Arkansas River Corridor Projects
Site Reconnaissance Summary

TO: Tulsa County

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FROM: CH2M HILL

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Executive Summary

The purpose of the site reconnaissance was to review existing project area resources and provide additional information to support the alternatives analyses efforts under Phase 1 of the Arkansas River Corridor Projects study. A multidisciplinary team of subject matter experts conducted a site reconnaissance with the Program Manager from March 30 through April 1, 2009. The site reconnaissance involved a series of visual surveys conducted by helicopter, car, and foot for approximately 42 miles of the project area from Keystone Dam, located upstream of Tulsa, Oklahoma and downstream to the Tulsa County-Wagoner County line. The visual surveys focused upon the following major characteristics of the project area: topography; the floodplain; water resources; biological resources; hazardous waste contamination and hazardous waste sites; utility service availability; community services; transportation; land use; and cultural resources.

Several major observations were made during the site reconnaissance:

- Topography: The project area encompasses two ecoregions--the Northern Cross Timbers in the west and the Osage Cuetas of the Central Irregular Plains in the east. The topography of the two ecoregions is characterized by a combination of low, forested ridges and hills, steep, rocky faces, or low, wide floodplains.
- Floodplain: The floodplain within the project area varies from a wide, undeveloped floodplain with established riparian corridor in the upstream portions to a more urbanized floodplain in lower reaches.
- Water Resources: The timing of the site reconnaissance allowed observations of the river at flows between 7,470 and 30,000 cubic feet per second (cfs). In addition to observations of the main river, staff visited several tributaries including Prattville and Polecat Creeks. Much of the river exhibited the effects of variable flows, including severe erosion.

- Biological Resources: During the observations of terrestrial and aquatic habitat, at least two bald eagles were observed. Other water birds were also observed, although the interior least terns were not present at their nesting sites.
- Hazardous Waste Contamination/Hazardous Waste Sites: Several sites of dumping, landfills, or current or delisted Superfund sites, including Sand Springs Petrochemical Complex, were observed within the project area.
- Utilities: Several wastewater treatment plants and electrical service lines were observed within the river corridor. A very large electrical transmission line crosses the river near the confluence of Prattville Creek. Several drinking water wells were documented in the project area during the Geographic Information System (GIS) data review.
- Community Services: Significant recreational lands within the corridor include Keystone State Park adjacent to Keystone Dam; Chandler Park and Sand Springs River City Park; and Boulder, Johnson, and Tulsa River Parks within Tulsa.. . There are also several schools and churches located within the study area. The initial review suggests that no hospitals are located within the project or study area.
- Transportation: Several highways and railroads are present within the study corridor, including numerous bridges across the Arkansas River.
- Land Use: Land uses range from woodland, pastureland and more rural patterns of residential, commercial, and industrial development to more urbanized high density residential, commercial, and industrial uses. Within the Tulsa metropolitan area, the river corridor is greatly encroached by existing and historical development.
- Cultural Resources: Although not visited during the site reconnaissance, 84 known and prehistoric-era archaeological sites, 6 historic districts, and areas with Native American cultural and spiritual properties have been identified in the area.

As a result of the site reconnaissance and associated data collection, several areas will be identified as areas of constraints (areas where avoidance is preferred) and others as potential areas of opportunity (areas where restoration or other features might be constructed). These will be communicated to the design team as part of a constraint analysis, which will also address fish passage, least tern habitat restoration, and riparian corridor considerations. To support further refinement of the design under future phases of work, more thorough surveys, including environmental site assessments, cultural resources, and biological surveys, are probably warranted. Owners of property within or adjacent to the proposed construction areas and those which may be affected by changes in hydrologic regimes should also be contacted to discuss the proposed project implementation.

