2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

This section describes the several alternative approaches to meeting the purpose and need discussed in Section 1.0. Under a moderate population growth scenario, Jackson County and portions of the surrounding region are projected to need 3.5 million gallons of water a day (mgd) by the year 2050. In addition to this need, the Jackson County Lake Committee has expressed a desire for increased opportunities for outdoor recreation for the people of Jackson and surrounding counties. For the alternatives described in the following sections to be considered reasonable for further consideration, they must meet the projected water need stated above. As a secondary requirement, the alternatives should meet the desire for additional recreational opportunities, but not meeting this desire would not eliminate an alternative for further consideration.

Section 2.0 is divided into six main subsections. Section 2.1 discusses those alternatives that do not entail the creation of a new reservoir in Jackson County, but which have been evaluated and eliminated. Section 2.2 describes those alternative dam and reservoir sites, which have also been evaluated and eliminated, within Jackson County. Section 2.3 provides a brief introduction to the three reservoir sites in Jackson County that were evaluated and determined reasonable for further consideration. Section 2.3 also describes the No Action alternative, which will be analyzed, along with the three proposed alternative reservoir sites, for environmental impacts in Section 3.0 of this EIS. Section 2.4 describes the proposed action, including a more detailed analysis of each of the reservoir sites considered reasonable for further examination. Section 2.5 provides a comparison of the potential environmental impacts of each of the alternatives considered reasonable for further examination. Section 2.6 discusses the preferred alternative identified by the lead agency, the Rural Utilities Service (RUS).

2.1 NON-RESERVOIR ALTERNATIVES ELIMINATED

This section evaluates four alternatives for meeting the purpose and need, discussed in Section 1.0, that do not entail constructing a new dam and reservoir in Jackson County. Each of these alternatives is discussed separately. Section 2.1.1 examines the use of various groundwater sources throughout the County to meet the purpose and need; Section 2.1.2 assesses the expansion of one and/or both of the County's existing water supply reservoirs; Section 2.1.3 examines the importation of water from existing surface water resources outside the County; and Section 2.1.4 discusses water conservation in order to more efficiently utilize water already in the system.

Each of these alternatives was investigated and found incapable of fully meeting the primary purpose and need of water supply and the secondary purpose and need of supplying lake-oriented outdoor recreation. Three of these alternatives, including the expansion of existing County reservoirs, groundwater, and conservation, were found to be highly unlikely to fully supply the

projected water needs for the year 2050. The remaining alternative, that of importing water from surrounding counties, was not cost-effective. None of these alternatives met the secondary purpose and need. These alternatives are, therefore, eliminated from more detailed study.

2.1.1 GROUNDWATER DEVELOPMENT

In Kentucky and throughout the United States, groundwater is an important source of water for domestic, agricultural, and industrial purposes, but one that is susceptible to contamination from above-ground human activities and land uses (KDOW, Website). This section examines the use of groundwater, both in terms of quantity and quality, as an alternative water supply source for Jackson County.

The quantity and quality of groundwater from any given location is largely determined by the type of geological formation which underlies that location. A geological formation consists of layers of rock, deposited in the same geological age and forming a distinctive unit. Jackson County is situated over two such formations, the Breathitt Formation and the Lee Formation.

The Breathitt Formation is present at the surface over most of the eastern quarter of Jackson County. This geological formation consists of interbedded shale, siltstone, and sandstone (MEG, 1999c). Most water wells in this part of the County are situated in sandstones of this formation. In valley bottoms, the majority of these wells yield enough water for a modern domestic supply. However, only about one-half of the wells drilled on slopes and ridge tops yield sufficient water for a domestic supply. Most wells located on the Breathitt Formation have moderately hard water, with noticeable traces of iron.

The Lee Formation, composed of thick sandstone beds, is present at or near the ground surface in the western three-quarters of the County (MEG, 1999c). Wells located in the Lee Formation are more productive than those in the Breathitt Formation. Most of the wells situated in the valley bottoms of the Lee Formation yield enough water for a modern domestic supply, and at least 75 percent of the wells on slopes and ridge tops produce a minimal domestic water supply. Water from the Lee Formation tends to be soft to moderately hard, with noticeable amounts of iron.

The Kentucky Geological Survey (KGS) reports that there are approximately 160 domestic water supply wells registered in Jackson County (MEG, 1999c). These registered wells have an average depth of about 116 feet.

Inquiries were conducted with the KGS about whether Jackson County's groundwater resources could supply its projected water needs from three additional, possible sources of groundwater. These included: 1) reservoirs associated with lineaments; 2) the use of pumping to induce infiltration from surface streams through alluvium to wells and pits; and 3) the use of abandoned underground coal mines as storage reservoirs (Straw, 1999a; 1999b; 1999c; 2000a; 2000b).

Lineaments are linear zones of extensive bedrock fractures that may be localities along which water moves. The locations of lineaments have been mapped in other parts of Kentucky, and KGS geologists are undertaking research into the yield of underground reservoirs formed along

these features. Lineaments, and especially intersections of them, are known to be productive of water (Straw, 1999c). Research conducted to date indicates that wells associated with such features may produce up to 100 gallons of water per minute (144,000 gpd), a good deal less than Jackson County's projected needs.

It would be necessary to develop and implement an extensive, long-term exploration program to ascertain the presence and potential yield of lineaments in Jackson County (Straw, 1999c). However, the results of such a study would be uncertain. The fact that water well yields would probably be moderate at best, coupled with the need for a major drilling program to prove the existence of any such reserves, suggest that exploration of lineaments in and adjacent to Jackson County is not a viable alternative to an impoundment as a water supply source.

With regard to the use of pumping to induce infiltration from surface streams, the prospect for supplying water from the Indian Creek gravel pit in southwestern Jackson County was also investigated (Straw, 1999b; 2000a; 2000b). This gravel pit must be emptied on a regular basis with two pumps for mining operations to proceed (Williams, 1999a). Evidence of coliform contamination of this water, which indicates the presence of human or animal feces, has been reported, suggesting that this water a mixture of surface and groundwater. In addition, according to USGS geological maps of this portion of Jackson County, the alluvium in this valley is too thin (20 feet or less) to hold considerable quantities of groundwater, and the stream is subject to low flows (Straw, 1999b). In other words, the available underground storage reservoir is not large. Therefore, extraction from these alluvial materials would not constitute a reliable source of water supply, especially during low or no flows (Straw 2000a; 2000b).

Alluvium: Material transported and deposited by flowing water, such as clay, silt, and sand.

The KGS has studied abandoned deep coal mines in eastern Kentucky as potential storage sites for municipal water supplies (Straw, 1999a). As long as these mines were worked in low-sulfur coal, water quality is acceptable. However, the geologic position of Jackson County within the Eastern Coal Province, which is known for high-sulfur coal mines, means that abandoned, underground mines in the County are likely to be unsuitable as storage reservoirs (Straw, 1999d; 2000b).

The rather limited studies of water quality from existing private wells in Jackson County have yielded inconclusive results, but do suggest a problem with coliform contamination. In water samples from 20 wells collected in the early 1990's for the Kentucky Farm Bureau Federation (KFBF) and analyzed for seven measures of water quality, only nitrate nitrogen was problematic (Carey et al., 1993; Currens, 1999). However, neither total nor fecal coliform contamination were analyzed in this study. In 1997, the Jackson County Health Department (JCHD) tested several well water samples for fecal coliform bacteria and found a portion to be contaminated (MEG, 1999c). One specimen tested for total coliform was also contaminated. Another water quality survey conducted in 1998 by the JCHD found that nearly half of the well water samples tested were contaminated with fecal coliform.

It is important to emphasize that contaminated well water does not necessarily imply contaminated aquifers (Goodman, 1999). One possible cause of contaminated aquifers is coal

mines. Abandoned underground coal mines may adversely impact groundwater if the coal extracted was high in sulfur and pyrite (iron sulfide) content, leading to acid mine drainage. Aside from such abandoned coal mines in certain locations in Jackson County, there is no evidence of systematic pollution of aquifers in the County.

In conclusion, well-founded doubts about quantity, and somewhat about quality, argue against vigorously pursuing the groundwater development alternative at this time. Ongoing research by the KGS indicates that discovering untapped groundwater resources in Jackson County in quantities sufficient to meet projected future demands is unlikely (Straw, 1999c).

2.1.2 EXPANSION OF TYNER LAKE AND/ OR McKEE RESERVOIR

Under this alternative, Tyner Lake and/or McKee Reservoir would be expanded by raising the dams at these sites. The intent would be to increase the supply of potable water in Jackson County. However, the potential water supply yield of a reservoir at any given site depends on average annual precipitation and associated runoff, and on the size of the upstream watershed or drainage area, not on the size of the reservoir. Since precipitation does not vary significantly at different locations within Jackson County, differences in watershed size account for virtually all of the different yields obtainable at any given site. Therefore, the study team analyzed the sizes of the watersheds for these reservoirs and their yields.

Tyner Lake

The dam at Tyner Lake impounds Flat Lick Creek, a tributary of Laurel Fork (MEG, 1999c). It is located in the headwaters of the Laurel Fork watershed at an elevation of 1,250 feet above MSL. The drainage area of Tyner Lake is 670 acres. However, there is no reliable data on the yield of this watershed under drought conditions. Therefore, the study team used estimated drought yields for the 6,945-acre drainage area for War Fork/Steer Fork and adjusted those figures based on the smaller size of the Tyner Lake drainage area (670 acres). That is, assuming precipitation is the same in both watersheds, the Tyner Lake watershed is 9.7 percent as big as the War Fork/Steer Fork watershed, so its yield should be 9.7 percent that of the proposed War Fork and Steer Fork reservoir.

The estimated “average drought condition” and “worst drought condition” yields for the War Fork/Steer Fork watershed are 5.7 and 3.6 million gallons per day (mgd), respectively (MEG, 1999b). Therefore, Tyner Lake would have theoretical average drought and worst drought condition yields of 0.55 mgd and 0.35 mgd, respectively.

In 1998, the most recent year for which an entire calendar year of yield data is available, the Jackson County Water Association (JCWA) withdrew a daily average of 791,000 gallons per day (gpd) (0.791 mgd) from Tyner Lake (Cates, 1999b). This rate exceeds the theoretical limit of the drainage area during times of drought, suggesting that there is virtually no room for expansion with reliability of service. In other words, raising the dam to increase the size of the reservoir

would not increase yield. Moreover, Tyner Lake is not located in a narrow, high valley. Therefore, raising the dam to increase the size of the lake is not feasible.

McKee Reservoir

A similar conclusion applies to McKee Reservoir and the newly completed MPS #1 (Multi-Purpose Structure), located just upstream. These facilities are located on Bills Branch, with drainage areas of 685 acres and 563 acres, respectively (MEG, 1999c). Based on the same comparative methodology used above, the theoretical yields of the McKee Reservoir site for average and worst drought conditions would be 0.56 mgd and 0.36 mgd, respectively. In 1998, the City of McKee pumped just over 200,000 gpd (0.2 mgd) from McKee Reservoir. When MPS #1 is brought on-line, the combined yield of both will be approximately 460,000 gpd (0.46 mgd), which suggests little capacity, if any, for any further expansion.

Neither Tyner Lake nor the McKee Reservoir is located in a watershed large enough to yield a quantity of water sufficient to provide for projected increases in Jackson County's water demand to the year 2050. Therefore, the expansion of Tyner Lake, the expansion of McKee Reservoir, or a combination thereof, are not feasible options for meeting Jackson County's projected water supply needs over the next 50 years.

2.1.3 WATER SUPPLY FROM SURROUNDING COUNTIES

This section evaluates the potential for meeting Jackson County's projected water needs by importing surface water from one or more existing sources in surrounding counties. Only currently-available or existing surplus water sources are addressed; potential new water storage sites (e.g. reservoirs, locks) are not discussed in this section. Evaluating the multitude of possible reservoir sites in the seven surrounding counties (Clay, Madison, Rockcastle, Owsley, Estill, Lee, and Laurel) as alternatives would unreasonably expand the number of sites requiring study. Moreover, unless a source of stored water currently exists, it does not possess the intrinsic advantage of avoiding the predicted environmental consequences of a Jackson County dam and reservoir.

Jackson County sits on the divide between the Kentucky River and the Cumberland River watersheds, but for administrative purposes, belongs to the eight-county Cumberland Valley Area Development District (ADD) (Neal, 1999). This ADD has a single Water Supply Planning Council, which approves water supply plans for each county, per state law. Jackson County's water supply plan was approved in March 1999 by this council, and in June 1999 by the Kentucky Division of Water (Rush, 1999b). Since there are already interties between the water supply networks of the numerous water associations and districts in the region, and because there is a trend toward regionalization of water supply, transmission, and distribution in Kentucky (Caldwell, 1999b), it is appropriate for Jackson County to consider obtaining water from sources in neighboring counties.

Several of the counties surrounding Jackson County, including Clay, Madison, Owsley, and Rockcastle, are either already receiving water exports from Jackson County or have expressed interest in the yield from a new Jackson County reservoir (MEG, 1999c). This suggests that they do not currently have surplus water themselves. Nevertheless, several abundant sources of surface water do exist in other counties, including Buckhorn Lake in Perry and Leslie Counties, Wood Creek Lake and Laurel Lake in Laurel County, and Lock 14 in Lee County. These sources of surface water are shown in **Figure 2.1-1**.

Buckhorn Lake -- Perry County and Leslie County

Buckhorn Lake is a U.S. Army Corps of Engineers (USACE) facility that was built primarily for flood control, which to some extent puts it at cross purposes with a water supply function. This is because flood control reservoirs stay largely empty during the wet season, precisely when water supply reservoirs are recharging and filling up. Nonetheless, the possibility of a limited amount of water supply is written into Buckhorn Lake's authorizing legislation, provided that it would not interfere with the primary function of flood control (Hamilton, 1999). There would be restrictions on withdrawal rates and volume allocated to storage. Water users would have to pay for storage, operations, and annual maintenance. After receiving a formal request from a water district, the USACE would need to conduct a feasibility study investigating these issues. It is estimated to take five to ten years, at a minimum, for this project to be implemented (Hamilton, 1999).

The possibility of constructing a pipeline from Buckhorn Lake to Jackson County was considered, and even costed out, but as a result of the above administrative and legal hurdles and general uncertainty as to timing, Buckhorn has been abandoned as a feasible alternative at this time (Powell, 1999a; Schmitt, 1999a). These cost estimates have not been made available to the study team. An additional deterrent is the long distance from the lake to the JCWA Treatment Plant, nearly 48 miles, over which a water transmission pipeline would have to be constructed (Kenvirons, 1999a).

Wood Creek Lake -- Laurel County

The closest of the existing surface water resources to the JCWA Treatment Plant is Wood Creek Lake in northern Laurel County. The distance from Wood Creek Lake to the JCWA Treatment Plant is 119,500 linear feet, or 22.6 miles (Williams, 1999f). Wood Creek Lake already supplies the Wood Creek Water District, and it is estimated to also be able to supply Jackson County's future needs without significant problem (Caldwell, 1999b).

The primary problem with the Wood Creek Lake alternative is one of distance and the cost of transporting water over this distance. Construction and operation costs for raw water transmission facilities sized to transport 3.5 million gallons of water per day from Wood Creek Lake to the JCWA Treatment Plant have been estimated. According to these estimates, construction alone of the water transmission main and associated facilities would cost about $12,318,000 (Kenvirons, 2000). The total present worth for operation and maintenance of the water main for 20 years would be approximately $1,486,000. This cost reflects the electrical power consumption and transmission main repairs over the 20-year period, plus the cost of pump

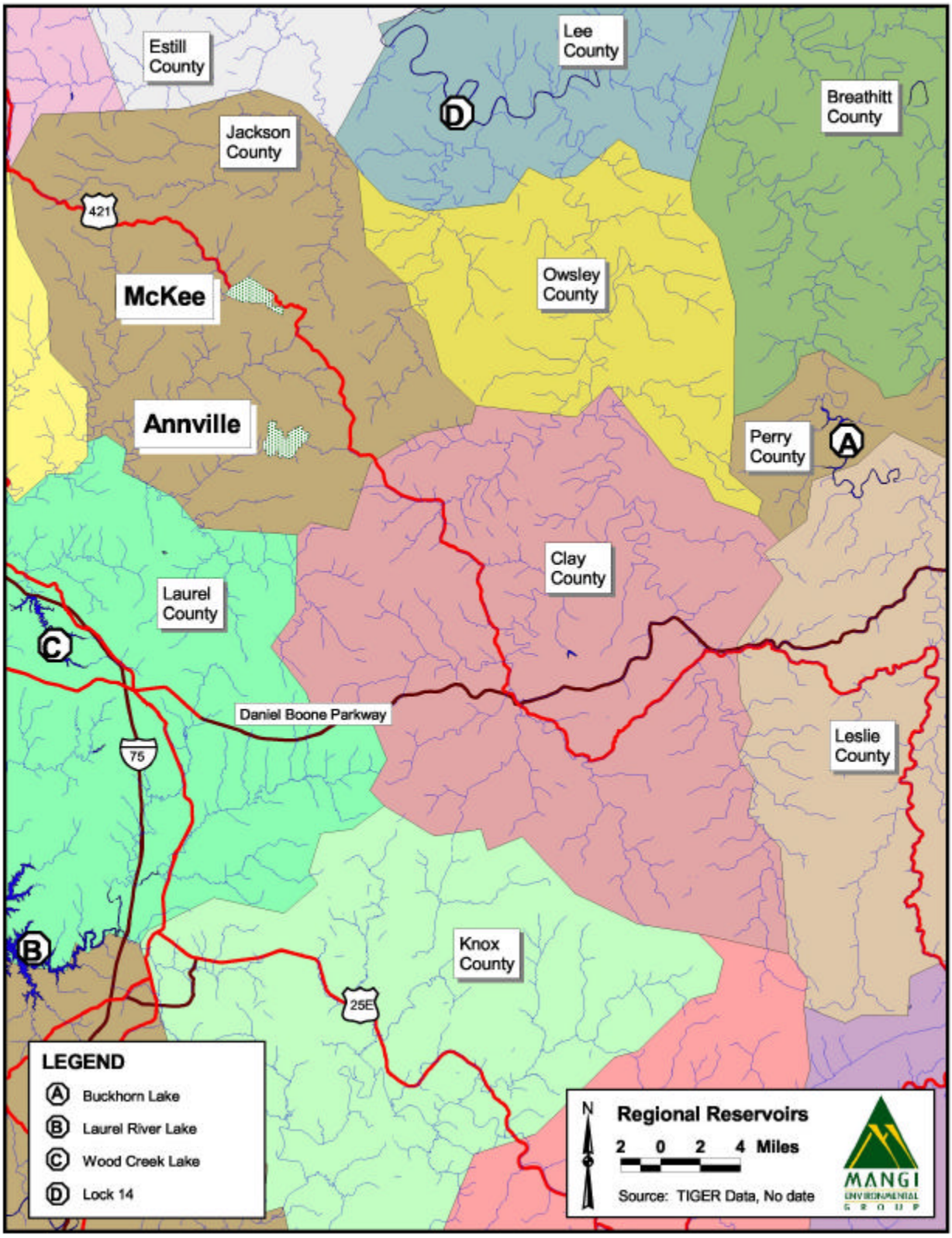


Figure 2.1-1. Existing Surface Water Sources in Counties Surrounding Jackson

replacements during the fifteenth year of operation. Thus, the total cost of construction and operation of the raw water transmission main from Wood Creek Lake would be about $13,804,000 (Kenvirons, 2000). These costs suggest that this option would not be a cost-effective alternative.

