4.0 CUMULATIVE IMPACTS

The Council on Environmental Quality's (CEQ) Regulations (40 CFR 1500-1508) implementing the procedural provisions of the National Environmental Policy Act (NEPA), as amended (42 USC 4321), define cumulative effects as:

> "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other action" (40 CFR 1508.7)

Incorporating the principles of cumulative effects analysis into the environmental impact assessment of an action should address the following:

- Past, present, and future actions;
- All Federal, non-Federal, and private actions;
- Impacts on each affected resource, ecosystem, and human community; and
- Truly meaningful effects.

When describing the affected environment of cumulative impacts, natural boundaries should be used. When determining the environmental consequences of cumulative impacts, additive, opposing, and synergistic effects should be addressed. Also considered should be the sustainability of resources, ecosystems, and human communities. The analysis should look beyond the life of the proposed action.

This section is divided into two main subsections: short-term cumulative impacts and long-term cumulative impacts. The investigation of short-term impacts involves an analysis of the actions and activities occurring simultaneously with and nearby the construction phase of the Jackson County Lake Project. Environmental impacts associated with construction are, in the most part, inherently limited to the duration of construction activities. For this reason, the discussion of short-term impacts is separated from that of long-term impacts.

Each of these main subsections are further broken down into a discussion of the cumulative impacts associated with the proposed action and those associated with the No Action alternative. A description of past, current, and anticipated future activities occurring within Jackson County is given first, followed by a general analysis of the potential environmental impacts of those activities. A conclusion is then provided to discuss the cumulative effects of these activities when combined with the proposed action or the No Action alternative. The No Change alternative is not included in the analysis of cumulative impacts due to it not being a reasonable alternative to pursue. Within each conclusion section, a table is provided to show a summary of the various types of impacts. For each resource area within the table, the impacts of the proposed action or the No Action alternative are combined with those of the past, current, and future actions to derive an estimate of the cumulative effect. Due to the highly complex interactions between the different actions and their associated effects, which vary by resource area, it is not possible to simply add or subtract each adverse impact (denoted by "*" in the table)

and each beneficial or positive impact (denoted by "+") across a row to obtain a cumulative effect. Two or more effects may be additive, synergistic (multiplicative), or opposing. Thus, the ratings for the cumulative impacts reflect professional judgment as to how the different effects interact.

Section 4.1 addresses the potential short-term cumulative effects of the proposed action and the No Action alternative. Section 4.2 addresses the long-term cumulative effects of the proposed action and the No Action alternative. Section 4.3 provides an overall summary of both of these types of cumulative impacts.

4.1 SHORT-TERM CUMULATIVE IMPACTS

It is estimated that construction of the proposed dam and impoundment of the reservoir would take about three years altogether, within the 2002 to 2005 timeframe. The prior year and the following year are included to completely encompass or bracket the potential construction period. Thus, short-term duration is assumed to be approximately five years, between the years 2001 and 2006.

In terms of appropriate geographic boundaries to the analysis, most of the other activities that could potentially lead to short-term cumulative impacts would have to occur in the immediate project vicinity, that is, within the War Fork or Sturgeon Creek valleys. However, this is not always the case. With regard to water resources, for example, upstream and downstream activities within the watersheds are relevant, and in the case of air quality, all of Jackson County is relevant. With some resource areas, surrounding counties, the eight counties of the Cumberland Valley Area Development District (ADD), or the entire watershed of the Kentucky River should be included.

To determine potential projects in the area of the affected environment, coordination was made with the Kentucky Highlands Empowerment Zone (EZ/EC), Cumberland Valley ADD, Kentucky River Water Authority, and the Kentucky Department of Transportation (KDOT). The purpose of this coordination was to determine reasonably foreseeable projects originating from Federal, non-Federal, or private sources.

4.1.1 PROPOSED ACTION

The analysis of short-term cumulative effects of the proposed action considers projects, actions, and trends occurring simultaneously with, and in close proximity to, the construction phase of the Jackson County Lake Project. The analysis evaluates the interaction and significance of these combined impacts. Section 4.1.1.1 provides an overview of past, current, and anticipated future projects and activities that will be evaluated with the proposed action for short-term cumulative impacts. Section 4.1.1.2 investigates the environmental consequences of these actions and activities.

4.1.1.1 Past, Current, and Future Projects and Activities

This section provides a short discussion of past, current, and future projects and activities within the affected area, or the Region of Influence (ROI). These projects and activities will be taken in context with the short-term construction impacts of the Jackson County Lake Project to determine the short-term cumulative impacts of the proposed action.

Highway Development

The hilly terrain and winding roads of Jackson County have long been considered a deterrent to greater development and prosperity. In 1999, major work began on construction and realignment of KY 421, the major northwest-southeast road in Jackson County, at "Big Hill" near the northern portal to the County (Schwendeman, 2000). This realignment will reduce commute and travel times toward Berea, Interstate I-75, and the northwest in general.

The only other highway construction project that may occur along with the proposed action both temporally and geographically is the relocation of KY 30 across or around the proposed Sturgeon Creek reservoir sites, if either of these sites is chosen as the final project location. This relocation would take place around the same time as the construction of the proposed dam and would have to be completed before the reservoir is impounded. This issue is discussed in detail in Section 3.2.9 of this EIS.