Introduction

CH2M HILL conducted a site reconnaissance of the Arkansas River Corridor Projects area from March 30 through April 1, 2009. The purposes of the site reconnaissance were to familiarize key project-team task leads with the existing human and natural environment along the river and to identify potential constraints and information gaps which may need to be addressed during scoping and preparation of an Environmental Assessment (EA) or

Environmental Impact Statement (EIS). The site reconnaissance consisted of ground surveys and a helicopter survey. The surveys covered the approximately 42-mile reach of the Arkansas River from Keystone Dam, located upstream of Tulsa, Oklahoma, downstream to the Tulsa County-Wagoner County line. The lower portion of Keystone Lake also was observed during the helicopter survey.

This Technical Memorandum describes the site reconnaissance activities and summarizes the findings relative to potential human and natural environmental constraints to the conceptual design and permitting of the proposed project.

Methodology

In addition to the site visit itself, site reconnaissance activities included the collection and review of available maps and site information prior to the site visit.

Team

The CH2M HILL site reconnaissance field team included: Task Manager Lara Jarrett, A.I.C.P.; Senior Consultant Doug Baughman, and Aquatic Ecologist Steve Layman, Ph.D. This team was joined for the ground reconnaissance on April 1, 2009, by Program Manager Gaylon Pinc of PMg, who identified key areas of interest and coordinated property access and participation by local authorities.

Mapping

Prior to the site visit, CH2M HILL compiled U.S. Geological Survey (USGS) topographic maps depicting the key features of the study area. Features of interest were hydrologic features, including floodplains, cultural resources, native American lands, zoning within Tulsa County, geology, soils, vegetation and potential habitat of protected species, known hazardous material and solid waste sites, and wetlands compiled by the National Wetlands Inventory.

The study area, for purposes of environmental data review, is defined as the Arkansas River corridor extending from, and including, the U.S. Army Corps of Engineers' 26,000-acre Keystone Lake (Osage, Pawnee, Creek, Tulsa, and Payne Counties) downstream to the Tulsa/Wagoner county line. An additional 42 miles downstream to the confluence of the Arkansas River and the Verdigris River at the McClellan-Kerr Navigation Channel may also be considered, relative to fish migration. The study area includes a corridor extending 2,200 feet on each side of the centerline of the river, and a 1,500-foot-wide zone around Keystone Lake. The site reconnaissance focused on that portion of the study area in Tulsa County, extending from Keystone Dam downstream to the Wagoner County line. This study area was established, based upon professional judgment, to include the extent of possible effects on land use, hydrology, habitat, and other resources that required a site reconnaissance. For example, the economic effects of the project might extend beyond the study area but would not benefit from a site reconnaissance because the analyses would largely be dependent upon regional trends, whereas a review of riparian habitat would be beneficial. As the understanding of the project evolves, the study area may be refined.

Site Reconnaissance Area

The site reconnaissance field work included ground and helicopter surveys as follows:

- March 30, 2009: Ground survey of Tulsa Wave Park and Zink Dam from the west shoreline of the Arkansas River; conducted by D. Baughman and S. Layman from 6:30 a.m. to 7:45 p.m. Central Daylight Time (CDT); river flow was rising from 7,470 cfs at 6:00 p.m., to 10,800 cfs at 7:00 p.m., to 13,100 cfs at 8:00 p.m.
- March 31, 2009: Helicopter survey of the Arkansas River corridor from Keystone Dam and the lower end of Keystone Lake to the Tulsa County-Wagoner County line; originating from Richard Lloyd Jones Jr. Airport near Jenks, Oklahoma; conducted by L. Jarrett, D. Baughman, and S. Layman from 3:30 p.m. to 5:10 p.m. CDT; river flow was about 17,500 cfs.
- April 1, 2009: Ground survey of the Arkansas River corridor, including: Keystone Dam; the proposed sites of the Sand Springs and South Tulsa/Jenks low-head dams; the east shoreline of the river between the Creek Turnpike and East 41st Street; and Zink Dam from the east shoreline; conducted by L. Jarrett, D. Baughman, S. Layman, and G. Pinc from 8:15 a.m. to 5:30 p.m.; river flow was about 30,000 cfs.

Digital photographs were taken of the reconnaissance areas, including: the proposed low-head dam sites; key features of the river and riparian habitat, including bald eagles and their habitat; and representative land uses and shoreline activities along the river corridor in Tulsa County. The photographs were logged by photo number, date, location, notes, and estimated river flow at the time of the reconnaissance. All of the project photos and log will be submitted as a part of the Administrative Record of the project.

