarily Boone formation limestone and chert of lower Mississippian age.

Rock of the Ozark Mountains is in relatively flat-lying layers eroded by streams into steep drainages. Because shales and siltstones erode faster than sandstones and limestones, the typical topography is flat-topped mountains with stepped flanks.

3.3.1.1.1 Soils

A listing of the soils associations in the project area, as well as a discussion of their characteristics is found below. A soils association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and is named for the major soils. The soils in one association may occur in another, but have a different pattern.

Washington County Soil Associations

Captina-Nixa-Pickwick association: Silty and cherty, deep and moderately shallow, moderately well drained to well drained, nearly level to sloping soils. This association is on a broad plateau. Its gradient is mainly 1 - 8 percent. The bedrock is cherty limestone.

Clarksville-Nixa-Baxter association: Cherty, deep and moderately shallow, moderately well drained to excessively drained, gently sloping to steep soils on hillsides and narrow ridges. This association is on a highly dissected plateau. It is characterized by long, narrow, gently sloping ridges separated by steep V-shaped valleys 200 to 800 feet (60 to 245 meters) wide. The bedrock is cherty limestone.

Enders-Allegheny-Hector association: Deep and shallow, moderately well drained to somewhat excessively drained, gently sloping to steep soils on mountainsides in Washington County. Steep mountainsides and stream valleys characterize this association. The mountainsides rise from the valleys in a series of steep slopes and gently sloping benches. They are gravelly and stony and are strongly dissected. The rock formations consist of alternate layers of acid shale and sandstone. The caprock is hard sandstone.

Benton County Soil Associations

Clarksville-Nixa-Noark association: Somewhat excessively drained to moderately well drained, gently sloping to steep, deep and moderately deep, cherty soils on hills and ridges. This association is mainly in the northern and eastern parts of Benton County. It

is on a highly dissected plateau that is dominantly cherty limestone. The association is characterized by long, narrow ridges that have moderately steep to steep sides and are separated by narrow valleys. Slope ranges from 3 - 50 percent.

Linker-Enders-Montainburg association: Well drained, gently sloping to steep, deep to shallow, stony and loamy soils on hills and mountains. This association is on isolated outliers of the Boston Mountains.

Tonti-Nixa-Captina association: Moderately well drained, nearly level to moderately sloping, deep and moderately deep, loam and cherty soils on ridges and broad uplands. This association occurs throughout Benton County but is dominant in the central part. Slopes range from 1 - 12 percent.

Captina-Peridge association: Moderately well drained and well drained, nearly level to gently sloping, deep loam soils on broad upland divides. This association is scattered over the western two-thirds of Benton County. The association is on broad, gently rolling upland divides. Slope ranges from 1 - 8 percent.

Secesh-Britwater-Captina association: Well drained and moderately well drained, level to moderately sloping, deep, loamy soils on flood plains and terraces. This association is in valleys along the larger creeks and rivers in Benton County. Slope ranges from 0 - 12 percent.

3.3.1.1.2 Mineral Resources

The mineral deposits of Benton and Washington Counties consist of clay, dolomite, lead, zinc, limestone, sandstone, sand, gravel and tripoli. The following information describes the current status of mineral deposits in the two counties:

- Many small deposits of residual clays are found in various sections of Benton County. The quantity of clay suitable for the manufacture of brick and tile is not known. Large reserves of clay-shale suitable for brick and tile are found in Washington County.
- A small amount of coal was mined in previous years for local use in Washington County. Deposits are now too small to warrant commercial development.

- Cotter dolomite crops out in stream valleys in northwest Benton County and in the vicinity of the White River and its tributaries in the eastern part of the county. Reserves of dolomite in Benton County are believed to be many million tons.
- Large quantities of limestone suitable for cement, crushed rock, and agricultural and chemical lime are available in both Benton and Washington Counties.
- Small quantities of lead and zinc occur sporadically in Benton and Washington Counties, but have no commercial significance.
- Natural gas has been produced in Washington County, however, exploratory drilling has been unsuccessful in the discovery of significant sources of natural gas.
- Several thousand tons of sandstone reserves suitable for use as building stone are located in Benton County. Large reserves of sandstone are also found in Washington County.
- Benton County has many million tons of silica sand reserves.
- Sand and gravel of good quality is found in the floodplains of streams. Many deposits are worked sporadically to supply aggregate and road stone. Talus gravel deposits containing chert and limestone fragments occur on the slopes of hills and ridges. Reserves of sand and gravel deposits are large and nearly inexhaustible because they are replenished by the action of floodwaters.
- Tripoli is found in many locations in Benton County but has not been produced recently. Reserves are estimated at three million tons.

3.3.2 Hydrogeology

As discussed in the Physiography Section, three erosional plateaus from the southwest to the northeast physiographically characterize Northern Arkansas. These are the Boston Mountains, the Springfield Plateau, and the Salem Plateau. The Ozark Plateaus' aquifer system underlies the Springfield and the Salem Plateaus.

The Ozark Plateaus' aquifer system crops out in a wide band that extends across most of northern Arkansas. Three aquifers, separated by two confining units, compose the Ozark Plateaus' aquifer system. From shallowest to deepest, the aquifers are the Springfield Plateau, the Ozark, and the St. Francois aquifers.

Within the Ozark Plateaus' aquifer system, the Springfield Plateau aquifer and the upper and middle parts of the Ozark aquifer yield most of the ground water that is withdrawn. Usually, it is not economically feasible to drill wells into the lower parts of the aquifer system that lies at great depths. Only a few wells penetrate the lower parts of the Ozark aquifer, and none are known to produce water from the St. Francois aquifer.

The yield of wells completed in the Springfield Plateau aquifer are reported to range from less than 1 gallon (4 liters) to more than 75 gallons (285 liters) per minute; average yield is reported to be 5 gallons (19 liters) per minute. Because the aquifer is thin, relative to the great thickness of the Ozark aquifer, and has been highly dissected by erosion, it is used primarily as a source of water for domestic and stock-water wells. The Springfield Plateau aquifer is underlain in this area by the Ozark confining unit. Where this confining unit is present and has not been breached by erosion, it effectively separates the Springfield Plateau and the Ozark aquifers.

The thick, extensive, and productive Ozark aquifer is the principle source of ground water in northern Arkansas. Wells that obtain water from this aquifer commonly yield from 100 to 300 gallons (380 to 1,140 liters) per minute and yields of 500 gallons (1900 liters) per minute have been reported for some wells. Shale and dolomite of the St. Francois confining unit underlie the Ozark aquifer and separate it from the deeper St. Francois aquifer.

The St. Francois aquifer is deeply buried in northern Arkansas, usually to depths that range from 1,500 to more than 4,000 feet (460 to more than 1,200 meters) below land surface. The aquifer is not used as a source of water in northern Arkansas because the depth to the top of the aquifer makes the costs of drilling and completing wells in the aquifer prohibitively expensive. (U.S.G.S. 1998)

The source of water that recharges the Ozark Plateaus aquifer system is precipitation that falls on the aquifer system where it is exposed at the land surface. The carbonate rocks are readily dissolved by carbonic acid carried in the precipitation. The end results of partial dissolution are a network of subsurface openings and an irregular rock surface characterized by sinkholes, caves, and other types of openings, which is called karst topography. Water that recharges an aquifer with a karstified surface either enters as direct runoff through

sinkholes and sinking streams (streams that flow into shallow holes and sinkholes) or enters by downward infiltration through the shallow soil in the upland, interstream areas. Ground-water flow in the Ozark Plateaus aquifer system tends to be concentrated by a system of well-connected conduits formed by solution-enlarged fractures and bedding-plane partings. Some of the conduits are cavern-sized, form parts of large cave systems, and in places, are part of a subsurface trunk drainage system. Where fractures, bedding-plane partings, and other solution conduits are widely spaced, the flow system tends to be poorly interconnected; in such places, subsurface conduits can cross one another without interference, and water levels can vary widely among closely spaced wells. Conversely, where solution conduits are closely spaced and well connected, the potentiometric surface will probably reflect the shape of the local topography. Such is the case with the Springfield Plateau aquifer in northwestern Arkansas.

Sparse data are available for the Springfield aquifer in northwestern Arkansas. However, regional ground-water flow within the Springfield Plateau aquifer probably is similar to that of the more extensive Ozark aquifer.

Potentiometric data for the Ozark aquifer suggest that topographic relief controls ground-water movement and much of the water that enters the aquifer is quickly discharged to local streams. Some water, however, moves toward major rivers that serve as points of discharge.

Sinkholes are bowl-shaped depressions that form by the dissolution of underlying carbonate bedrock. Sinkholes range in size from small, local depressions, to broad, shallow depressions that extend over an area of a square mile or more. Sinkholes can form by slow subsidence or sudden collapse. In northern Arkansas, sinkholes are most abundant in the north-central part of the Springfield plateau, where they develop in the rocks that form the Springfield Plateau aquifer. Sinkholes are hydrologically important because they are sites where concentrated recharge directly enters the aquifer.

Springs are sites where concentrated discharge emerges from an aquifer at the land surface. Many springs that discharge from the Ozark Plateaus aquifer system are located along the sides of deeply incised valleys in the Salem Plateau area and maintain a relatively constant rate of discharge, which is characteristic of springs in the Ozark region. Average discharge

from springs in the state is reported to range from less than 1 to about 80 cubic feet (0.03 to 2.4 cubic meters) per second. Discharge from springs is related to the size of their catchment areas. The discharge of springs within the project study area varies greatly. The project area has numerous small to medium sized springs with few larger springs. This is characteristic of conditions in the Boone formation in northwestern Arkansas. (Aley, 1978)

3.3.2.1 Caves and Cave Resources

Caves represent the third major type of solution feature in the Ozark Plateaus aquifer system. An accurate survey of caves is not available for Arkansas. Caves in northern Arkansas are located mostly within the Springfield and Salem Plateaus. The greatest concentration of caves is in the Boone Formation and its lower member, the St. Joe Limestone Member, which are geologic units that compose the Springfield Plateau aquifer.

Caves in the Springfield Plateau aquifer were formed randomly in response to changes in lithology, fracture density, and the presence or absence of local, low-permeability rock layers that created perched water-table conditions. In the Springfield Plateau aquifer, caves appear to have formed above and below the saturated part of the aquifer. Small caves that formed above the water table were probably caused by discontinuous, poorly permeable shale, siltstone, or chert within the aquifer. These poorly permeable confining units perch water above the main water table, which allows partial dissolution of the limestone or may reflect an earlier, higher base lever. The larger, connected caves are within the lower part of the Springfield Plateau aquifer (the St. Joe Limestone Member) where it immediately overlies the Ozark confining unit (the Chattanooga Shale). These caves formed at or below the main water table of the aquifer. Small caves are within some sandstone beds of the Ozark aquifer. These "pseudocaves" probably formed as water leaked downward into solution-enlarged fractures in underlying carbonate strata. Continued dissolution of the underlying carbonate rocks and removal of carbonate cement in the sandstone beds allowed sand to enter solution cavities in the carbonate rocks by piping and (or) cave collapse. (U.S.G.S. 1998)

Within the project study area, the Cave Springs area has been studied extensively as related to water quality and recharge area (Aley, 1978; Williams, 1991; Graening, 1999; Aley and Moss, 2001). Aley and Williams utilized extensive dye tracing to establish the recharge area

for Cave Springs. Figure 3-4 illustrates an overview of the recharge area and its location. Figure 3-5 shows the recharge area as delineated by the Aley 1978 study; the Williams 1991 study; and, the Aley and Moss 2001 study.

Members of the AHTD Environmental Division and USFWS conducted on-site surveys of the project area for cave openings or sinkholes that could be associated with endangered or threatened species. During the fieldwork and public involvement process, efforts were made to locate caves in the project area. Six caves/sinkholes were identified within the project area.