Residential-related Action

Personal Responsibility In a Desirable Environment (PRIDE) is a Federally-supported program that encourages residents of several southeastern Kentucky counties to take individual actions leading to improved environmental quality. Among other things, PRIDE makes low-interest loans available to replace "straight pipes," which discharge domestic sewage directly into receiving waters, with septic systems (Schwendeman, 2000). It is uncertain at this time how many Jackson County residents are, or are projected to become, beneficiaries of this program.

Jackson County is in the process of converting from a voluntary to a mandatory residential solid waste collection system. Under the mandatory program, scheduled to begin July 2000, all households would have to dispose of their trash once weekly. They may be given the option of transporting their own garbage to the County's transfer station. Overall, the County is making a concerted effort to institute comprehensive solid waste management and eliminate open or illegal dumps. Both proposed Sturgeon Creek project sites contain four documented open dumps within their boundaries, which have been scheduled for cleanup under the PRIDE program. In addition to these open dumps, there are an unknown number of other open dumps throughout the County.

Economic Development

The EZ/EC, which includes Jackson County and two other nearby counties, is promoting a number of initiatives and projects to aid in the regional economic, social, and educational development of Jackson County. The largest initiative the EZ/EC is supporting is the Jackson County Lake Project. Other initiatives include a vocational school in McKee, which may still be

under construction within the short-term cumulative impacts period, and various small to medium-sized businesses and plants located primarily in McKee and Annville (Hayes, 2000a). There are no EZ/EC initiatives in the immediate vicinity of any of the alternative proposed reservoir sites.

Recent industrial development in Jackson County and much of the surrounding region has been oriented toward light manufacturing and assembly, including electronic parts assembly, tool and dye, appliance components, plastic injection molding, and some wood products manufacture (Hayes, 2000a). These plants have largely been located in designated industrial parks along the US 421 and KY 30 corridors in McKee and Annville. New developments that may occur within the short-term timeframe are also likely to be sited in these existing industrial parks, which are located at least five miles (straight-line air distance) from any of the proposed reservoir sites.

Agricultural Development

The hilly terrain of Jackson County is not conducive to intensive agriculture. Rather, grazing, hay fields, and small-scale, family-oriented cultivation for crops, including tobacco and corn, are the norm (Hayes, 2000a). There is ongoing, low-level agriculture in the upstream drainage basins of both War Fork and Sturgeon Creek.

Tourism

There are no tourist developments planned for the near future within the short-term ROI of the Proposed Action.

Other Water Development Projects

There are no other water development projects planned for the ROI within the short-term timeframe.

Resource Extraction

Jackson County and the surrounding region have seen a certain amount of extractive activities over the past century, both for renewable resources, such as timber, and non-renewable resources, including minerals, principally coal, and oil (Schwendeman, 2000). Both surface and underground coal mines have been operated, but in recent years, coal mining activity has declined. Abandoned surface coal mines are present in the vicinity of the War Fork and Steer Fork and the two Sturgeon Creek project sites. Managed harvests of second-growth forests are still carried out on both private and public lands, principally in the Daniel Boone National Forest (DBNF). Currently, there is no logging underway in the immediate vicinity of the proposed War Fork and Steer Fork site.

4.1.1.2 Environmental Consequences

Highway Development

The short-term environmental impacts associated with construction of the "Big Hill" segment of US 421 are minor to moderately adverse impacts on virtually all resource areas. The only exceptions include socioeconomics, on which impacts will be beneficial, and environmental justice, for which there will be no effect. Probably the greatest short-term adverse effect will be on aesthetics, as a result of the extensive grading, blasting, and landform alteration to accommodate a reduced grade on the realigned highway.

The environmental impacts associated with relocation of KY 30 would be comparable to those of associated with the realignment of US 421, but less severe in that less grading and landscape modification would be necessary.

Residential-related Actions

The principal impacts of the PRIDE program would be positive on the resource areas of socioeconomics, human health and safety, aesthetics, and particularly water quality, by reducing loadings of bacterial contaminants, organic carbon, biochemical oxygen demand (BOD), and nutrients to surface and groundwater. No other impacts are expected.

The movement of Jackson County toward comprehensive, mandatory trash collection would also have positive aesthetic, water quality, socioeconomic, and human healthy and safety effects.

Both of these positive trends have a particular bearing on the proposed Sturgeon Creek project sites, due to the presence of about 50 households within the larger reservoir site and dozens more in the immediate vicinity.

Economic Development

The kinds of economic enterprises fostered by the EZ/EC in Jackson County, including light assembly and manufacturing plants at existing industrial parks, have relatively minor short-term environmental impacts on air, water, and transportation associated with their construction. Overall, impacts would typically be short-term, minor to moderately adverse impacts on virtually all resource areas. The only exceptions include impacts on socioeconomics and environmental justice, which would be beneficial. However, there would also be some long-term effects associated with industrial development. These long-term effects are discussed in Section 4.2. The vocational school slated for McKee would generate transportation impacts, primarily adverse, but minor increases in traffic, and beneficial socioeconomic impacts. No other effects of significance are expected from this activity.

