1.0 Introduction and Purpose and Need

2.0 Alternatives Analysis

3.0 Affected Environment and Predicted Environmental Consequences

4.0 Cumulative and Growth-Inducing Effects

5.0 Comparison of Alternatives and Mitigation

6.0 Compliance and Consultation with Applicable Laws, Policies, and Plans

7.0 Public Involvement

8.0 References

9.0 List of Preparers

10.0 Distribution List

3.0 Affected Environment and Predicted Environmental Consequences

3.1 Resources Not Evaluated in Detail

Rangeland Resources

This issue was eliminated from further study because there are no properties in the project area classified as rangeland under the Public Rangeland Improvement Act.

Protected Lands

This issue was eliminated from further study because there are no properties in the project area classified as a state or federal park or wildlife refuge or funded with Land and Water Conservation funds.

Air Quality

This issue was eliminated from further study because there have been no substantial changes in air quality since the 2006 FEIS.

Invertebrate Species

This issue was eliminated from further study because no rare or endangered invertebrate species are listed in the area of the Proposed Action.

Soils

This issue was eliminated from further study because there have been no substantial changes in soils since the 2006 FEIS.

Minerals

This issue was eliminated from further study because there have been no substantial changes in minerals since the 2006 FEIS.

Geology

This issue was eliminated from further study because there have been no substantial changes in geology since the 2006 FEIS.

3.2 Climate

3.2.1 Affected Environment

The project area is entirely located in Sullivan County, approximately 0.5 mile south of Pollock, Missouri, and approximately 113 miles northeast of Kansas City, Missouri. Land use within the county is primarily agricultural. August is typically the hottest month and January is the coldest. Average annual total rainfall is 45.42 inches.

Table 3.2.1-1 shows patterns from 2006 – 2016. Data was retrieved from the Kirksville, Missouri, U.S. COO234544 Weather Station, which is located approximately 26 miles east-southeast of the Proposed Action (NOAA 2016).

Table 3.2.1-1. 2006 – 2016 Sullivan County Climate Patterns from Kirksville Weather Station.

Year	Mean Max (degrees Fahrenheit)	Mean Min (degrees Fahrenheit)	High (degrees Fahrenheit)	Month	Low (degrees Fahrenheit)	Month	Total Precipitation (inches)
2016	63.8	43.5	97	June	-9	Dec.	33.64
2015	62.6	41.8	93	July	-7	Feb.	58.44
2014	58.8	38.0	93	Aug.	-14	Jan.	45.17
2013	60.4	39.1	102	Aug.	-11	Dec.	41.45
2012	66.9	43.6	105	July	5	Jan.	30.7
2011	61.9	41.1	98	Aug.	-8	Feb.	46.84
2010	61.35	40.8	96	Aug.	-17	Jan.	60.23
2009	59.8	39.7	94	June	-12	Jan.	57.92
2008	59.4	39.1	94	July/Aug.	-6	Jan.	61.92*
2007	62.7	40.2*	99	Aug.	-4*	Feb.	36.87
2006	66.9*	46.2*	98*	July	-3*	Feb.	22.42*

(Source: NOAA 2016)
*Missing data for one or more months

The Midwest region is vulnerable to climate variability and climate change. The annual high temperature varied by 12 degrees and the annual low temperature varied by 22 degrees over the 10-year period. Precipitation varied from a low of 30.7 inches in 2012, a year with complete data, to at least 61.92 inches in 2008, a year with incomplete data, which is a difference of at least 31.22 inches.

3.2.2 Direct and Indirect Effects of the No Action Alternative

The No Action alternative would have no impacts on the overall climate of Sullivan County or the 10-county region, which in addition to Sullivan County includes Adair, Chariton, Grundy, Linn, Livingston, Macon, Mercer, Putnam, and Schuyler counties. There would be no increase or decrease of greenhouse gas emissions as a result of the No Action alternative.

3.2.3 Direct and Indirect Effects of the Proposed Action

The Proposed Action would not have any negative impacts on the climate of Sullivan County or the 10-county region and is not expected to result in an increase of greenhouse gas emissions. Given the concern that global climate change is likely to cause increased drought and flood frequency in Missouri with negative impacts on agriculture, industry, and quality of life, the Proposed Action provides resiliency in mitigating future impacts from extreme weather events for Sullivan County.