General Characterization of the Study Area

The following sections summarize observations from the site reconnaissance by resource area and identify potential constraints to the design and permitting of the project.

Topography

The topography in the study area varies along an east-west gradient from the Northern Cross Timbers ecoregion in the western (upstream) portion of the study area to the Osage Cuestas ecoregion of the Central Irregular Plains in the eastern (downstream) portion of the study area. The transition zone between these ecoregions generally occurs at the big bend in the Arkansas River at Tulsa known as the "Tulsa bend." Downstream of the Tulsa bend, the western floodplain of the north-south trending reach of the river lies along the eastern edge of the Northern Cross Timbers ecoregion.

Upstream of Tulsa, the Northern Cross Timbers ecoregion is characterized by low, forested ridges and hills, many with steep, rocky faces (cuestas) bordering the Arkansas River floodplain, particularly between Keystone Dam and Sand Springs (Figure 1). Downstream of Tulsa, the Northern Cross Timbers ecoregion gives way to the Osage Cuestas ecoregion, especially downstream of Jenks as the river turns in a southeasterly direction. A prominent feature along the eastern edge of the Northern Cross Timbers is Turkey Mountain along the west shoreline downstream of Zink Dam between the I-44 and 71st Street bridges (Figure 2).

The Osage Cuestas ecoregion downstream of Jenks is characterized by low, forested hills and cuestas and a much greater prevalence of undulating plain (Figure 3).

Floodplain

The floodplain in the upstream portion of the study area, between Keystone Dam and Sand Springs, is relatively broad and sandy and contains well developed riparian vegetation in many areas, including tracts of riparian forest. The floodplain in this reach is widest along the inside bends of the river, including the north shore just downstream of Keystone Dam, the south shore at Fisher Bottom (Figure 4), and the north shore at Sand Springs. These areas are occupied by open lands and homes upstream of Sand Springs and by commercial, industrial, and residential areas in Sand Springs. The wide floodplain at Sand Springs along the north shore is protected by a levee (Figure 5), which extends downstream toward Tulsa.

The floodplain along the river between Sand Springs and Zink Dam becomes progressively more developed and confined between levees as the river flows downstream through Tulsa. The Sunoco Oil refinery and adjacent Red Fork industrial area occupy a large area of the southern floodplain at the Tulsa bend (Figure 6). Downstream of the bend, the streets, communities, and parks of Tulsa border the river along Riverside Drive on the east (Figure 7). The Sinclair Oil refinery and adjacent Red Fork industrial area border the levee on the west. The River Parks trail system occurs along both sides of the river throughout much of this reach. Riparian vegetation in this reach mainly occurs in association with the trail system as a narrow band of trees above the steep banks of the river.

The floodplain between Zink Dam and the Creek Turnpike in Jenks also is relatively narrow, confined between urban residential communities, parks, and commercial development on the east side of the river, and a levee on the west side of the river. Riverside Drive runs along the east side of the river (Figure 8). A mixture of industrial and commercial areas and some open lands border the levee on the west side of the river (Figure 9). With the exception of Turkey Mountain along a segment of the west shoreline, riparian vegetation mainly occurs in a narrow band above the steep banks of the river.

Downstream of the Creek Turnpike bridge and Jenks, the floodplain is broad and sandy as the river extends away from the urban development and levees of the Tulsa area and enters the plains topography of the Osage Cuestas ecoregion (Figure 10). The floodplains are occupied by sod farms, other agricultural lands, sand mining and other limited industrial operations, patches of woodlands, and rural residential areas. Riparian vegetation occurs as bands or patches of trees or shrub/herbaceous vegetation along the shoreline or exposed sand bars at wide bends in the river. Riparian zone excavation and dumping of trash, tires and other debris occurred in several areas along the river near Bixby (Figures 11 and 12).