However, the distance of all of these projects from any of the proposed reservoir sites means that neither their construction nor their operation would generate environmental effects that would add to those of the construction of the proposed dam and reservoir.

The kinds of industries that have recently located in the area, and those expected over the next few years, are light manufacturing and assembly plants. These kinds of industry do not typically entail significant land conversion, as they are located in existing industrial parks, nor do they entail significant waste generation or pollution. Moreover, the distance of all of these projects from any of the proposed reservoir sites means that short-term cumulative effects would not occur.

Agricultural Development

Low-intensity agricultural land uses in the War Fork and Sturgeon Creek drainage basins generate non-point sources of pollutants, including sediments, coliform bacteria, organic carbon, nutrients, such as nitrogen and phosphorus, and some pesticide residues. Nevertheless, loadings are generally dispersed and are not concentrated like factory farms or livestock feedlots. Water quality and habitat assessments have been carried out on both watercourses by the Kentucky Division of Water (KDOW) and the Kentucky State Nature Preserves Commission (KSNPC). These assessments show that the impact on water quality due to these operations at both War Fork and Sturgeon Creek appears to be minor. Other impacts from agriculture would also be insignificant.

Tourism

There would be no short-term cumulative impacts resulting from the combined effects of the proposed action and tourism developments.

Other Water Development Projects

There would be no short-term cumulative impacts resulting from the combined effects of the proposed action and other water development projects within the ROI.

Resource Extraction

Past and present extractive activities continue to have generally adverse environmental impacts within the region, although of a minor level of significance. Coal mines can adversely affect water quality due to acid mine drainage, which can continue for many decades after the closure of a mine. Within the War Fork and Sturgeon Creek watersheds, however, this is not a significant problem. Surface coal mining can also impair aesthetic qualities of an area over the long-term, but again, in spite of the presence of abandoned mines on or near all proposed project sites, there is no conspicuous evidence of adverse effects on the landscape.

Forestry activities, primarily road building and logging, can be detrimental to water quality and aesthetics, in addition to wildlife and endangered species habitat. However, this has not occurred in the vicinity of any of the proposed project sites.

The impacts of past and present extractive activities on other resource areas would be insignificant. No new future extractive activities are foreseen within the timeframe of the short-term analysis.

4.1.1.3 Conclusion

Table 4.1-1 provides a summary of the potential short-term cumulative environmental impacts of the proposed action and other activities that could be reasonably foreseen in the ROI. This table assumes that the proposed action could be at any one of the three proposed project sites. Where the environmental effects of the proposed action differ from alternative to alternative, the worst case is assumed. Some resource areas in **Table 4.1-1** have been given dual impacts ratings. These dual ratings indicate that both beneficial and adverse impacts would occur on those resource areas in the short-term.

Table 4.1-1. Summary of the Potential Short-Term Cumulative Impacts of the Proposed Action

Resource Area	Proposed Action	Past, Current, and Future Actions	Cumulative Impacts
Geology/Soils	***	**	***
Surface and Groundwater Resources	**	*	**
Air Quality	*	*	*
Biological Resources	**	*	**
Noise	*	*	*
Recreation	**	0	**
Cultural Resources	**	0	**
Land Use	**	*	**
Transportation	**	*	**
Waste Management	*	*	*
Human Health and Safety	*	0	*
Socioeconomics	**, +	+	**, ++
Environmental Justice	+	+	+
Aesthetics	**	*	**

Key:
Adverse: * Minor Impact ** Moderate Impact *** High Impact
Beneficial: + Minor Impact ++ Moderate Impact +++ High Impact
No Impact: 0

As shown in **Table 4.1-1**, there would be very few short-term cumulative effects associated with the construction of the proposed dam and reservoir in Jackson County. This is due to the general lack of concurrent construction projects, intensive activities, and ongoing negative environmental practices and trends in the vicinity of the three proposed project sites.

Socioeconomic impacts, in the short-term, would be both moderately beneficial and moderately adverse. Relatively modest positive impacts would occur because of temporary employment opportunities, additional income, and purchases of construction materials, services, and merchandise. The principal moderately significant adverse impact would result from the relocation of residents from the project area, which would have both a social and an economic cost.

The only action of note is the relocation of KY 30, which would be necessitated if either of the Sturgeon Creek project sites is chosen. This is both a connected action (triggered by the proposed action) and one whose own environmental effects are cumulative with the proposed action in that they would take place at nearly the same place and time. Relocation of KY 30 would entail certain short-term and several long-term impacts typical of those related to road construction in rural areas.

Overall, the potential short-term cumulative impacts of the Jackson County Lake Project would be insignificant.

4.1.2 NO ACTION

The same ROI has been chosen for the analysis of the short-term cumulative impacts of the No Action alternative. As discussed in Section 2.3 of this EIS, the No Action alternative assumes that no dam and reservoir would be constructed at any of the proposed project sites in Jackson County. However, it also assumes that certain activities would be undertaken to increase the current water supply in the County, although in insufficient quantities to meet the projected need. These activities may include drilling additional water wells throughout the County, constructing water transmission lines from existing water sources within the Jackson County, and/or water conservation.