3.3.3 Hydrology

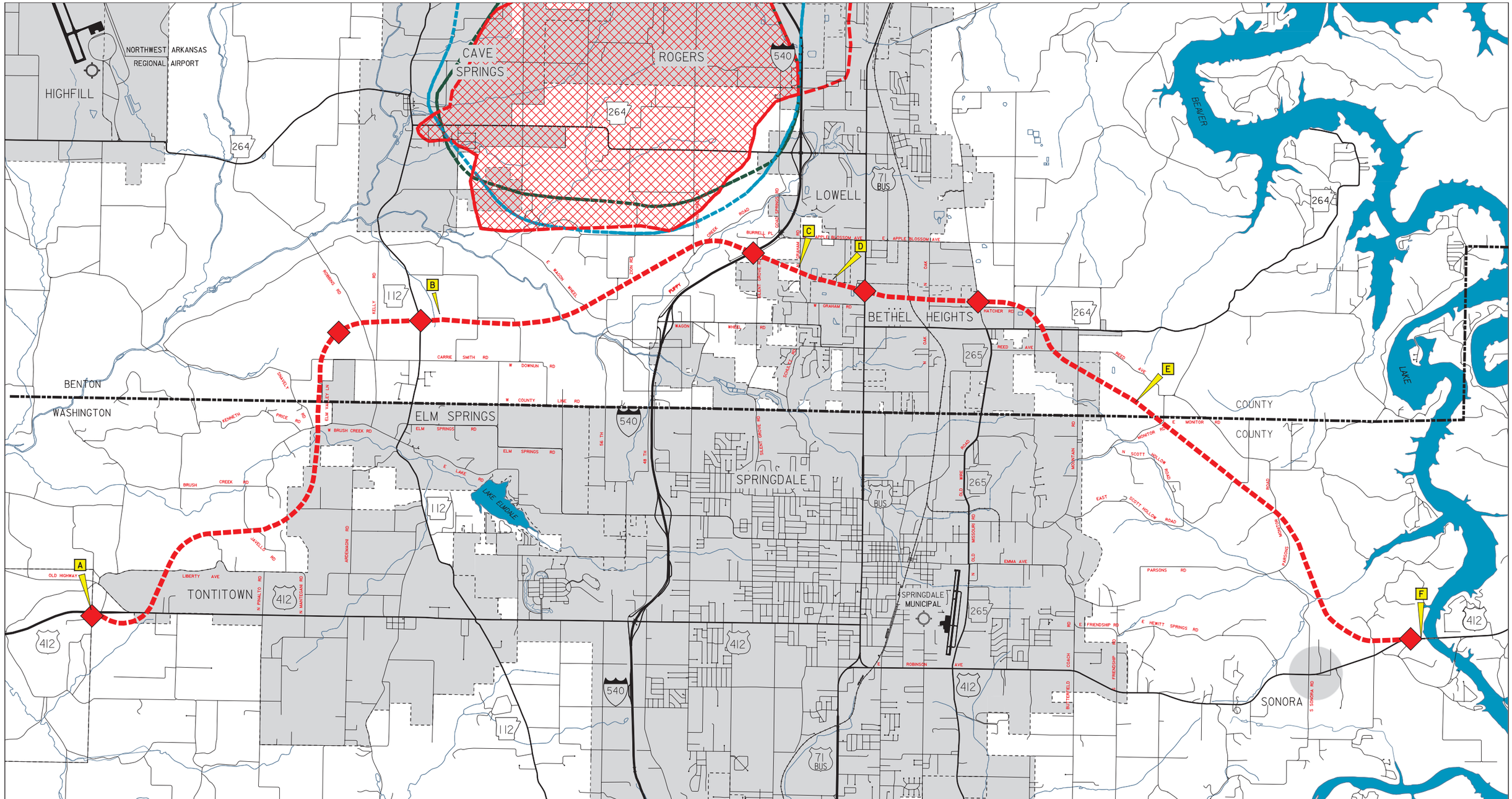
Hydrology is the study of the properties, distribution, and effects of water on the earth's surface, in the soil and underlying rocks, and in the atmosphere. The following information is included as a discussion of those hydrologic properties that could influence or be potentially impacted by the proposed project.

3.3.3.1 Precipitation and Runoff

Precipitation is the ultimate source of water that recharges the major aquifers. Average annual rainfall (1951-80) amounts range from about 40 to about 60 inches (1.0 to 1.5 meters). Temporal (seasonal) and spatial variations in precipitation are evident in the state. Precipitation is greatest during January and May in Arkansas. Average annual runoff is less than 12 inches (0.3 meter) in northwestern Arkansas. Comparison of precipitation and runoff maps shows that less than one-half of the annual precipitation leaves the area as stream runoff. Much of the water that does not leave as runoff is returned to the atmosphere by evapotranspiration, which is the combination of transpiration by vegetation and evaporation from marshes, swamps, lakes and streams. A small amount of water recharges aquifers that are either exposed or buried to shallow depth, and an even smaller amount percolates downward and enters the deep flow system. (U.S.G.S. 1998)

3.3.3.2 Drainage

The project area falls within the Arkansas River Basin and White River Basin drainage areas. Most of the project area drains west and north into the Illinois River drainage, a component



0 1.0 2.0 3.0 MI
0 1.0 2.0 3.0 4.0 5.0 KM

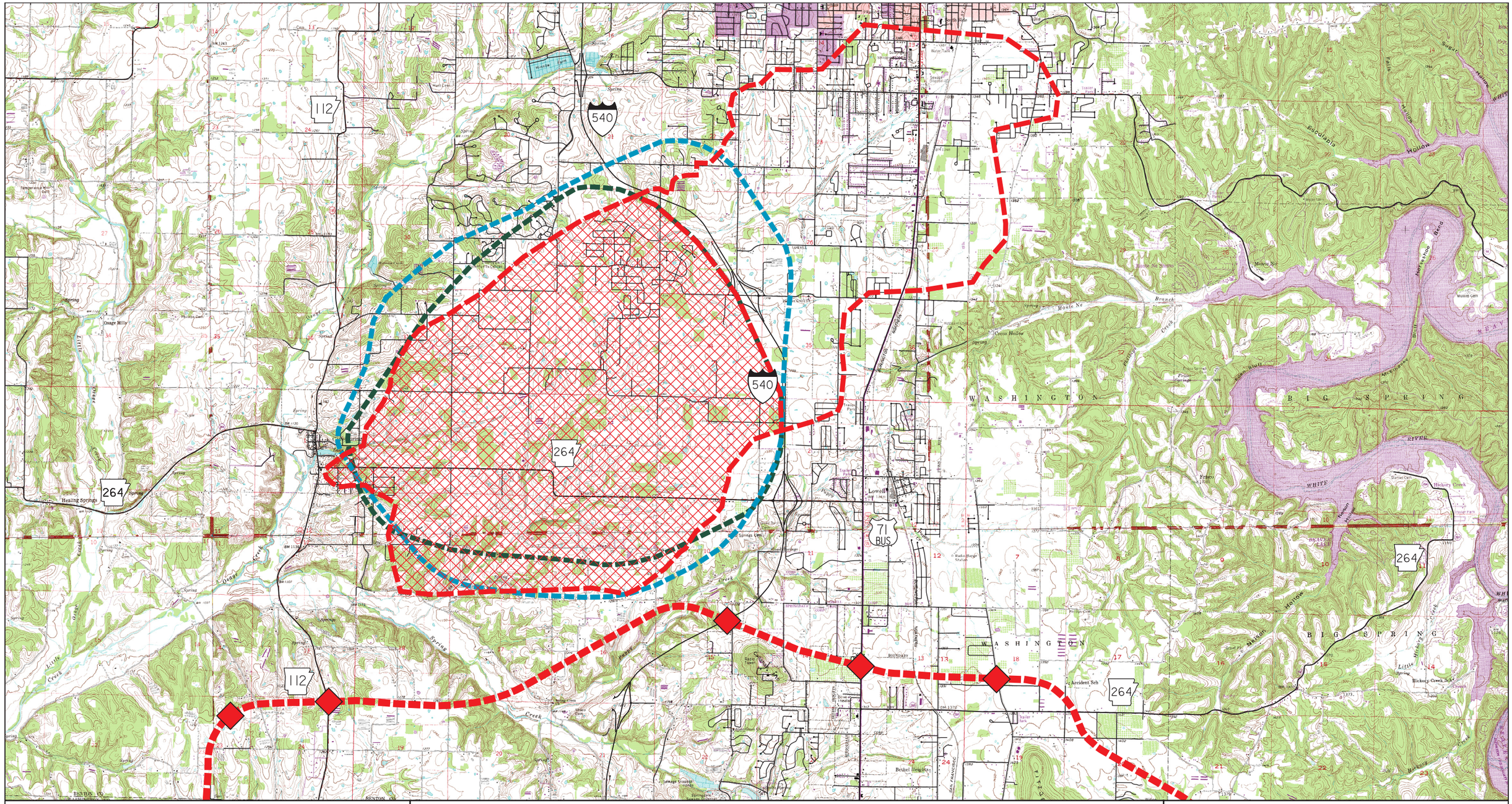
Job Number - 001966
AHTD/Environmental - GIS - Pearson
04/18/2005

Legend

- Aley & Moss - 2001 Direct Recharge Area
- Aley & Moss - 2001 Indirect Recharge Area
- Aley - 1978
- Williams - 1989
- Preferred Line
- Segment Breaks (A)
- Proposed Interchange

Figure 3 - 4
Overview of
Cave Springs Recharge Area

This page is intentionally blank.



0 1.0 2.0 3.0 MI

0 1.0 2.0 3.0 4.0 5.0 KM

N

Legend

- Aley & Moss - 2001 Direct Recharge Area
- Aley & Moss - 2001 Indirect Recharge Area
- Aley - 1978
- Williams - 1989
- Preferred Line
- Proposed Interchange

Job Number - 001966
AHTD/Environmental - GIS - Pearson
04/18/2005

Figure 3 - 5
Topographic Map of
Cave Springs Recharge Area

This page is intentionally blank.

of the Arkansas River Basin. The portion of the project east of Fitzgerald and Weber Figure Mountain is in the Friendship and Phillips Creek drainage, which drains east to the White River.

There are numerous unnamed streams in the project area that have intermittent or perennial stream flow. Numerous spring runs within the project area maintain a measurable flow year round.

3.3.3.3 Floodways and Floodplains

The protection of floodplains and floodways is required by Executive Order 11988, Floodplain Management; U.S. DOT Order 5640.2, Floodplain Management and Protection; and 23 Code of Federal Regulations 650. The intent of these regulations is to avoid or minimize, where practicable, highway encroachments within the 100-year (base) floodplains and to avoid supporting land use development that is incompatible with floodplain values.

Floodplains have many natural and beneficial values. These values include, but are not limited to fish, wildlife, plants, open space, natural beauty, scientific study, outdoor recreation, agriculture, aquaculture, forestry, natural moderation of floods, water quality maintenance, and groundwater recharge.

Flood Insurance Rate Maps and Flood Hazard Boundary Maps were obtained for counties and cities within the study area. Within this study area, the largest floodplain areas occur along Spring, Brush, and Puppy Creeks.

3.3.4 Wetlands and Waters of the United States

3.3.4.1 Waters of the U. S.

The project area falls within the Arkansas and White River drainages. Most of the project area drains west and north to the Illinois River, a component of the Arkansas River System. The portion of the project east of Fitzgerald and Weber Mountains is in the Friendship and Phillips Creek drainage that drains east to the White River.

Streams in the project area are categorized as ephemeral, intermittent or perennial following definitions utilized by the United States Army Corps of Engineers (USACE) in their

Nationwide Permits, General Conditions, and Definitions (67 FR 2094-2095). Ephemeral streams have flowing water only during and for a short duration after precipitation events in a typical year. Ephemeral streambeds are located above the water table year round. Runoff from precipitation is the primary water source for stream flow. Ephemeral streams typically support few aquatic organisms. When aquatic organisms are present, they typically have a very short aquatic life stage.

Intermittent streams have flowing water during certain times of the year when ground water is sufficient for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from precipitation is a supplemental water source for intermittent stream flow. The biological community of intermittent streams is composed of species that are aquatic during a part of their life history or are capable of movement to perennial water sources.

A perennial stream has flowing water year-round during a typical year. The water table is located above the streambed for most of the year. Groundwater is the primary water source of water for stream flow, and runoff from precipitation is a supplemental source. Perennial streams support a diverse aquatic community of organisms year round, and they are typically the streams that support major fisheries.

Spring and Brush creeks are the largest creeks in the project area with the mean annual discharge of Spring Creek becoming greater than five cubic feet per second approximately halfway through the project area. Spring and Brush creeks are the only two larger streams in the project area with year round surface flow. Other named streams in the project area include Puppy, Friendship, and Phillips creeks. There are numerous additional small streams in the project area that are not named and have ephemeral to perennial stream flow. Figures 3-6 to 3-10 illustrate the different streams in the project area.

Approximately 80% of the land use in the project area is open (pasture, yards, roads, etc.). The majority of the forested land is located along the streams and steeper hillsides. Most of the streams in the project area have riparian habitat present, although some are heavily impacted by cattle grazing. Water quality is variable and often related to runoff from adjacent areas.