Laurel Lake -- Laurel County

Likewise, Laurel Lake in southern Laurel County is a substantial, well-recharged water storage reservoir, located in a large watershed, and could accommodate a large increase in withdrawals (Rush, 1999a). Withdrawal of one to two million gallons of water per day to meet Jackson County's projected 2050 water demand would have an insignificant effect on Laurel Lake (Caldwell, 1999b).

However, the problems associated with withdrawing water from Laurel Lake to provide for Jackson County's needs are the distance of Laurel Lake from the JCWA Treatment Plant and the cost of transporting water over this distance. The distance from Laurel Lake to the JCWA Treatment Plant is about 35 miles, which is greater than the distance of Wood Creek Lake from the treatment plant. Construction and operation costs for raw water transmission facilities from Laurel Lake to the JCWA Treatment Plant have not been estimated. However, because the distance from Laurel Lake to the treatment plant is greater than that from Wood Creek Lake, it can be reasonably assumed that the costs for a raw water transmission main from Laurel Lake would be greater. This suggests that the Laurel Lake alternative would not be cost effective.

Lock 14 -- Lee County

The discharge of the Kentucky River mainstem near Heidelberg is far greater than the quantities needed by Jackson County. The County could meet its projected water needs to the year 2050 by withdrawing less than one percent of the river's 7Q10 flow at Lock 14 near Heidelberg (Caldwell, 1999b). The 7Q10 is the average minimum flow which occurs for seven consecutive days, with a recurrence interval of ten years. To protect aquatic life and habitat and other in-stream flow values, the State prohibits water withdrawals that would reduce a watercourse's discharge to below 7Q10. Furthermore, the Kentucky River would be a secure source of water, with little present or projected competition for its water supply. The nearest significant withdrawal from this river is located 30 miles downstream at Lock 11 (Caldwell, 1999b).

However, the problems associated with withdrawing water from Lock 14 to provide for Jackson County's water needs are the distance of Lock 14 from the JCWA Treatment Plant and the cost of transporting water over this distance. The distance from Lock 14 to the JCWA Treatment Plant is about 25 miles which is greater than the distance of Wood Creek Lake from the treatment plant. Construction and operation costs for raw water transmission facilities from Lock 14 to the JCWA Treatment Plant have not been estimated. However, because the distance from Lock 14 to the treatment plant is greater than that from Wood Creek Lake, it can be reasonably assumed that the costs for a water transmission main from Lock 14 would be greater. This suggests that the Lock 14 alternative would not be cost effective.

In conclusion, while existing sources of surface water, which could easily meet Jackson County's projected water needs, are available, they are not accessible at reasonable cost. Furthermore, none of these alternatives would meet the secondary objective of the project, that of providing a water-oriented outdoor recreation facility.

2.1.4 WATER CONSERVATION

Water conservation has two distinct purposes: 1) temporary reduction in water demand to meet an acute water shortage caused by chemical contamination or drought, and 2) permanent reduction in demand through efficiency improvements (USACE, 1998). This section evaluates the potential for meeting Jackson County's projected future water supply needs through long-term reduction in demand from water conservation efforts. A more thorough discussion of the principles of water conservation is provided in this EIS as Appendix G.

Estimates of potential reduction in municipal water consumption from a vigorous conservation and efficiency program range from about 10 to 30 percent (KRADD and CT, No date; Sullivan, 1999; USACE, 1997), depending on the methods of conservation and types of efficiency improvements available. Examples of conservation methods and efficiency improvements are provided in Appendix G of this EIS.

Although the Jackson County Water Association (JCWA) does not currently have an active water conservation program (Powell, 1999a), existing water consumption rates in Jackson County are already comparatively low. Per capita residential water consumption in Jackson County (JCWA customers) averaged 54 gallons per day (gpd) from 1989 to 1997, compared to the 67 gpd state-wide average for Kentucky. Present commercial and industrial use rates are also well below the state average (MEG, 1999c). Thus, the opportunity for water users in Jackson County to conserve may be somewhat less than in other locales with higher consumption rates.

As discussed in Section 1.2.1, the low, moderate, and high projected water demands calculated for Jackson County, including regional needs, in 2050 were 2.6, 3.5, and 5.4 million gallons per day (mgd), respectively. If an active water conservation program could reduce these amounts by 20 percent, the low, moderate, and high water demand projections would be 2.1, 2.8, and 4.3 mgd, respectively. A 20 percent reduction represents the midway point between the low (10 percent) and high (30 percent) estimates of conservation's potential to reduce water consumption. These projections show that, while noticeably reducing the increase in projected water use, a concerted water conservation program would not eliminate the need for developing additional raw water supplies.

To the extent that water conservation could substitute for expanding water storage capacity, it can avoid the direct environmental impacts associated with the construction and operation of a dam, reservoir, and raw water transmission main described elsewhere in this EIS. While the manufacture and installation of water-saving devices does entail certain environmental impacts, primarily from mining and refining metals, as well as from energy consumption, these tend to be indirect, dispersed, and comparatively small in scale.

The cumulative impacts of a water conservation program in Jackson County, however, could be very similar to those associated with the creation of a reservoir. If a water conservation program could supply the same quantity of additional water as a reservoir, this could allow the number of water users to grow at the same rate as with a reservoir project. This enlarged number of residential, commercial, and industrial water consumers would then have several long-term, cumulative effects on the biophysical, social, and economic environment of Jackson County. Cumulative impacts associated with the construction of a dam to create a reservoir in Jackson County are described in Section 4.0 of this EIS.

In conclusion, water conservation, if energetically pursued, could reduce the projected increase in water consumption over the next 50 years by approximately 10 to 30 percent. This effect, while considerable, is insufficient to eliminate the need to develop additional water supplies for Jackson County, if the economic development initiatives promoted by the EZ are effective. A water conservation program would avoid the direct environmental impacts of the proposed dam and reservoir, but could still lead to similar long-term, cumulative effects on the environment. Water conservation would not meet the secondary purpose of the Jackson County Lake Project, that of providing lake-based recreational opportunities to meet the present and future demands of the residents of the County and surrounding areas. On the basis of these considerations, water conservation is eliminated from further study.

2.2 RESERVOIR ALTERNATIVES ELIMINATED

Section 2.2 provides a summary of the alternative reservoir sites that were previously evaluated in the *Jackson County Lake Project Final Alternatives Analysis*, prepared by The Mangi Environmental Group, Incorporated (MEG, 1999b). This analysis is provided in this EIS as Appendix H. **Figure 2.2-1** shows the locations of these alternative sites within Jackson County. Each site was examined and excluded from further consideration based on the following three criteria:

- **Estimated yield of at least 3.5 million gallons of water a day (mgd) for the potential impoundment.**

- **No Threatened, Endangered, or otherwise protected species present within or downstream of the proposed impoundment.**

  All information concerning these species was gathered by Eco-Tech, Incorporated, through a literature search, with the exception of the information concerning *Villosa trabalis* (Cumberland Bean Pearly Mussel), which Eco-Tech, Inc. gained by a field survey. The literature and methodologies used are discussed in *Endangered Species Screening Study and Field Survey for the Cumberland Bean Pearly Mussel for a Proposed Reservoir in Jackson County, Kentucky* (Libby et al., 1999a), and is provided in this EIS as Appendix I.

- **No Special Resource designations for the waterway.**

  Special Resource designations stem from the Federal Wild and Scenic Rivers Act (16 USC 1271-1287) (WRSA) or the Kentucky Outstanding Resource Water (ORW) program. For the purposes of this study, an alternative would receive a recommendation to proceed only if the alternative was free of any Wild and Scenic, Study Status, or ORW designations. Wild and Scenic Rivers are those free-flowing rivers that "possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values" (16 USC 1271 (b)) and that meet certain criteria based on factors that include being free from impoundments, accessibility, and the amount of development of the riverbanks and watersheds. A Study Status designation refers to those rivers or river segments that are under investigation by an agency to determine their suitability for addition to the Wild and Scenic Rivers system. ORW designations include: (1) Waters designated under the Kentucky Wild Rivers Act; (2) Waters listed on the Federal Wild and Scenic Rivers System; (3) Waters identified under the Kentucky Nature Preserves Act; and (4) Waters that support Federally recognized Endangered or Threatened species.

Table 2.2-1 provides a summary of the status of these three criteria for each reservoir site examined and excluded from further consideration. A more detailed discussion of this alternatives analysis can be found in the *Jackson County Lake Project Final Alternatives Analysis*, provided in this EIS as Appendix H.

2.2.1 LAUREL FORK AND BUZZARD BRANCH

This alternative is located approximately 2.5 miles north of the town of Dabolt in the southern half of Jackson County. The dam would be situated on the Laurel Fork River approximately one mile above the confluence with Indian Creek. The pool elevation of the reservoir would be approximately 1,040 feet above mean sea level (MSL), resulting in an impoundment of approximately 750 surface acres and a capacity of 10.6 billion gallons (BG) of water. During average drought conditions, there would be a sustainable yield of 17.0 million gallons of water per day (mgd) and a yield of 10.6 mgd during worst drought conditions.

The State of Kentucky has designated this portion of the Laurel Fork River as an ORW. Although the yield for this alternative would be well above that required to meet the projected needs of Jackson County, due to the presence of Threatened and Endangered species, especially the Cumberland Bean Pearly Mussel, and the ORW designation, this alternative was excluded from further consideration.

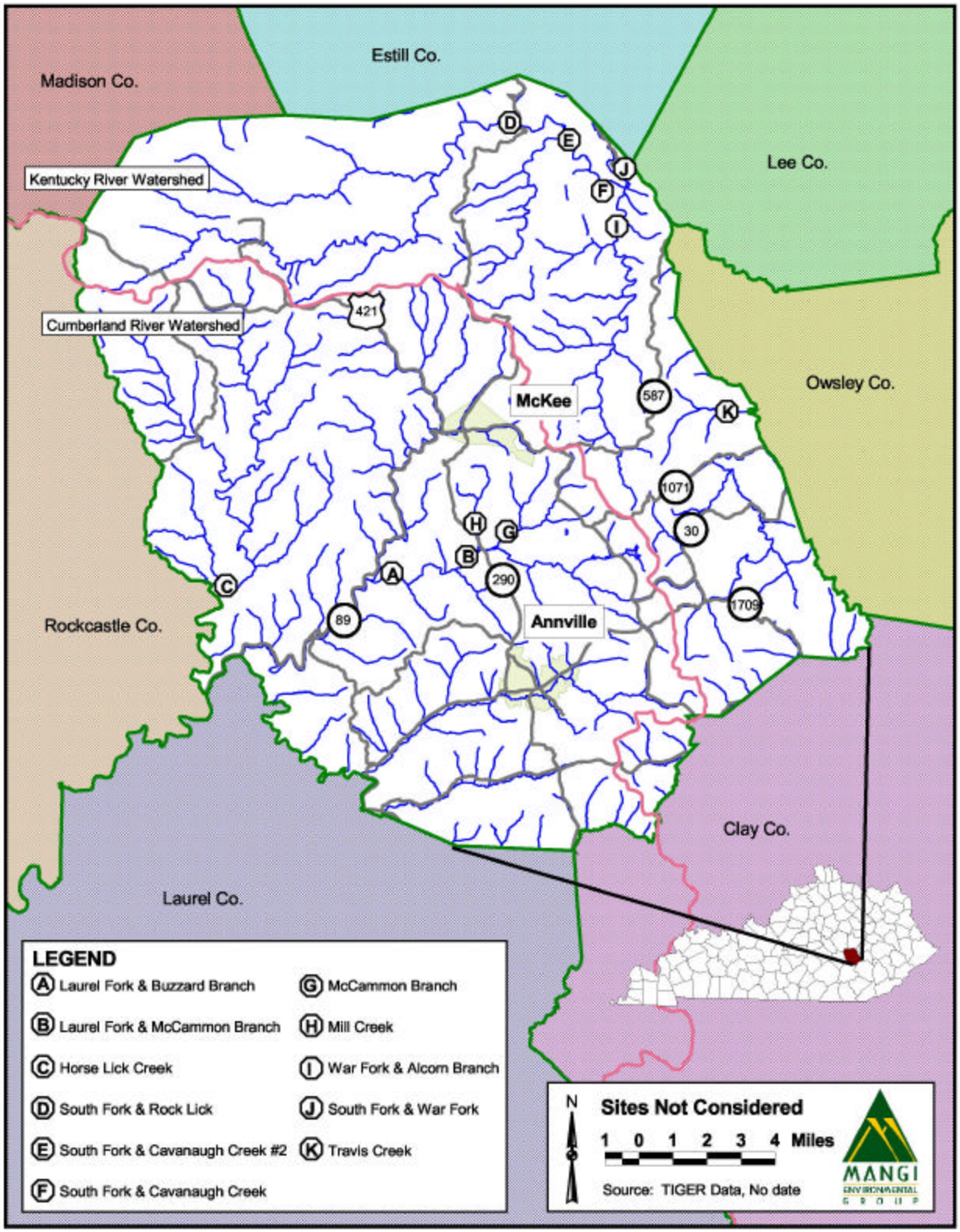


Figure 2.2-1. Alternative Reservoir Sites Eliminated in Jackson County

2.2.2 LAUREL FORK AND McCAMMON BRANCH

This alternative is located approximately 3.5 miles south of the town of McKee in southern Jackson County. The dam would be situated on the Laurel Fork River just upstream from the relocated Highway 290 bridge. The pool elevation of the reservoir would be approximately 1,060 feet above MSL, resulting in an impoundment of approximately 396 surface acres and a capacity of 5.1 BG of water. During average drought conditions, there would be a sustainable yield of 12.5 mgd and a yield of 7.8 mgd during worst drought conditions.

The State of Kentucky has designated this portion of the Laurel Fork River as an ORW. Although the yield for this alternative would be well above that required to meet the projected needs of Jackson County, due to the presence of Threatened and Endangered species, especially the Cumberland Bean Pearly Mussel, and the ORW designation, this alternative was excluded from further consideration.

2.2.3 HORSE LICK CREEK

This alternative is located along the Jackson/Rockcastle County boundary line and is located approximately one mile west of Carpenter School in western Jackson County. The dam would be situated on Horse Lick Creek just below the confluence with Dry Fork. The pool elevation of the reservoir would be approximately 985 feet above MSL, resulting in an impoundment of approximately 422 surface acres and a capacity of 3.5 BG of water. During average drought conditions, there would be a sustainable yield of 19.3 mgd and a yield of 15.9 mgd during worst drought conditions.

The State of Kentucky has designated this portion of Horse Lick Creek as an ORW. Although the yield for this alternative would be well above that required to meet the projected needs of Jackson County, due to the presence of Threatened and Endangered species, especially the Cumberland Bean Pearly Mussel, and the ORW designation, this alternative was excluded from further consideration.

2.2.4 SOUTH FORK OF STATION CAMP CREEK AND ROCK LICK

This alternative is located in the northeastern corner of Jackson County, approximately one mile southeast of the town of Drip Rock. The dam would be situated on South Fork near the Highway 89 bridge. The pool elevation of the reservoir would be approximately 900 feet above MSL, resulting in an impoundment of approximately 770 surface acres and a capacity of 17.6 BG of water. During average drought conditions, there would be a sustainable yield of 21.9 mgd and a yield of 13.7 mgd during worst drought conditions

The South Fork of Station Camp Creek is a Study River for possible inclusion in the Wild and Scenic River system. Even though the U.S. Forest Service (USFS) recommendation is to not include this river in the system, the Study status of the river remains in effect until removed by the Secretary of Agriculture (Hersel, 1999b). Therefore, although the yield for this alternative is well above that required to meet the projected needs of Jackson County, this alternative was excluded from further consideration.

2.2.5 SOUTH FORK OF STATION CAMP CREEK AND CAVANAUGH CREEK #2

This alternative is located in the northeastern corner of Jackson County, approximately 2.5 miles southeast of the town of Drip Rock. The dam would be situated on South Fork just below the confluence with Cavanaugh Creek. The pool elevation of the reservoir would be approximately 820 feet above MSL, resulting in an impoundment of approximately 710 surface acres and a capacity of 11.45 BG of water. During average drought conditions, there would be a sustainable yield of 30.0 mgd and a yield of 18.7 mgd during worst drought conditions.

The South Fork of Station Camp Creek has been a Study River for possible inclusion in the Wild and Scenic River system. Although the USFS recommendation is to not include this river in the system, the Study status of the river remains in effect until removed by the Secretary of Agriculture (Hersel, 1999b). Therefore, although the yield for this alternative is well above that required to meet the projected needs of Jackson County, this alternative was excluded from further consideration.

2.2.6 SOUTH FORK OF STATION CAMP CREEK AND CAVANAUGH CREEK

This alternative is located near the Lee County boundary line in northeastern Jackson County and is approximately one mile southwest of the Jackson/Estill/Lee County conjunction. The dam would be situated on South Fork just above the confluence with War Fork. The pool elevation of the reservoir would be approximately 800 feet above MSL, resulting in an impoundment of approximately 810 surface acres and a capacity of 12.0 BG of water. During average drought conditions, there would be a sustainable yield of 31.5 mgd and a yield of 19.7 mgd during worst drought conditions.

The South Fork of Station Camp Creek has been a Study River for possible inclusion in the Wild and Scenic River system. Although the USFS recommendation is to not include this river in the system, the Study status of the river remains in effect until removed by the Secretary of Agriculture (Hersel, 1999b). Therefore, although the yield for this alternative is well above that required to meet the projected needs of Jackson County, this alternative was excluded from further consideration.

2.2.7 McCAMMON BRANCH

This alternative is located approximately one mile west of Atkinstown in southern Jackson County. The dam would be situated on McCammon Branch approximately one-half of a mile upstream from the confluence with the Laurel Fork River. The pool elevation of the reservoir would be approximately 1,160 feet above MSL, resulting in an impoundment of approximately 280 surface acres and a capacity of 5.5 BG of water. During average drought conditions, there would be a sustainable yield of 3.7 mgd and a yield of 2.3 mgd during worst drought conditions. There are no known Endangered, Threatened, or Special Concern plants or animals that have been reported within the boundaries of the proposed reservoir. There are, however, reported *Villosa trabalis* (Cumberland Bean Pearly Mussel) downstream of the proposed site. This portion of McCammon Branch does not have any status under the WSRA or the Kentucky ORW program. However, the waters of McCammon Branch feed into waters that the State of Kentucky has designated as an ORW.

Although the yield for this alternative would be above the required limit during average drought conditions, the yield falls below the required limit during worst drought conditions. For the purposes of this study, the presence of a protected species, the Cumberland Bean Pearly Mussel, downstream of the proposed site would make this a difficult alternative to pursue. In addition, stream waters that feed into waters with ORW designation contribute to its exclusion as a reasonable alternative.