Section 4.1.2.1 provides an overview of past, current, and anticipated future projects and activities that will be evaluated with the No Action alternative for short-term cumulative impacts. Section 4.1.2.2 investigates the environmental consequences of these actions and activities.

4.1.2.1 Past, Current, and Future Projects and Activities

Except for the relocation of KY 30 at the proposed Sturgeon Creek project sites, the past, current, and future projects and activities described in Section 4.1.1, all taking place within the 2001 to 2006 timeframe, would be identical to those of the No Action alternative. Under the No Action alternative, KY 30 would likely be realigned at some point in the future in keeping with long-range plans of the KDOT, but this would not occur within the short-term timeframe.

As discussed above, the No Action alternative assumes that certain activities would be undertaken to increase the current water supply in Jackson County. The potential environmental impacts of these initiatives and projects are discussed by resource area in the Section 3.0 of this EIS.

4.1.2.2 Environmental Consequences

The environmental consequences of each of the pertinent past, present, and anticipated future activities are discussed in Section 4.1.1.2.

4.1.2.3 Conclusion

Table 4.1-2 summarizes the potential short-term cumulative effects of the No Action alternative. This table assumes the worst case where the environmental effects of any of the efforts under the No Action alternative differ from each other. Some resource areas in **Table 4.1-2** have been given dual impacts ratings. These dual ratings indicate that both beneficial and adverse impacts would occur on those resource areas in the short-term.

Table 4.1-2. Summary of the Potential Short-Term Cumulative Impacts of the No Action Alternative

Resource Area	No Action Alternative	Past, Current, and Future Actions	Cumulative Impacts
Geology/Soils	*	**	**
Surface and Groundwater Resources	*	*	*
Air Quality	0	*	*
Biological Resources	0	*	*
Noise	*	*	*
Recreation	0	0	0
Cultural Resources	0	0	0
Land Use	*	*	*
Transportation	*	*	*
Waste Management	*	*	*
Human Health and Safety	**	0	**
Socioeconomics	**	+	*
Environmental Justice	*	+	*, +
Aesthetics	0	*	*

Key:
Adverse: * Minor Impact ** Moderate Impact *** High Impact
Beneficial: + Minor Impact ++ Moderate Impact +++ High Impact
No Impact: 0

Due to the elimination of the construction of the proposed dam and reservoir in Jackson County, there would be fewer short-term cumulative effects associated with the No Action alternative than with any of the proposed alternatives under the proposed action. However, the No Action alternative would result in a minor adverse impact on environmental justice, due to continued economic stagnation and adverse health impacts, and moderately significant adverse impacts on human health and safety due to an insufficient drinking water supply.

4.2 LONG-TERM CUMULATIVE IMPACTS

The construction phase of the proposed dam and reservoir project has not been scheduled at this point, but is being projected, for the purposes of this study, to occur within the 2001 to 2006 timeframe. Short-term impacts associated with the construction, discussed in Section 4.1, address the past, present, and future actions associated with this construction period. This section addresses the cumulative impacts associated with the operation of the proposed reservoir.

The temporal bounds of this study should encompass the proposed life of the facility, which is anticipated to be fifty years. Therefore, the timeframe associated with the long-term cumulative impacts of the proposed Jackson County Lake Project would be from completion of the proposed impoundment to the end of the facility lifetime, or between the years 2006 and 2056. Geographically, the proposed alternative project sites for the Jackson County Lake Project are all in the Kentucky River watershed. Therefore, the area encompassed by this watershed should be included in this analysis. Further, Jackson County is part of the Cumberland River ADD. The boundaries of this district should also be included. Lastly, the counties surrounding Jackson may have a water requirement that may be filled by the yield of a proposed reservoir in Jackson County. Therefore, the geographic boundaries, or affected environment, of this cumulative impacts discussion will include all of these areas and will be referred to as the ROI.

To determine potential projects in the area of the affected environment, coordination was made with the EZ/EC, Cumberland Valley ADD, Kentucky River Water Authority, and KDOT. The purpose of this coordination was to determine reasonably foreseeable projects originating from Federal, non-Federal, or private sources.

4.2.1 PROPOSED ACTION

The analysis of long-term cumulative effects of the proposed action considers projects, actions, and trends occurring in the ROI alongside the operation of the proposed reservoir in Jackson County. The analysis evaluates the interaction and significance of these combined impacts. Section 4.2.1.1 provides an overview of past, current, and anticipated future projects and activities that will be evaluated with the proposed action for long-term cumulative impacts. Section 4.2.1.2 investigates the environmental consequences of these actions and activities.

4.2.1.1 Past, Current, and Future Projects and Activities

The assumption for this portion of the analysis is that one of the three alternative proposed reservoir sites has been chosen and the dam and reservoir have been built.

Highway Development

Highway development in the area has been and currently is the greatest single source of ‘major’ activity. The development of US 421 within Jackson County, also known as the “Big Hill” project, will provide a major improvement in the accessibility of the ROI (Schwendeman, 2000).