Figure 3-6: View of Spring Creek.

Figure 3-7: View of Brush Creek.

Figure 3-8: View of Friendship Creek.

Figure 3-9: View of Puppy Creek.

Figure 3-10: View of unnamed ephemeral stream in the project area.

Figure 3-11: View of spring on the Preferred Line.

The numerous springs in the project area provide for perennial flow in some of the headwater streams. There are many springs and spring runs that maintain measurable flow year round. Most of the springs have spring boxes and are water sources for livestock. These are located in pastures or have been dammed to create stock ponds. Undisturbed sections of spring runs support lush growth of watercress and good water quality. However, most of the spring runs in the project area have been disturbed. Refer to Figure 3-11 for a view of the small spring on the Preferred Line.

No natural lakes are present in the project area, although there are two man made lakes. Lake Elmdale belongs to the Arkansas Game and Fish Commission and is a public fishing lake. Beaver Lake is a reservoir constructed on the White River.

3.3.4.2 Wetlands

Any discharge of dredged or fill material into wetlands as a result of this project is subject to regulation under the Clean Water Act. Wetlands are defined in the USACE Wetlands Delineation Manual (Final Report 1987) as being, "Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances, do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands can include old creek or river channels, sloughs, swamps, bogs, ponded pasture areas, pond fringes and seep areas. Three characteristics must be present for a wetland to exist. These are: 1) the presence of hydric soils, 2) hydrophytic vegetation, and 3) wetland hydrology.

Executive Order 11990 (E.O. 11990, May 1977) entitled, "Protection of Wetlands", established a national policy to "avoid to the extent possible the long-term and short term adverse impacts associated with the destruction or modification of wetlands and to avoid the direct or indirect support of new construction in wetlands wherever there is a practicable alternative." Wetlands within the project area have been evaluated in accordance with E.O. 11990.

Potential wetland areas within the project corridors were located by using hydric soils maps, U. S. Geological Survey 7.5' topographic maps, color infrared photography and limited field reconnaissance.

Within the project area, only two soils occur that contain hydric soil inclusions (Harper 1979, Phillips 1977). These two soils are Taloka silt loam that contains 10% inclusions of Cherokee hydric soils and Johnsburg silt loam that contains 10% inclusions of Leaf hydric soils. These two potentially hydric soils occur in a few small areas within the proposed alignments. After field review it was determined that all of these areas are located in well-maintained hay fields or grazed pastures. Figure 3-12 is a view of the ponded pasture wetland within the proposed Highway 71B interchange.

Wetlands of substantial size do not occur within the project area. Figure 3-13 provides a color infrared view of the wetland locations in the project area. These small isolated wetlands are associated with stock pond fringes and ponded depressions in pastures, and they

Figure 3-12: View of ponded pasture wetland within the proposed Highway 71B interchange.

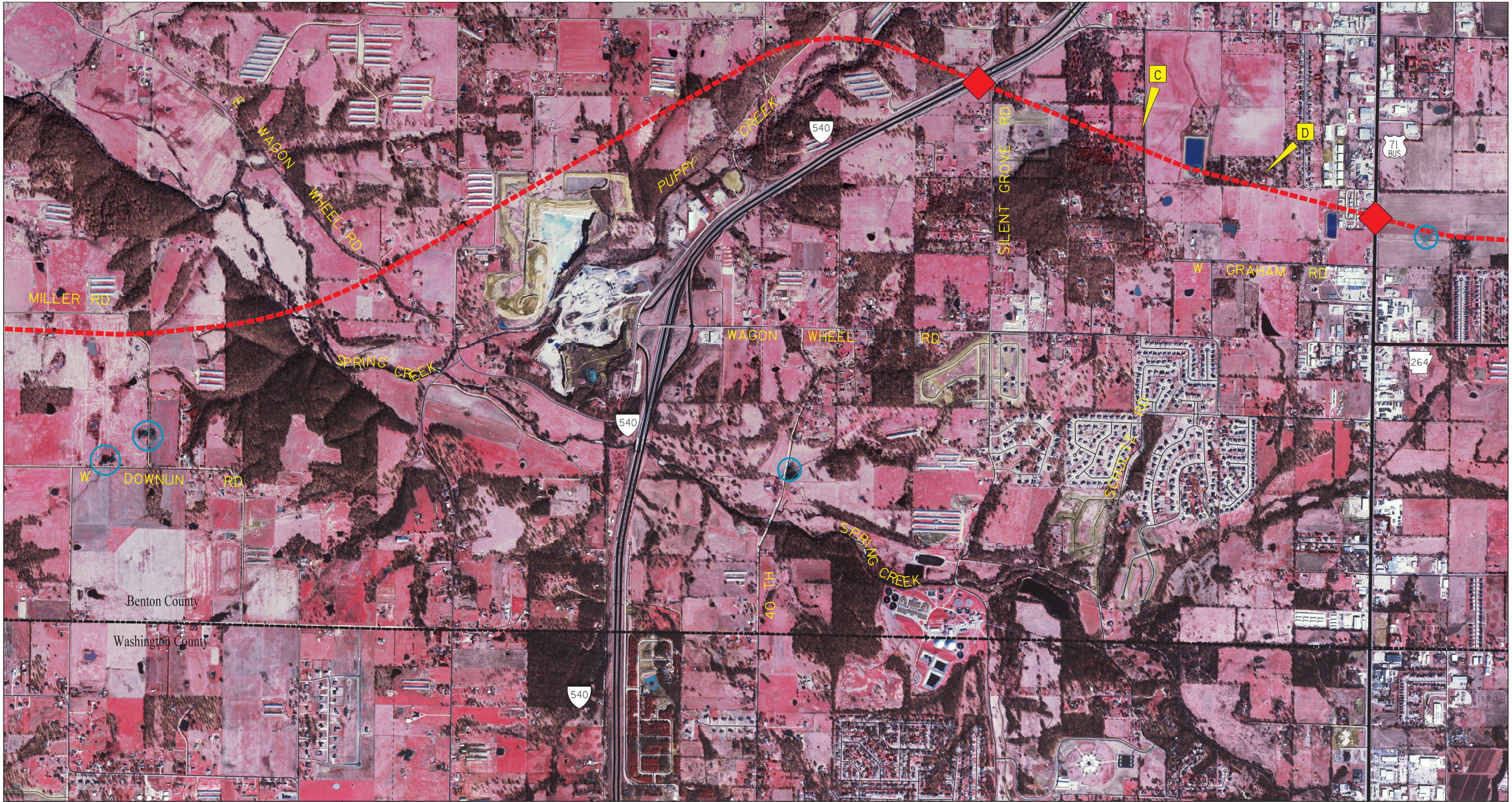
are located on the Captina Silt Loam soil type. This soil type is not listed as hydric, however; it has slow permeability and a fragipan that slows the movement of water through the soil. If the right conditions occur, a wetland can exist on this soil type. The dominant vegetation on these wetlands includes blue mud plantain *(Heteranthera limosa)*, jungle rice *(Echinochloa colona)*, Engelmann's spikerush *(Eleocharis engelmannii)* and curly dock *(Rumex crispus)*.

3.3.5 Surface Water Quality

The project study area is within the Ozark Highlands Ecoregion, which is noted for its mountainous terrain with steep gradients and fast-flowing, spring-fed streams. A large percentage of the streams from within the Ozark Highlands Ecoregion are designated as extraordinary resource waters. The fractured limestone geology of the region allows a direct linkage from surface waters to ground waters. The water quality problems within this region are directly related to land use. Within this region are some of the highest animal production rates in the United States, specifically, chickens, swine and cattle. The waste generated from these animal production facilities is generally land applied and therefore, has the potential for contaminating both surface and ground waters. The nitrate levels measured from this region are uncharacteristically high. Direct habitat destruction and accelerated siltation problems are also caused by the removal of gravel from the banks and beds of streams.

The Arkansas Department of Environmental Quality (ADEQ) divides the six major river basins in Arkansas into thirty-eight water quality planning segments based on hydrological characteristics, human activities, geographic characteristics, etc. The waters within the project area fall into two of these planning segments, Segment 3J of the Arkansas River Basin, and Segment 4K of the White River Basin.

Segment 3J of the Arkansas River Basin has been designated suitable for the propagation of fish and wildlife, primary and secondary contact recreation, and public, industrial and agricultural water supplies. This segment contains 204 stream miles (327 km), 172 miles (277 km) of which are being assessed with monitoring stations. Within Segment 3J, 13 stream miles (21 km) are listed as non-supporting the "aquatic life" use. The primary cause of these impacts is from pastureland that is being treated with poultry waste products. Secondary causes listed are extensive bank erosion and destabilization of the streambeds caused by in-stream gravel removal, and road construction and maintenance (ADEQ, 2002).



0 1/4 3/4 1/2 MI
0 0.3 0.6 1.0 1.3 1.6 KM

Job Number - 001966
AHTD/Environmental - GIS - Pearson
04/18/2005

Legend

Preferred Line
Wetland
Segment Breaks
Proposed Interchange

Photography Date: February 2001

Figure 3 - 13

Aerial Infrared Photography Illustrating Wetland Locations

This page intentionally left blank.

Segment 4K of the White River Basin has been designated suitable for the propagation of fish and wildlife, primary and secondary contact recreation, domestic, agricultural, and industrial water supplies. Also, about 20 percent of these waters are designated as outstanding state or national resource waters. This segment contains 495 stream miles (797 km), 208 miles (335 km) of which were being assessed with monitoring stations. The "aquatic life" use was assessed as not supported in 33 miles (53 km) of the West Fork of the White River. The major cause was high turbidity levels and excessive silt loads from three primary sources: (1) the clearing of land for agricultural use; (2) road construction and maintenance; and (3) gravel removal from streambeds (ADEQ, 2002).

A review of data from least disturbed reference streams in the Ozark Highlands Ecoregion reveals certain common physical characteristics. Headwater streams within the project area are high gradient with a pool/riffle ratio of approximately 1:1. Velocities for streams within the region during low flow generally average approximately 1.0 foot/second (0.3m/second) (Arkansas Department of Pollution Control and Ecology (ADPCE), 1986). Substrates within the headwaters are usually gravel and small rock with smaller amounts of silt and sand. The numerous springs and sinkholes in the area can cause streams to gain or lose considerable portions of their volume. The streams are typically very clear (ADPCE, 1987).

Undisturbed sections of the numerous spring runs within the project area support lush growth of watercress and good water quality. Rare animal species may also persist in some undisturbed springs (see Threatened and Endangered Species Section).

In areas with appreciable dissolution of limestone, the surface is known as karst topography and includes features such as sinks, disappearing streams, and solution valleys as well as caves or caverns. All of these features can provide direct connection of the surface water system to the ground water system.

3.3.6 Groundwater Quality

In the karst environment that provides the geologic and hydrogeologic setting for ground water resources in this project study area, geology is an important aspect of any groundwater discussion; therefore refer to the Hydrogeology Section for more background information related to this discussion.

Areas of karst topography include features such as caves, sinking streams, sinkholes, and springs. All of these features can provide direct connection between surface water and groundwater, i.e., the groundwater is directly affected by surface land use and its associated runoff. Studies have shown that the shallow aquifer in northwestern Arkansas is directly affected by local land usage (Steele and Adamski 1987).

In most areas, the major sources of groundwater contamination are probably due to domestic animal waste (e.g., chicken litter and cattle manure) and septic tank effluent. Septic tank drain fields that are located immediately above fractures and improperly installed will provide ready access of the effluent to the groundwater system. Land application of animal wastes has been a common practice for many years in northwestern Arkansas, leading to the introduction of contaminants into the groundwater system (Steele, 1985).

Statistical correlations between nitrate, sodium, and chloride in the Springfield Plateau aquifer suggest that these constituents share a common source, probably animal wastes. Attempts to define a relationship between water chemistry and water table elevations within the Springfield Plateau Aquifer have failed. Land use variations, the anisotropic character of the aquifer, and the potential for widespread nonpoint source contaminant input generate variations in water chemistry, which are not dependant on position in the flow system (Smith, 1992).

The confining layer under the Springfield Plateau separates the deeper Ozark aquifer from the shallower surface aquifer, and thus protects it from infiltrating surface contaminates. As a result, surface source contaminants are less in the deeper aquifer. The outcrop portion of the Ozark aquifer lies in an area not heavily utilized for agriculture, thus reducing the potential for contamination from animal waste.