2.2.8 MILL CREEK

This alternative is located approximately three miles south of the town of McKee in the southern half of Jackson County. The dam would be situated on Mill Creek near the Highway 290 bridge. The pool elevation of the reservoir would be approximately 1,135 feet above MSL, resulting in an impoundment of approximately 96 surface acres and a capacity of 1.6 BG of water. During average drought conditions, there would be a sustainable yield of 1.4 mgd and a yield of 0.9 mgd during worst drought conditions.

The yield for this alternative is below that required to meet the projected needs of Jackson County, and therefore, excludes it as a reasonable alternative. For the purposes of this study, the presence of a protected species, the Cumberland Bean Pearly Mussel, downstream of the proposed site would make this a difficult alternative to pursue. In addition, stream waters that feed into waters with ORW designation contribute to its exclusion as a reasonable alternative.

2.2.9 WAR FORK AND ALCORN BRANCH

This alternative is located approximately one mile east of Wind Cave in eastern Jackson County. The dam would be situated on War Fork approximately two miles south of the confluence with South Fork. The pool elevation of the reservoir would be approximately 795 feet above MSL, resulting in an impoundment of approximately 155 surface acres and a capacity of 2.1 BG of

water. During average drought conditions, there would be a sustainable yield of 9.1 mgd and a yield of 7.3 mgd during worst drought conditions.

This area is under Study River status for possible inclusion under the Federal WSRA. Further, the USFS has recommended to the Department of Interior (DOI)/National Park Service (NPS) that the portion of War Fork between Turkey Foot Campground and the mouth of the South Fork of Station Camp Creek be included in the National Wild and Scenic River System. This alternative lies within these boundaries. Therefore, this alternative was excluded from further consideration.

2.2.10 SOUTH FORK OF STATION CAMP CREEK AND WAR FORK

This alternative is located near the Lee County boundary line in northeastern Jackson County and is approximately one mile southwest of the Jackson/Estill/Lee County conjunction. The dam would be situated on War Fork just upstream from the confluence with South Fork. The pool elevation of the reservoir would be approximately 800 feet above MSL, resulting in an impoundment of approximately 1,170 surface acres and a capacity of 19.7 BG of water. During average drought conditions, there would be a sustainable yield of 46.5 mgd and a yield of 29.1 mgd during worst drought conditions.

This area is under Study River status for possible inclusion under the Federal WSRA. Further, the USFS has recommended to the DOI/NPS that the portion of War Fork between Turkey Foot Campground and the mouth of the South Fork of Station Camp Creek be included in the National Wild and Scenic River System. This alternative lies within these boundaries and has the protection provided for a Study River. Therefore, this alternative was excluded from further consideration.

2.2.11 TRAVIS CREEK

This alternative is located near the Jackson/Owsley County boundary line in eastern Jackson County and is located approximately three miles north of the community of Mummie. The dam would be situated on Travis Creek just north of Travis School. The pool elevation of the reservoir would be approximately 1,100 feet above MSL, resulting in an impoundment of approximately 450 surface acres and a capacity of 9.6 BG of water. During average drought conditions, there would be a sustainable yield of 1.1 mgd and a yield of 0.7 mgd during worst drought conditions.

Although there are no known Endangered, Threatened, or Special Concern plants or animals within the boundaries of the proposed reservoir and this portion of Travis Creek does not have any status under the WSRA or the Kentucky ORW program, the yield for this alternative is below that required to meet the projected needs of Jackson County. For this reason, this alternative was excluded from further consideration.

Table 2.2-1. Status of Each Alternative Reservoir Excluded From Further Consideration Under Exclusion Criteria

Alternative	Yield (mgd) (Avg. Drought Conditions)	Presence of Threatened or Endangered Species	Special Use Designation*
Laurel Fork and Buzzard Branch	17.0	Yes (Cumberland Bean Pearly Mussel)	ORW designation
Laurel Fork and McCammon Branch	12.5	Yes (Cumberland Bean Pearly Mussel)	ORW designation
Horse Lick Creek	19.3	Yes (Cumberland Bean Pearly Mussel)	ORW designation
South Fork of Station Camp Creek and Rock Lick	21.9	No	Wild and Scenic Study River
South Fork of Station Camp Creek and Cavanaugh Creek #2	30.0	No	Wild and Scenic Study River
South Fork of Station Camp Creek and Cavanaugh Creek	31.5	No	Wild and Scenic Study River
McCammon Branch	3.7	Yes (downstream) (Cumberland Bean Pearly Mussel)	ORW designation downstream
Mill Creek	1.4	No	None
War Fork and Alcorn Branch	9.1	No	Wild and Scenic Study River
South Fork of Station Camp Creek and War Fork	46.5	No	Wild and Scenic Study River
Travis Creek	1.1	No	None

*Special Use Designations are described on Page 2-11 of this EIS.

2.3 ALTERNATIVES TO BE ASSESSED

Section 2.3 provides both a brief summary of the dam and reservoir sites evaluated in the *Jackson County Lake Project Final Alternatives Analysis* (MEG, 1999b), and determined to be reasonable for further consideration. Section 2.3 also provides a description of the No Action alternative. More specifically, Sections 2.3.1 through 2.3.3 note the rationale for considering each of these sites as a reasonable alternative. A more detailed description of each of these sites is provided in Section 2.4 of this EIS. **Figure 2.3-1** shows the locations of these three proposed reservoir sites within Jackson County.

The *Jackson County Lake Project Final Alternatives Analysis*, provided in this EIS as Appendix H, examined a range of reservoir possibilities for each site, differing in elevation, surface acreage, and volume. Since completion of the analysis, more precise parameters for each of these sites have been determined. This section, along with Section 2.4, describe the proposed dam and reservoir at each of these sites using the selected parameters.

2.3.1 WAR FORK AND STEER FORK

The proposed War Fork and Steer Fork dam site is located approximately 0.5 miles southwest of Turkey Foot in eastern Jackson County. The dam would be situated on War Fork, approximately 0.75 miles north of the confluence with Steer Fork. The normal pool elevation of the reservoir would be 982 feet above MSL, resulting in an impoundment of 118 surface acres and a capacity of 1.438 BG of water (Kenvirons, 1999a). This reservoir would provide an average yield of 3.5 mgd.

The USFS has recommended to the DOI/NPS that the portion of War Fork between Turkey Foot campground and the mouth of the South Fork of Station Camp Creek be included in the National Wild and Scenic River System. This portion of War Fork does not fall within the area of the proposed dam and reservoir. Therefore, the area of the proposed dam and reservoir at this site does not have any status under the WSRA or the Kentucky ORW program.

2.3.2 STURGEON CREEK, 8.5 mgd

The proposed Sturgeon Creek, 8.5 mgd dam site is located near the Jackson/Owsley County boundary line in eastern Jackson County, approximately 1.5 miles northeast of the community of Mummie. The dam would be situated on Sturgeon Creek just below the confluence with Blackwater Creek. The normal pool elevation of the reservoir would be 989 feet above MSL, resulting in an impoundment of 475 surface acres and a capacity of 3.586 BG of water (Kenvirons, 1999c). This reservoir would provide an average yield of 8.5 mgd.

The *Villosa lienosa* (Little Spectaclecase), a mussel, designated as a species of KSNPC Special Concern, has been documented from Sturgeon Creek, but was not observed during the 1999 Eco-Tech, Inc. field survey. In addition, this portion of Sturgeon Creek does not have any status under the WSRA or the Kentucky ORW program. Given these findings, and a yield for the proposed reservoir well above that necessary to meet the projected needs of Jackson County, this alternative was studied in detail for this EIS.

2.3.3 STURGEON CREEK, 3.5 mgd

The proposed Sturgeon Creek, 3.5 mgd dam site is located near the Jackson/Owsley County boundary line in eastern Jackson County, approximately 0.8 miles upstream of the Sturgeon Creek (8.5 mgd) dam site. The footprint of this reservoir lies completely within the footprint of the Sturgeon Creek, 8.5 mgd reservoir. The dam would be situated on Sturgeon Creek just above the confluence with Blackwater Creek. The normal pool elevation of the reservoir would be 980 feet above MSL, resulting in an impoundment of 275 surface acres and a capacity of 1.449 BG of water (Kenvirons, 1999c). This reservoir would provide an average yield of 3.5 mgd, sufficient to provide for the projected needs of Jackson County. Therefore, this variation on the larger Sturgeon Creek alternative was also studied in detail for this EIS.

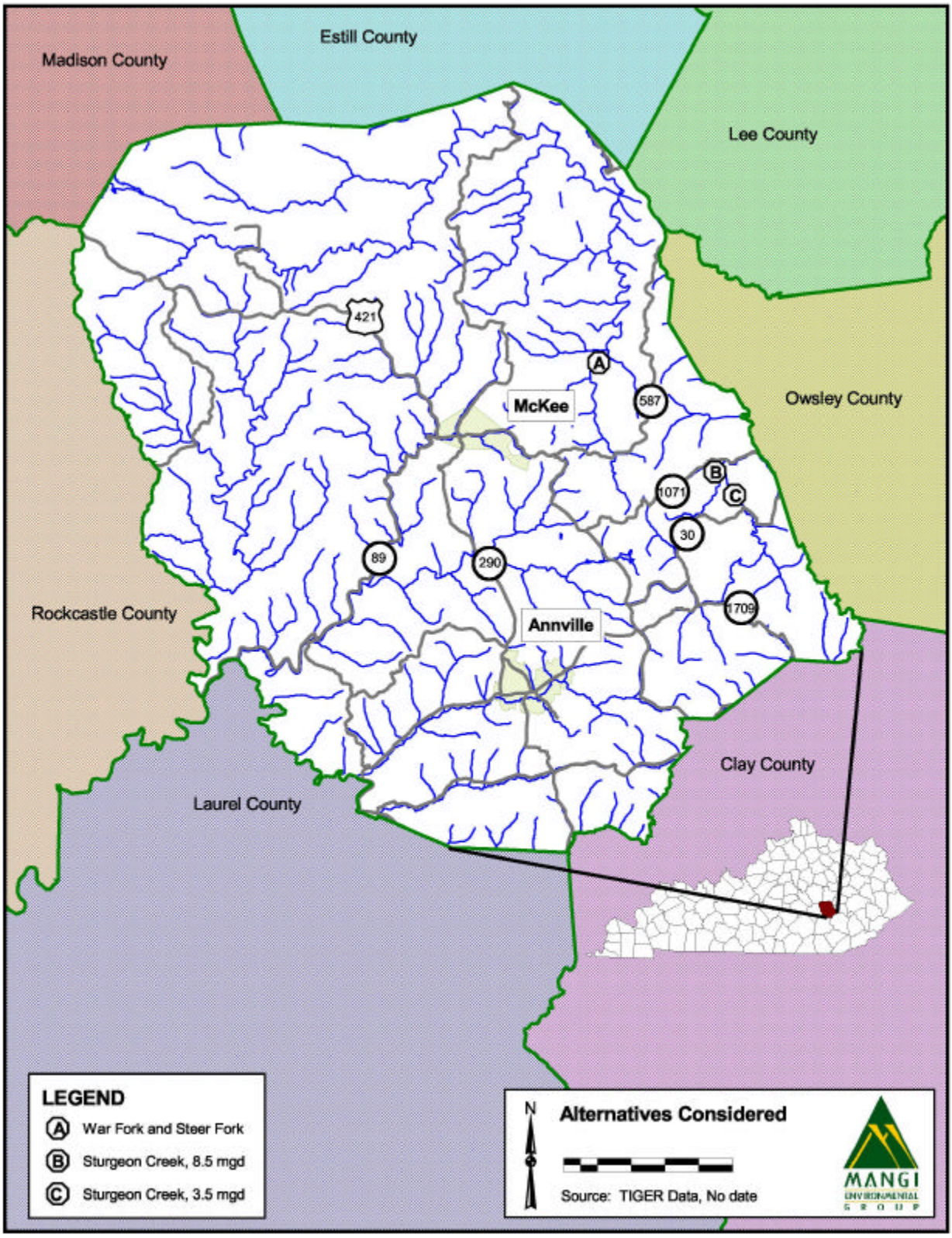


Figure 2.3-1. Alternative Reservoir Sites Considered in Detail

2.3.4 NO ACTION

There are two definitions of the No Action alternative, both of which will be evaluated along with the above three dam and reservoir alternatives in Section 3.0 of this EIS. One definition describes the situation in which nothing is done to meet the projected water and recreational needs of Jackson County. In other words, there are no changes to the current water supply and recreation situations in the County. This situation will be identified as the "No Change" alternative in this EIS.

However, the No Change alternative is not a reasonable alternative, as Jackson County has a documented need for additional water. Therefore, this EIS will provide an analysis of the impacts of a second definition of the No Action alternative, which will continue to be referred to as the "No Action" alternative throughout this EIS. The No Action alternative assumes two things. First, it assumes that neither the dam and reservoir nor the raw water transmission main leading from the reservoir to the JCWA Treatment Plant would be constructed to meet the projected water and recreational needs of Jackson County. Second, the No Action alternative assumes that certain activities would occur under this alternative to increase the current water supply, although in insufficient quantities to meet the projected water need. These activities may include the following or combinations thereof: drilling additional water wells throughout Jackson County, constructing water transmission lines leading from existing resources in the County, such as nearby intermittent streams, to the JCWA Treatment Plant, or instituting a water conservation program in Jackson County. Water conservation is discussed in Section 2.1.4 and Appendix G of this EIS.

2.4 PROPOSED ACTION

There are two primary components to the proposed action: the construction of a roller-compacted concrete (RCC) dam to create a reservoir and the construction of a raw water transmission main from the proposed reservoir to the existing Jackson County Water Association (JCWA) Treatment Plant at Tyner Lake. Each component is discussed separately in this section. Section 2.4.1 discusses actions pertaining to the site preparation, construction, operation, and connected actions associated with the proposed dam and reservoir at each alternative site. Section 2.4.2 considers actions regarding the construction and operation of the proposed raw water transmission main leading from each proposed reservoir site to the JCWA Treatment Plant.

2.4.1 DAM AND RESERVOIR

This component of the action proposed by the Jackson County EZ Community, Incorporated (EZ), the Jackson County Fiscal Court, and the JCWA is to obtain additional water supply and recreation opportunities by constructing an RCC dam to produce a reservoir. In conjunction with the dam, a water intake structure and a pump house would be constructed to pump water out of the reservoir. Recreational development around the reservoir may include a boat ramp, boat dock, public beach, picnic areas, and a primitive campground (Schmitt, 1999d). Other recreational activities that would be provided by the reservoir include swimming and fishing. A

300-foot buffer zone surrounding the reservoir horizontally from the normal pool level has been proposed to protect the water quality of the reservoir by restricting development and certain land uses in this area (JCEC, 1999).

The land within the proposed reservoir, up to normal pool elevation, would be purchased at a fair market value by the EZ. If the funds are available, the land up to the maximum flood level and the land within the buffer area would also be purchased by the EZ. Otherwise, this land would be acquired via voluntary easements with restrictive covenants (Schmitt, 1999e). If the current owners of this land refuse to donate or accept restrictions on the use of their land through easements, the land would be purchased or acquired via eminent domain.

Easement: The right of a person, government agency, or public utility to use or restrict public or private land owned by another for a specific purpose.

When an easement is obtained, it is added to the title of the property. The easement travels with the title through ownership transfers. Easements can be bought, donated, or negotiated on a specific piece of property. They are usually valid for an indefinite period of time; however, certain easements protecting natural environmental features can be created to be valid for a specific timeframe, such as 30 years. It is most common for easements to be valid *in perpetuity*, and the entity holding it determines the period of time most suiting its goals. The owner of the land holds the easement, making provisions for monitoring and enforcement of its terms (Callies et al., 1994).

Eminent domain is a power reserved by a government agency, usually at the State or local level, to use their legislatively-granted police power to condemn a piece of property for the 'public use.' Public use can include anything that furthers the health, safety, and welfare of the general public. In condemning the property, the entity must provide 'just compensation' for the property, which involves paying the market value of the land or structure at the time of condemnation. It is required that the exercise of the eminent domain power be rationally related to a conceivable public purpose (Callies et al., 1994).

Eminent Domain: A power reserved by a government agency, usually at the State or local level, to use their legislatively-granted police power to condemn a piece of property for the 'public use.'

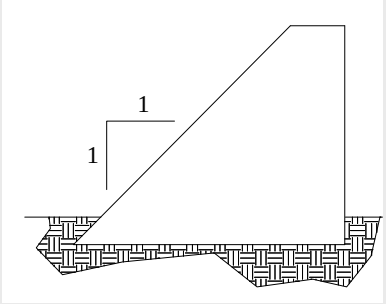
The following sections provide the details of this action for each alternative site considered. Activities associated with the site preparation, construction, and operation of the dam and reservoir, and connected actions that are consistent regardless of the specific site under consideration are discussed first. Site-specific details are discussed in sections following the general discussion.

2.4.1.1 Site Description

This section identifies the location of each alternative site under consideration and provides a description of the characteristics of the dam and reservoir at each site, including estimated site-specific project costs. A range is given for the height, length, and width of the proposed dam at each site. Widths of the dams are based on a 1:1 slope on the downstream side of the dam, allowance for a walkway with a 15-foot width across the top of the dam (see text box), and in the case of the Sturgeon Creek, 3.5 mgd site, an additional allowance of 25 feet for a potential road

to be constructed across the top of the dam (Williams, 2000). Dam and reservoir site statistics for the War Fork and Steer Fork project site were derived from the June 1999 Cost Comparison Analysis, prepared by Kenvirons, Incorporated (Kenvirons, 1999a), and from Parrott, Ely, and Hurt, Engineers (PEH) data. Dam and reservoir site statistics for the Sturgeon Creek, 8.5 mgd project site were derived from the September 1999 Cost Comparison Analysis, prepared by Kenvirons, Inc. (Kenvirons, 1999b), and from U.S. Geological Survey (USGS) maps. Dam and reservoir site statistics for the Sturgeon Creek, 3.5 mgd project site were derived from the September 1999 Cost Comparison Analysis, prepared by Kenvirons, Inc. (Kenvirons, 1999b), and from PEH data. Study area elevations of the reservoir are based on both normal pool elevations and on potential maximum flood level elevations, which are about 20 feet above normal pool elevations.

Slope: An inclined surface, usually defined by the ratio of the horizontal distance to the vertical distance.



A sediment accumulation pool would be provided within the reservoir to maintain the storage capacity of the reservoir and maximize its useful life (Kenvirons, 1999c). The size of the sediment pool would be based on the useful life of the dam, which is anticipated to be a minimum of 50 years. An average sediment accumulation rate of 0.74 acre-feet per square mile of drainage area per year was derived from surveys of reservoirs operated by the U.S. Army Corps of Engineers (USACE) in central and eastern Kentucky. Sediment accumulation rates for the reservoir sites were based on this average rate.

Acre-foot: The measurement of a volume of water, or the amount of water needed to cover one acre (43,560 square feet) one foot deep (325,851 gallons).