3.3 Land Use

3.3.1 Affected Environment

There have been no substantial changes to land use within the Proposed Action since preparation of the FEIS and signing of the ROD in 2006. Figure 3.3.3-1 summarizes NLCD land uses in the project area.

3.3.2 Direct and Indirect Effects of the No Action Alternative

If the Proposed Action is not constructed, current land use would be unchanged.

3.3.3 Direct and Indirect Effects of the Proposed Action

Acquisition of land for the Proposed Action began March 2009 and was essentially completed August 2017. A total of 4,326 acres was purchased from 103 different parcels and 83 different owners. Funding for acquisition of land was provided by NRCS throughout that period. NRCS funding for the SEIS was made available beginning August 2014.

Construction of this alternative would result in inundation of land within the normal pool and construction of recreational amenities around the lake. The current land use is idle or leased for agriculture.

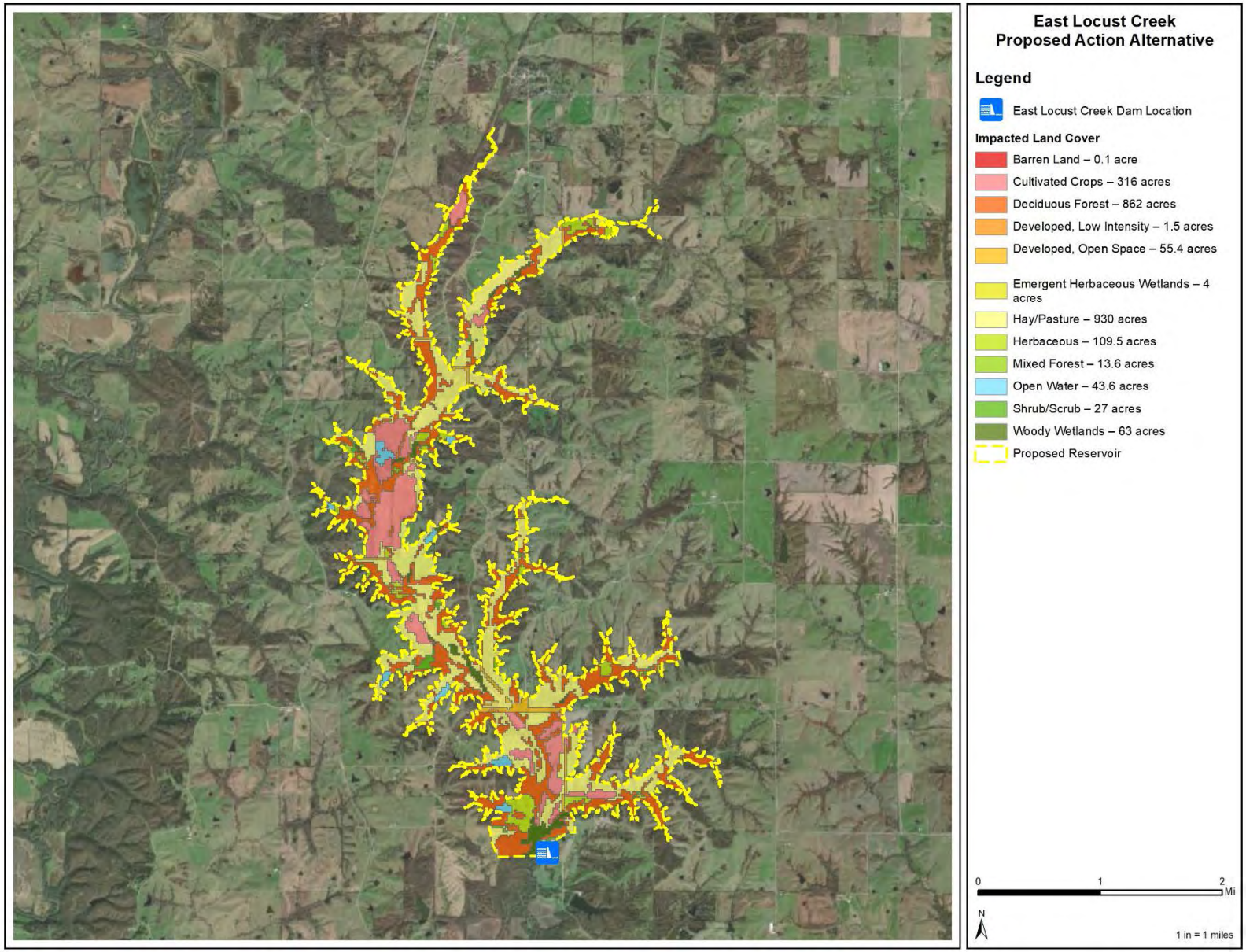

Figure 3.3.3-1. National Land Cover Database Land Use in the Project Area.

3.4 Farmland Resources

Under the Farmland Protection Policy Act (FPPA), federal agencies must identify and consider the adverse effects of federal programs on the preservation of prime or unique farmland. The purpose of the FPPA is to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses and to assure that federal programs are compatible with state and local policies to protect farmland.

3.4.1 Affected Environment