Water Resources

The lower end of Keystone Lake was observed by helicopter at the confluence of the Arkansas River entering from the north and the Cimarron River meandering in from the south. The turbid red color of the Cimarron River stood in contrast to the blue-green color of the Arkansas River (Figure 13), indicating differing upstream watershed characteristics and water quality between the two rivers.

At the time of the survey, water was being released through the gated spillway section of Keystone Dam (Figure 14). At the estimated flow of 30,000 cfs, the Arkansas River channel throughout the study area was wetted across its entire width, with the exception of exposed sand bars at wide bends in the river and occasional larger sand bars in the middle of the channel.

Exposed sandbars at this river flow were common in the reach between Keystone Dam and Sand Springs, including Fisher Bottom and a wide mid-channel sand bar just downstream of the proposed site of the Sand Springs low-head dam (Figure 15). Sandbars were most pervasive in the reach between Jenks and the Tulsa/Wagoner county line. Sandbars also were present but generally less extensive in the north-south reach of the river between Tulsa and Jenks. Portions of two islands in the upstream end of the Zink pool were exposed (Figure 7).

Numerous tributary streams enter the Arkansas River in the study area. Most appear to drain relatively small watersheds. Several have been channelized and paved or rip-rapped in their lower reaches to facilitate drainage and prevent upstream flooding, such as along the east side of the river between Zink Dam and the Creek Turnpike bridge at Jenks.

Prattville Creek, which enters from the south just downstream of Highway 97 and the proposed site of the Sand Springs low-head dam, was noteworthy for its active severe erosion and bank failure in the lower meander approaching the river (Figure 16). The existing narrow peninsula of eroding land between the creek and the river would pose a potentially significant constraint to dam design and construction at this location. However, reconfiguring and stabilizing this confluence area would present an opportunity for restoring riparian habitat as part of the project design.

Polecat Creek, which enters from the west just downstream of the proposed site of the South Tulsa/Jenks low-head dam, also has a highly unstable, eroding stream channel, which apparently conveys high volumes of stormwater (Figure 17). The instability of this tributary confluence and the filling and grading of the adjacent floodplain site (formerly occupied by a sand mining operation) (Figure 18) would pose constraints to dam design but could also present stream restoration opportunities.

Biological Resources

Although federally endangered interior least terns had not arrived yet in the study area for the breeding season, at least two areas of known interior least tern nesting habitat were observed at these flows. These included the sandbar just downstream of the Sand Springs proposed low-head dam site (Figure 15) and the unvegetated island in the upstream end of the Zink pool (Figure 7). According to Kevin Stubbs of the U.S. Fish and Wildlife Service, several other sandbars between Zink Dam and Jenks, including the reach just downstream of the South Tulsa/Jenks proposed low-head dam site, have supported tern nesting sites in recent years. These sandbars may not have been exposed at the observed river flows.

Several bald eagle nests and at least two bald eagles were observed along the river between Keystone Dam and Sand Springs (Figure 19). Large trees suitable for nesting were most abundant in the upper portion of this reach (e.g., Swift Park). An active nest also was observed near the Sand Springs industrial area along the north shoreline. Another bald eagle nest was observed in a large tree along the reach between Bixby and the county line.

Other water birds observed in the study area included American white pelican and great blue heron. Neither species is federally nor state listed. American white pelicans were common in flocks on sandbars and above the water throughout the study area, where the pelicans apparently overwinter. Several great blue herons and heron nests were observed on the small island and transmission line tower in the middle of the river downstream of the proposed site of the Sand Springs low-head dam.

At the observed river flows, little variation was evident in riverine aquatic habitat, with the exception of the swift water below Zink Dam and the remnants of a relocated rock dam immediately downstream, which included the Tulsa Wave (Figure 20). Anglers were observed during the site reconnaissance along the bank at Tulsa Wave Park, along the bank and on the fishing platform at Zink Dam, and along both banks and in boats in the tailwater of Keystone Dam (Figure 21).