2.4.1.1.1 War Fork and Steer Fork

The proposed War Fork and Steer Fork dam site is located approximately 0.5 miles southwest of Turkey Foot in eastern Jackson County. The dam would be situated on War Fork approximately 0.75 miles north of the confluence with Steer Fork. **Figure 2.4-1** shows the location of the proposed dam at the War Fork and Steer Fork site, the normal pool and maximum flood levels of the proposed reservoir, and the 300-foot buffer zone extending from the normal pool level of the reservoir.

The dam at the proposed War Fork and Steer Fork project site would have an approximate height range of 87 to 107 feet, a length range of 760 to 790 feet, and a width range of 102 to 122 feet (Kenvirons, 1999a; Basanta, 2000). At a normal pool elevation of 982 feet above MSL, the surface area of the impoundment would be approximately 118 acres, with a storage capacity of 4,414 acre-feet (1.438 billion gallons (BG)). The drainage area for this reservoir would be 10.85 square miles. Water depth of the impoundment at the dam would be approximately 82 feet, with an estimated maximum lake level fluctuation of about 33 feet. This reservoir would provide an average yield of 3.5 million gallons of water per day (mgd) (Kenvirons, 1999a).

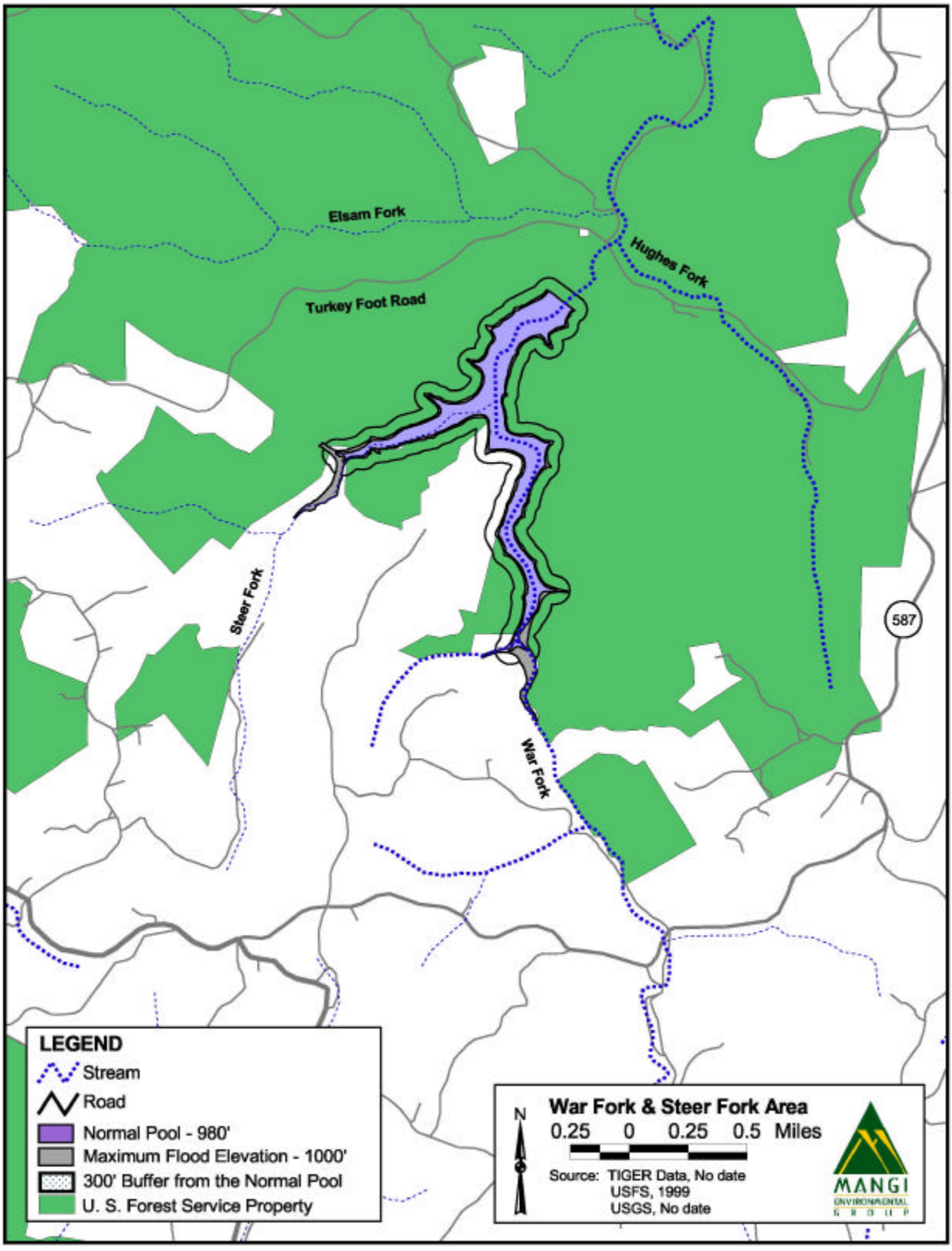


Figure 2.4-1. The Proposed War Fork and Steer Fork Dam and Reservoir Site

A sediment accumulation pool would be provided in the reservoir up to 924 feet above MSL (Kenvirons, 1999a). Based on the average sediment accumulation rate of 0.74 acre-feet per square mile of drainage area per year for central and eastern Kentucky, it is anticipated that sediment would be deposited at a rate of approximately 8.0 acre-feet/year in the War Fork and Steer Fork reservoir (Kenvirons, 1999c). Over a projected useful lifetime of 50 years, 396 acre-feet of sediment is anticipated to accumulate in the reservoir (Kenvirons, 1999a), or about 9 percent of the total volume.

Due to the resolution limitations of the USGS Digital Raster Graphics, the normal pool elevation of the proposed reservoir at War Fork and Steer Fork was approximated to 980 feet above MSL for this study. At this elevation, the proposed reservoir at this site would have a surface area of approximately 116 acres (USGS, No date). Approximately 109 acres (93.5 percent) of this land is currently managed by the U.S. Forest Service (USFS) (USFS, 1999). The remaining 7 acres is privately-owned.

A 300-foot buffer area around this reservoir at normal pool elevation would increase the surface area by about 211 acres, totaling 327 acres for the reservoir and buffer area (USGS, No date). Approximately 174 acres (82.5 percent) of the land within the buffer area is currently USFS land, with the total acreage owned by the USFS for the reservoir and buffer zone being 283 acres (USFS, 1999). The remaining 37 acres of the land within the buffer zone is privately-owned, with the total acreage owned by residents within the reservoir and buffer zone combined being approximately 45 acres.

At a potential maximum flood elevation of 1,000 feet above MSL, the surface area of the proposed reservoir at the War Fork and Steer Fork site would be approximately 162 acres (USGS, No date). About 153 acres of the maximum flood would be contained within the buffer area, and 10 acres would exceed the buffer area. The total acreage for a reservoir at maximum flood level at this site, with a 300-foot buffer extending from normal pool level, would be approximately 337 acres of land.

Cost estimates for the War Fork and Steer Fork project site were derived from the June 1999 Cost Comparison Analysis, prepared by Kenvirons, Inc. (Kenvirons, 1999a). The estimated cost of construction alone of the proposed dam and reservoir at this site would be approximately $5,547,000. Construction of the raw water transmission facilities leading from the proposed reservoir to the JCWA Treatment Plant would cost about $3,871,000. The total present worth of operation and maintenance of the water main for 20 years would be approximately $1,133,916. This total operating cost reflects the electrical power consumption and transmission main repairs over the 20-year period, plus the cost of pump replacements during the fifteenth year of operation. The raw water transmission main is discussed in detail in Section 2.4.2 of this EIS.

The estimated total capital cost of the project at the War Fork and Steer Fork site would be approximately $9,671,000. Total capital cost includes the costs of construction of the dam, reservoir, and raw water transmission main; land acquisition for the project at normal pool elevation of the reservoir; and utility relocations within the normal pool area of the reservoir. Thus, the total cost for the project at this site, including operation and maintenance costs for the raw water transmission main for 20 years, would be approximately $10,805,000. The total

capital and project costs given here do not include costs of land acquisition or utility relocations within the buffer or maximum flood areas of the project, nor do they include costs of constructing or operating the proposed recreational facilities associated with the reservoir. These costs are currently unavailable. Should the land within the buffer zone and maximum flood level of the reservoir also be obtained from the USFS, the total costs for the project would be higher.

2.4.1.1.2 Sturgeon Creek, 8.5 mgd

The proposed Sturgeon Creek, 8.5 mgd dam site is located near the Jackson/Owsley County boundary line in eastern Jackson County, approximately 1.5 miles northeast of the community of Mummie. The dam would be situated on Sturgeon Creek just below the confluence with Blackwater Creek. **Figure 2.4-2** shows the location of the proposed dam at the Sturgeon Creek, 8.5 mgd site, the normal pool and maximum flood levels of the proposed reservoir, and the 300-foot buffer zone extending from the normal pool level of the reservoir.

The dam at the proposed Sturgeon Creek, 8.5 mgd project site would have an approximate height range of 84 to 100 feet, a length range of 825 to 850 feet, and a width range of 99 to 115 feet (Kenvirons, 1999b; USGS, No date). At a normal pool elevation of 989 feet above MSL, the surface area of the impoundment would be approximately 475 acres, with a storage capacity of 11,007 acre-feet (3.586 BG). The drainage area for this reservoir would be 21.23 square miles. Water depth of the impoundment at the dam would be approximately 79 feet, with an estimated lake level fluctuation of about 21 feet. This reservoir would provide an average yield of 8.5 mgd (Kenvirons, 1999b).

A sediment accumulation pool would be provided in the reservoir up to 945 feet above MSL (Kenvirons, 1999b). Based on the average sediment accumulation rate of 0.74 acre-feet per square mile of drainage area per year for central and eastern Kentucky, it is anticipated that sediment would be deposited at a rate of 15.7 acre-feet/year in the Sturgeon Creek, 8.5 mgd reservoir (Kenvirons, 1999c). Over a projected useful lifetime of 50 years, 783 acre-feet of sediment is anticipated to accumulate in the reservoir (Kenvirons, 1999b), or about 7 percent of the total volume.

Due to the resolution limitations of the USGS Digital Raster Graphics, the normal pool elevation of the proposed 8.5 mgd reservoir at Sturgeon Creek was approximated to 990 feet above MSL for this study. At this elevation, the proposed 8.5 mgd reservoir at the Sturgeon Creek site would have a surface area of approximately 467 acres (USGS, No date). All of this land is currently privately-owned. A 300-foot buffer area around this reservoir at normal pool elevation would increase the surface area by about 592 acres, totaling 1,059 acres for the reservoir and buffer area.

At a potential maximum flood elevation of 1,010 feet above MSL, the surface area of the proposed 8.5 mgd reservoir at the Sturgeon Creek site would be approximately 740 acres (USGS, No date). About 680 acres of the maximum flood would be contained within the buffer area, and 59 acres would exceed the buffer area. The total acreage for a reservoir at maximum flood level at this site, with a 300-foot buffer extending from normal pool level, would be approximately 1,119 acres of land.

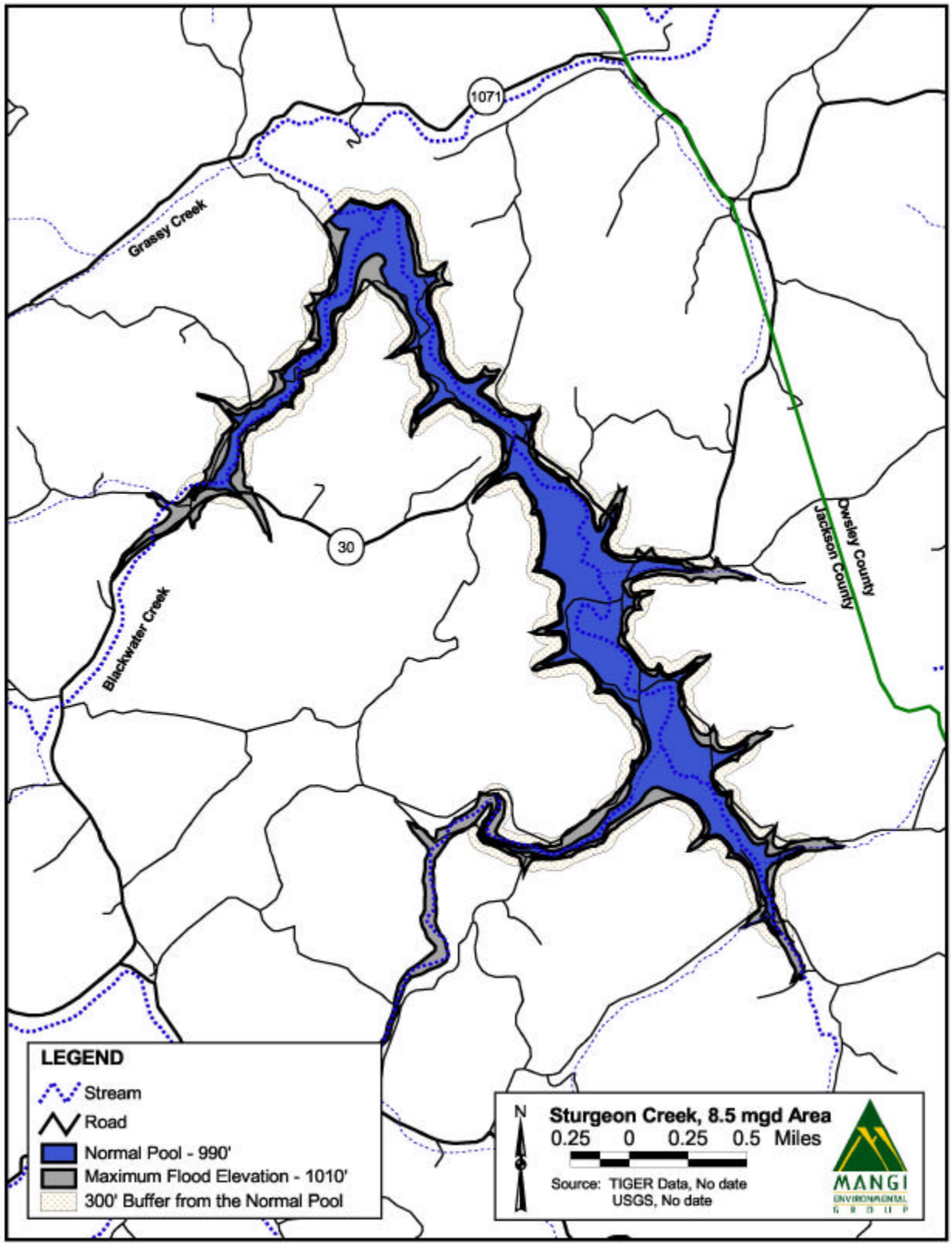


Figure 2.4-2. The Proposed Sturgeon Creek, 8.5 mgd Dam and Reservoir Site

Cost estimates for the Sturgeon Creek, 8.5 mgd project site were derived from the September 1999 Cost Comparison Analysis, prepared by Kenvirons, Inc. (Kenvirons, 1999b). The estimated cost of construction alone of the proposed dam and reservoir at this site would be approximately $8,500,000. Construction of the raw water transmission facilities leading from the proposed reservoir to the JCWA Treatment Plant would cost about $12,100,000. The total present worth of operation and maintenance of the water main for 20 years would be approximately $3,200,000. This total operating cost reflects the electrical power consumption and transmission main repairs over the 20-year period, plus the cost of pump replacements during the fifteenth year of operation. The raw water transmission main is discussed in detail in Section 2.4.2 of this EIS.

The estimated total capital cost of the project at the Sturgeon Creek, 8.5 mgd site would be approximately $27,600,000. Total capital cost includes the costs of construction of the dam, reservoir, and raw water transmission main; land acquisition for the project at normal pool elevation of the reservoir; and utility and residential relocations within the normal pool area of the reservoir. Thus, the total cost for the project at this site, including operation and maintenance costs for the raw water transmission main for 20 years, would be approximately $30,800,000. The total capital and project costs given here do not include costs of land acquisition or utility and residential relocations within the buffer or maximum flood areas of the project, nor do they include costs of constructing or operating the proposed recreational facilities associated with the reservoir. These costs are currently unavailable. Including these costs, however, would increase the total costs for the project at this site.

2.4.1.1.3 Sturgeon Creek, 3.5 mgd

The proposed Sturgeon Creek, 3.5 mgd dam site is located near the Jackson/Owsley County boundary line in eastern Jackson County, approximately 1.5 miles east-northeast of the community of Mummie. The dam would be situated on Sturgeon Creek approximately 0.6 miles above the confluence with Blackwater Creek, and approximately 0.8 miles upstream of the Sturgeon Creek 8.5 mgd dam site. **Figure 2.4-3** shows the location of the proposed dam at the Sturgeon Creek, 3.5 mgd site, the normal pool and maximum flood levels of the proposed reservoir, and the 300-foot buffer zone extending from the normal pool level of the reservoir.

The dam at the proposed Sturgeon Creek, 3.5 mgd project site would have an approximate height range of 64 to 67 feet, a length range of 500 to 600 feet, and a width range of 104 to 107 feet, due to the allowance for a potential road to be constructed across its top (Kenvirons, 1999b; Basanta, 2000). At a normal pool elevation of 980 feet above MSL, the surface area of the impoundment would be approximately 275 acres, with a storage capacity of 4,446 acre-feet (1.449 BG). The drainage area for this reservoir would be 15.62 square miles. Water depth of the impoundment at the dam would be approximately 62 feet, with an estimated lake level fluctuation of about 15 feet. This reservoir would provide an average yield of 3.5 mgd (Kenvirons, 1999b).