The Proposed Action is located entirely in Sullivan County. According to the 2012 Census of Agriculture, Sullivan County has 798 farms with an average size of 405 acres, totaling 323,005 acres of farmland. Of the total acres, 158,840 acres (49 percent) are characterized as cropland, and 99,726 acres are characterized as harvested cropland (USDA 2012).

3.4.1.1 Direct and Indirect Effects of the No Action Alternative

The No Action alternative would have no impacts on farmlands.

3.4.1.2 Direct and Indirect Effects of the Proposed Action

There are approximately 273 acres of cropland and approximately 1,078 acres of hay/pastureland in the project area that would be inundated or purchased for the creation of the Proposed Action (Homer et al. 2015). This totals 1,351 acres and represents approximately 0.4 percent of the total farmland within the county. This farmland consists mainly of corn, soybean, and wheat cropland and pastureland.

Approximately 407 acres within the project area are .classified as prime farmland or farmland of statewide importance based on soil types: 53 acres is classified as prime farmland, 163 acres is classified as prime farmland if drained, and 191 acres is classified as farmland of statewide importance. This is 1.5 percent of the 27,000 acres of prime farmland or farmland of statewide importance in Sullivan County. Prime farmland is determined based on soil types and does not always indicate cropland. NRCS has completed and filed FORM AD-1006 as required by the FPPA. Figure 3.4.1.2-1 shows the prime farmland and farmland of statewide importance in relation to the Proposed Action.