Future highway development in the ROI seems also to be the greatest single source of 'major' future activities. Along with the continuing "Big Hill" project is the further development and possible relocation of KY 30 within Jackson County. There is also a proposed I-66 Interstate that would run east-west just to the south of Jackson County, within neighboring Clay and Laurel Counties.

Residential-related Actions

Highway development projects forecast in the area would continue to improve the accessibility of the ROI. This improved accessibility could lead to further development in Jackson County that would serve larger communities outside of the County. This could lead to residential development and the impacts associated with this kind of development. This improved infrastructure would also make Jackson County more attractive to future light industrial development.

Continued development of light industrial and manufacturing plants in the area would require additional workers. The current high level of unemployment within the ROI could be reduced, and there would be the potential of attracting more workers from outside Jackson County. These workers would either relocate, which would lead to further residential development in the area, or commute, which is not expected to put additional strain on the transportation system in the County.

Economic Development

Economic development within the ROI has centered on development of light industrial and manufacturing plants (Hayes, 2000a). These plants employ from a couple to several dozen workers. There has also been some interest in the service industry involving "Call" centers, phone solicitation, and telemarketing centers (Schwendeman, 2000). There has not been any new development in the extractive (mining) industry within the ROI.

Anticipated future economic development within the ROI would most likely consist of further development of light industrial and manufacturing plants. These plants would employ from a dozen to possibly several hundred workers. A vocational training center is projected in McKee to meet the basic training needs of these future plants.

Agricultural Development

Jackson County does not have large tracts of agricultural assets and lands. The rough nature of the land has led to the development of small agricultural plots devoted to tobacco and the crop rotation suitable for this cash crop.

Within the agricultural area, there is concern about the growing sensitivity and continued viability of the tobacco industry. The search for a future new cash crop could cause some anxiety within the area.

Increased development of residential communities and commercial development in the area would require additional lands for the purpose. Availability of agricultural lands in the area could provide for this need.

Tourism

There has been, and continues to be, a growing interest in developing tourism in the area. The creation of the Harlan County Coal Mining Museum, located east of Jackson County within the Cumberland Valley ADD, along with folk festivals and emerging bed and breakfasts, reflects the growing interest in the ROI (Schwendeman, 2000). The intent seems to be to emphasize the rural nature of the area and capitalize on this unique characteristic.

The growth of tourism would be affected by the presence of a new reservoir in the area. Most of the tourism growth in the area would be local or regional in nature, primarily providing local and surrounding county residents with recreational assets. Boating, fishing, and swimming activities provided by the new reservoir could enhance this area as a recreational attraction. Further development of a State, County, or local park at the proposed reservoir would further enhance this attraction.

Other Water Development Projects

Within the ROI, there are currently no definite water development plans. One future possibility would include the study of Buckhorn Lake in Perry and Leslie Counties for possible use as a water resource for several counties. A pipeline has also been discussed from Wood Creek Lake in Laurel County to Clay County. There is also continuing discussion regarding utilizing the main stem of the Kentucky River as a source of water for several counties.

Resource Extraction

Abandoned surface coal mines are present in the vicinity of the War Fork and Steer Fork and the two Sturgeon Creek project sites. There does not seem to be any interest at this time in reviving these mines or in pursuing mining projects in the area.

There does seem to be some continuing interest in forestry and the development of a hardwood-based furniture industry in the area. Managed harvests of second-growth forests are still carried out on both private and public lands, principally in the DBNF. Currently, there is no logging underway in the immediate vicinity of the proposed War Fork and Steer Fork site.

4.2.1.2 Environmental Consequences

This section addresses the potential long-term cumulative environmental impacts of the past, present, and future projects and activities, discussed in Section 4.2.1.1, in conjunction with the proposed action.

Highway Development

Environmental impacts associated with current and projected highway projects would typically be short-term, minor to moderately adverse impacts on virtually all resource areas. The only exceptions include impacts on socioeconomics, which would be beneficial, and environmental justice, on which there would normally be no effect. However, there would also be some long-term effects associated with highways projects. Such long-term effects would include highly beneficial impacts on transportation in the area, moderately beneficial socioeconomic impacts, and minor, but adverse, impacts on noise. Additionally there would be a permanent loss of habitat in the ROI that would have a detrimental impact upon biological resources.

The long-term impacts associated with the proposed reservoir would overshadow most of the impacts associated with the highway projects. Most of these highway projects would not directly affect the proposed reservoir, with the notable exception of the relocation of KY 30. However, the long-term impacts associated with this project would be minor, with the exception of loss of wildlife habitat in the area.

Residential-related Actions

Environmental impacts associated with residential projects would typically be short-term, minor to moderately adverse impacts on virtually all resource areas. The only exceptions include impacts on socioeconomics, which would be beneficial, and environmental justice, on which there would normally be no effect. However, there would also be some long-term effects associated with residential projects. Such long-term effects would include highly beneficial impacts on transportation in the area, moderately beneficial socioeconomic impacts, and minor, but adverse, impacts on noise, air quality, and biological resources as a result of the loss of habitat.