A sediment accumulation pool would be provided in the reservoir up to 952 feet above MSL (Kenvirons, 1999b). Based on the average sediment accumulation rate of 0.74 acre-feet per square mile of drainage area per year for central and eastern Kentucky, it is anticipated that

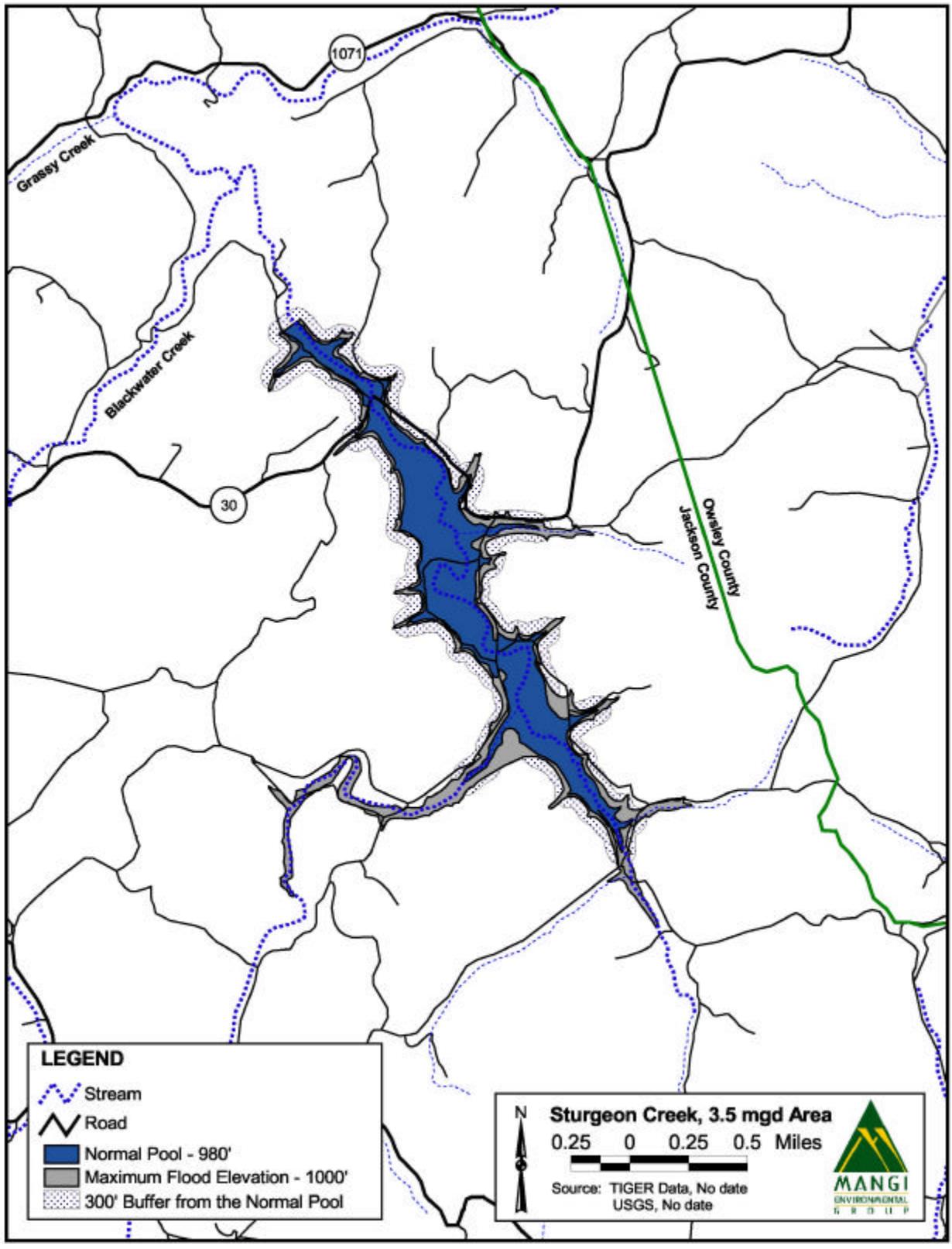


Figure 2.4-3. The Proposed Sturgeon Creek, 3.5 mgd Dam and Reservoir Site

sediment would be deposited at a rate of 11.5 acre-feet/year in the Sturgeon Creek, 3.5 mgd reservoir (Kenvirons, 1999c). Over a projected useful lifetime of 50 years, 576 acre-feet of sediment is anticipated to accumulate in the reservoir (Kenvirons, 1999b), or about 13 percent of the total volume.

USGS Digital Raster Graphics (No date) were used to calculate the surface acreage of the maximum flood level and 300-foot buffer zone surrounding the proposed reservoir at the Sturgeon Creek, 3.5 mgd site. Due to differences in graphical representations, at an elevation of 980 feet above MSL, these maps estimated the normal pool surface area of the proposed Sturgeon Creek, 3.5 mgd reservoir to be approximately 264 acres (USGS, No date). A 300-foot buffer area around this reservoir at normal pool elevation would increase the surface area by approximately 322 acres, totaling approximately 586 acres for the reservoir up to normal pool and the buffer area. All of this land is currently privately-owned.

At a potential maximum flood elevation of 1,000 feet above MSL, the surface area of the proposed reservoir at the Sturgeon Creek, 3.5 mgd site would be approximately 440 acres (USGS, No date). About 384 acres of the maximum flood would be contained within the buffer area, and 57 acres would exceed the buffer area. The total acreage for a reservoir at maximum flood level at this site, with a 300-foot buffer extending from normal pool level, would be approximately 643 acres of land.

Cost estimates for the Sturgeon Creek, 3.5 mgd project site were derived from the September 1999 Cost Comparison Analysis, prepared by Kenvirons, Inc. (Kenvirons, 1999b). The estimated cost of construction alone of the proposed dam and reservoir at this site would be approximately $4,800,000. Construction of the raw water transmission facilities leading from the proposed reservoir to the JCWA Treatment Plant would cost about $2,600,000. The total present worth of operation and maintenance of the water main for 20 years would be approximately $900,000. This total operating cost reflects the electrical power consumption and transmission main repairs over the 20-year period, plus the cost of pump replacements during the fifteenth year of operation. The raw water transmission main is discussed in detail in Section 2.4.2 of this EIS.

The estimated total capital cost of the project at the Sturgeon Creek, 3.5 mgd site would be approximately $10,700,000. Total capital cost includes the costs of construction of the dam, reservoir, and raw water transmission main; land acquisition for the project at normal pool elevation of the reservoir; and utility and residential relocations within the normal pool area of the reservoir. Thus, the total cost for the project at this site, including operation and maintenance costs for the raw water transmission main for 20 years, would be approximately $11,600,000. The total capital and project costs given here do not include costs of land acquisition or utility and residential relocations within the buffer or maximum flood areas of the project, nor do they include costs of constructing or operating the proposed recreational facilities associated with the reservoir. These costs are currently unavailable. Including these costs, however, would increase the total costs for the project at this site.

2.4.1.2 Site Preparation

401 KAR 63:005 Open Burning defines open burning as "the burning of any matter without an approved burn chamber and a stack or chimney with approved control devices." Open burning is prohibited in Kentucky, except for the purposes outlined in Section 3 of the regulation. Some these purposes include:

- Cooking of food for human consumption;
- Recreational or ceremonial purposes;
- Weed abatement, disease, and pest prevention;
- Recognized agricultural, range, and wildlife management practices; and
- Disposal of natural growth for land clearing.

The majority of the reservoir area up to normal pool elevation would be cleared of vegetation and existing structures (Kenvirons, 1999c). Cleared vegetation, such as trees and brush, would be burned on-site in accordance with the measures outlined in 401 KAR 63:005 Open Burning. The reservoir area would not need to be graded. Some trees and other vegetation may be left in select areas, such as coves, to provide aquatic habitat in the reservoir.

Existing utilities, including water, telephone, and power lines, in the area of the proposed dam, maximum flood level elevation of the reservoir, and within the buffer zone, would be relocated as necessary, beginning prior to the onset of construction activities, and continuing after construction has begun. All utility relocations would be completed prior to the impoundment of the reservoir (JCEC, 1999).

Homes, farm buildings, and other structures in the dam construction zone, maximum flood level of the reservoir, and the buffer zone would be removed and/or demolished prior to the onset of site preparation and construction activities (JCEC, 1999). Residents currently living in the project areas would be reimbursed for their land at a fair market value, and would be given the options of relocating their homes to a new area, being reimbursed for their houses at a fair market value, or selling their structures for scrap metal or relocation purposes at a public auction (Schmitt, 1999c; Kenvirons, 1999c). These auctions would establish a period of time by which the purchasers must complete their intended use of the structures. After such a period of time, the structures would be gutted to remove any hazardous materials and demolished (Kenvirons, 1999c). Asbestos removal and disposal would be performed by contractors certified by the Kentucky Division of Air Quality (DAQ) (KDAQ, Webpage). All asbestos-containing waste would be disposed of in a landfill approved by the Kentucky Division of Waste Management (KDWM) for asbestos disposal. In addition, any residential septic tanks and petroleum storage tanks located in the dam and reservoir area would be closed or removed by this time. Septic tanks would be closed by a licensed septic tank operator (Sheehan, 1999).

An area no larger than five acres would be designated as a staging area (Kenvirons, 1999c), and would be cleared and graded for this purpose. One possible location of the staging area would be within the reservoir's pool area; however, more detailed surveys of the proposed sites would be conducted prior to the determination of an exact location. The staging area would serve as a station for equipment and workers' vehicles, as well as a temporary office space during construction activities (JCEC, 1999). The portable concrete mixing plant and designated areas for fueling and equipment maintenance would also be located on the staging area. An additional area of no more than ten acres would serve as a layout site for raw materials. The specific

location of this layout site is currently unknown and would be determined by the construction contractor.

Fuel storage and equipment maintenance activities would be confined to areas specifically designed for those purposes (Kenvirons, 1999c). These areas would be equipped with spill clean-up kits and protective gear, and would have trained personnel available on-site to handle accidental spills (JCEC, 1999).

The construction contractor would be required to collect and arrange for the off-site disposal of solid wastes in accordance with the approved Jackson County Solid Waste Management Plan, as well as existing laws and regulations. Vehicles used to transport wastes would be enclosed or adequately covered to prevent spillage during transit (Smith, 1999). The contractor would be responsible for providing adequate portable on-site sanitary facilities in accordance with Occupational Safety and Health Administration (OSHA) requirements. Portable sanitary facilities would be maintained by a licensed septic tank operator (Sheehan, 1999), and sanitary waste would be transported and disposed of in compliance with KRS 211.970 through 211.982 Septic Tank Servicing.

Two estimates were obtained for the amount of construction materials needed for a dam at the proposed War Fork and Steer Fork and the Sturgeon Creek, 3.5 mgd project sites. These estimates were used to develop a range of quantities of materials for these sites. From this range, a range of truckloads required to transport these materials to the project sites was calculated. Only one estimate was obtained for the amount of construction materials needed for a dam at the proposed Sturgeon Creek, 8.5 mgd site. Therefore, only one estimate for the number of truckloads required for this site was calculated.

Transport of raw materials for the dam structure to the layout site would begin prior to the onset of construction, and would continue after construction has begun (JCEC, 1999). Materials that would be required for an RCC dam include Portland cement, gravel, sand, fly ash, and steel for reinforcement, valves, and gates (Kenvirons, 1999c). Cement would most likely be transported to Jackson County from Louisville, Kentucky; sand would most likely be transported from Ohio. Gravel would most likely be quarried from the Indian Creek gravel pit located southwest of McKee in Jackson County. Raw materials would be transported to the layout site using the existing road network, where possible (Kenvirons, 1999c). At sites where there are no existing roads, new roads would be constructed.

During site preparation and construction activities, gates would be erected around the construction areas and signs would be posted to warn the public that the site is a construction zone (Kenvirons, 1999c). The public would be restricted from using the access roads to the construction site. All visitors would be required to be accompanied by an authorized representative of the construction contractor prior to entering the site.

Soil erosion and dust would be controlled throughout all stages of site preparation and construction by using the measures outlined in the *Kentucky Best Management Practices for Construction Activities* (KNREPC, 1994). Soil erosion control measures may include temporary and/or permanent vegetative covers, diversion ditches, riprap, silt fences, straw bale barriers, and

topsoil stockspiling. One example of these measures, a silt fence, is provided in the text box on the right. Dust control measures may include spraying the affected area with water or calcium chloride.

Example of Best Management Practices

Silt Fence: A temporary barrier to trap sediment that consists of a filter fabric stretched between supporting posts, with the bottom entrenched in the soil.

Worker parking would be accommodated in designated areas on-site, such as the staging area (Kenvirons, 1999c). The exact types and quantities of equipment to be used for these activities would be determined by the construction contractor(s), but are anticipated to include bulldozers, graders, dump trucks, backhoes, and haul trucks. Site preparation and construction activities would be confined to daylight hours, five days of the week, except during the pouring of the RCC fill (JCEC, 1999). This intensive dam construction phase is described in Section 2.4.1.3. The total duration of the site preparation and construction activities for all of the proposed project sites is expected to be approximately 1.5 years (Kenvirons, 1999c).

2.4.1.2.1 War Fork and Steer Fork

The estimated land acquisition required for a dam and reservoir, up to maximum flood level elevation, and for a 300-foot buffer zone extending from normal pool elevation of the proposed reservoir at War Fork and Steer Fork would be 337 acres (USGS, No date). Land acquisition at this site would involve a land exchange with the USFS for land within the Daniel Boone National Forest (DBNF). This land exchange is discussed in detail in Section 2.4.1.5.1. Approximately 116 acres of this land, or the area up to the normal pool elevation of the reservoir, would be cleared of trees (Kenvirons, 1999c).

There are currently no households living on the proposed War Fork and Steer Fork project site that would require relocation (Schmitt, 1999f). In addition, there are no barns, trailers, or other structures present on this site.

As mentioned in Section 2.4.1.2, two estimates of the volumes of materials needed for construction of the RCC dam at the War Fork and Steer Fork project site were obtained. Based on these estimates, the range of RCC fill needed for a dam at this site would be 44,800 to 94,000 cubic yards (cu. yd.) (Kenvirons, 1999a; Sexton, 1999a). Additionally, the range of conventional concrete also needed for a dam at this site would be approximately 3,400 to 10,300 cu. yd. Approximately 1,080 to 3,590 cu. yd. of concrete would be needed for the upstream and spillway pre-cast panels.

Based on these estimated volumes of construction materials, the approximate number of truckloads of each raw material that would be needed for the dam are: 540 to 1,130 truckloads

of cement; 1,250 to 2,600 truckloads of sand; and 2,240 to 4,700 truckloads of gravel. The War Fork and Steer Fork site would be accessed using Turkey Foot Road and a new road adjacent to War Fork (Kenvirons, 1999c). The new access road would require an additional 3 to 5 acres to be disturbed for construction, and would be approximately 3,500 feet, or about 0.7 miles, in length. This road may later be used for permanent access to the dam.

The average workforce that would be needed for the duration of the site preparation and construction activities associated with a dam at War Fork and Steer Fork would consist of approximately 15 to 25 workers (Kenvirons, 1999c).

2.4.1.2.2 Sturgeon Creek, 8.5 mgd

The estimated land acquisition required for a dam and reservoir, up to maximum flood level elevation, and for a 300-foot buffer zone extending from normal pool elevation of the proposed Sturgeon Creek, 8.5 mgd reservoir would be approximately 1,119 acres (USGS, No date). Approximately 467 acres of this land, or the area up to the normal pool elevation of the reservoir, would be cleared of trees (Kenvirons, 1999c). All land in the reservoir maximum flood area and in the buffer zone would be cleared of existing structures.

Approximately 50 households are currently living on the proposed Sturgeon Creek, 8.5 mgd project site that would need to be relocated (Schmitt, 1999f). There are 43 houses, 6 trailers, 35 barns, and 66 small outbuildings or detached garages currently present on the project site. These structures would be removed prior to the onset of dam construction (JCEC, 1999).

Based on an estimated RCC fill volume of 77,600 cu. yd., an estimated volume of 5,800 cu. yd. of conventional concrete, and an estimated volume of 3,570 cu. yd. of concrete for the upstream and spillway pre-cast panels for the dam at the Sturgeon Creek, 8.5 mgd site (Kenvirons, 1999b), the approximate number of truckloads of each raw material that would be needed for the dam are: 920 truckloads of cement; 2,140 truckloads of sand; and 4,620 truckloads of gravel. The Sturgeon Creek, 8.5 mgd dam site would be accessed using KY 1071 and Mummie-Grassy Creek Road (Kenvirons, 1999c). A new road of approximately 800 linear feet, requiring less than one acre of additional land to be disturbed, may be required to access the base of the dam. This road may later be used for permanent access to the dam.

The average workforce that would be needed for the duration of the site preparation and construction activities associated with a dam at the Sturgeon Creek, 8.5 mgd site would consist of approximately 20 to 30 workers (Kenvirons, 1999c).

2.4.1.2.3 Sturgeon Creek, 3.5 mgd

The estimated land acquisition required for a dam and reservoir, up to maximum flood level elevation, and for a 300-foot buffer zone extending from normal pool elevation of the proposed Sturgeon Creek, 3.5 mgd reservoir would be approximately 643 acres (USGS, No date). Approximately 264 acres of this land, or the area up to the normal pool elevation of the reservoir, would be cleared of trees (Kenvirons, 1999c). All land in the reservoir maximum flood area and in the buffer zone would be cleared of existing structures.

Approximately 30 households are currently living on the proposed Sturgeon Creek, 3.5 mgd project site that would need to be relocated (Schmitt, 1999f). There are 27 houses, 4 trailers, 25 barns, and an unknown number of small outbuildings and detached garages currently present on the site. These structures would be removed prior to the onset of dam construction (JCEC, 1999).

As mentioned in Section 2.4.1.2, two estimates of the volumes of materials needed for construction of the RCC dam at the Sturgeon Creek, 3.5 project site were obtained. Based on these estimates, the range of RCC fill needed for a dam at this site would be 20,000 to 37,300 cu. yd. (Sexton, 1999a; Kenvirons, 1999a). Additionally, the range of conventional concrete also needed for a dam at this site would be approximately 2,800 to 7,200 cu. yd. Approximately 360 to 2,320 cu. yd. of concrete would be needed for the upstream and spillway pre-cast panels.

Based on these estimated volumes of construction materials, the approximate number of truckloads of each raw material that would be needed for the dam are: 240 to 440 truckloads of cement; 460 to 860 truckloads of sand; and 1,000 to 1,870 truckloads of gravel. The Sturgeon Creek, 3.5 mgd dam site would be accessed using either KY 30, Gregory Road, and an unnamed road adjacent to Blackwater Creek and Sturgeon Creek, or by using the planned realignment of KY 30 (Kenvirons, 1999c). No new access roads would need to be constructed to access the construction site (Kenvirons, 1999b).

The average workforce that would be needed for the duration of the site preparation and construction activities associated with a dam at the Sturgeon Creek, 3.5 mgd site would consist of approximately 15 to 25 workers (Kenvirons, 1999c).

2.4.1.3 Facility Construction

Prior to the onset of dam construction, the path of the existing stream would have to be diverted. The diversion conduit would be one of the first items to be constructed (Kenvirons, 1999c). The inlet of the conduit would be positioned upstream of the dam location and would terminate downstream of the construction zone. Once the conduit is installed and the foundation work surrounding the conduit is completed, the stream would be diverted from its channel to the conduit. This method of diversion would allow for the conduit to later serve as part of the principal spillway or reservoir drawdown (Kenvirons, 1999c).

Excavation of soil and rock would be required for the dam foundation. If the excavated material proves to be unsuitable for construction use, it may be stored, or permanently disposed of, within the reservoir's pool area (Kenvirons, 1999c). Blasting may be required to break through rock during excavation for the dam foundation. Any blasting required for excavation would be conducted by a licensed blaster (Schneider, 1999). Blasting operations would be conducted in accordance with the provisions outlined in 805 KAR Chapter 4.

Seepage Control Through an RCC Dam

For an RCC dam, seepage can be controlled through proper foundation preparation and by ensuring a watertight structure. Proper foundation preparation should include grouting, or pumping concrete into subsurface cracks in the rock. A watertight structure may be ensured by the use of:

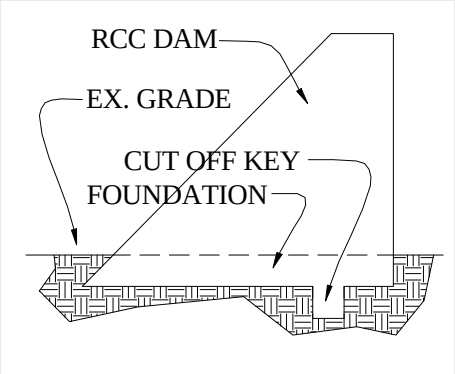
- Pre-cast concrete panels bonded to the dam with a PVC membrane;
- Nuclear density testing equipment to determine proper compaction of each lift in the dam; and
- Electrical detectors to assure that there are no holes in the PVC membrane.