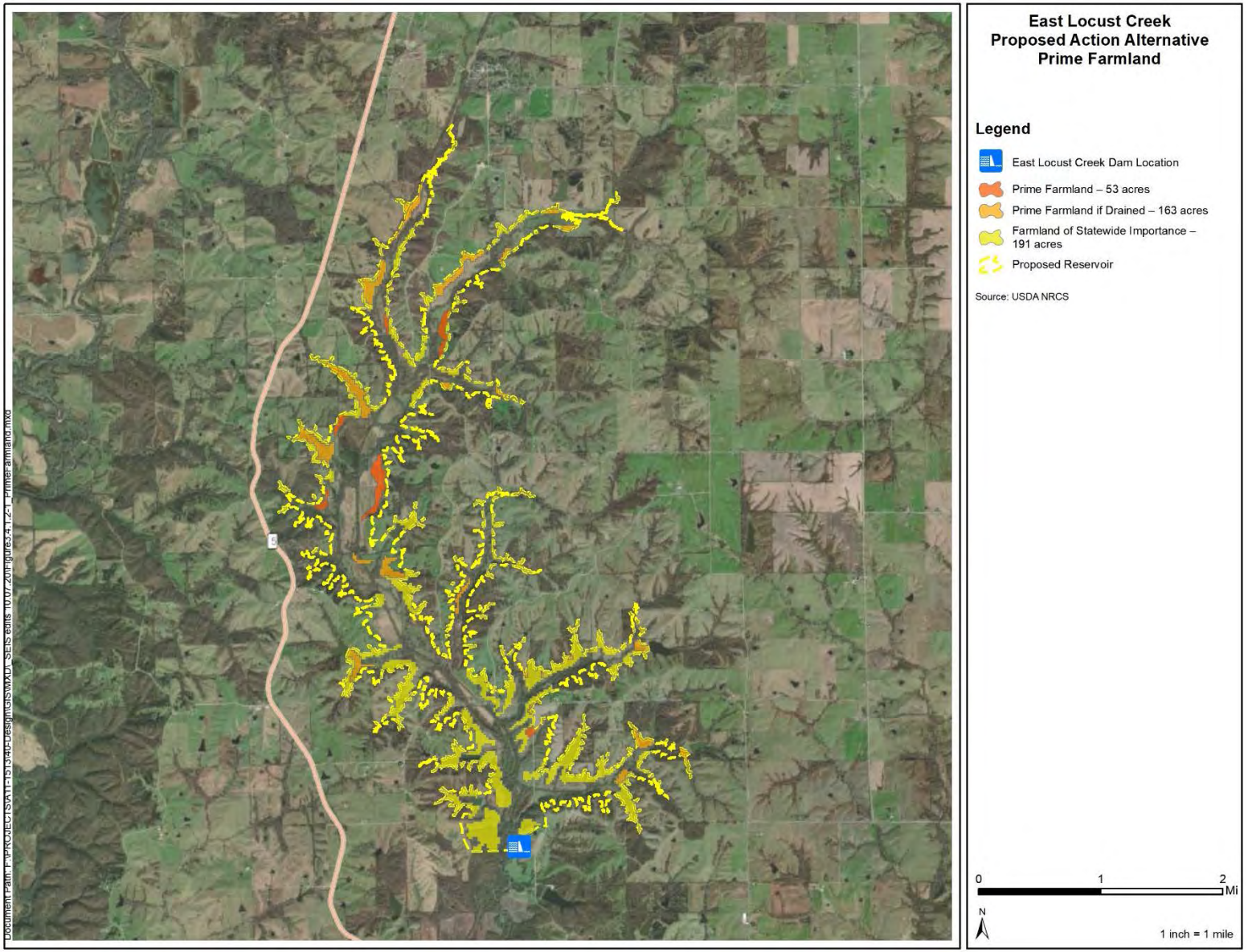

Figure 3.4.1.2-1. Prime Farmland in the Project Area.

3.5 Forest/Woodland Resources

3.5.1 Affected Environment

There has been no substantial change to forest resources within the project area since they were described in the affected environment and impact analysis portion of the FEIS and since the signing of the ROD in 2006. A Forest and Field Inventory report for the Proposed Action was completed July 7, 2016, and described the forested areas within the project area as "highly fragmented, consisting mainly of riparian corridors and upland drainageways" (Arndt 2016). The report also found that larger blocks of forest, greater than 20 acres, are scattered throughout the area. These are dominated by shingle oak (*Quercus imbricaria*), American elm (*Ulmus americana*), honeylocust (*Gleditsia triacanthos*), and shagbark hickory (*Carya ovata*) in the old-field/early successional areas; large-diameter oaks (*Quercus* sp.), hickory (*Carya* sp.), cottonwood (*Populus* sp.), and assorted small-diameter trees along upland drainages; white oak (*Quercus alba*), northern red oak (*Quercus rubra*), black oak (*Quercus velutina*), and shagbark hickory in the mixed upland hardwood forest areas; and silver maple (*Acer saccharinum*), eastern cottonwood (*Populus deltoides*), and green ash (*Fraxinus pennsylvanica*) in the bottomland forests. Black walnut (*Juglans nigra*) was also found scattered throughout the project area (Arndt 2016).

3.5.1.1 Direct and Indirect Effects of the No Action Alternative

The No Action alternative would have no impacts on woodland or forest resources.

3.5.1.2 Direct and Indirect Effects of the Proposed Action

The Proposed Action could result in the conversion of 1,410 acres of forest over the 100-year project life (Table 3.5.1.2-1). The normal pool inundation would include 973 acres of forest conversion, based on an aerial imagery review and NLCD forest layer. Forest impacts reported in the alternatives analysis were based on NLCD only for comparison to other alternatives.

Table 3.5.1.2-1. Project Forest Impacts.