Hazardous Waste Contamination/Hazardous Waste Sites

The locations of active municipal landfills, land application sites, large quantity solid waste generators, Superfund sites, and Treatment, Storage, and Disposal sites were obtained from the Oklahoma Department of Environmental Quality (Appendix A). Although the maps were at a scale which prevented identification of exact locations and identification of facilities by name, the data suggested that several Superfund sites and large quantity generators are located near the riparian corridor in Sand Springs and downtown Tulsa. Figure 5 shows an industrial area with Superfund sites (upper right background of photo) within the study area.

During the review, several illicit dumps were identified throughout the study area. A combination of residential, industrial and commercial waste was observed.

Utilities

Several wastewater treatment plants (WWTPs) are located along the Arkansas River within the study area and discharge to the river. Those observed during the site reconnaissance included:

- Sand Springs WWTP off of Morrow Road on the north side of the river
- Tulsa Southside WWTP just downstream of I-44 bridge on the west side of the river
- Jenks WWTP, Glenpool WWTP discharge, Sapulpa WWTP discharge via Polecat Creek and Bixby Lagoons
- Haikey Creek WWTP just south of East 151st South, on the north side of the river across from Bixby
- Broken Arrow WWTP

Other small wastewater treatment operations were observed in the study area, but the facilities were not readily identifiable based on map review.

Several electrical utilities lines are located within the river corridor. A high-power transmission line crosses the river near the confluence of Prattville Creek and is threatened by severe erosion.

Community Services

Several community services, such as recreational and educational facilities, landmarks, hospitals and federal lands, are located within or adjacent to the study area. The following sections identifies some significant community services. These descriptions follow the corridor beginning near Keystone Dam.

- Keystone State Park is located south of the dam. The park is bounded by the lake to the north and west and State Routes (SH) 151 to the east and 52 to the south. Tanglewood School is located approximately 3 miles to the west of the dam along 11th Street within Sand Springs. The school is adjacent to the northern study area boundary.
- River City Park is located on the north bank of the river just west of SH 97 in Sand Springs.
- East of Sand Springs, Chandler Park is located at the intersection of 21st Street and 75th West Avenue on the south side of the river. Approximately 1.25 miles to the northeast of Chandler Park and across the river, the Mark Twain School is located adjacent to the northern study area boundary near the intersection of 5th and West 42nd. A church is located within the study area approximately 0.4 mile to the southwest of the Mark Twain School.
- Within Tulsa, two schools are located within the project area near the intersection of Interstates (I-) 444 and 244. The Riverway School is located on the north side of the river near the intersections of S. Galveston Avenue and I-444.The OSU College of Osteopathic Medicine is located on the east side of the river near 17th Street and I-244. Other schools within Tulsa located in the study area include: Eugene Field Elementary School, located on 23rd Street near I-244; Oral Roberts University, located at 81st Street and S. Lewis Avenue; and Jenks East Middle School, located on 101st Street approximately 1/3 mile east of the river.
- The Oklahoma Orthopedic Hospital is located within Tulsa at 81st Street and S. Lewis Avenue.
- Several parks are located within Tulsa and the study area. Veterans Park is located on the east side of the river near the 21st Street Bridge. Fred Johnson Park is located on the east side of the river near the intersection of 61st Street and Riverside. Riverside Park is located just south of Fred Johnson Park at the intersection of S. Peoria Avenue and Riverside Parkway. Tulsa's River Parks is located on both banks of the river and essentially runs the entire length between 11th Street and 96th Street.
- The Indian Springs Elementary school is located on the north shore near the Indian Springs Golf Course, which is partially within the study area. The two facilities are located within Broken Arrow.
- Washing Irving Park and the Bentley Sports Complex are located in Bixby.