Within the project study area, the Cave Springs area has been studied extensively as related to groundwater quality (Aley, 1978; Williams, 1991; Graening, 1999).

3.3.7 Drinking Water Supplies

Most of the domestic water used in the study area comes from two public water distribution systems; Beaver Water District and Benton–Washington Regional PWA. The distribution

systems supply water to the municipal and rural water systems whose service limits cover the entire study area. The water source for both distribution systems is Beaver Lake Reservoir, an impoundment on the White River.

There are some rural residents in the study area who have chosen to stay on private sources of water for their domestic and/or agricultural purposes. These private sources of water come from wells and springs. Wells are typically installed in the first water-bearing rock formation encountered during drilling.

The Safe Drinking Water Act of 1986 requires identification and protection of sole source aquifers and the establishment of wellhead protection areas. No sole source aquifers or wellhead protection areas are located within the study area.

3.3.8 Terrestrial Communities

3.3.8.1 Terrestrial Flora

Historically, upland prairies dotted the landscape of the project area as illustrated on the 1838, 1839, and 1840 Government Land Office maps. Much of the area was cleared for farming and fruit production, and no prairies remain. All of the land cover in the project area has been disturbed at some point following settlement, primarily by conversion to pasture for livestock forage.

Vegetation cover within the project area is predominantly modern pasture. A few small areas are still used as orchards for fruit production. Natural vegetation consists of upland hardwood oak-hickory (*Quercus* and *Carya*) communities, occurring primarily on the steep slopes of mountains and stream banks.

There are two main flora communities in the project area:

1) Pasture-Pastures and hayfields in the project area consist predominantly of either tall fescue (*Festuca arundinacea*) or bermuda grass (*Cynodon dactylon*), often as monocultures but sometimes mixed with other grasses. Both grasses are introductions from Europe. Tall fescue is a clump-forming cool-season grass. Bermuda grass is a turf-forming warm-season grass. Although tall fescue has long

been the principal grass in the area, many fields have been converted to bermuda grass. Some landowners leave scattered trees or small forested areas among their pastures, typically as shade for livestock. Abandoned pastures eventually revert to upland forest unless impacted by modern development. Common species of abandoned fields include ragweeds (*Ambrosia* spp.), asters (*Aster* spp.), goldenrods (*Solidago* spp.), foxtail (*Setaria geniculata*) and other grasses.

2) Woodland-Existing natural plant communities in the project area consist primarily of the oak/hickory associations of the eastern deciduous forest. There are two common oak-hickory communities in the project area: the black oak/red oak/white oak community, and the post oak/blackjack oak community. These community types overlap and intermingle in the project area depending on available moisture and substrate.

   The black oak/red oak/white oak community is most commonly dominated by black oak (*Quercus velutina*), and southern red oak (*Q. falcata*) is usually co-dominant. In more mesic areas like north-facing slopes, white oak (*Q. alba*) is a major component of the community. Common hickories include bitternut (*Carya cordiformis*) and mockernut (*C. tomentosa*). Hackberry (*Celtis occidentalis*), black gum (*Nyssa sylvatica*), and chestnut oak (*Q. muehlenbergii*) are also common.

   The post oak/blackjack oak community occupies more exposed areas that are hotter and dryer, such as south facing slopes or mountaintops. Dominant species include post oak (*Q. stellata*) and blackjack oak (*Q. marilandica*). Black hickory (*C. texana*) is also often present.

Along streams and other places where moisture is available, common trees include sycamore (*Platanus occidentalis*) and silver maple (*Acer saccharinum*). Sassafras (*Sassafras albidum*) and persimmon (*Diospyros virginiana*) are common along fencerows and other disturbed boundaries.

3.3.8.2 Terrestrial Fauna

A diverse array of wildlife species occurs within the project area. Lists of mammals (Sealander and Heidt 1990), birds (James and Neal 1986), and reptiles and amphibians

(Conant and Collins 1991) likely to occur in the project area are included in Appendix I. Forest big games species that occur in the project area include white tailed deer (*Odocoileus virginianus*), eastern wild turkey (*Meleagris gallopavo*), and black bear (*Ursus americanus*). Important small game and furbearers in the project area include the fox squirrel (*Sciurus niger*), gray squirrel, (*Sciurus carolinensis*), coyote (*Canis latrans*), opossum (*Didelphis virginiana*) and raccoon (*Procyon lotor*). Forest dwelling small mammals such as mice, moles and shrews provide a valuable food resource for larger forest predators such as the coyote, red fox (*Vulpes vulpes*), gray fox (*Urocyon cinerioargenteus*), bobcat (*Felis rufus*), and mink (*Mustela vison)*.

Forest birds include a variety of warblers, wrens, thrushes, vireos, flycatchers, and woodpeckers. Forest raptors include the great horned owl (*Bubo virginianus*), barred owl (*Stryx varia*), Cooper's Hawk (*Accipiter cooperii*), sharp-shinned hawk (*Accipiter striatus*) and red-shouldered hawk (*Buteo lineatus*).

Amphibians and reptiles are also important members of the forest community and play a role in nutrient recycling, predator-prey relationships, and energy flow (Green and Pauley 1987). Common species in the project area include the box turtle (*Terrapene c. caroliniana*), several species of woodland salamanders (Plethodontidae), and several species of mole salamanders (Ambystomatidae).

Pastures and old-field communities provide habitat for a number of wildlife species adapted to early successional vegetation. Small mammals and birds typically dominate the vertebrate wildlife communities. The eastern cottontail rabbit (*Sylvilagus floridanus*) and a variety of mice, voles, moles and shrews are common small mammals. Larger predators such as the coyote and fox frequently prey upon the small mammals in the pasture and old-field communities.

A variety of bird species forage in the pasture-old field areas and use the shrubby edge habitat for nesting and cover. Typical species seasonally include the indigo bunting (*Passerina cyanea*), a variety of sparrows, eastern meadowlark (*Sturnella magna*), cardinals (*Cardinalis cardinalis*), eastern bluebird (*Sialia sialis*), and blackbirds. In addition, these areas are utilized as foraging habitat by raptor species such as the red-tailed hawk (*Buteo jamaicensis*) and American kestral (*Falco spaverius*).

The relative open space and lack of adequate ground cover within these habitats generally results in poor species diversity and population numbers for most reptile and amphibian species. However, some snake species such as the black rat snake (*Elaphe o. obsoleta*), garter snake (*Thamnophis sirtalis*) and hognose snake (*Heterodon platyrhinos*) prey on the resident small mammal and insect populations.

3.3.9 Aquatic Fauna

3.3.9.1 Macroinvertebrates

The Arkansas Soil and Water Conservation Commission performed a bioassessment of the Illinois River Drainage (Arkansas Soil and Water Conservation Commission, 1994) and sampled one site in Spring Creek and one site in Brush Creek that are within the project area. Representatives from 19 aquatic families were collected at each site. Results of the bioassessment indicated that organic pollution was probable at Brush Creek, and that Spring Creek water quality was fair with substantial pollution likely. The Arkansas Department of Pollution Control and Ecology (1997) sampled two sites in Spring Creek using rapid bioassessment (RBA) techniques. Site 1 was located upstream of the Springdale wastewater treatment discharge point and Site 2 was located approximately 0.5 mile (0.8 km) downstream of the wastewater treatment outfall. Nine taxa were recorded from Site 1 and 13 taxa were recorded from Site 2. Both sites were dominated by individuals of the mayfly nymph *Baetis* (63% and 66% of total individuals, respectively). Site 1 was classified as slightly impaired and Site 2 was classified as not significantly impaired in terms of biological condition when compared to an unimpaired reference site.

3.3.9.2 Fish

Geishler et al. (1975) reported 62 fish species from the Illinois River. Fishes of Washington County were surveyed by Cloutman and Olmsted (1976), and 66 species were reported from the Illinois River drainage within the county. Fish species likely to occur within the Illinois River drainage are summarized from Robison and Buchanan (1988) and appear in Appendix I. The Arkansas Department of Pollution Control and Ecology (1997) sampled three sites in Spring Creek and collected a total of 20 fish species. The most upstream Spring Creek sample site was located upstream of the City of Springdale's wastewater treatment

plant discharge. The drainage area for this site was approximately 8.0 square miles (20 sq. km.) and seven fish species were collected as shown in Table 3-3. A second Spring Creek sample site was located approximately 0.5 mile (0.8 km) downstream of the Springdale wastewater treatment discharge point, and 15 species of fish were collected at this site. The most downstream sample site was located approximately 1.8 miles (2.9 km) downstream of the wastewater treatment discharge point and upstream of the confluence with Puppy Creek. A total of 15 species were also collected at this site. All of these sample sites are located upstream of the preferred alignment.

Harris and Smith (1985) reported the Arkansas darter and least darter from five sites each within the Illinois River drainage, and these are the only known localities where these species occur in Arkansas. Habitat for these species is first and second order spring runs with sand and gravel substrate and an abundance of aquatic vegetation, primarily watercress (Harris and Smith 1985, Robison and Buchanan 1988). Neither species is known to occur in the proposed project area, however both species have been collected from Little Osage Creek at the Highway 264 crossing, Benton County, approximately 3.0 miles (4.8 km) northwest of the project area. Both species could occur in spring run habitat within the proposed project area.

Additional fishery resources are found within farm ponds and reservoirs in the proposed project area, and the typical fauna associated with these is the bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), channel catfish (*Ictalurus punctatus*) triumvirate.

3.3.10 Threatened and Endangered Species

The Arkansas Natural Heritage Commission (ANHC) provided information from their inventory research program regarding elements of special concern within the project study area. Species of special concern can include federally listed threatened or endangered species, or species of state concern. A list of species of state concern is maintained by the ANHC and consists of species rarely found within the state of Arkansas. Eighty taxa of special concern have been recorded from Benton County, and these include 16 invertebrate species, six fish species, three amphibians, three reptiles, three birds, five mammals, and 44 plants. In Washington County, 64 species of special concern have been recorded, and these

Table 3-3
Fish Species of the Project Area

Species Name	Common Name	Site 1	Site 2	Site 3
Campostoma anomalum	stoneroller	X	X	X
Cyprinus carpio	carp		X	X
Luxilus cardinalis	cardinal shiner		X	X
Phoxinus erythrogaster	southern redbelly dace	X	X	X
Semotilus atromaculatus	creek chub	X	X	X
Catotomus commersoni	white sucker	X		X
Hypentelium nigricans	northern hogsucker		X	X
Ameiurus melas	black bullhead			X
Ameiurus natalis	yellow bullhead		X	X
Noturus exilis	slender madtom			X
Lepomis cyanellus	green sunfish	X	X	X
Lepomis macrochirus	bluegill			X
Lepomis megalotis	longear sunfish		X	
Micropterus dolomieui	smallmouth bass		X	
Micropterus punctulatus	spotted bass		X	
Micropterus salmoides	largemouth bass		X	
Etheostoma punctulatum	stippled darter		X	
Etheostoma spectabile	orangethroat darter	X	X	X
Etheostoma zonale	banded darter			X
Cottus carolinae	banded sculpin	X	X	X
TOTAL SPECIES		7	15	15

include 16 invertebrates, six fish, three amphibians, three reptiles, four birds, seven mammals, and 25 plants. Federally listed species which have occurred or continue to exist in the two county area include a cave crayfish (*Cambarus aculabrum*), Ozark cavefish, Interior least tern, gray bat, Indiana bat, Florida panther, and Missouri bladderpod.

Cave Springs Cave and its associated recharge area are immediately north of the project study area. This cave complex is home to the largest known population of the Ozark cavefish that is listed as federally threatened (Graening and Brown 1999). This cave system is one of only two caves in Arkansas known to be inhabited by *Cambarus aculabrum.* Also, Cave Springs Cave hosts one of the few maternity colonies of the endangered gray bat (*Myotis grisescens*). The recharge area for Cave Springs as delineated by Aley (1978), Williams (1989), and Aley and Moss (2001) is shown in Figures 3-4 and 3-5.

Split Cave is located in the extreme eastern portion of the project study area, with the cave opening located east of Sonora Road. Split Cave apparently has a subsurface connection to Beaver Lake. No cave crayfish or Ozark cavefish have been recorded from this cave, and recent diving explorations concluded that these troglobytic species are not likely to exist in Split Cave.