Project Element	Projected Forest Conversion (acres)
Normal Pool Inundation	973[a]
Fence Construction	67
Recreational Facilities Development	27
Utilities and Road Relocation	34
Dam Construction, Borrow Sites, Spillway Construction, and Temporary Dam Access Roads	23
Water Treatment, Transmission, and Distribution	55[b]
Future Development Outside NCMRWC Property	162[c]
Tree Clearing on NCMRWC Property because of Development	69[d]
TOTAL FOREST CONVERSION	**1,410**

[a] To improve accuracy, an aerial imagery review was included with the NLCD forest layer.
[b] Includes 25 percent of the NLCD forest layer that occurs in the conceptual water transmission lines.
[c] Includes forest clearing as a result of potential development outside of the Proposed Action area.
[d] Includes tree clearing on NCMRWC property to support development.

3.6 Residential

3.6.1 Affected Environment

The area to be served by the Proposed Action includes 10 counties in north-central Missouri. This 10-county region includes Adair, Chariton, Grundy, Linn, Livingston, Macon, Mercer, Putnam, Schuyler, and Sullivan counties. The 2010 population of the 10-county region was 107,130 people (U.S. Census 2010) and is comprised largely of agricultural, rural land. The City of Kirksville is the largest urban area in the 10-county region and is located in the center of Adair County. Other communities within the 10-county region include Chillicothe, Trenton, Milan, Macon, and Brookfield.

3.6.1.1 Direct and Indirect Effects of the No Action Alternative

The No Action alternative would result in the continuation of inadequate water supply for the communities surrounding the Proposed Action area. Residents within the vicinity of East Locust Creek Reservoir would also see a continuation of flood events and a continuation of the damages, road closures, unsafe conditions, and costs associated with such events.

The 2010 population of the 10-county region was 1 percent less than the 2000 Census data (U.S. Census 2010). The implementation of a reliable water supply in the 10-county region could help stabilize population and increase both population and per capita water usage as more industry and development are attracted to the area.

3.6.1.2 Direct and Indirect Effects of the Proposed Action

The unincorporated community of Boynton (population unknown) would be inundated by the permanent pool of the Proposed Action. Twenty-one buildings located in Boynton were coded as residential. Acquisition complying with the Uniform Act has been provided to owners of all residential properties purchased in conjunction with construction of the reservoir and related works of improvement. Buildings on purchased parcels have been demolished and cleared.

As a result of installation of the Proposed Action, current and future water shortage problems experienced by communities in the 10-county region would be greatly reduced. In addition, floodwater damages related to cropland and pastures, fences, commercial and urban properties, roads, bridges, rerouting of traffic, maintenance, and clean-up would all be reduced. Costs to Sullivan County communities for such damages would be reduced. Disruption to daily traffic, mail delivery, emergency services and other vehicle movement, and unsafe flooded roadway conditions would be reduced as infrastructure flooding is reduced.

Many water suppliers within the 10-county region need alternative water sources to meet the needs of their customers. The Proposed Action would provide an adequate and dependable water supply for residents in the 10-county region.

The Proposed Action would improve recreational opportunities and quality of life for local residents by providing 91,956 of the unmet annual user-days for water-based recreation in the region.

Some field and residential drives would be temporarily affected during construction and during necessary regrading or realigning of drive approaches.

3.7 Commercial/Industrial/Infrastructure/Utilities/Other

3.7.1 Affected Environment

There are no commercial or industrial facilities, utility buildings, or substations within the project area. Public and private utilities (i.e., electric power, water, communication) are present in the project area. Missouri Highway 5, Missouri Highway M, Missouri Highway B, and Missouri Highway Y border the project area and Missouri Highway N and several local roads run through the project area.

3.7.1.1 Direct and Indirect Effects of the No Action Alternative

The No Action alternative would not have an impact because there would be no change to the existing utility service within the project area.

3.7.1.2 Direct and Indirect Effects of the Proposed Action

EXISTING DRINKING WATER LINES

The Project will affect drinking water lines and pressure zones through dam creation and inundation. Impacts will occur to two pressure zones that will affect the flows, pressures, and recovery rates of the two elevated storage tanks.

To maintain the existing flow, pressures, and system recovery capacity, the existing radial lines that will be inundated will be combined prior to inundation and replaced with two lake crossings in the area of Knob Hill Road and the dam. Construction of the new lines would be included with electrical and telecommunication line relocations.