Transportation

Several major transportation corridors, including highways and railroads, were observed along the Arkansas River. Upstream of Tulsa, major transportation routes include:

- U.S. Highway 64 paralleling the north side of the river between Tulsa and Keystone Dam just beyond the study area
- Aubrey Drive (old SH 51) paralleling the south side of the river between Keystone Dam and Sand Springs just beyond the study area with SH 151 crossing over Keystone Dam
- Burlington Northern Santa Fe (BNSF) Railway line along the south side of the river, a portion of which is within the study area, between Keystone Dam and Tulsa
- SH 97/51 bridge crossing the river at Sand Springs

Major transportation routes along the river between Tulsa and Jenks include:

- I-244 and U.S. Highway 75 bridges, and a BNSF Railway line bridge, crossing the river next to one another at downtown Tulsa
- Riverside Drive paralleling the east side of the river within the study area through Tulsa
- Union Pacific Railroad/Tulsa Sapulpa Union Railway line along the west side of the river, a portion of which is within the study area, between Tulsa and Jenks
- West 23rd Street South bridge crossing the river near downtown Tulsa
- I-44 bridge crossing the river between Zink Dam and Jenks at 51st Street.
- East 71st Street South bridge crossing the river in Tulsa between Zink Dam and Jenks
- East 96th Street South/East Main Street bridge crossing the river betweenTulsa and Jenks
- Creek Turnpike bridge crossing the river at Jenks
- Major transportation routes downstream of Jenks to the county line include:
- U.S. Highway 64 crossing the river at Bixby
- Union Pacific Railroad/Tulsa Sapulpa Union Railway line along the west side of the river, a portion of which is within the study area, between Jenks and Bixby

Land Use

Land use upstream of Tulsa in the reach between Keystone Dam and Sand Springs includes a mosaic of woodland, pastureland, rural residential, transportation, and commercial and industrial uses. Croplands are not very common.

Land use through the Tulsa metropolitan area is dominated by urban, residential, commercial, parkland and transportation land uses along the east side of the river. The west side of the river includes a mix of industrial, commercial, electric utilities, open land, railroad and some residential land uses.

Land uses between Jenks and the Tulsa County-Wagoner County line include a mix of woodland, farmland, rural residential land, and railroad uses, as well as localized industrial and commercial land uses. Croplands are common including large tracts of sod farms observed along the river between Jenks and the Wagoner County line (Figure 3).

Cultural Resources

Although archeological sites and historic properties were not directly observed during the field work portion of the site reconnaissance, the literature review conducted prior to the site visit revealed the following information on cultural resources in the project area.

Cultural resources are broadly defined as tangible links with the past and they include historic and prehistoric archaeological sites, structures, districts, buildings, landscapes and objects. Cultural resources can be categorized as: archaeological resources, traditional cultural properties, and architectural resources (including districts, structures and buildings).

There are at least 84 known historic and prehistoric-era archaeological sites spread throughout the study area. Of these, three are National Register of Historic Places (NRHP) eligible or listed (Cherokee, 2007). The vast majority of the sites have not been assessed for NRHP eligibility. The known sites are somewhat clustered in the northwest portion of the study area, near Keystone Dam, and in the southeast area from Jenks to the south. Turkey Mountain, a recreational area with numerous inscriptions and petroglyphs (Guernsey, 2005), is located on the west bank of the river between the I-44 and 71st Street bridges. According to the Guernsey Team *Report on Cultural Resources* from 2005, few formal archaeological surveys have been conducted in the area. However, the history of the area dates back to 12,000 BC, suggesting there is a high probability for further archaeological deposits to be found. Previous human settlement and uses tend to be situated close to bodies of water, further indicating the high probability of archaeological deposits in the project area. Additional research and survey would be necessary to identify NRHP-eligible and –listed sites in the proposed construction and water impact areas.

There is a known Native American cemetery from the historic period in the western portion of the Wekiwa quad map. There is also a historic grave site on the south side of the river on the Bixby quadrangle (Cherokee, 2007). No traditional cultural properties were identified through available resources. In order to ascertain the locations and significance of traditional cultural properties, consultations with local tribes and other cultural groups would need to be conducted. The Osage Indian Reservation is located to the north and east of Keystone Dam. During public meetings in October 2005, a member of the Osage Nation commented that the project area may have religious and/or cultural significance to that tribe (Guernsey at al., 2005). Further research and consultation with tribes in the area will be required to identify Native American cultural and spiritual properties.