Source: Parrott et al., No date

The proposed dam would be designed structurally and hydraulically to handle the probable maximum precipitation flood event (Kenvirons, 1999c). Ice loads would be evaluated during the design of the dam to ensure stability against the forces imposed by wintertime ice formation. To ensure the safety and stability of the dam structure during all stages of construction and operation, seepage through the embankment, foundation, and abutments would be controlled. Some methods for controlling seepage through an RCC dam are presented in the text box on the left.

A core trench would be cut and cleaned in preparation for the dam foundation (Parrott et al., No date). A cut-off key, approximately 10 feet by 10 feet, would be cut into the bottom of the trench, near the upstream side of the dam (Basanta, 1999). This cut-off key would serve as an anchor for the dam foundation (see text box). "Dental" concrete would be used to plug holes, cracks, or fissures in the rock foundation prior to pouring the concrete (Sexton, 2000).

Diagram of a Cut-Off Key



Before the RCC fill is placed, a layer of conventional concrete would be laid in the trench and cut-off key as a base. The RCC fill would be mixed on-site using a portable batch plant (Kenvirons, 1999c). The batch plant would be located on the staging area. Raw materials would be mixed at the plant using filtered water from the existing stream, if available, and then transported to the dam site (JCEC, 1999). If water is not available at the stream due to low flow or no flow conditions, off-site water would be transported to the site by truck. The RCC fill would be poured from scrapers, spread into one-foot lifts with bulldozers, and then compacted by vibratory rollers (Parrott et al., No date). Continuous pours are required for an RCC dam; therefore, construction activities would occur 24 hours a day, 7 days of the week during this period of the construction (Schmitt, 1999e). The duration of this intensive dam construction phase would vary by project site, due to the differences in the volumes of RCC fill needed for each dam site. The study team derived estimates of the duration of this phase by comparing the amount of RCC fill needed for a similar RCC dam built in Winchester, Kentucky (32,000 cu. yd.) and the amount of time required during this intensive phase in construction of that dam (960 hours over 8 weeks), to the amount of RCC fill required for each of the proposed alternative dams investigated in this EIS. Because a range of the required amount of RCC fill was estimated for the proposed War Fork and Steer Fork and the Sturgeon Creek, 3.5 mgd dams, the duration of this construction phase is also expressed as a range.

The upstream face of the dam would be vertical; the downstream side would be at a 1:1 slope. In an RCC dam, a single spillway is used as both the principal and emergency spillways (Parrott et al., No date). For this project, the spillway on each alternative dam would be approximately 200 feet in length, which is about one-third the length of the dam (Basanta, 1999). The spillway would be aligned with the center of the creek bed, not with the center of the dam.

The spillway and upstream faces of the dam would be formed with 4-foot by 16-foot pre-cast concrete panels (Sexton, 1999b). Prior to laying the pre-cast panels, conventional concrete, or bedding mix, would be spread onto the upstream and spillway facings to ensure a flat surface against which to place the panels (Sexton, 2000). One method that has been used to control seepage in other RCC dams, which may be used here, is the use of a polyvinyl chloride (PVC) membrane. This PVC membrane may be bonded to the downstream side of the panels (patented) and embedded into the layer of bedding mix concrete (Parrott et al., No date). The joints of the PVC membrane may be heat-welded in the field, forming an impermeable membrane.

Once construction of the dam has begun, construction inspections would be performed periodically by the Kentucky Division of Water (KDOW), Dam Safety and Floodplain Compliance (DSFC) Section, during the critical stages of work to ensure compliance with the approved dam design specifications (KDOW, 1998a). A final inspection would be conducted upon completion of construction.

Construction of the water intake structure and pump house would occur concurrently with the construction of the dam (JCEC, 1999). The water intake structure would extend from the ground to about 10 feet above normal pool elevation of the reservoir (Purkey, 2000a). The exact location of the structure within the reservoir has not yet been determined. The intake structure would be approximately 15 feet square, and would extend the full height of the reservoir. To enable JCWA water managers to obtain the highest-quality water, the inlet structure would have inlet ports at intervals of about 10 to 15 feet down to the bottom of the reservoir. Valves at the surface would allow the managers to select water from whichever depth offers the most suitable quality water. These inlet ports would be protected by screens to prevent fish or other aquatic life from entering the intake. In addition, a fence would be constructed on top of the intake structure for safety purposes.

The pump house would be located near the dam at an elevation lower than the normal pool surface elevation of the reservoir. The pump house would consist of a small, one-story building, with approximate dimensions of 30 feet by 30 feet (Williams, 1999f).

Upon completion of dam construction, damage to roads used to access the site during site preparation and construction activities would be repaired (Williams, 1999c). Existing roads located within the reservoir pool area would be permanently closed, and necessary road relocations completed, at the time impoundment of the reservoir begins (Kenvirons, 1999c). The reservoir would be filled immediately following the completion of dam construction (JCEC, 1999). Impounding the reservoir could take as long as four years during an extremely dry period and as little as three months during a wet period (Kenvirons, 1999c). During impoundment, downstream flows would be reduced to the amount allowed by the KDOW. This flow would be

the minimum average flow which occurs for seven consecutive days with a recurrence interval of ten years (7Q10), plus any permitted downstream withdrawals.

Site preparation and construction of the recreation facilities may occur simultaneously with the dam construction and impoundment of the reservoir (JCEC, 1999). Proposed recreational and associated facilities include a boat ramp; boat dock; picnic area; camping area; a swimming area with an imported sand public beach; gravel parking at the boat, picnic, swimming, and camping areas; and sanitary facilities for visitors. Hiking trails would connect the different activity areas (JCEC, 1999). Some facilities, such as the boat ramp, boat dock, and public beach, would be built prior to impounding the reservoir (Purkey, 2000a). Although exact locations of the recreational facilities would not be determined until land for the reservoir has been acquired, the boat ramp, boat dock, and associated parking areas would be in close proximity to each other. All differential-use recreation areas would be separated as needed for optimal use. Approximately 20 to 35 acres, but no more than 50 acres, would be occupied by these facilities, although not in one continuous tract (JCEC, 1999).

The boat ramp would be approximately 20 feet wide, with sufficient length to allow for use during normal lake-level fluctuation. The slope of the ramp would be no greater than 15 percent. The boat ramp would be composed of concrete, and may be pre-cast or cast in place. The surface of the ramp would be roughened for maximum traction.

The boat dock would be composed of decking situated over foam flotation boats. The decking would be wooden, steel, plastic, or a combination thereof. The dock would be designed to allow for use during normal lake-level fluctuation, and would be securely-located to avoid unintentional lateral movement. No marina would be associated with the boat dock.

Campsites would be located in or near wooded areas. Most vegetation, such as brush and undergrowth, would be cleared from this area. Individual campsites would be separated as much as possible. Each campsite would consist of a parking space, a level, fine-gravel tent area, a fire pit, and a picnic table. The camping area would have a centrally-located toilet facility for use by all campsite visitors.

All parking areas at the recreation facilities would be gravel or paved and would be graded to no greater than a five percent slope. All roads leading up to the recreation areas would be gravel or paved with asphalt, with a slope no greater than 15 percent. All facilities would be designed to follow the natural contours of the land and minimize grading wherever possible. Construction of the parking areas and roads may require the use of heavy equipment.

2.4.1.3.1 War Fork and Steer Fork

Construction of a dam at the proposed War Fork and Steer Fork site would require approximately 13,000 to 16,800 cu. yd. of earth to be excavated (Sexton, 1999a; Kenvirons, 1999a). Estimates of the volume of materials needed for dam construction are given in Section 2.4.1.2.1. The intensive dam construction phase, the pouring of the RCC fill, would last about 8 to 17 weeks at this project site.

The pump station for this reservoir would be located at an elevation of 900 feet above MSL. It would contain 3 pumps, each with a required estimated horsepower of 393. The estimated pump discharge pressure would be 242 pounds per square inch (psi).

Based on estimated mean annual flows at the site, the War Fork and Steer Fork reservoir site would take approximately five months to fill (Kenvirons, 1999c). The minimum downstream flow requirement for War Fork is estimated at 0.03 cubic feet per second (cfs). Impounding of the reservoir would flood one road at this site. This road is a USFS gravel road running along Steer Fork.

The proposed picnic area at the War Fork and Steer Fork reservoir site would consist of approximately 10 tables. Approximately 20 campsites would be constructed in the camping area associated with the reservoir at this site.

Water Flow Measures

The rate at which given volumes of water flow past a point is measured by several different units. One of the most common is the cubic foot per second (cfs). That is, a volume of water equivalent to a cube measuring one foot high, one foot long, and one foot high, and one foot wide, which flows past a point (along a river, stream, or pipeline) each second.

1 cfs = 7.48 gallons per second
= 448.8 gallons per minute (gpm)
= 26,928 gallons per hour
= 646,272 gallons per day
= 236 million gallons per year
= 724 acre-feet per year
= 28.32 liters per second

There would be a total of approximately 80 parking spaces for the recreation facilities associated with the reservoir at the War Fork and Steer Fork site. These parking spaces would be designated as follows: 20 spaces for the boat area, 40 spaces at the picnic and swimming areas, and 20 spaces at the campground.

2.4.1.3.2 Sturgeon Creek, 8.5 mgd

Construction of a dam at the Sturgeon Creek, 8.5 mgd site would require approximately 21,900 cu. yd. of earth to be excavated (Kenvirons, 1999b). Estimates of the volume of materials needed for dam construction at this site are given in Section 2.4.1.2.2. The intensive dam construction phase, the pouring of the RCC fill, would last about 14 weeks at this project site.

The pump station for this reservoir would be located at an elevation of 910 feet above MSL. It would contain 4 pumps, each with a required estimated horsepower of 994. The estimated pump discharge pressure would be 249 psi.

Based on estimated mean annual flows at the site, the Sturgeon Creek, 8.5 mgd reservoir site would take approximately 6.5 months to fill (Kenvirons, 1999c). Filling of the reservoir would take place year-round until normal pool elevation is reached. The minimum downstream flow requirement for Sturgeon Creek is estimated to be 0.06 cfs. Several roads would be flooded at normal pool during impoundment. These roads include: KY 30, Herd-Elias Road, C. Wilson Road, Creech Road, three unnamed roads adjacent to Sturgeon Creek, Lynch Cemetery Road, Grassy Creek Road, Maulden-Owsley County Line Road, Wilfreds Fork Road, and Gregory Road. Pavement would not be removed from these roads before flooding (JCEC, 1999).

The proposed picnic area at the Sturgeon Creek, 8.5 mgd reservoir site would consist of approximately 15 tables. Approximately 30 campsites would be constructed in the camping area associated with the reservoir at this site.

There would be a total of approximately 120 parking spaces for the recreation facilities associated with the reservoir at the Sturgeon Creek, 8.5 mgd site. These parking spaces would be designated as follows: 30 spaces for the boat area, 60 spaces at the picnic and swimming areas, and 30 spaces at the campground.

2.4.1.3.3 Sturgeon Creek, 3.5 mgd

Construction of a dam at the Sturgeon Creek, 3.5 mgd site would require approximately 9,000 to 12,100 cu. yd. of earth to be excavated (Sexton, 1999a; Kenvirons, 1999b). Estimates of the volume of materials needed for dam construction at this site are given in Section 2.4.1.2.3. The intensive dam construction phase, the pouring of the RCC fill, would last about 3.5 to 6.5 weeks at this project site.

The pump station for this reservoir would be located at an elevation of 918 feet above MSL. It would contain 3 pumps, each with a required estimated horsepower of 311. The estimated pump discharge pressure would be 190 psi.

Based on estimated mean annual flows at the site, the Sturgeon Creek, 3.5 mgd reservoir site would take approximately 3.5 months to fill (Kenvirons, 1999c). Filling of the reservoir would take place year-round until normal pool elevation is reached. The minimum downstream flow requirement for Sturgeon Creek is estimated to be 0.06 cfs. Several roads would be flooded at normal pool during impoundment. These roads include: KY 30, Herd-Elias Road, C. Wilson Road, Creech Road, three unnamed roads adjacent to Sturgeon Creek, Lynch Cemetery Road, and Maulden-Owsley County Line Road. Pavement would not be removed from these roads before flooding (JCEC, 1999).

The proposed picnic area at the Sturgeon Creek, 3.5 mgd reservoir site would consist of approximately 10 tables. Approximately 20 campsites would be constructed in the camping area associated with the reservoir at this site.
There would be a total of approximately 80 parking spaces for the recreation facilities associated with the reservoir at the Sturgeon Creek, 3.5 mgd site. These parking spaces would be designated as follows: 20 spaces for the boat area, 40 spaces at the picnic and swimming areas, and 20 spaces at the campground.

2.4.1.4 Facility Operation

The proposed dam would be inspected periodically by the DSFC for the duration of its lifetime (KDOW, 1998a). If inspections reveal deficiencies in the dam which may pose a threat to life or property, it would be required by law to be rendered safe, and safety deficiencies corrected, if it is to remain in service.

The proposed reservoir would be owned by the Jackson County Fiscal Court and would be managed by the JCWA (JCEC, 1999). Water quality of the reservoir would be tested regularly and monitored for waterborne diseases and other contaminants. If the water quality of the reservoir is found to be unsuitable for recreation due to high levels of contamination, recreational users would be notified via signs posted around the reservoir.

Periodic dredging of the reservoir for the purpose of reducing sediment accumulation would not be needed due to the allowance of a sediment accumulation pool within the reservoir (Kenvirons, 1999c). With the exception of the minimum downstream flow requirement, discharge from the reservoir would not be controlled. Once the reservoir has reached normal pool capacity, the incoming flow would be partially withdrawn for potable water use, with the remaining flow discharged through the outlet works at the dam. Since the intended use of the reservoir does not include flood protection, the pool level would not be lowered prior to the onset of wet season (Kenvirons, 1999c).

Pumping of water out of the reservoir for potable use would begin as soon as possible (JCEC, 1999). This would be as soon as the construction of the transmission facilities is complete and water is available (Purkey, 2000a). Depending on the needs of the JCWA, a temporary stream withdrawal may be constructed once the final location of the reservoir is determined. Water would be pumped from the proposed War Fork and Steer Fork and Sturgeon Creek, 3.5 mgd reservoirs to the JCWA Treatment Plant only. Water from the proposed Sturgeon Creek, 8.5 mgd reservoir may be pumped to both the JCWA Treatment Plant and the City of Manchester Treatment Plant, located in Clay County (Purkey, 2000a).

The proposed recreation facilities associated with the reservoir would be owned and managed by the Jackson County Fiscal Court (JCEC, 1999). After construction of the recreation facilities is complete, no hazardous materials or petroleum products would be stored in these areas. Recreation facilities would not be staffed, and no lifeguard would be present at the reservoir. If a fee is required to use a facility, a lockbox would be provided on-site for deposit of the fee. Phones may be available on-site, but running water would not be available to visitors at the recreational facilities (JCEC, 1999). Sanitary facilities in the form of storage or septic tanks would be available for visitors. All septic tanks would be restricted to areas outside the buffer zone. These facilities would be managed by Jackson County in accordance with existing laws and regulations. Trash bins and/or dumpsters would be provided at picnic areas and campgrounds for the disposal of solid wastes from recreational users. Solid wastes would be managed by Jackson County Fiscal Court in accordance with the Jackson County Area Solid Waste Management Plan.

The reservoir would be stocked regularly with sport fish by the Kentucky Department of Fish and Wildlife. Waterfowl hunting may be permitted as regulated by the State of Kentucky (JCEC, 1999). Unrestricted fueling of boats would not be permitted around the lake or in recreational areas. The boat dock would be designated for short-term use only; long-term use would not be permitted. Restrictions may be placed on the use of motor-operated boats on the reservoir.

2.4.1.5 Connected Actions

Section 2.4.1.5 describes actions that would occur as an indirect effect or result of the proposed action of constructing a dam to create a reservoir. Connected actions include land exchange with the U.S. Forest Service (USFS), cleaning up open dumps in the area, plugging existing water and/or oil wells, and relocation of roads. Site-specific aspects of these connected actions are discussed in Sections 2.4.1.5.1 through 2.4.1.5.3.

Any open dumps within the project area would have to be cleaned up prior to impoundment of the reservoir. Locations and scheduled clean-up dates for the open dumps in Jackson County are identified in the Jackson County Area Solid Waste Management Plan (JCETF, 1997). The dumps will be cleaned-up under the PRIDE (Personal Responsibility in a Desirable Environment) program of Eastern Kentucky.

Any water wells on residential properties within the project areas would be plugged and properly abandoned prior to impoundment of the reservoir. Water wells would be abandoned by a Certified Water Well Driller in accordance with 401 KAR 6:310 (KDOW, 1998a).

Any oil wells in the project areas would also be plugged, and the surrounding areas properly remediated, prior to impoundment of the reservoir. Oil wells would be plugged in accordance with existing laws and regulations. Any contaminated soils in the vicinity of the wells would be removed and disposed of at a permitted waste disposal facility.

2.4.1.5.1 War Fork and Steer Fork

Approximately 283 acres of the land within the maximum flood level and buffer zone of the proposed reservoir at the War Fork and Steer Fork site belong to the Daniel Boone National Forest (DBNF) (USFS, 1999). Of the approximately 116 acres within the normal pool area of the proposed reservoir, the USFS administers and manages about 109 acres. A land exchange with the USFS would be necessary before the project could proceed at this site. In a land exchange, the USFS would acquire from Jackson County an area of land of equal value to the land needed for this project (Purkey, 1999). The Jackson County EZ Community would commit to acquiring fee simple title to one or more parcels of suitable privately-owned land for the exchange. This title could be obtained by purchase or by donations. It is unknown at this time whether Jackson County would need to acquire land to exchange for all 283 acres within the maximum flood level and buffer zone of the reservoir or just the 116 acres up to normal pool elevation of the reservoir. The USFS may choose not to exchange the land within the buffer zone and to continue to manage this area for the purposes of protecting aesthetics and water quality within the proposed reservoir (Strojan, 2000a).

The Jackson County Area Solid Waste Management Plan lists no illegal dumps on the proposed War Fork and Steer Fork dam and reservoir site, including the buffer area (JCETF, 1997).

Since there are no known residences or other buildings on the proposed War Fork and Steer Fork project site, there are no water wells at this site that would need to be plugged and abandoned. In

addition, USGS maps do not indicate that any oil wells are present in or around this project site (USGS, No date).

2.4.1.5.2 Sturgeon Creek, 8.5 mgd

None of the land within the maximum flood level and buffer zone of the proposed reservoir at the Sturgeon Creek, 8.5 mgd site is currently managed by the USFS (USFS, 1999). Therefore, land exchange with the USFS would not be necessary at this site.