The Elm Springs area is endowed with a complex of 11 springs along Brush Creek between the Lake Elmdale Dam and approximately 0.25 mile (0.4 km) downstream of the Highway 112 crossing of Brush Creek. In July 2004, a single specimen of an endangered federally listed species, the cave crayfish *Cambarus aculabrum,* was recovered by a local landowner from one of the spring openings. The recharge area for the spring complex is currently unknown, but surrounding topography suggests that recharge would occur from the south from the vicinity of Highway 412 and Tontitown.

Two species of state concern have occurred within the project study area and their localities are listed in Table 3-4.

Table 3-4
Species of State Concern

Site No.	Site Location & Description	State Rank	Federal Status	Species	Common Name
1	T18N; R31W; Sec. 13 Hwy 112, 1.7 miles north of County Line	S4	NA	*Ambystoma annulatum*	ringed salamander
2	T18N; R31W; Sec. 25 Fayetteville, Elm Springs	S3	NA	*Trillium pusillum var. ozarkanum*	Ozark least trillium
3	T18N; R31W; Sec. 14 5.1 miles north of jct. Hwy. 112 & Hwy. 68; 0.6 miles west on dirt road	S3	NA	*Trillium pusillum var. ozarkanum*	Ozark least trillium

3.3.11 Natural Areas

Staff members of the ANHC have reviewed their files for any designated natural areas or other locations of concern within or near the project study area known to contain significant components of the Arkansas natural diversity. There are no natural areas identified near the study area.

3.3.12 Wild and Scenic Rivers

No components of the Wild and Scenic Rivers System or streams listed on the Nationwide Rivers Inventory are located in the proximity of the project study area.

3.3.13 Public Recreational Lands

Correspondence received from the Arkansas Department of Parks and Tourism and the City of Springdale confirmed the following three parks in the proximity of the study area.

1) Bethel Heights Fun Park- This park is located at the Bethel Heights City Hall.

2) J. B. Hunt Park-This is a 97-acre (39 hectare) facility being developed as a park by the City of Springdale. The park is located east of Silent Grove Road and south of the Benton/Washington County Line.

3) Lowell Road-The City of Springdale has recently had property donated for park development on Lowell Road.

These parks were considered as constraints to be avoided, which led to the adjustment and/or elimination of some of the preliminary corridors.

In 1838-1839, the U. S. Government forcibly relocated the Cherokee Indians from their homelands in the southeastern United States to Indian Territory hundreds of miles to the west. In 1987, Congress designated the route as a National Historic Trail to commemorate the event. The routes chosen for the trail encompass over 2,219 miles (3570 km) and span parts of nine states. While the exact route in this area has not been verified, most researchers believe that it more than likely followed what is now known as Old Wire Road, which runs north-south through the eastern portion of the project area and crosses all of the alignments. No public lands are associated with the trail within the study area. The National Park Service has also delineated a Trail of Tears driving route that follows Highway 71 from the Missouri-Arkansas border to the city of Fayetteville in Washington County.

Further research and a survey of the proposed alignment routes failed to disclose any existing publicly owned park or recreational area within proximity to the alignments under consideration.

3.3.14 Cultural Resources

The identification and assessment of potential project impacts to cultural resources is based on several different types of information. The most substantial data comes from a thorough review of all available records regarding archeological and historic resources in the project study area. Resources examined include an array of early maps, archeological site files, National Register nomination forms, historic structure documentation, the AHTD historic bridge inventory, cemetery records, land entry records, tax records, census data, and a number of archeological reports and historical journals.

Each alignment was also examined in regards to historic land use and known settlement patterns in an attempt to identify “high probability areas” where archeological sites or historic structures are likely to occur. This involved examination of the various landforms along each alignment and their proximity to streams, springs, arable soils, former prairie

locations, early trails, roads and other features that might influence the location of settlements and sites.

Additional information incorporated into the study was received from the general public as a part of the public involvement process. Comment forms addressing a variety of project specific concerns were distributed to the public at all public involvement sessions. One of the queries on the form is: "Do you know of any archeological or historical sites in the project area?" This approach resulted in local knowledge becoming an effective tool in locating potential site locations and historic structures that had not been identified during the records review. Two federally recognized Native American Tribes were also consulted in regards to properties or sites that might be of importance to their heritage or culture.

Finally, a reconnaissance level windshield survey was conducted for each alignment. This consisted of driving to as many public access points as possible along each of the alignments in order to identify any obvious areas that might warrant avoidance or additional work.

3.3.14.1 Archeological Resources

Most current knowledge regarding archeology in the Ozark Mountains has been compiled within the last century. To date, a wide variety of prehistoric site types have been recognized in the region including bluff shelters, ridge top sites, bench sites, upland plateau sites, stream terrace sites, rock art sites, mound sites, stone quarry sites and isolated artifact finds. Broad archeological sequences have been developed but refined local chronologies are needed for just about all periods. Table 3-5 outlines the prehistoric cultural history of the Ozark Mountains region as it is currently understood. For a more in-depth review, the reader is directed to the list of Cultural Resource Reading Materials in Appendix N.

3.3.14.1.1 Archeological Projects and Sites

Records of known archeological sites are maintained by the Arkansas Archeological Survey in Fayetteville. These records are available to the AHTD archeologists through the Multi-Agency User Program. This program allows access to the Automated Management of Archeological Site Data in Arkansas (AMASDA) data files and the Arkansas Archeological Project Listing. These databases contain information on all archeological projects that have been completed in the State.

Table 3-5
Prehistoric Cultural Sequence for Northwest Arkansas

Cultural Period	Cultural Phase	Date Range	Site(s)
Mississippi	Neosho focus	1,100-300 B. P.*	Albertson Bontke Shelter
Woodland Late Middle Early	Cooper complex? Mulberry River Culture	1,800-1,000 B. P.	Spinach Patch
Archaic Late	James River/Wister phase	5,000-1,800 B. P.	Tom's Brook Holman Creek Turner Cave
Middle Early	White River complex/Tom's Brook Rice complex	9,500-5,000 B. P.	Tom's Brook Albertson
Transitional	Dalton	10,500-9,500 B. P.	Albertson Breckenridge Holman Creek Tom's Brook
Paleo-Indian	Paleo-Indian	12,500-10,500 B. P.	

*Years Before Present (B. P.)

A review of the Project Listings shows 241 citations for archeological projects in Washington and Benton Counties. These range from records checks to large-scale excavations, but most are small-scale surveys of relatively limited scope.

The records indicate that relatively little intensive archeological fieldwork has taken place within or near the study area. To date, seven previous archeological projects have covered areas that coincide with or overlap parts of the project study area. Three of these projects were intensive surveys conducted by the AHTD staff archeologists in anticipation of road projects.

AMASDA Project Number 671 was a survey of the Highway 71 Relocation project conducted in the late 1970s and early 1980s (McClurkan, 1982). The area surveyed incorporates the now complete I-540 right-of-way. AMASDA Project Numbers 3271 and 1745 consisted of intensive surveys of two sections of Highway 412 (McClurkan, 1991;

Miller, 1995). Small portions of the survey areas for these projects overlap with the proposed interchange areas located at the project termini.

AMASDA Project Number 657 consisted of an intensive survey conducted for the expansion of Springdale's sewage facilities (Cande, 1981). Its project area covered about 40 acres (16 hectares) and lies directly south of the C-D Segment of Line 2.

AMASDA Project Number 4388 consisted of a survey of the proposed NWARA Access Road and was conducted by the Arkansas Archeological Survey (Cande, Pebworth, and Evans, 2001). It consisted of the intensive survey of two corridors for the proposed access road that are concurrent with Lines 2, 3, and 4 of the bypass between Highway 112 and I-540.

AMASDA Project Number 4579 consisted of a survey of the proposed Genova Power Plant and Transmission Line and was conducted by SPEARS, INC (Spears 2002). The project corridor intersects with Preferred Segment A-B a quarter mile north of Highway 412 at the beginning of the project, while the power plant location is on Liberty Avenue under Preferred Segment A-B.

AMASDA Project Number 4646 consists of a survey of the proposed AEP Tontitown Power Line (Biscoe 2002). The transmission line project corridor intersects with the Preferred Segment A-B west of Elm Springs and with Lines 2, 3, 4 where they split west of Highway 112. It also crosses the Preferred Line to the north, and ends in the proposed Highway 71B interchange on the Preferred Line.

A review of the Arkansas Archeological Survey's site files indicates there are sixteen previously recorded archeological sites within the project area. One (3BE301) of these was recorded as a result of the above mentioned sewer facility survey AMASDA Project Number 657. Two (3BE267, 3BE708) resulted from finds made by avocational archeologists. Five (3BE658-662) resulted from the survey of the proposed NWARA Access road, AMASDA Project Number 4388. Four (3BE699-701, 3BE710) resulted from the survey of the Genova Power Plant, AMASDA Project Number 4579, and four (3BE716, 3BE718-719, 3BE721) resulted from the survey of the AEP Tontitown Power Line, AMASDA Project Number

4646. Five additional sites (3BE300, 3BE711, 3BE714, 3BE715, 3BE717) are on record in the project vicinity.

Two previously unknown sites were identified during the reconnaissance survey and a number of site leads were obtained from the public involvement comment sheets. Due to the sensitive nature of archeological site information, the locations of the sites are not disclosed to the public. Brief descriptions of potentially impacted sites and specific information on the potential impacts are discussed in the Environmental Consequences Section.

3.3.14.2 Historic Resources

The history of Washington and Benton Counties is well documented. For further information refer to the Cultural Resources Reading Materials listed in Appendix N. A visit to the Shiloh Museum in Springdale is a worthwhile endeavor and can provide an excellent visual experience of the area's early history. Many of these resources as well as a variety of site files, maps and other documents were utilized in assessing the project's potential impacts to historic resources.

A wide variety of historic resources have been identified, including standing structures and bridges that are at least 50 years old, cemeteries, old roads, as well as archival documentation of areas or sites that may now be largely archeological in nature. These are briefly discussed below.

3.3.14.2.1 Map Resources

Hundreds of early maps on file at the Arkansas History Commission show various parts of the state. Most of these are of little use when it comes to locating specific cultural features. However, a few do contain information that is specific enough to provide information on early historic settlement and give some insight into the possible location of historic structures and archeological sites.

The earliest accurate maps of the region are the General Land Office (GLO) maps made by the U.S. Government. In Arkansas, these maps date as early as the 1800s and depending on the discretion of the survey party, often show natural and cultural features that were present during the survey. Early roads, fields, buildings, and even Indian villages are sometimes

illustrated and can supplement archeological research and provide valuable information on early settlement patterns.

There are six GLO maps (dating from 1837 to 1840) covering the project area (see Table 3-6). Several of these show cleared fields, cabins, old roads or trails, as well as springs and the former location of prairies. Springs and prairies were often magnets for early settlers and are generally considered as high probability areas for the occurrence of archeological sites. Figure 3-14 illustrates the features shown on the GLO maps reviewed for the project area.