The following historic resources are less likely to be impacted by the proposed activities. There are six NRHP-listed or –eligible historic districts in the survey area: one in Sand Springs and the others in Tulsa. The Riverside, Riverview and Maple Ridge historic districts are all listed in the NRHP and have frontage on or near the river. Nineteen individual properties are listed or eligible for listing in the NRHP, including the Creek Council Tree site, the Riverside Studio, two bridges, the Sand Springs Power Plant, and several

residential structures (Cherokee, 2007). Fort Arbuckle is an NRHP-listed site west of Sand Springs, just north of the river. The 1916 Route 66 bridge over the Arkansas River at 11th Street has been listed in the NRHP since 2002 (OHS, 2009). Further research and survey would be necessary to identify all NRHP-listed and –eligible structures in the proposed construction areas.

Recommendations Following Site Reconnaissance

As a result of the site reconnaissance and associated data collection, several areas of constraints and opportunities will be identified. Project alternatives to address these constraints and opportunities will then be identified for further consideration. To support further refinement of the design under future phases of work, more thorough surveys, including environmental site assessments, cultural resources and biological surveys, are probably warranted. Owners of property within or adjacent to the proposed construction areas and those which may be affected by changes in hydrologic regimes should also be contacted to discuss the proposed project implementation.

References

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Cherokee CRC, Inc. 2007. *Cultural Resource Evaluation, Task 5, Environmental Data for the Arkansas River Corridor Project*. Prepared for the U.S. Army Corps of Engineers (USACE), Tulsa County. June.

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Guernsey, Team. 2005. *Report on Cultural Resources Literature Search, Arkansas River Corridor*. Prepared for the U.S. Army Corps of Engineers (USACE). An Appendix to Final *Arkansas River Corridor Master Plan, Phase II Master Plan and Pre-Reconnaissance Study.* Tulsa County. May.

Oklahoma Historical Society. National Register of Historic Places and Oklahoma Landmarks Inventory Websites. http://www.seic.okstate.edu/shpo/allsites.htm. Accessed April 13, 2009.

Figure 1. Upstream View toward Sand Springs and the Highway 97 Bridge

Figure 2. Downstream View of the I-44 Bridge and Turkey Mountain

Figure 3. Downstream View of Sod Farm along East/North Shore at South Garnett Rd

Figure 4. Downstream View from Sand Creek toward Fisher Bottom (on Right)

Figure 5. North Riparian Zone Industrial Area at Highway 97 Bridge in Sand Springs with River City Park in the foreground

Figure 6. Downstream View of South/West Shoreline and Sunoco Oil Refinery

Figure 7. Downstream View from I-244 Bridge in Tulsa, including Zink Islands

Figure 8. Downstream View of East Shoreline toward 71st Street Bridge in Tulsa

Figure 9. Downstream View of Westbank Soccer Complex and Industrial Areas on West Shoreline

Figure 10. Downstream View from Vicinity of Polecat Creek Confluence

Figure 11. Trash Dump in Riparian Forest along Shoreline East of Bixby

Figure 12. Tire Dump along Shoreline East of Bixby

Figure 13. Turbidity Entering Keystone Lake from Cimarron River Arm

Figure 14. Upstream View of Keystone Dam on March 31, 2009

Figure 15. Downstream View of Proposed Site of Low-head Dam at Sand Springs

Figure 16. FFA Hog Farm and Eroding Banks of Prattville Creek next to Proposed Site of Low-head Dam at Sand Springs

Figure 17. Polecat Creek approaching its Confluence with the Arkansas River in Jenks

Figure 18. Downstream View of Proposed Site of Low-head Dam at Jenks

Figure 19. Bald Eagle Perched in Tree at Swift Park along the South Shoreline

Figure 20. Upstream View of Tulsa Wave (Foreground) and Zink Dam (Background)

Figure 21. Keystone Dam and Tailwater at White Water Park

Appendix A
Data Sources

Oklahoma DEQ. April 2001. *Municipal Landfills*. http://maps.scigis.com/deq%5Fwq/ (March 31, 2009).

Oklahoma DEQ. December 1999. *Superfund National Priority Sites*. http://maps.scigis.com/deq%5Fwq/ (March 31, 2009).

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