TRANSPORTATION AND UTILITY RELOCATION

The Project will inundate 5 miles of existing county roads and 1 mile of state highway. The Project inundation results in the loss of East Locust Creek crossings from Highway 6 at Milan to the Village of Pollock located approximately 13 miles to the north. Funding has been identified through the BUILD grant program. Through this program, federal funding is provided through the project sponsor (MoDOT) to invest in road, rail, and transit projects. Additional information on the BUILD grant road improvements and relocations can be found in Appendix E.

The Project will inundate 5 miles of existing county roads and 1 mile of state highway. The Project inundation results in the loss of two East Locust Creek bridge crossings that represent the only stream crossings between Missouri Highway 6 at Milan to the Village of Pollock, located approximately 13 miles to the north. The bridges will be left in place and would be inundated after dam construction.

The BUILD grant surface transportation project will result in the improvement of a network of roads that include the relocation of Missouri Route N, the extension of Missouri Route VV to Missouri Route 5, improvements to Missouri Route 5 between relocated Missouri Route N, and the new intersection of Missouri Route VV at Missouri Route 5 and upgrades to county roads accessing the new reservoir. This surface transportation project is needed to assist in funding the

transportation roadway safety and capacity improvements for safe access, emergency response, and intersection turn lanes (Figure 3.7.1.2-1).

The Project will affect single-phase and three-phase power lines and telecommunication lines located along Missouri Route N and nearby gravel roads. To replace the existing service, the areas with disconnected service would be served by a new utility corridor south of the dam and by an earthen utility corridor built across the Project along the Knob Hill Road to the Missouri Highway VV corridor. The Proposed Action would require relocation or coordination of the utilities listed below. Coordination with the utilities is ongoing.

- North Central Missouri Electric
- Northeast Missouri Rural Telephone
- Sullivan County PWSD No. 1
- Utility Safety and Design
- Windstream

WATER TREATMENT FACILITY

The current 2.2 MGD NCMRWC water treatment plant at Milan would need to be upgraded over the 100-year project life to provide the 7 MGD water supply for the 10-county region. The water treatment plant upgrade will occur onsite and will not impact streams or wetlands. Wholesale water will be sold to water systems within the region without water production capabilities.

WATER TRANSMISSION LINES

The water transmission lines have not been designed and the routes provided in Figure 2.0-1 above are conceptual only. The exact location of the transmission lines would be designed as the distribution system is built out over time. Construction of the distribution system would have temporary impacts to streams and wetlands. Permanent impacts are considered for forested areas and for PFO wetlands. The forest impacts based on the conceptual diagram total 210 acres and the PFO wetlands impacts total 30 acres.