Table 3-6
General Land Office Maps Covering the Project Area

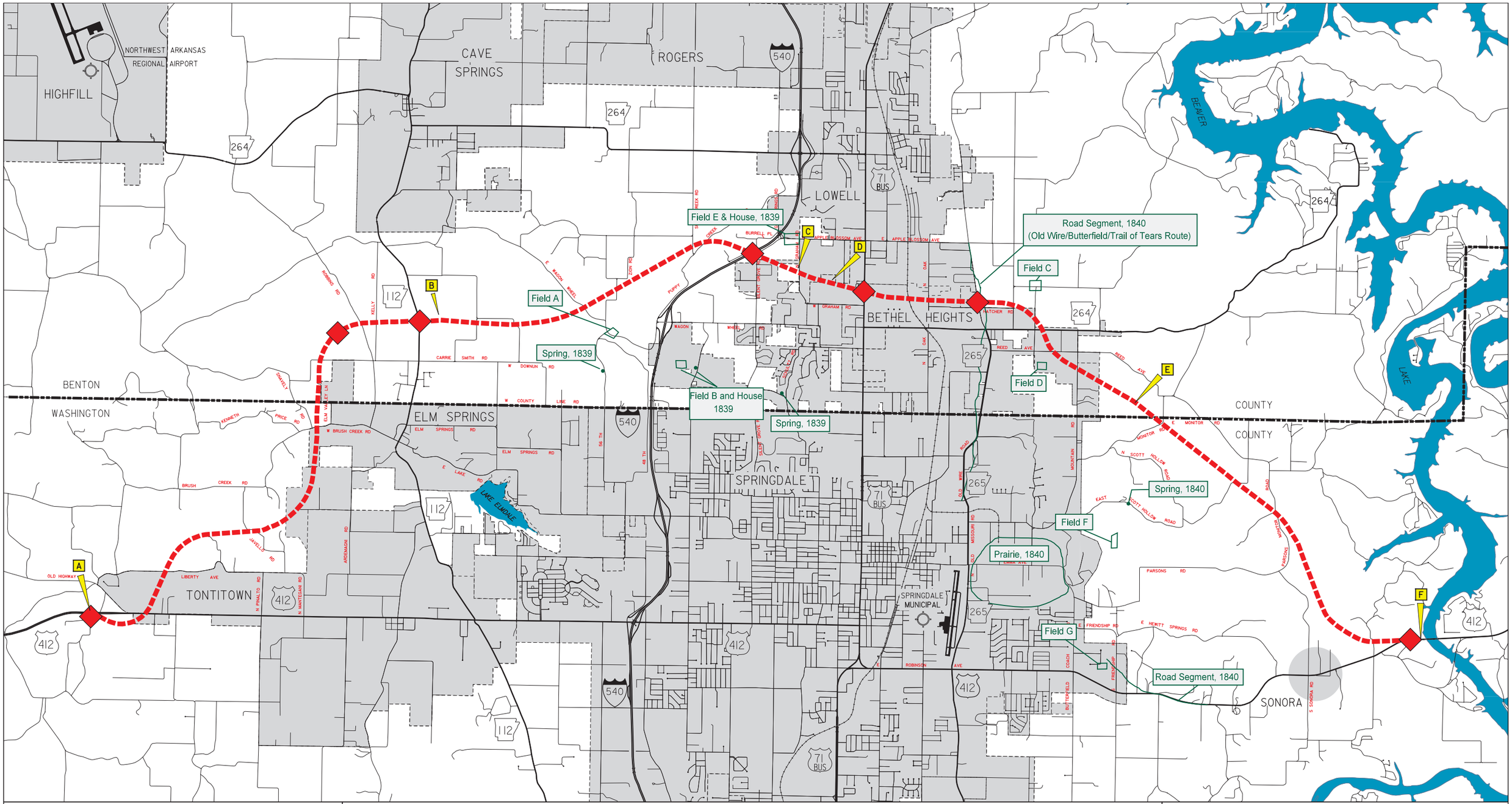
Map Date	Township	Range
1838;1839	17N	29W
1840	18N	29W
1839	18N	30W
1840	18N	31W
1837	17N	31W

The 1936 county road maps published by the Arkansas Highway Commission in conjunction with the Bureau of Public Roads are often helpful in identifying early 20th century settlement patterns. A review of the Benton and Washington County maps shows a basic infrastructure of roads and buildings in the project area, many of which survive today. Unfortunately the maps' exaggerated scale makes accurate identification of specific building locations somewhat difficult.

Another standard reference reviewed during this study is the 1899 Fayetteville 30' Quadrangle map. This series of 30' maps were the first topographic maps made in the state and often show cultural features.

3.3.14.2.2 Historic Structures

Records at the Arkansas Historic Preservation Program (AHPP) contain data on hundreds of structures in Benton and Washington Counties. Benton County is one of a small number of



0 1.0 2.0 3.0 MI
0 1.0 2.0 3.0 4.0 5.0 KM

Job Number - 001966
AHTD/Environmental - GIS - Pearson
04/18/2005

Legend

- Preferred Line
- Field, 1840 — Cultural and Natural Features Shown on the GLO Maps
- Segment Break
- Proposed Interchange

Figure 3 - 14

Features From General Land Office Plats

This page intentionally left blank.

Arkansas counties to have received a fairly comprehensive historic structures survey due largely to the efforts of John Cole, Cy Sutherland and financial assistance provided by the Walton family. Their survey was conducted in the early 1980s and attempted to document all structures in Benton County that were 50 years old or older. There has not been a systematic historic structure survey done in Washington County but there has been some survey work organized by the local historical society. Individual property owners, local historical societies and other interested parties were responsible for submitting most properties on record at the AHPP for Washington County

Fourteen properties with structures were identified during the AHPP records review while twenty-three others were identified during the public involvement sessions and the reconnaissance survey. These properties are described below and are listed in Table 3-7. Those properties referenced by site number have been previously recorded, while those referenced by structure letter were identified during the reconnaissance survey. Architectural evaluation of all structures was conducted by trained architectural historians at the AHPP. Twelve of those submitted were determined to be eligible to the National Register of Historic Places. See Appendix B for correspondence with the State Historic Preservation Officer (SHPO). Refer to the Determination column of Table 3-7 for determinations for each property. Photographs of the properties are provided in Appendix F and their locations are shown in Figure 3-15. Information concerning each property is detailed as follows:

BE901- Records on file at the AHPP show this structure as a frame house with an addition built around 1930. A field check during the reconnaissance survey revealed that the structure is no longer present. Vegetation and the remains of a concrete porch mark its former location. The structure may have burned.

BE900- Records at the AHPP show this structure to also be a frame house with additions. It is thought to have been built in the 1930s. A field check during the reconnaissance survey revealed that the structure has been extensively modified. It is now covered with vinyl siding and its original windows have been replaced with modern aluminum-framed substitutes. It is not eligible for nomination to the National Register.

BE898- Records at the AHPP show this structure to be a frame house bungalow built about 1920. A field check during the reconnaissance survey revealed that the structure is no longer present. A modern house has replaced it.

BE904- This is a frame structure originally built as the Accident School but since converted to a residence. It appears to have been covered with vinyl siding and has had its original windows replaced. It is not eligible for nomination to the National Register.

BE905- This is a Craftsman-style house with associated outbuildings and is in excellent condition. It is eligible for nomination to the National Register.

BE882- Records on file at the AHPP show this property to be a traditional frame house with associated ancillary structures built around 1900. A field check during the reconnaissance survey revealed that no structures remain at the site. It is currently in grown up pasture.

BE877- This structure is a craftsman style house and appears to be relatively unmodified. It is eligible for nomination to the National Register.

BE897- Records on file at the AHPP show this structure as a frame house built around 1930 with additions from the 1950s or 1960s. A field check during the reconnaissance survey revealed that the structure is no longer present. It has been replaced by a modern house and storage buildings.

BE894- Records at the AHPP show this structure to also be a frame house with stone veneer and is thought to have been built about 1910. A field check during the reconnaissance survey revealed that the structure has been extensively modified. It is now covered with vinyl siding and its original windows and doors have been replaced. It is not eligible for nomination to the National Register.

BE893- Records on file at the AHPP show this property to be a traditional frame house built around 1930, with associated ancillary structures. A field check during the reconnaissance survey revealed that no structures remain at the site. All structures have collapsed into piles of rubble and the entire property is grown up in thicket.

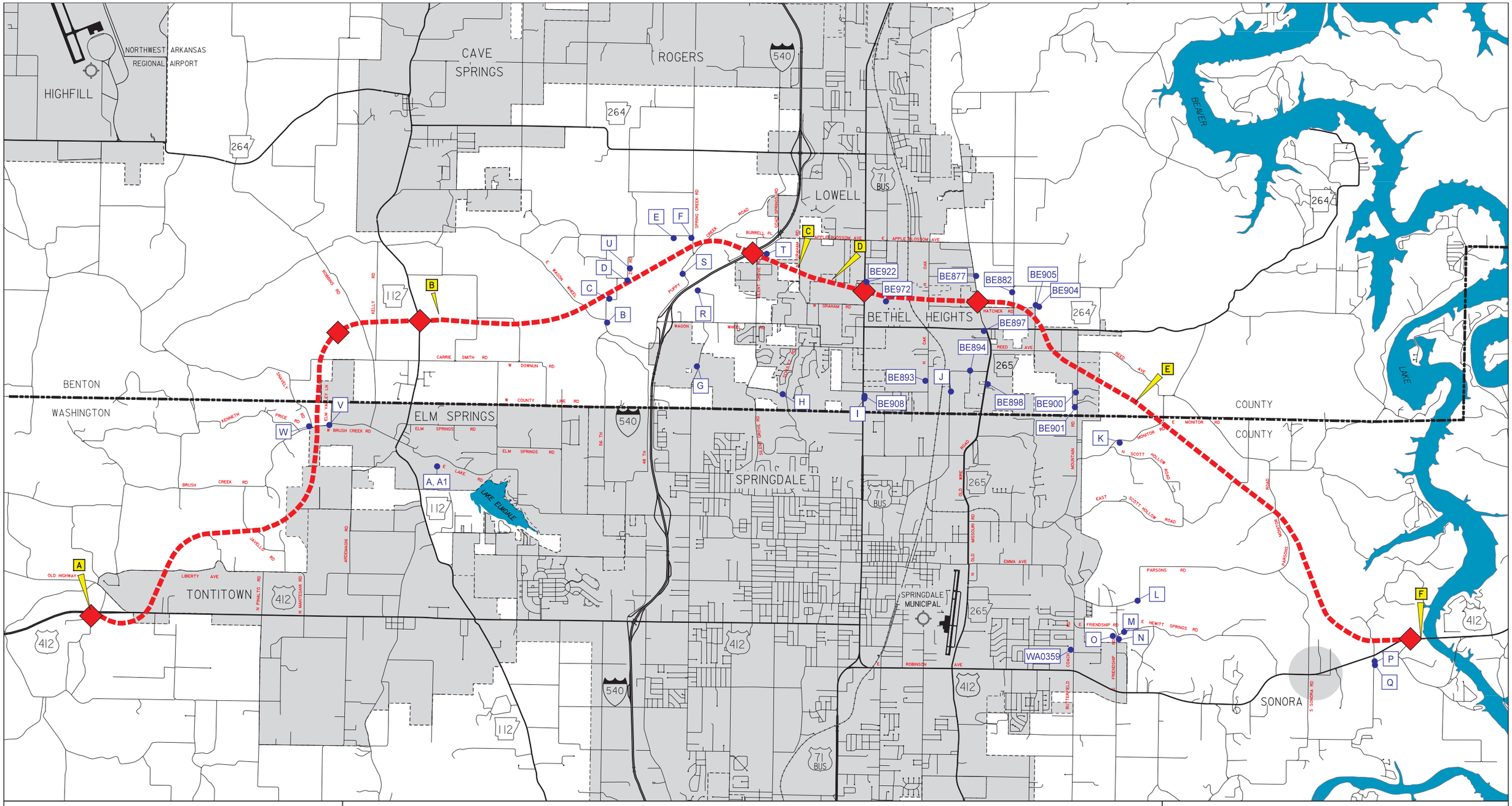
Table 3-7
Historic Structures Identified in the Project Area

Resource	Name	Construction Date	Description	Condition	Determination
BE901 *	Reed House	C1930	Frame house with addition	No longer present	Was not evaluated
BE900 *	Jones House	C1930	Frame house with additions	Vinyl siding/ aluminum windows	Ineligible
BE898 *	Stillwell House	C1920	Frame Bungalow	No longer present	Was not evaluated
BE904 *	Accident School	C1930	Frame structure	Vinyl siding/new windows	Ineligible
BE905 *	Emerson House	C1930	Frame house	Excellent	Eligible
BE882 *	Phillips House	C1900	Traditional frame house with ancillary structures	No longer present	Was not evaluated
BE877 *	Morris House	C1915	Traditional frame house with ancillary structures	Good	Eligible
BE897 *	Tarkington House	C1930	Frame house with additions from 1950's and 1960's	No longer present	Was not evaluated
BE894 *	Kendrick House	C1910	Frame house with stone veneer	Vinyl siding/new windows	Ineligible
BE893 *	Reed House	C1930	Traditional frame house with ancillary structures	No longer present	Was not evaluated
BE908 *	Gentry House	C1930	Rusticated concrete block house	Good	Ineligible
BE922 *	Skelton-Moody	C1920	Traditional frame house with barn	No longer present	Was not evaluated
BE972 *	Ruined Barn	C1930	Dilapidated frame barn	No longer present	Was not evaluated
WA0359	Fishback School	C1925	Frame schoolhouse	Good	Eligible
A, A1 (Hays Farmstead) *	Unknown	C1870	Frame house, stone root cellar, large frame barn	Good	Eligible
B	Spring Creek Church	C1910	Rock church with additions	Excellent	Eligible
C	Unknown	C1930	Craftsman Bungalow with rear addition	Good	Eligible
D	Unknown	C1940	Craftsman Bungalow house	Poor	Ineligible
E	Unknown	C1930	Craftsman Bungalow with additions	Vinyl siding	Ineligible
F	Unknown	C1920	Rock house with additions	Good	Ineligible
G (Frame House) *	Unknown	C1890	Frame house with additions	Good	Ineligible
H (Stultz Springs) *	Stultz Springs	C1930	Craftsman house with associated water works, spring boxes	Good	Eligible
I (Callaway Auction) *	Callaway Auction	C1915	Conglomeration of several buildings	Fair	Ineligible
J	Unknown	C1920	Rock house	Fair	Ineligible
K (Monitor School) *	Monitor School	C1930	Frame School House and unusual out house	Good	Eligible
L (Stone House A) *	Unknown	C1930	Eclectic Stone House	Excellent	Eligible
M	Unknown	C1930	Steel girder road bridge	Poor	Ineligible
N (Arnold-Jones House) *	Arnold-Jones House	C1890	Frame house	Good	Ineligible
O	Unknown	C1910	Double pen house with additions	Vinyl siding	Ineligible
P (Stone House B) *	Unknown	C1935	Craftsman style house with stone siding and out buildings	Fair	Eligible
Q (Stone House C) *	Unknown	C1930	Craftsman style house with stone siding	Fair	Eligible
R	Unknown	C1930	Traditional frame house with additions	Vinyl siding	Ineligible
S	Unknown	C1900	Double crib log barn	Poor	Ineligible
T	Unknown	C1930	Frame house with asbestos siding	Good	Ineligible
U	Unknown	C1940	Rock duplex	Good	Eligible
V	Unknown	C1930	Frame house with additions	Good	Ineligible
W	Unknown	C1940	Frame house with asbestos siding	Good	Ineligible

* Indicates structures that were included in Draft EIS

( ) Indicates name of structures used in Draft EIS

This page intentionally left blank.