The improvement of a major infrastructure feature such as water could potentially spur residential growth. The long-term impacts of this development, concurrent with the proposed reservoir, would be minor. The only exceptions include potential moderate adverse impacts from the loss of habitat and moderate to high beneficial impacts to socioeconomics and environmental justice.

Economic Development

Environmental impacts associated with light to moderate industrial projects would typically be short-term, minor to moderately adverse impacts on virtually all resource areas. The only exceptions include impacts on socioeconomics, which would be beneficial, and environmental justice, on which there could be a beneficial effect due to employment opportunities and increased income. However, there would also be some long-term effects associated with industrial development. Such long-term effects would include highly beneficial socioeconomic impacts, and minor, but adverse, impacts on transportation, noise, and air quality.

The improvement of a major infrastructure feature such as water may not spur economic growth in itself, but it could be a contributing factor. The long-term impacts of this development,

concurrent with the proposed reservoir, would be minor, with the exceptions of potential moderately adverse impacts due to loss of wildlife habitat, and moderately to highly beneficial impacts on socioeconomics and environmental justice.

Agricultural Development

The potential environmental impacts associated with agricultural development would be minimal. The development of a new cash crop to replace tobacco may necessitate a change in the types of herbicides, insecticides, and fertilizers used in the area. Also, residential and commercial development would create a change in land use in the area; however, it is debatable whether this change would be adverse or beneficial.

The improvement of such a major infrastructure feature such as water could potentially spur or at least diversify agricultural development. The long-term impacts of this development, concurrent with the proposed reservoir, would be minor with the exceptions of moderately to highly beneficial impacts on socioeconomics and environmental justice.

Tourism

The potential environmental impacts associated with the development of the tourism industry would be minimal. A new reservoir in Jackson County and a possible associated State or County park would be a highly beneficial impact to recreation in the area.

The improvement of a major infrastructure feature such as water could potentially spur, or at least diversify, the development of tourism. The long-term impacts of this development, concurrent with the proposed reservoir, would be minor. The only exceptions include moderately to highly beneficial impacts on socioeconomics, recreation, and environmental justice.

Other Water Development Projects

The utilization of Buckhorn Lake, Wood Creek Lake, or the Kentucky River as future water sources would, at a minimum, necessitate the construction of water transmission lines to areas of need. Many of the impacts associated with the construction of water transmission lines would be similar to those discussed in Section 3.0 of this EIS. There may also be the requirement to improve the water treatment capacities in those areas of need.

The improvement of a major infrastructure feature such as water could potentially spur, or at least diversify, other water development projects in the area. Projects that are being considered, mentioned above, may be altered if the Jackson County Lake Project is implemented. For example, if the proposed Sturgeon Creek, 8.5 mgd site is chosen as the final project location, this reservoir could potentially serve as a regional water supply source, possibly eliminating the need for some of the other water development projects considered for the ROI. Water transmission lines could be constructed from the reservoir in order to provide these other nearby areas with water. However, this activity is highly speculative at this time.

Resource Extraction

The remnants of past extractive activities would continue to have adverse environmental impacts within the region, although of a minor level of significance. Abandoned coal mines can adversely affect water quality due to acid mine drainage, which could continue for many decades after the closure of a mine. Within the War Fork and Sturgeon Creek watersheds, however, this is not a significant problem. Surface coal mining can also impair aesthetic qualities of an area over the long-term, but again, in spite of the presence of abandoned mines on or near all proposed project sites, there is no conspicuous evidence of adverse effects on the landscape.

Impacts associated with future extractive activities in the ROI would be minor. As a result, cumulative impacts from these activities, concurrent with the proposed action, would be minor.

4.2.1.3 Conclusion

Table 4.2-1 provides a summary of the potential long-term cumulative environmental impacts of the proposed action and other activities that could be reasonably foreseen in the ROI. Some resource areas in **Table 4.2-1** have been given dual impacts ratings. These dual ratings indicate that both beneficial and adverse impacts would occur on those resource areas in the long-term.

Table 4.2-1. Summary of the Potential Long-Term Cumulative Impacts of the Proposed Action

Resource Area	Proposed Action	Past, Current, and Future Actions	Cumulative Impact
Geology/Soils	***	**	***
Surface and Ground Water Resources	**	**	**
Air Quality	*	*	*
Biological Resources	*, +	*	*, +
Noise	*	*	*
Recreation	+++	++	+++
Cultural	**	*	**
Land Use	**	*	**
Transportation	*	++	+
Waste Management	*	*	**
Human Health and Safety	*	*	*
Socioeconomics	+	++	++
Environmental Justice	++	++	+++
Aesthetics	*, ++	*	*, ++

Key:
Adverse: * Minor Impact ** Moderate Impact *** High Impact
Beneficial: + Minor Impact ++ Moderate Impact +++ High Impact
No Impact: 0

As shown in **Table 4.2-1**, there does not seem to be any major project on the horizon, outside of highway projects, that could overshadow the effects of the proposed reservoir in Jackson County. The additive nature of even some highly speculative developments would not overshadow the effects of the proposed reservoir.

Impacts on socioeconomics and environmental justice would be highly beneficial, due to new employment opportunities, increased income, and the introduction of a sufficient public water supply.