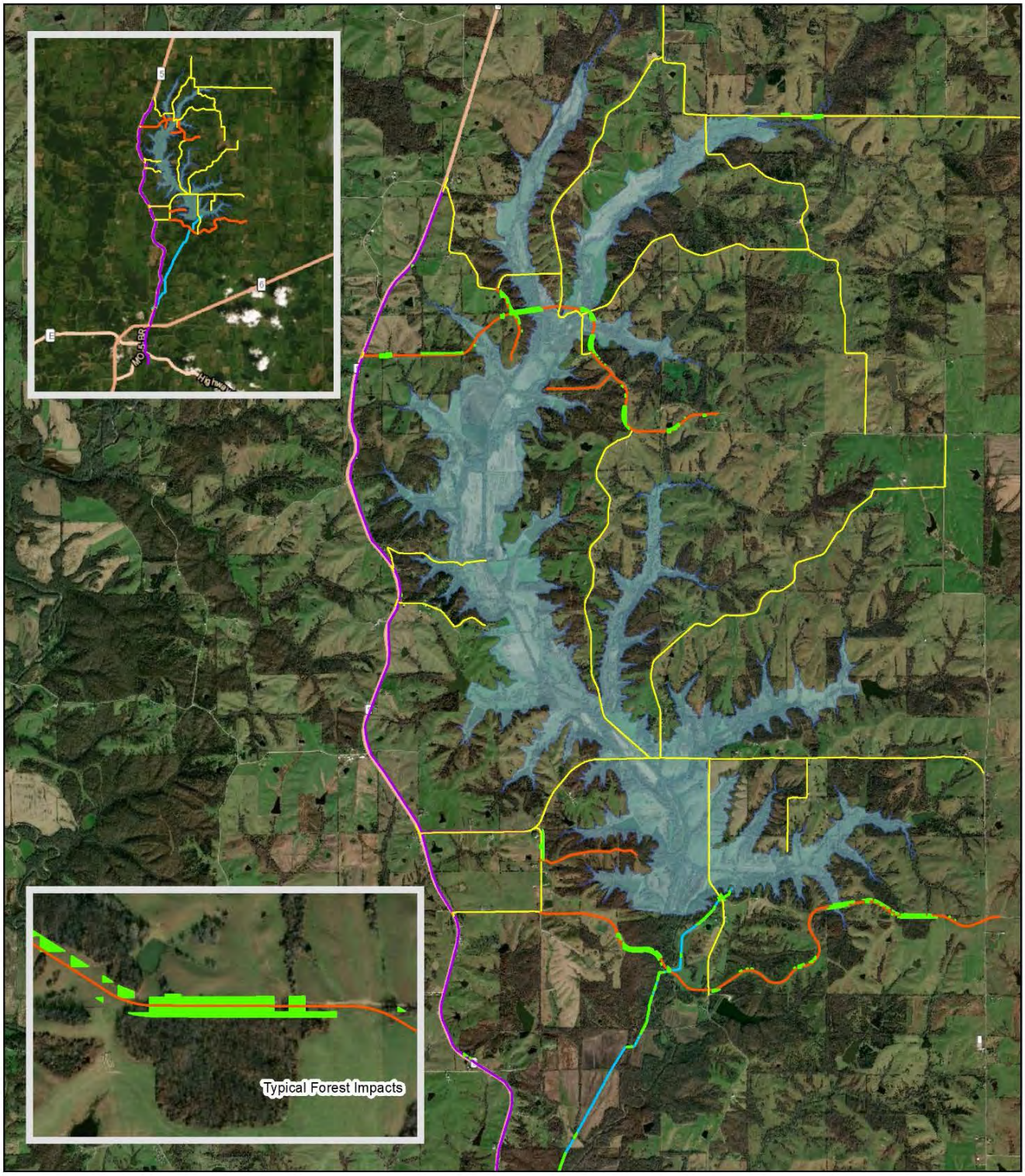

Figure 3.7.1.2-1. Proposed Utility and Road Corridors.

3.8 Water Resources

3.8.1 Streams

3.8.1.1 Affected Environment

East Locust Creek, from the mouth to Missouri Highway 6, is classified by the State Of Missouri (10 CSR 20-7.031) as "P," which identifies "streams that maintain permanent flow even in drought periods." From Missouri Highway 6 to Section 12, Township 64N, Range 20W, near Pollock, the stream is classified as "C," which identifies "streams that may cease flow in dry periods but maintain permanent pools which support aquatic life" (10 CSR 20-7.031). The remainder of the stream is unclassified. The state-designated beneficial uses for East Locust Creek are for livestock and wildlife watering and for the protection of warm water aquatic life and human health – fish consumption (10 CSR 20-7.031). Whole-body contact recreation is also a designated beneficial use for East Locust Creek (10 CSR 20-7.031).

According to the 2006 FEIS, the majority of the creek within the project area is laden with sandy sediment. The creek is incised from past degradation but appears relatively stable and has natural and artificial grade control at several locations. Substrate of the creek is primarily coarse to fine sand with occasional riffles over resistant clay or weathered shale, with rare exposures of bedrock and a few private cobble low-water crossings (NRCS 2006).

In 2015 and 2016, a stream assessment was conducted for all streams within the normal pool of the Proposed Action. The stream assessment reports are available on the NCMRWC website (NCMRWC 2017). The stream assessment identified 49.1 miles of stream, which included 27.6 miles of ephemeral, 12.6 miles of intermittent, and 8.9 miles of perennial streams within the normal pool. The stream assessments for East Locust Creek (perennial) measured the ordinary high-water mark width of 12 to 25 feet and the top-of-bank width from 35 to 60 feet. The buffer vegetation along East Locust Creek included black walnut, multiflora rose (*Rosa multiflora)*, red mulberry (*Morus rubra*), American elm, white oak, black willow (*Salix nigra*), shagbark hickory, tall fescue *(Schedonorus arundinacea)*, silver maple, hackberry (*Celtis occidentalis*), and river birch (*Betula nigra*). East Locust Creek had natural stream characteristics but was incised or had excessive erosion in areas. Figure 3.8.1.1-1 shows photographs of East Locust Creek.