The Jackson County Area Solid Waste Management Plan lists four open dump sites on or very near the Sturgeon Creek, 8.5 mgd dam and reservoir site (JCETF, 1997). These open dumps have been scheduled for clean-up under the PRIDE program on the following dates: June 2000, July 2000, August 2000, and June 2002. If necessary, the dates for these clean-ups could be pushed forward to accommodate the dam project schedule (Guess, 1999).

At least some of the residences currently present on the proposed Sturgeon Creek, 8.5 mgd project site have associated water wells for drinking water. As stated in Section 2.4.1.5, these water wells would need to be plugged and properly abandoned prior to impoundment of the reservoir.

USGS maps indicate the presence of oil wells in two locations in the proposed Sturgeon Creek, 8.5 mgd project area (USGS, No date). One location is along Blackwater Creek, approximately 0.8 miles from the proposed dam at this site. The other location is along Sturgeon Creek, approximately two miles from the proposed dam. As discussed in Section 2.4.1.5, these oil wells would need to be plugged, and the surrounding area remediated, prior to impoundment of the reservoir.

A reservoir at the Sturgeon Creek, 8.5 mgd site would flood the existing KY 30 in two locations. A proposal to relocate KY 30 for the purpose of straightening it has been under consideration for years (Jewell, 1999a). Plans for the relocation are in the preliminary stages, with preliminary engineering slated for Fiscal Year 2001. Based on a 1994 Corridor Study, a proposed corridor was established, which would place the new KY 30 through the middle of the proposed Sturgeon Creek, 8.5 mgd reservoir. However, future Environmental Assessments (EA) on the relocation of KY 30 may or may not include this site. The impoundment of a reservoir at the Sturgeon Creek, 8.5 mgd site would require close coordination with the Kentucky Division of Highways for the relocation of this highway.

2.4.1.5.3 Sturgeon Creek, 3.5 mgd

None of the land within the maximum flood level and buffer zone of the proposed reservoir at the Sturgeon Creek, 3.5 mgd site is currently managed by the USFS (USFS, 1999). Therefore, land exchange with the USFS would not be necessary at this site.

The Jackson County Area Solid Waste Management Plan lists four open dump sites on or very near the Sturgeon Creek, 3.5 mgd dam and reservoir site (JCETF, 1997). These open dumps have been scheduled for clean-up under the PRIDE program on the following dates: June 2000,

July 2000, August 2000, and June 2002. If necessary, the dates for these clean-ups could be pushed forward to accommodate the dam project schedule (Guess, 1999).

At least some of the residences currently present on the proposed Sturgeon Creek, 3.5 mgd project site have associated water wells for drinking water. As stated in Section 2.4.1.5, these water wells would need to be plugged and properly abandoned prior to impoundment of the reservoir.

USGS maps indicate the presence of oil wells in one location in the proposed Sturgeon Creek, 3.5 mgd project area. These wells are located along Sturgeon Creek, approximately 0.7 miles from the proposed dam. As discussed in Section 2.4.1.5, these oil wells would need to be plugged, and the surrounding area remediated, prior to impoundment of the reservoir.

A reservoir at the Sturgeon Creek, 3.5 mgd site would flood the existing KY 30 at one location. However, as discussed in Section 2.4.1.5.2, a proposal to relocate KY 30 has been under consideration for years (Jewell, 1999a). The position of the proposed dam at the Sturgeon Creek, 3.5 mgd site would be at the same location as the corridor for the new KY 30 proposed by the 1994 Corridor Study. Although future EAs on the relocation of KY 30 may or may not include this corridor, if this corridor is chosen, a dam and reservoir at the Sturgeon Creek, 3.5 mgd site may not require an additional relocation of KY 30. Close coordination with the Kentucky Division of Highways would be necessary for this project site.

2.4.2 WATER TRANSMISSION MAIN CONSTRUCTION

This component of the proposed action involves the construction of a raw water transmission main from the proposed reservoir to the JCWA Treatment Plant at Tyner (Beulah) Lake. The proposed water transmission main would run underground from a pump station located at the reservoir to the treatment plant. One of three pipe materials would be used, depending only on their respective prices at the time of purchase (Williams, 1999b). These materials include ductile iron, polyvinyl chloride (PVC), or high density polyethylene. Other materials that would be required for the construction of the raw water transmission main include ductile or cast iron fittings and pumps (Kenvirons, 1999c).

Construction of the raw water transmission main would involve three basic steps: trench excavation, pipe-laying, and trench backfilling (Williams, 1999b). An excavator or trackhoe would be used to dig a trench approximately four to five feet deep. Immediately following the excavation of the trench, a section of the pipe would be laid in the trench, and the trench would be refilled with the excavated soil and earth. It is required that there be at least 30 inches of cover above the pipe. No trenches would be left exposed overnight; excavated trenches would be refilled by close of work for the day (Williams, 1999b).

The raw water transmission main would run mostly alongside existing roadways within the Kentucky Department of Transportation (KDOT) or County rights-of-way (ROW) to the treatment plant. When a stream is encountered along the proposed route of the water main, the

pipeline would be placed under the stream, as preferred by the KDOT (Williams, 1999b). Only in cases of very steep ravines or chasms with a long, high bridge crossing would the pipeline be attached to the bridge structure instead of being dropped into the stream. Stream crossings would be done during low flow or no flow periods in the stream (Williams, 1999e). Silt bales would be used as water filters to minimize sediment problems.

The workforce required for pipe-laying activities for raw water transmission main from any of the reservoir sites would consist of approximately three to four workers (Williams, 1999e). During construction alongside roadways, the lane adjacent to the pipe-laying activities would be closed, and traffic would be directed around the closed lane into the one free lane. An additional two workers would be required to direct traffic.

The construction contractor would be required to collect and arrange for the off-site disposal of solid wastes in accordance with the approved Jackson County Solid Waste Management Plan, as well as existing laws and regulations. Vehicles used to transport wastes would be enclosed or adequately covered to prevent spillage during transit (Smith, 1999). The contractor would be responsible for providing adequate portable on-site sanitary facilities in accordance with Occupational Safety and Health Administration (OSHA) requirements. Portable sanitary facilities would be maintained by a licensed septic tank operator (Sheehan, 1999), and sanitary waste would be transported and disposed of in compliance with KRS 211.970 through 211.982 Septic Tank Servicing.

During construction, orange fencing would be placed around any open trench for safety purposes (Williams, 1999e). There would also be signs at the site, and in surrounding areas, warning the public that the site is a construction zone and that there are workers present.

Some clearing of vegetation, such as trees and brush, may be necessary for construction. If any vegetation is cleared, it would be burned on-site in accordance with the measures outlined in 401 KAR 63:005 Open Burning.

Soil erosion and dust would be controlled throughout all stages of construction by using the measures outlined in the *Kentucky Best Management Practices for Construction Activities* (KNREPC, 1994). Fuel storage and equipment maintenance activities would be confined to areas specifically designed for those purposes (Williams, 1999e). A fuel storage tank may be present on site, and would be situated on top of a plastic liner covered by a layer of dirt or gravel. All hazardous materials, such as POLs, would be stored, transported, and disposed of in accordance with all applicable laws and regulations. Once the construction of the raw water transmission main is completed, no hazardous materials or POLs would be needed for operation of the main, and would not be handled or stored along the route.

Construction of the water main would occur simultaneously with that of the dam (JCEC, 1999). Construction would begin as soon as the final location for the proposed reservoir is determined and funding is available (Purkey, 2000a). If necessary, a temporary water intake structure would be utilized. Pipe laying would occur at an approximate rate of 1,000 to 1,500 linear feet per day, but could range from 40 to 5,000 linear feet, depending on a number of factors (Williams, 1999b).

Pumping of water from the proposed reservoir through the transmission main would begin as soon as possible (JCEC, 1999). Water from the reservoir would be transported to the pump station via the intake structure located at the reservoir, entering the transmission main at the pump station. Water would be pumped from the proposed War Fork and Steer Fork and Sturgeon Creek, 3.5 mgd reservoirs to the JCWA Treatment Plant only. Water from the proposed Sturgeon Creek, 8.5 mgd reservoir may be pumped to both the JCWA Treatment Plant and the City of Manchester Treatment Plant, located in Clay County (Purkey, 2000a).

The following sections, Sections 2.4.2.1 through 2.4.2.3, provide the details of this action that are specific to the sites under consideration.

2.4.2.1 War Fork and Steer Fork

The raw water transmission main leading from the pump station at the proposed War Fork and Steer Fork reservoir would run approximately 9.5 miles to the JCWA Treatment Plant at Tyner Lake. All but approximately one mile would follow alongside existing roadways in the KDOT or County ROW. The transmission main would run northeast alongside County Road 3109 to Turkey Foot Road East, then would follow State Highway 587 (KY 587) South to Privett Road. The main would run southwest along Privett Road to State Highway 1071 (KY 1071), continuing in the southwestern direction to Peters Road South. From this road, the transmission main would feed into an unnamed tributary of Flat Lick Creek, which supplies Tyner Lake with water (Kenvirons, 1999d). The route of the raw water transmission main leading from the proposed War Fork and Steer Fork reservoir to the JCWA Treatment Plant is shown in **Figure 2.4-4**.

Site statistics for the raw water transmission main associated with the proposed reservoir at War Fork and Steer Fork were taken from the June 1999 Cost Comparison Analysis, prepared by Kenvirons, Inc. (Kenvirons, 1999a). The project would require approximately 50,000 linear feet, or about 9.5 miles, of pipe for the proposed route from the War Fork and Steer Fork site. The water main would have a diameter of 18 inches, and would contain 10 valve sites. The high point along the water main would be 1,380 feet above MSL. An estimated pump discharge pressure of 242 psi would be applied to the water entering the main at the pump station.

Construction of a raw water transmission main along the proposed route from the War Fork and Steer Fork reservoir site to the water treatment plant would require crossing 60 linear feet of streams, 240 linear feet of open-cut road, and 160 linear feet of bored road (Kenvirons, 1999a). As a result of the water main construction, 1,500 linear feet (0.3 miles) of pavement would need to be replaced.

2.4.2.2 Sturgeon Creek, 8.5 mgd

The raw water transmission main leading from the pump station at the proposed Sturgeon Creek, 8.5 mgd reservoir would run approximately 7.6 miles to the JCWA Treatment Plant at Tyner Lake. Almost the entire route would follow alongside existing roadways in the KDOT or County ROW. The transmission main would run southwest alongside Mummie-Grassy Creek Road to State Highway 30 (KY 30), continuing southwest to Oak Grove Church Road. The main would

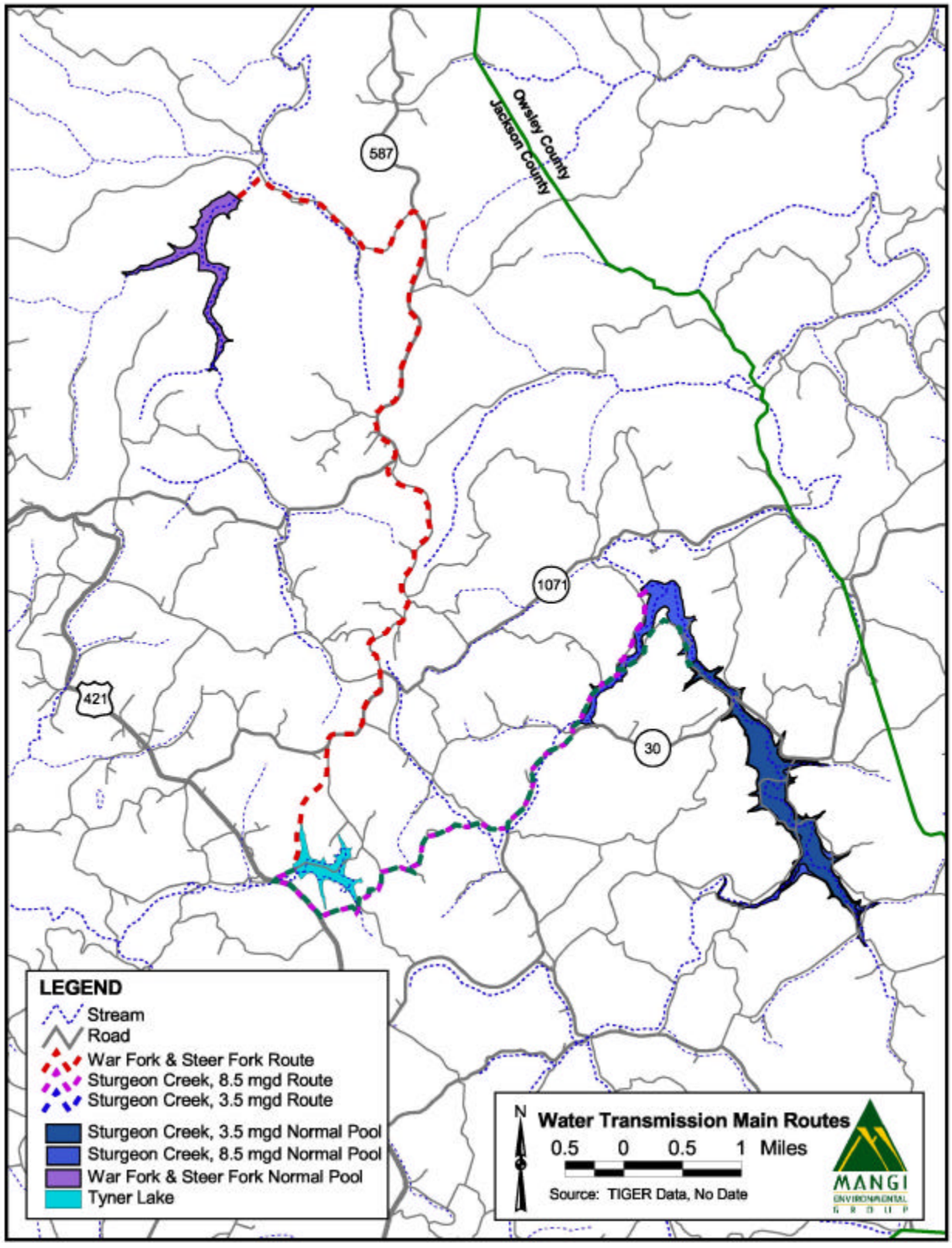


Figure 2.4-4. Proposed Routes of the Water Transmission Main From Each Reservoir Site

run southwest along Oak Grove Church Road to U.S. Highway 421 (US 421), turning northwest to Beulah Lake Road, which runs northeast to the treatment plant (Kenvirons, 1999e). The route of the raw water transmission main leading from the proposed Sturgeon Creek, 8.5 mgd reservoir to the JCWA Treatment Plant is shown in **Figure 2.4-4**.

Site statistics for the water transmission main associated with the proposed 8.5 mgd reservoir at Sturgeon Creek were taken from the September 1999 Cost Comparison Analysis, prepared by Kenvirons, Inc. (Kenvirons, 1999b). The project would require approximately 40,000 linear feet, or about 7.6 miles, of pipe for the proposed route from the Sturgeon Creek, 8.5 mgd site. The water main would have a diameter of 24 inches, and would contain 6 valve sites. The high point along the water main would be 1,310 feet above MSL. An estimated pump discharge pressure of 249 psi would be applied to the water entering the main at the pump station.

Construction of a raw water transmission main along the proposed route from the Sturgeon Creek, 8.5 mgd reservoir site to the water treatment plant would require crossing 300 linear feet of streams, 240 linear feet of open-cut road, and 240 linear feet of bored road (Kenvirons, 1999b). As a result of the water main construction, 1,200 linear feet (0.2 miles) of pavement would need to be replaced.

2.4.2.3 Sturgeon Creek, 3.5 mgd

The raw water transmission main leading from the pump station at the proposed Sturgeon Creek, 3.5 mgd reservoir would run approximately 5.7 miles to the JCWA Treatment Plant at Tyner Lake. Almost the entire route would follow alongside existing roadways in the KDOT or County ROW. The transmission main would run northwest alongside an unnamed road, turning southwest and intersecting Mummie-Grassy Creek Road. The main would run southwest alongside Mummie-Grassy Creek Road to KY 30, continuing southwest to Oak Grove Church Road. The main would run southwest along Oak Grove Church Road to US 421, turning northwest to Beulah Lake Road, which runs northeast to the treatment plant (Kenvirons, 1999e). The route of the raw water transmission main leading from the proposed Sturgeon Creek, 3.5 mgd reservoir to the JCWA Treatment Plant is shown in **Figure 2.4-4**.

Site statistics for the water transmission main associated with the proposed 3.5 mgd reservoir at Sturgeon Creek were taken from the September 1999 Cost Comparison Analysis, prepared by Kenvirons, Inc. (Kenvirons, 1999b). The project would require approximately 30,000 linear feet, or about 5.7 miles, of pipe for the proposed route from the Sturgeon Creek, 3.5 mgd site. The water main would have a diameter of 18 inches, and would contain 6 valve sites. The high point along the water main would be 1,310 feet above MSL. An estimated pump discharge pressure of 190 psi would be applied to the water entering the main at the pump station.

Construction of a raw water transmission main along the proposed route from the Sturgeon Creek, 3.5 mgd reservoir site to the water treatment plant would require crossing 90 linear feet of streams, 240 linear feet of open-cut road, and 120 linear feet of bored road (Kenvirons, 1999b). As a result of the water main construction, 900 linear feet (0.2 miles) of pavement would need to be replaced.

2.5 COMPARISON OF IMPACTS OF ALTERNATIVES

Table 2.5-1 compares the potential environmental impacts of the proposed action at each alternative proposed project site and the No Action alternative. Potential impacts are grouped according to environmental resource area or component. A reference is provided as to which section of this EIS contains the detailed discussion of those potential impacts. In addition, a short list of differences among alternatives is provided under each resource area, where differences exist. The criteria used to determine the significance of impacts are provided in Appendix C of this EIS.