There would be effects that cannot be or would be extremely difficult to quantify. The potential development of the proposed Jackson County reservoir, known highway projects, the speculative nature of commercial and residential development within the area, and the resultant loss of wildlife habitat could affect the rural nature of the region. This potential development could bring about a degree of urbanization that is not understood by the local residents at this time. This may be viewed as either a positive or a negative impact. It may be enough at this time to note the potential.

4.2.2 NO ACTION

The same ROI has been chosen for the analysis of the short-term cumulative impacts of the No Action alternative. As discussed in Section 2.3 of this EIS, the No Action alternative assumes that no dam and reservoir would be constructed at any of the proposed project sites in Jackson County. However, it also assumes that certain activities would be undertaken to increase the current water supply in the County, although in insufficient quantities to meet the projected need. These activities may include drilling additional water wells throughout the County, constructing water transmission lines from existing water sources within the Jackson County, and/or water conservation.

Section 4.2.2.1 provides an overview of past, current, and anticipated future projects and activities that will be evaluated with the No Action alternative for long-term cumulative impacts. Section 4.2.2.2 investigates the environmental consequences of these actions and activities.

4.2.2.1 Past, Current, and Future Projects and Activities

The following is a short discussion of past, current, and anticipated future projects and activities within the ROI. Further, the assumption for this portion of the analysis is that none of the three alternative proposed reservoir sites have been chosen and the proposed dam and reservoir would not be built.

Highway Development

The highway development projects discussed in Section 4.2.1.1 would probably still occur without the presence of a new reservoir in Jackson County. These highway development projects would improve accessibility to the ROI. This improved accessibility could lead to further development in the County if necessary infrastructure improvements were to take place.

Residential-related Actions

Jackson County is currently experiencing a shortage of potable water, and this situation would not improve unless some other form of potable water is made available. The potential for residential communities to expand would be a great deal less without this important element of the County infrastructure. As a result of the No Action alternative, there would probably be very little residential development, and therefore, impacts associated with this activity would be minimal.

Economic Development

The economic development of the ROI has and would probably continue to concentrate on the development of light industrial and manufacturing plants. These plants potentially could employ from a couple to several hundred workers. Again, the importance of available infrastructure cannot be minimized. Water would still be in need, and this lack of water would not be very attractive to any potential investor in the area. It is very likely that a good portion of potential commercial activities would not consider Jackson County an attractive area if such a basic requirement as water were not available. As a result of the County attracting fewer commercial endeavors, environmental impacts associated with these endeavors would be far less.

Agricultural Development

The sensitivity of the area to the continued use of tobacco as a main cash crop would not be affected by the absence of a new reservoir in Jackson County. The continued lack of water would not, in itself, affect the search for a new cash crop. Decreased residential development, discussed above, would mean less demand on area lands. There would probably be continued interest in forestry in the ROI.

Tourism

The interest in developing tourism in the area would not be greatly affected by the absence of a reservoir in Jackson County. However, the limited recreational assets in the area could limit the potential development of the tourism industry.

Other Water Development Projects

As previously stated, within the ROI there are currently no definite water development plans. Buckhorn Lake in Perry and Leslie Counties is being studied for possible use as a water resource for several counties. A pipeline has also been discussed from Wood Creek Lake in Laurel County to Clay County. There is also continuing discussion regarding utilizing the main stem of the Kentucky River as a source of water for several counties. The development of one or more of these possibilities would have to be accelerated in order to provide Jackson County and the ROI with the water they would need.

Resource Extraction

Abandoned surface coal mines are present in the vicinity of the War Fork and Steer Fork and the two Sturgeon Creek project sites. There does not seem to be any interest at this time in reviving these mines or in pursuing mining projects in the area.

There does seem to be some continuing interest in forestry and the development of a hardwood-based furniture industry in the area. Managed harvests of second-growth forests are still carried out on both private and public lands, principally in the DBNF. Currently, there is no logging underway in the immediate vicinity of the proposed War Fork and Steer Fork site.

4.2.2.2 Environmental Consequences

This section addresses the potential long-term cumulative environmental impacts of the past, present, and future projects and activities, discussed in Section 4.2.2.1, in conjunction with the No Action alternative.

Highway Development

As stated in Section 4.2.1.2, environmental impacts associated with current and projected highway projects would typically be short-term, minor to moderately adverse impacts to virtually all resource areas. The only exceptions include impacts on socioeconomics, which would be beneficial, and environmental justice, on which there would normally be no effect. However, there would also be some long-term effects associated with highways projects. Such long-term effects would include highly beneficial impacts on transportation in the area, moderately beneficial socioeconomic impacts, and minor, but adverse, impacts on noise and air quality.

Residential-related Actions

Under the No Action alternative, residential development would mostly likely be minimal because the availability of water would be in doubt. Therefore, impacts associated with this activity would be minimal. However, potential long-term effects associated with residential projects, if they were to occur, would include highly beneficial impacts on transportation in the area, moderately beneficial socioeconomic impacts, and minor, but adverse, impacts on noise and air quality.