Legend

- Preferred Line
- Historic Structure
- Segment Break
- Proposed Interchange

Job Number - 001966
AHTD/Environmental - GIS - Pearson
04/18/2005

Figure 3 - 15

Historic Structures

This page intentionally blank.

BE908- This house consists of a rusticated concrete block structure that has been converted to an office. It is not eligible for nomination to the National Register.

BE922- Records on file at the AHPP show this property to be a traditional frame house built around 1920, with an associated barn. A field check during the reconnaissance survey revealed that no structures remain at the site. It is currently in grown up pasture.

BE972- This property is recorded as a dilapidated frame barn possibly built in the 1930s. A field check during the reconnaissance survey revealed that this structure has collapsed and is grown up in thicket.

WA0359- This property is a Craftsman influenced frame building in good condition with a hipped roof and double hung windows. The property is called the Fishback School and was constructed in 1925. It is not eligible for nomination to the National Register.

Structures A, A1 (Hays Farmstead)- This property consists of a traditional frame house built around 1870, an associated stone root cellar, and a large frame barn. There are also a number of springs on the property and there is a good potential for the presence of archeological sites. It is eligible for nomination to the National Register.

Structure B- This property, Spring Creek Church, consists of a rock church in excellent condition with one rear addition and original double hung windows. It is eligible for nomination to the National Register.

Structure C- This property consists of a Craftsman bungalow-style house with one rear addition. The property is in good condition. It is eligible for nomination to the National Register.

Structure D- This property consists of a Craftsman bungalow-style house in poor condition with board and batten wood siding. It is not eligible for nomination to the National Register.

Structure E- This property consists of a Craftsman bungalow-style house in fair condition with double hung windows, vinyl siding and one rear addition. It is not eligible for nomination to the National Register.

Structure F- This property consists of a rock house in good condition with double hung windows, a frame side addition and frame rear addition with aluminum siding. It is not eligible for nomination to the National Register.

Structure G (Frame house)- This property consists of a traditional frame farmhouse that has had several additions. Judging from its form, it appears to have been built in the late 19th or early 20th century but it may well have some earlier components. It is built on the exact location of a structure shown on the 1839 GLO map and the existing structure may actually incorporate this earlier structure. It is not eligible for nomination to the National Register.

Structure H (Stultz Springs)- This property consists of a series of well preserved structures built during the 1930s including a house and structures used to maintain a series of springs. Structures include a well-preserved Craftsman style house, stone spring boxes, and several brick and concrete buildings. They appear to be part of an early public water supply system. It is eligible for nomination to the National Register.

Structure I (Callaway Auction Center)- This structure is a conglomerate of several structures which have merged over time to become one. Their original use is unknown but one may have been a stone store, while another part of the building resembles a frame barn. It is not eligible for nomination to the National Register.

Structure J- This property consists of a rock house in fair condition with double hung windows and an outbuilding. It is not eligible for nomination to the National Register.

Structure K (Monitor School)- This property consists of the old Monitor school and a rather unique out-building. The school is a frame structure and is currently being used as a residence. It is eligible for nomination to the National Register.

Structure L (Stone House A)- This property consists of a unique stone house in excellent condition. It is eligible for nomination to the National Register.

Structure M- This property is a steel girder road bridge, circa 1930, in poor condition. The bridge is no longer used for vehicular traffic. It is not eligible for nomination to the National Register.

Structure N (Arnold-Jones House)- The house was built in 1890 on top of an earlier foundation that is said to date before the Civil War. The house is a two-story, frame structure and is adjacent to a large spring (Hewitt Spring) that is probably an Indian site and probably was used by early settlers and Civil War soldiers. It is not eligible for nomination to the National Register.

Structure O- This property is a plain, double pen house, circa 1910 in good condition with double hung windows, a rear addition and vinyl siding. It is not eligible for nomination to the National Register.

Structure P (Stone House B)- This property consists of a Craftsman-style house and several associated out buildings. The house and associated garage are veneered with stone siding. It is eligible for nomination to the National Register.

Structure Q (Stone House C)- This structure consists of a frame, Craftsman-style house with field stone siding. It is eligible for nomination to the National Register.

Structure R- This property is a traditional, frame house in good condition with a side addition, a front addition and vinyl siding. It is not eligible for nomination to the National Register.

Structure S- This property is a double crib log barn, circa 1900, in poor condition. It is not eligible for nomination to the National Register.

Structure T- This property is a Craftsman-style house in good condition with double hung windows and asbestos siding. It is not eligible for nomination to the National Register.

Structure U- This property is a rock Craftsman influenced duplex in good condition with double hung windows. It is eligible for nomination to the National Register.

Structure V- This property was originally a frame Craftsman-style house. A side and front addition was added which was constructed of rock. A barn and outbuildings are associated with the property. It is not eligible for nomination to the National Register.

Structure W- This property is a frame house in good condition with double hung windows and asbestos siding. It is not eligible for nomination to the National Register.

As indicated in the above resource descriptions and in Table 3-7, seven (BE901, BE898, BE882, BE897, BE893, BE972, BE922) of the structures on record at the SHPO have been destroyed since they were recorded. These structures were eliminated from further analysis.

3.3.14.2.3 Bridges

In 1987, the AHTD, in conjunction with FHWA and the SHPO, conducted an inventory and evaluation of all potentially historic bridges maintained on the State Highway System, county roads and urban streets. The evaluation process is updated every five years so that any bridge achieving an age of 50 years can be reviewed for eligibility to the National Register of Historic Places.

A review of the AHTD Bridge Inventories through 2005 indicates that there are twelve bridges listed on the National Register in Washington and Benton counties. None of these are located within the study area and none will be affected.

3.3.14.2.4 Old Roads and Historic Trails

The GLO maps show segments of two roads dating to the early 1800s located in the project study area (see Figure 3-14). One road corresponds favorably with what is now known as Old Wire Road (Highway 265). This route is one of the earliest and most famous roads in northwest Arkansas and probably followed an established Indian trail. Parts of the road have been witness to a number of historic events including the Trail of Tears and the first trans-

continental mail route. It also served as the route for the first telegraph wire in the region, hence the name Old Wire Road.

In the fall and winter of 1838-1839, the U. S. Government forcibly relocated the Cherokee Indians from their homelands in the southeastern United States to Indian Territory hundreds of miles to the west. The journey was made under adverse conditions and it is estimated that more than 8,000 Cherokee perished along the route. In 1987, Congress designated the route as a National Historic Trail to commemorate the tragic event. The routes chosen for the trail encompass over 2,219 miles (3570 km) and span parts of nine states. There are 46 associated historic sites along the entire route. A segment of the northern overland route is known to have passed through northwest Arkansas in the immediate vicinity of the project study area. While the exact route in this area has not been verified, most researchers believe that it more than likely followed what is now known as Old Wire Road, which runs north-south through the eastern portion of the project area and crosses all of the proposed alignments. The National Park Service has also delineated a Trail of Tears driving route that follows Highway 71 from the Missouri-Arkansas border to the city of Fayetteville in Washington County.

In 1858, part of what is now Old Wire Road was incorporated as a segment of the Butterfield Overland Stage route. This was the first trans-continental mail route in the United States. Twice weekly, the Butterfield stage carried mail and passengers from Tipton, Missouri to San Francisco. The fee was $200 per passenger, 10¢ per letter, and the journey took 25 days. Travel was continuous day and night with brief stops every 20-25 miles for fresh horses, drivers, and occasional meals. Fitzgerald Station, located less than a mile south of the project area, was one of the stage stops along the route. The stone barn built there for housing fresh horses is one of the last standing structures associated with the route. The Butterfield stage ran faithfully until the Civil War began in 1861.

The other road segment shown on the GLO maps coincides with parts of what is currently Highway 412. This route was once known as the Old Springdale to Hinesville Road and was used by troops during the Civil War.

Highway 112, which crosses the western end of the project study area, is the approximate route followed by Confederate Troops on their way to the Civil War Battle of Pea Ridge. Segments of Wagon Wheel Road may also date back to the 1800s.

3.3.14.2.5 Cemeteries

A review of the current U.S.G.S quadrangle maps covering the project area show the presence of seven cemeteries within or near the project study area. They are: Friendship Cemetery, Wilson Cemetery, Silent Grove Cemetery, Sharp Cemetery, Spring Creek Cemetery and the Elm Springs Cemetery (Figure 3-16). Another cemetery (Ingram Cemetery) not marked on these maps was reported on one of the comment forms passed out during the public involvement session and verified during the reconnaissance survey. It contains several members of the Ingram family and is located at the intersection of Primrose and Phillips Road, north of Highway 264.