Table 2.5-1. Comparison of Potential Impacts of Alternatives				
Environmental Resource/ Component	**ALTERNATIVES**			
	War Fork and Steer Fork	**Sturgeon Creek, 8.5 mgd**	**Sturgeon Creek, 3.5 mgd**	**No Action**
Geology/Soils (Section 3.2.1)	• Adverse, moderately significant increase in soil erosion, both short-term during construction and long-term during operations at the reservoir • Adverse, but insignificant, degradation of soil quality from the risk of a chemical/POL spill during construction • Adverse, moderately significant loss of Prime Farmland • Insignificant risk of fracturing bedrock during potential blasting or due to the weight of the dam • Adverse, but insignificant, degradation of wetlands	• Adverse, moderately significant increase in soil erosion, both short-term during construction and long-term during operations at the reservoir • Adverse, but insignificant, degradation of soil quality from the risk of a chemical/POL spill during construction • Adverse, very significant loss of Prime Farmland • Insignificant risk of fracturing bedrock during potential blasting or due to the weight of the dam • Adverse, but insignificant, degradation of wetlands	• Adverse, moderately significant increase in soil erosion, both short-term during construction and long-term during operations at the reservoir • Adverse, but insignificant, degradation of soil quality from the risk of a chemical/POL spill during construction • Adverse, very significant loss of Prime Farmland • Insignificant risk of fracturing bedrock during potential blasting or due to the weight of the dam • Adverse, but insignificant, degradation of wetlands	• Insignificant adverse increase in soil erosion from construction activities • Adverse, but insignificant, degradation of soil quality from the risk of a chemical/POL spill during construction activities • Adverse, but insignificant, loss of Prime Farmland
Differences Among Alternatives	• Larger amount of Prime Farmland lost at the Sturgeon Creek sites than at the War Fork and Steer Fork site • Larger amount of wetlands affected at both of the Sturgeon Creek sites, but impacts would be insignificant at all sites • Slightly greater soil erosion at the Sturgeon Creek, 8.5 mgd site due to the larger area affected by the project			
Surface and Groundwater Resources (Section 3.2.2)	• Adverse, moderately significant temporary degradation of downstream water quality from sedimentation and turbidity during construction	• Adverse, insignificant temporary degradation of downstream water quality from sedimentation, turbidity, and POL/ chemical spills during construction	• Adverse, insignificant temporary degradation of downstream water quality from sedimentation, turbidity, and POL/ chemical spills during construction	• Adverse, insignificant temporary degradation of downstream water quality from turbidity, sedimentation, and POL/chemical spills during construction of

	• Adverse, but insignificant, temporary degradation of downstream water quality due to POL/chemical spills during storage and handling • Adverse, moderately significant reduction of dissolved oxygen (DO) and elevation of summer water temperatures downstream • Positive, moderately significant creation of surface water • Positive, but insignificant, creation of new wetlands along shorelines and inflowing streams • Adverse, moderately significant short-term reduction in downstream flows on Wild and Scenic Study River segment downstream during impoundment • Insignificant long-term reductions in downstream flows due to withdrawals from reservoir • Adverse, but insignificant, long-term effects of surrounding land uses and lake-based recreation on reservoir water quality	• Adverse, but insignificant, reduction of DO and elevation of summer water temperatures downstream • Positive, moderately significant creation of surface water • Positive, but insignificant, creation of new wetlands along shorelines and inflowing streams • Insignificant short-term reductions in downstream flows • Adverse, but insignificant, long-term effects of surrounding land uses and lake-based recreation on reservoir water quality	• Adverse, but insignificant, reduction of DO and elevation of summer water temperatures downstream • Positive, moderately significant creation of surface water • Positive, but insignificant, creation of new wetlands along shorelines and inflowing streams • Insignificant short-term reductions in downstream flows • Adverse, but insignificant, long-term effects of surrounding land uses and lake-based recreation on reservoir water quality	water transmission lines • Moderately significant adverse impact on groundwater supplies and/or aquifers due to drilling new water wells

Differences Among Alternatives	• Greater adverse impacts (due to sedimentation, turbidity, and reduced DO) downstream of the War Fork and Steer Fork site than at either of the Sturgeon Creek sites due to the Wild and Scenic Study River status of the segment downstream of the proposed dam site • Amount of surface water created at each site would be incremental, with the greatest amount created at the Sturgeon Creek, 8.5 mgd site • Slightly greater long-term adverse impacts on water quality due to surrounding land uses at the Sturgeon Creek sites than at the War Fork and Steer Fork site due to greater pesticide usage and residential uses, but still insignificant at all sites			
Air Quality (Section 3.2.3)	• Adverse, but insignificant, degradation of air quality from fugitive dust, clearing and grading, vehicle maintenance and operation, debris burning, and potential chemical/ POL spills	• Adverse, but insignificant, degradation of air quality from fugitive dust, clearing and grading, vehicle maintenance and operation, debris burning, and potential chemical/ POL spills	• Adverse, but insignificant, degradation of air quality from fugitive dust, clearing and grading, vehicle maintenance and operation, debris burning, and potential chemical/ POL spills	• Adverse, but insignificant, degradation of air quality from construction activities
Biological Resources (Section 3.2.4)	• Adverse, but insignificant, temporary wildlife displacement during construction • Adverse, but insignificant elimination of potential habitats for Federally-listed Threatened and Endangered species from permanent removal of vegetation • Adverse, but insignificant, short-term harm to wildlife and vegetation from degraded air quality and risk of POL/chemical spills • Moderately significant short-term harm to downstream aquatic biota	• Adverse, but insignificant, temporary wildlife displacement during construction • Adverse, but insignificant elimination of potential habitats for Federally-listed Threatened and Endangered species from permanent removal of vegetation • Adverse, but insignificant, short-term harm to wildlife and vegetation from degraded air quality and risk of POL/chemical spills • Moderately significant short-term harm to downstream aquatic biota	• Adverse, but insignificant, temporary wildlife displacement during construction • Adverse, but insignificant elimination of potential habitats for Federally-listed Threatened and Endangered species from permanent removal of vegetation • Adverse, but insignificant, short-term harm to wildlife and vegetation from degraded air quality and risk of POL/chemical spills • Moderately significant short-term harm to downstream aquatic biota	• Insignificant damage to habitats due to construction activities • Insignificant damage to aquatic habitat from sedimentation and turbidity during construction activities

	from degraded water quality and reduced flow • Moderately significant adverse impact to terrestrial plants and wildlife due to permanent elimination of habitat • Positive increase in reservoir fish species and waterfowl • Moderately significant long-term effects on downstream aquatic biota and riparian vegetation from reduced DO and water flows, and changes in water temperature • Moderately significant adverse impact on small terrestrial and aquatic mammals, amphibians, and reptiles from permanent blockage of migration by the reservoir	from degraded water quality and reduced flow • Insignificant adverse impact to terrestrial plants and wildlife due to permanent elimination of habitat • Positive increase in reservoir fish species and waterfowl • Moderately significant long-term effects on downstream aquatic biota and riparian vegetation from reduced DO and water flows, and changes in water temperature • Moderately significant adverse impact on small terrestrial and aquatic mammals, amphibians, and reptiles from permanent blockage of migration by the reservoir	from degraded water quality and reduced flow • Insignificant adverse impact to terrestrial plants and wildlife due to permanent elimination of habitat • Positive increase in reservoir fish species and waterfowl • Moderately significant long-term effects on downstream aquatic biota and riparian vegetation from reduced DO and water flows, and changes in water temperature • Moderately significant adverse impact on small terrestrial and aquatic mammals, amphibians, and reptiles from permanent blockage of migration by the reservoir	
Differences Among Alternatives	• Less harm to terrestrial plants and wildlife from permanent elimination of habitat at either of the Sturgeon Creek sites due to the fragmented nature of forests and the large amount of farmland at these sites			
Noise (Section 3.2.5)	• Adverse, but insignificant, displacement/disturbance of wildlife during construction, potential blasting, and operations • Adverse, but insignificant disruption of nearby residents due to noise	• Adverse, but insignificant, displacement/disturbance of wildlife during construction, potential blasting, and operations • Adverse, but insignificant disruption of nearby residents due to noise	• Adverse, but insignificant, displacement/disturbance of wildlife during construction, potential blasting, and operations • Adverse, but insignificant disruption of nearby residents due to noise	• Insignificant, adverse displacement/ disturbance of wildlife due to noise created during construction activities • Insignificant, adverse disruption of nearby

	during construction, potential blasting, and operations	during construction, potential blasting, and operations	during construction, potential blasting, and operations	residents due to noise created during construction activities
Recreation (Section 3.2.6)	• Adverse, moderately significant short- and long-term reduction of recreational opportunities within the project area and downstream • Positive, very significant increase in recreational opportunities provided by the reservoir	• Adverse, but insignificant, short- and long-term reduction of recreational opportunities within the project area and downstream • Positive, very significant increase in recreational opportunities provided by the reservoir	• Adverse, but insignificant, short- and long-term reduction of recreational opportunities within the project area and downstream • Positive, very significant increase in recreational opportunities provided by the reservoir	• Adverse, but insignificant, reduction in recreational opportunities due to construction activities • Very significant continued recreation needs within Jackson County and the surrounding region
Differences Among Alternatives	• Greater short- and long-term reductions of recreational opportunities within and around the War Fork and Steer Fork project area due to the presence of Turkey Foot Campground downstream			
Cultural Resources (Section 3.2.7)	• Potential to adversely affect cultural resources would be insignificant	• Potential to adversely affect cultural resources would be moderately significant to very significant	• Potential to adversely affect cultural resources would be moderately significant to very significant	• Potential to adversely affect cultural resources would be insignificant during construction activities
Differences Among Alternatives	• Greater potential to adversely affect cultural resources at either of the Sturgeon Creek sites than at the War Fork and Steer Fork site due to the presence of a potentially significant archaeological site discovered and due to the potential for historic sites and undisturbed, intact cultural deposits at the Sturgeon Creek sites			
Land Use (Section 3.2.8)	• Moderately significant permanent alteration of existing land uses in the project area • Insignificant permanent changes in land use from socioeconomic forces • Adverse, but insignificant, effects of current land uses on environmental	• Moderately significant permanent alteration of existing land uses in the project area • Moderately significant permanent changes in land use from socioeconomic forces • Adverse, moderately significant, effects of	• Moderately significant permanent alteration of existing land uses in the project area • Moderately significant permanent changes in land use from socioeconomic forces • Adverse, moderately significant, effects of	• Moderately significant impact due to continued unplanned development

	conditions in and around the proposed reservoir • Adverse, moderately significant impact due to conflicts involving land ownership or easements	current land uses on environmental conditions in and around the proposed reservoir • Adverse, moderately significant impact due to conflicts involving land ownership or easements	current land uses on environmental conditions in and around the proposed reservoir • Adverse, moderately significant impact due to conflicts involving land ownership or easements	
Differences Among Alternatives	• Greater permanent changes of existing land uses from socioeconomic forces due to the project at the Sturgeon Creek sites than at the War Fork and Steer Fork site due to the private ownership of the land in and around the Sturgeon Creek sites; much of the land in and around the War Fork and Steer Fork site is publicly-owned			
Transportation (Section 3.2.9)	• Adverse, but insignificant, changes to levels of service (LOS) ratings of existing roads • Adverse, but insignificant, traffic congestion due to construction vehicles and construction zones • Insignificant increased risk of vehicular accidents due to construction- or recreation-related traffic • Insignificant changes to roadway structure due to road relocations	• Adverse, but insignificant, changes to LOS ratings of existing roads • Adverse, but insignificant, traffic congestion due to construction vehicles and construction zones • Insignificant increased risk of vehicular accidents due to construction- or recreation-related traffic • Moderately significant changes to roadway structure due to road relocations	• Adverse, but insignificant, changes to LOS ratings of existing roads • Adverse, but insignificant, traffic congestion due to construction vehicles and construction zones • Insignificant increased risk of vehicular accidents due to construction- or recreation-related traffic • Moderately significant changes to roadway structure due to road relocations	• Insignificant adverse slowing of traffic around construction sites
Differences Among Alternatives	• Slightly greater traffic congestion due to construction vehicles at the Sturgeon Creek, 8.5 mgd site due to a larger amount of truck trips needed to bring materials to this site • Greater changes to roadway structure if either of the Sturgeon Creek sites are chosen due to the necessary relocation of KY 30 and other flooded roads			
Waste Management (Section 3.2.10)	• Adverse, but insignificant, increase in solid and sanitary waste, and construction/demolition debris	• Adverse, but insignificant, increase in solid and sanitary waste, and construction/demolition debris	• Adverse, but insignificant, increase in solid and sanitary waste, and construction/demolition debris	• Adverse, but insignificant increase in solid, sanitary, and construction/ demolition waste from

	• Adverse, but insignificant, increase in the risk of POL/chemical spills during project construction and during operations at the JCWA Treatment Plant • Insignificant impact from the increase in sludge waste during operations at the JCWA Treatment Plant	• Adverse, but insignificant, increase in the risk of POL/chemical spills during project construction and during operations at the JCWA Treatment Plant • Insignificant impact from the increase in sludge waste during operations at the JCWA Treatment Plant	• Adverse, but insignificant, increase in the risk of POL/chemical spills during project construction and during operations at the JCWA Treatment Plant • Insignificant impact from the increase in sludge waste during operations at the JCWA Treatment Plant	construction activities • Adverse, but insignificant, increase in the risk of chemical/ POL spills during construction activities
Differences Among Alternatives	• Greater amount of waste generated from the Sturgeon Creek project sites due to the demolition of existing structures in the project areas; impacts due to the greater amount of waste would still be rated as insignificant			
Human Health and Safety (Section 3.2.11)	• Adverse, but insignificant, harm to human health and safety from potential POL/chemical spills during storage and handling • Adverse, but insignificant, impact to public health from construction activities • Adverse, but insignificant, impact on human health and safety due to removal and/or capping of septic tanks, storage tanks, and oil wells • Adverse, but insignificant, temporary degradation of air quality and water quality during	• Adverse, but insignificant, harm to human health and safety from potential POL/chemical spills during storage and handling • Adverse, but insignificant, impact to public health from construction activities • Adverse, but insignificant, impact on human health and safety due to removal and/or capping of septic tanks, storage tanks, and oil wells • Adverse, but insignificant, temporary degradation of air quality and water quality during	• Adverse, but insignificant, harm to human health and safety from potential POL/chemical spills during storage and handling • Adverse, but insignificant, impact to public health from construction activities • Adverse, but insignificant, impact on human health and safety due to removal and/or capping of septic tanks, storage tanks, and oil wells • Adverse, but insignificant, temporary degradation of air quality and water quality during	• Moderately significant adverse impact on human health and safety due to an insufficient water supply

	construction • Insignificant potential harm to recreational users of the proposed reservoir • Adverse, but insignificant, impact on human health and safety in the event of a dam failure	construction • Insignificant potential harm to recreational users of the proposed reservoir • Adverse, moderately significant impact on human health and safety in the event of a dam failure	construction • Insignificant potential harm to recreational users of the proposed reservoir • Adverse, moderately significant impact on human health and safety in the event of a dam failure	
Differences Among Alternatives	• Although the potential for dam failure would be extremely low at all project sites, impacts due to a dam failure would be greater at either of the Sturgeon Creek sites than at the War Fork and Steer Fork site due to potential loss of human life downstream			
Socioeconomics (Section 3.2.12)	• Positive, but insignificant, increase in income and employment in the region due to the project • Insignificant physical alteration of the community from changes in demographic structure and land use due to the project • Insignificant change in the character of the community adjacent to the proposed reservoir • Insignificant impact on the economy due to removal of private land from the County tax base • Moderately significant increase in property assessments on new lakefront land • Insignificant increase in	• Positive, but insignificant, increase in income and employment in the region due to the project • Very significant physical alteration of the community from changes in demographic structure and land use due to the project • Adverse, very significant disruption of community structure and social relations due to residential relocations from the project area • Insignificant impact on the economy due to removal of private land from the County tax base • Moderately significant increase in property assessments on new	• Positive, but insignificant, increase in income and employment in the region due to the project • Moderately significant physical alteration of the community from changes in demographic structure and land use due to the project • Adverse, moderately significant disruption of community structure and social relations due to residential relocations from the project area • Insignificant impact on the economy due to removal of private land from the County tax base • Moderately significant increase in property assessments on new	• Adverse, very significant continued impediment to growth of industry, residential development, and employment in Jackson County • Adverse, moderately significant impediment to other development goals of the EZ/EC

	County tax base from increased industrial and commercial development • Moderately significant increase in business development induced by the proposed reservoir • Moderately significant change in property values in the vicinity of the proposed reservoir • Insignificant increase in the need for community services to support increased population growth and business activity	lakefront land • Insignificant increase in County tax base from increased industrial and commercial development • Moderately significant increase in business development induced by the proposed reservoir • Moderately significant change in property values in the vicinity of the proposed reservoir • Insignificant increase in the need for community services to support increased population growth and business activity	lakefront land • Insignificant increase in County tax base from increased industrial and commercial development • Moderately significant increase in business development induced by the proposed reservoir • Moderately significant change in property values in the vicinity of the proposed reservoir • Insignificant increase in the need for community services to support increased population growth and business activity	
Differences Among Alternatives	• Greater disruption of the community structure and social relations at the Sturgeon Creek, 8.5 mgd site than at the Sturgeon Creek, 3.5 mgd site due to a greater number of residential relocations; no residential relocations would occur at the War Fork and Steer Fork site • Greater physical alteration of the community from changes in land use and demographics at the Sturgeon Creek, 8.5 mgd site due to a greater amount of land required for the project and a larger amount of resulting reservoir shoreline area available for development • Greater impact from removal of private land from the County's tax base at the Sturgeon Creek, 8.5 mgd site due to more private land withdrawn, but still rated as insignificant • Changes in property values in the vicinity of the Sturgeon Creek sites would have a greater impact than at the War Fork and Steer Fork site due to a larger amount of privately-owned land that would surround the proposed reservoir			
Environmental Justice (Section 3.2.13)	• Insignificant potential to disproportionately affect minority or low-income groups from adverse impacts associated with the proposed action	• Insignificant potential to disproportionately affect minority or low-income groups from adverse impacts associated with the proposed action	• Insignificant potential to disproportionately affect minority or low-income groups from adverse impacts associated with the proposed action	• Very significant potential to adversely and disproportionately affect minority or low-income groups from further economic

	• Very significant benefit to residents from improving health and economic conditions	• Very significant benefit to residents from improving health and economic conditions	• Very significant benefit to residents from improving health and economic conditions	degradation • Very significant potential to adversely and disproportionately affect minority or low-income groups from adverse health impacts associated with an insufficient water supply
Aesthetics (Section 3.2.14)	• Adverse, very significant temporary degradation of the visual quality of the area during construction • Adverse, moderately significant long-term impact on visual quality of the area due to the appearance of the proposed dam • Positive, moderately significant long-term impact on visual quality due to the appearance of the proposed reservoir	• Adverse, very significant temporary degradation of the visual quality of the area during construction • Adverse, insignificant long-term impact on visual quality of the area due to the appearance of the proposed dam • Positive, very significant long-term impact on visual quality due to the appearance of the proposed reservoir	• Adverse, very significant temporary degradation of the visual quality of the area during construction • Adverse, insignificant long-term impact on visual quality of the area due to the appearance of the proposed dam • Positive, very significant long-term impact on visual quality due to the appearance of the proposed reservoir	• Adverse, insignificant temporary degradation of visual quality due to construction activities

2.6 PREFERRED ALTERNATIVE

The preferred alternative, as identified by the lead agency, United States Department of Agriculture (USDA), Rural Utilities Service (RUS), is the proposed action at the War Fork and Steer Fork site. The proposed action at this site would have a reduced effect on the transportation infrastructure within and around the project area, a smaller potential adverse impact on human health and safety in the unlikely event of a dam failure, and a reduced adverse impact on the rural economy of the region, as a much smaller portion of tillable farmland within Jackson County would be lost as a result of the project. The proposed action at the War Fork and Steer Fork site would offer enhanced recreational opportunities due to its location within the Daniel Boone National Forest (DBNF), and would require no residential relocations from the project area. Support for the War Fork and Steer Fork site as the preferred alternative has been expressed by the Jackson County Empowerment Zone Community, Incorporated, the Jackson County Lake Committee, and the Jackson County Water Association (JCWA).

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