Economic Development

Environmental impacts associated with light to moderate industrial projects would typically be short-term, minor to moderately adverse impacts to virtually all resource areas. The only exceptions include impacts on socioeconomics, which would be beneficial, and environmental justice, on which there could be a beneficial impact due to increased employment opportunities and income. However, there would also be some long-term effects associated with industrial development. Such long-term effects would include highly beneficial socioeconomic impacts, and minor, but adverse, impacts on transportation, noise, and air quality.

Agricultural Development

The potential environmental impacts associated with agricultural development would be minimal. The development of a new cash crop to replace tobacco may necessitate a change in the types of herbicides, insecticides, and fertilizers used in the area. Residential and commercial development would be restricted by the limited availability of water in the area.

Tourism

The potential environmental impacts associated with the development of the tourism industry would be minimal.

Other Water Development Projects

The utilization of Buckhorn Lake, Wood Creek Lake, or the Kentucky River as future water sources would, at a minimum, necessitate the construction of water transmission lines to areas of need. Some of the impacts associated with the construction and operation of such water transmission lines are discussed in Section 3.0 of this EIS. There may also be the requirement to improve the water treatment capacities in those areas of need.

Under the No Action alternative, one of those areas of need would be Jackson County. Other sources of water would have to be investigated and the three water supply sources mentioned above may be required to provide for projected future Jackson County needs.

Resource Extraction

Environmental impacts associated with current resource extraction activities in the long-term would be the same as those discussed in Section 4.2.1.

As there does not seem to be any interest at this time in reviving abandoned coal mines present in the proposed project areas, or in pursuing mining projects in the area, impacts associated with future extractive activities would be minor. As a result, cumulative impacts from this type of activity, concurrent with the proposed reservoir, would be minor.

4.2.2.3 Conclusion

Table 4.2-2 provides a summary of the potential long-term cumulative environmental impacts of the No Action alternative and other activities that could be reasonable foreseen in the ROI. Some resource areas in **Table 4.2-2** have been given dual impacts ratings. These dual ratings indicate that both beneficial and adverse impacts would occur on those resource areas in the long-term.

Table 4.2-2. Summary of the Potential Long-Term Cumulative Impacts of the No Action Alternative			
Resource Area	**No Action Alternative**	**Past, Current, and Future Actions**	**Cumulative Impact**
Geology/ Soils	0	*	*
Surface and Ground Water Resources	*	*	*
Air Quality	0	*	*
Biological Resources	0	*	*
Noise	0	*	*
Recreation	*	0	*
Cultural Resources	0	*	*
Land Use	**	*	**
Transportation	0	++	++
Waste Management	0	*	*
Human Health and Safety	**	*	**
Socioeconomics	***	+	**
Environmental Justice	***	0	***
Aesthetics	0	*	*
Key: **Adverse:** * Minor Impact ** Moderate Impact *** High Impact **Beneficial:** + Minor Impact ++ Moderate Impact +++ High Impact **No Impact:** 0			

As shown by **Table 4.2-2**, there would be very few long-term impacts associated with the No Action alternative. However, it is important to note the No Action alternative does not mean no impacts. The No Action alternative would result in highly significant adverse impacts on socioeconomics and environmental justice, due to continued economic stagnation and adverse health impacts, and a moderately significant adverse impact on human health and safety, due to an insufficient drinking water supply. The socioeconomic impact of the lack of an important infrastructure requirement such as water cannot be minimized. This lack would affect potential commercial, industrial, and residential development in the area.

4.3 SUMMARY OF CUMULATIVE IMPACTS

There are very few short-term cumulative impacts associated with the construction phase of the proposed action. The proposed project sites are relatively isolated from other construction projects likely to be occurring within Jackson County at the same time. Other ongoing processes, trends, and activities within the ROI of the proposed project, with the exception of KY 30 relocation, would not interact or combine to any substantial extent with the construction of the proposed dam and reservoir to create additional impacts. There would be even fewer short-term cumulative effects associated with the No Action alternative, due to the elimination of the construction impacts associated with the proposed dam and reservoir in Jackson County.

Long-term cumulative effects associated with the proposed action are very difficult to predict with certainty. Nevertheless, if the proposed dam and reservoir are constructed, this action would have a fair chance of contributing significantly to the further economic development of Jackson County by providing an additional, secure source of water. The availability of this key resource, in turn, could provide for roughly a three-fold expansion in residential, commercial, and industrial development by the year 2050. In addition, other projects, growth, and development in the County and the surrounding region would occur regardless of the Jackson County Lake Project. Altogether, these could substantially improve the standard of living and quality of life in the area in many different respects. On the other hand, this long-range development could also generate some adverse impacts on biological resources by reducing natural habitats and placing more pressures on Threatened and Endangered species and on the rural character that defines Jackson County. These adverse cumulative effects would perhaps be more pronounced if economic development efforts were successful enough to attract substantial numbers of outsiders to Jackson County, rather than just meeting the needs of the County's residents.

Long-term cumulative effects of the No Action alternative could be especially severe in the areas of socioeconomics, environmental justice, and human health and safety. By not supplying needed potable water, the No Action alternative could diminish the social and economic aspirations of the people of Jackson County.

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