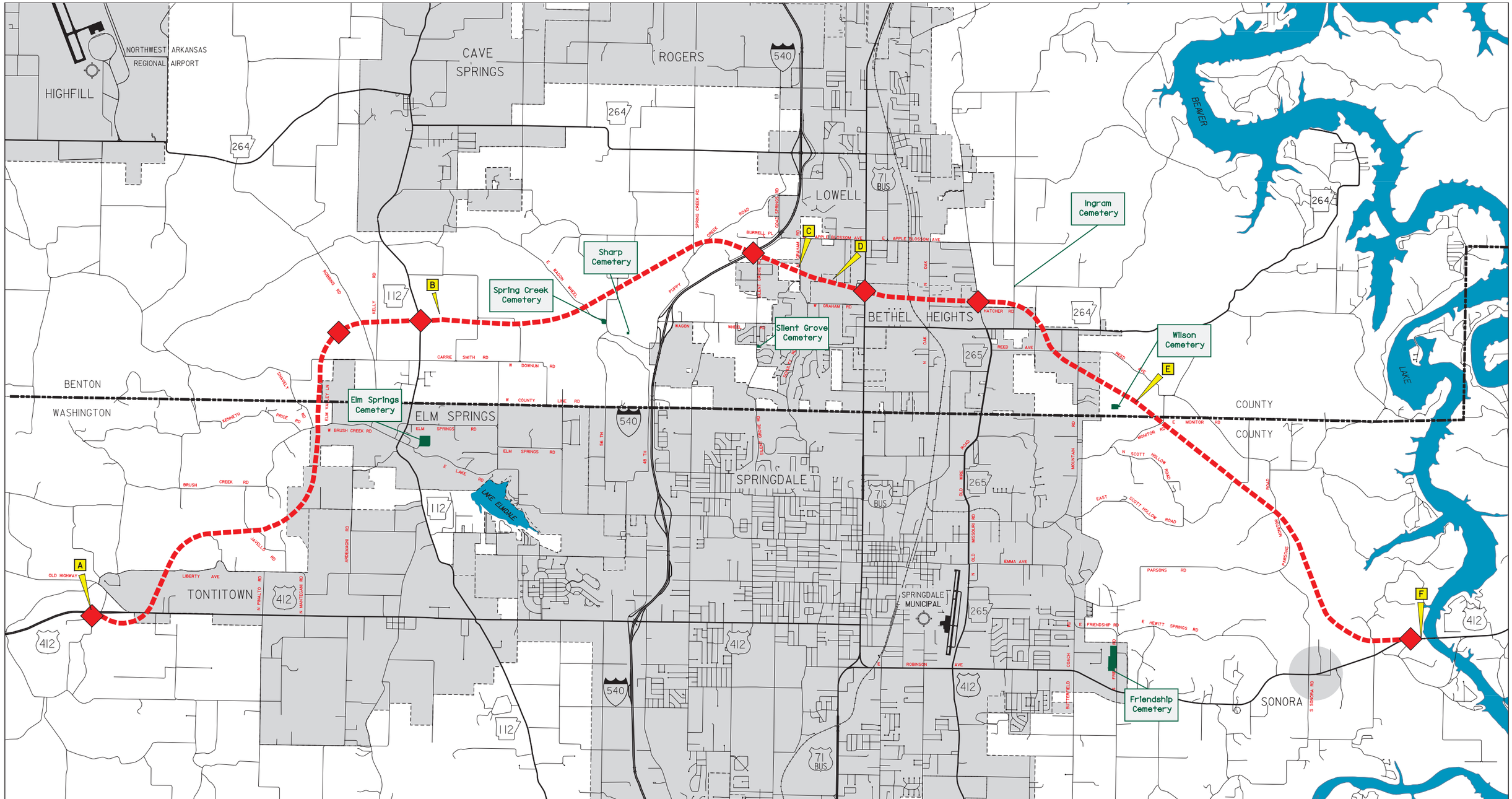
3.3.14.3 Section 4(f) Properties

An effort was made to identify all cultural resources along the route that may qualify as Section 4(f) properties. All standing structures along the route thought to be 50 years old or older were evaluated for nomination to the National Register of Historic Places as discussed in Section 3.3.14.2.2. Archeological site records were reviewed for information on site types and any unique elements or components that might warrant preservation in place. See Section 3.3.14.1 for further information related to the archeological sites. As discussed previously, two federally recognized Native American Tribes were consulted regarding properties or sites that might be of importance to their heritage or culture.

3.3.15 Farmlands

Physiographically, the study area is located mainly on the Springfield Plateau in Benton and Washington Counties. Topographically, the areas that are conducive to agricultural development are the broad uplands and the larger stream valleys. Land has been cleared as topography permits and farmland areas are generally in pasture and used for beef production. The project study area has a mixture of prime farmland, non-prime farmland and farmland of statewide importance. No unique farmland is found in the project study area.

The major agricultural activities in the two counties are beef and poultry production with a few hog farms. Some farms produce grapes, especially in and around the City of Tontitown. Concord grapes are sold to canneries for juice and jellies or to wineries to be made into wine.



Job Number - 001966
AHTD/Environmental - GIS - Pearson
04/18/2005

Legend

- Preferred Line
- Cemetery
- Segment Break
- Proposed Interchange

Figure 3 - 16

Cemeteries Located in the Project Area

This page is intentionally blank.

Historically, the study area had numerous apple orchards but these have declined over the years. The few remaining orchards in the project area are located at the eastern end.

Farmlands in northwest Arkansas are a major producer of poultry and beef. The beef production on the Springfield Plateau is greatly dependent upon the poultry industry. Because of the shallow and relatively infertile soils present, the land is not productive for pasture without the use of fertilizer. The use of chicken litter is a common practice in the study area and is relatively inexpensive compared to the use of commercial fertilizer. Poultry farming is primarily centralized west of the Springdale area. The area has ready access to feed, supplies, and major wholesale poultry producers. A decline in poultry operations in the area would likely result in a corresponding decline in beef production.

The intense development currently occurring in Benton and Washington Counties is already affecting the available acreage of farmland in the project area. Property historically used for agriculture is being converted to commercial, residential, and industrial use. Rapid growth of residential neighborhoods is increasing in historically rural areas. Most of the property being utilized for these neighborhoods was agricultural land.

3.3.16 Hazardous Materials

Normal Phase I Environmental Site Assessment (ESA) methods were utilized to study the project area. The purpose of the assessment was to identify recognized hazardous materials within or near the proposed corridors. The assessment had three main components; records review, field reconnaissance, and interviews. Figure 3-17 displays the location of all the potential hazardous material sites discovered during the survey.

The assessment for the proposed study area involved data collection efforts, including review of government agency files, review of past and current aerial photographs, and field reconnaissance. Federal records included the Federal National Priority List, Federal Comprehensive Environmental Response, Compensation and Liability Act List, Federal Resource Conservation and Recovery Act (RCRA)-Generators List, and the Federal RCRA-Transport Storage and Disposal Facilities List. Review of data from ADEQ was directly from the agency's databases, including industry environmental permits, business environmental permits, hazardous waste generators, registered underground storage tanks,

leaking underground storage tanks, registered open landfills, registered closed landfills, illegal dumps and site incidence reports. Information from the State Fire Marshall's Office, the Arkansas Department of Health, and the Federal Emergency Management Agency was also reviewed.

Interviews were conducted with individuals who had ownership of suspect property or who were responsible for management of suspect property in order to establish and clarify the likelihood of encountering hazardous materials.

Site reconnaissance confirmed three large landfills, five auto-salvage yards, two above ground storage tanks, one asphalt plant, five above ground illegal dumps, five buried illegal dumps, and one poultry disposal pit.

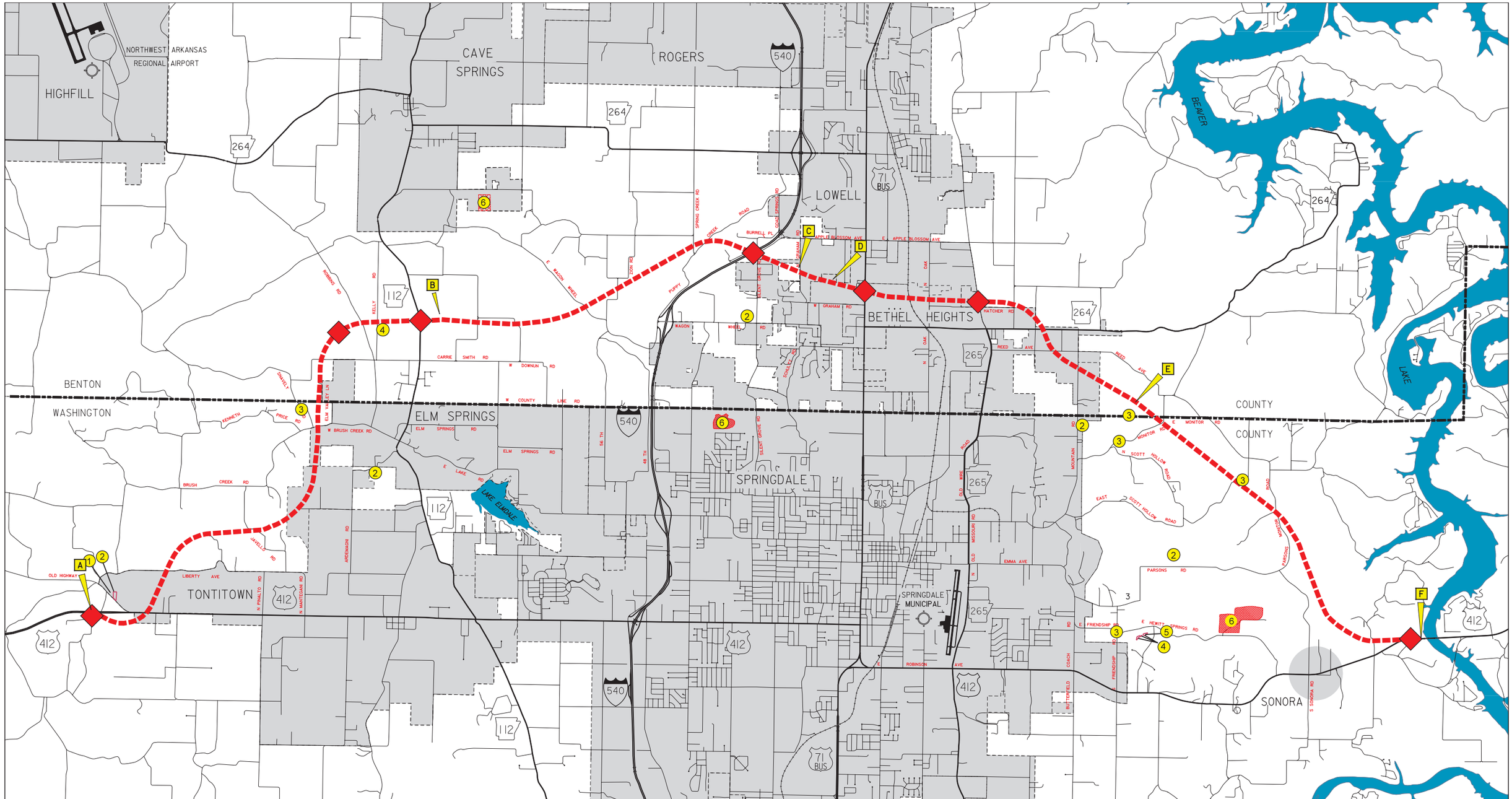
The three landfills identified in the project study area are:

1) Parson's Landfill-located on Hewitt Springs Road was operated by Northwest Arkansas Waste Management. Parson's landfill has been closed for several years and is currently being monitored. The landfill covers an area of approximately 105 acres (43 hectares).

2) City of Cave Springs Landfill- was in operation in the mid 1950's and closed in the early 70's. This landfill is approximately 5 acres (2 hectares) in size.

3) City of Springdale Landfill-located west-southwest of the present City of Springdale Wastewater Treatment Plant. The city of Springdale owns this landfill, which has been closed for several years and capped with topsoil. It is approximately 20 acres (8 hectares) in size.

Five auto-salvage yards are located near the study corridors. Potential contamination could be the result of spills of transmission fluid, brake fluids, hydraulic oils, solvents, alkalis, pitch and other related petroleum based products. The probability of petroleum contamination is low. There are two aboveground storage tanks within an auto-salvage yard located near Highway 412 and Old Highway 68. These petroleum tanks have a combined storage capacity of 5,000 gallons (19,000 liters) and are registered with ADEQ. Unleaded gas is kept in one tank for personal usage by the landowner and the other tank is not in use. The landowner has stated



0 1.0 2.0 3.0 MI

0 1.0 2.0 3.0 4.0 5.0 KM

Job Number - 001966
AHTD/Environmental - GIS - Pearson
04/18/2005

Legend

1. Aboveground Storage Tanks
2. Auto Salvage
3. Illegal Dump (Above Ground)
4. Illegal Dump (Buried)
5. Poultry Disposal Pit
6. Registered Landfill (Closed)

Preferred Line
Landfill Delineation
Proposed Interchange
Segment Breaks

Figure 3 - 17

Hazardous Materials Sites

This page is intentionally blank.

that (in the future) both tanks will be moved to another property. No remedial action is planned for the tanks, since they do not exhibit any leakage.

An ADEQ data query listed the issuance of air, water permits and an asphalt plant permit to the McClinton-Anchor Asphalt Plant located within the boundaries of the McClinton-Anchor Sharps Quarry. No serious hazardous waste concerns are expected at this location because of the types and nature of the materials involved in the manufacturing process. Since the last field survey, the Gilbert-Central Asphalt Plant has been built north of the Northwest Arkansas Quarry. No hazardous waste concerns are expected at this location.

Five above ground illegal dumps were located within the project study area. All of the above ground illegal dumps consisted of household garbage, old tires, appliances, and related household debris. No materials of a hazardous or suspicious nature were observed in any above ground dump.

A concrete chicken disposal pit located near Friendship Road and Vantress Farm Road was investigated and found to be of a non-hazardous nature. The pit was used for disposal of chicken carcasses by a research company working for Tyson Foods Inc. in the late 1960s. This pit is not expected to be impacted by the project.

Three buried illegal dumps were found in the area of the concrete chicken disposal pit. The buried dumps are largely composed of farming debris; farm machinery, farm implements and related poultry research building debris. These sites, if impacted, will be left in place and testing performed to insure no hazardous materials are present. Two additional buried illegal dumps were found near Orn Lane and Kelly Road. These two dumps are believed to be composed of household debris, rubbish, and discarded household items.

This page is intentionally blank.