Figure 3.8.1.1-1. Typical East Locust Creek Photos.

The Locust Creek Basin Management Plan indicates that 45 fish species within 11 families had been previously identified within a distribution range that includes the Locust Creek Basin (MDC 1994). Thirty-seven of those species have been collected in the Locust Creek basin, (which includes East Locust Creek but is not limited to it); 33 of those species were collected in 1988, the most recent collection date. Red shiner (*Cyprinella lutrensis*) was the most abundant species at 40 percent of all collected. Bigmouth shiner (*Notropis dorsalis*) was the second most collected. Other commonly collected species were creek chub (*Semotilus atromaculatus*), sand shiner (*Notropis stramineus*), bluntnose minnow (*Pimephales notatus*), suckermouth minnow (*Phenacobius mirabilis*), river carpsucker (*Carpiodes carpio*), green sunfish (*Lepomis cyanellus*), redfin shiner (*Lythrurus umbratilis*), and Johnny darter (*Etheostoma nigrum*).

Two species considered to be intolerant of poor water quality, stonecat (*Noturus flavus*) and trout-perch (*Percopsis omiscomaycus*), were also found. No threatened or endangered aquatic species have been found in the basin (MDC 1994). The Locust Creek Basin Management Plan did not specify how many species were found in East Locust Creek; however, all species in the distribution range were identified to occur in the region.

3.8.1.2 Direct and Indirect Effects of the No Action Alternative

The No Action alternative would have no impact on streams.

3.8.1.3 Direct and Indirect Effects of the Proposed Action

Based on the 2014/2015 stream assessments (Olsson 2016), implementation of the dam and normal pool would result in the inundation of the 49.1 miles of stream. Utilities and road relocations and improvements would cause permanent or temporary impacts to 0.3 mile of stream crossings based on the 2020 field delineation (Olsson 2020).

As mentioned earlier in the DSEIS, the stream impact numbers are based on a detailed site investigation rather than the Missouri stream classification, which was used to calculate effects in the alternatives analysis section. A preliminary jurisdictional determination has been provided by the USACE for the site. Figure 3.8.1.3-1 shows the affected streams in the project area.

Dams alter two critical elements of the geomorphic system: the ability of the river to transport sediment and the amount of sediment available for transport (Grant et al. 2003). If the transport capacity exceeds the available supply, a sediment deficit exists, and the channel can be expected to remove sediment from its bed and/or banks. If the transport capacity is less than the available sediment supply, then the channel can be expected to accumulate sediment. Both scenarios can occur below a dam, depending on the distance from the dam, input from tributaries, and the difference between pre-dam flows and dam releases (Collier et al. 1996). There are many adjustable attributes of a channel – its cross-section, bed material, planform, and gradient – and the response of a channel to sediment deficit or surplus varies. Typical downstream responses can include channel bed degradation or incision, textural changes such as coarsening or fining of surface grain-size distributions, and lateral adjustments, including both expansion and contraction of channel width (Petts 1980, 1982; Williams and Wolman 1984; Carling 1988; Brandt 2000).

The Proposed Action's dam and associated operation would fragment East Locust Creek and alter the movement of aquatic species, nutrients, and sediment upstream and downstream. The water budget model (Appendix D) describes operation and flow of the Proposed Action. The proposed reservoir spillway is a two-stage labyrinth weir with the first stage at normal pool and the second stage at the 25-year flood level. Approximately 10 feet below normal pool will be a passive flow system that will pass 0.5 cfs to East Locust Creek below the reservoir when the reservoir is at normal pool. The opening will pass flow at diminishing rates as the reservoir drops, until the flow ceases when the lake is approximately 10 feet below normal pool. The openings are fitted with removeable orifice plates so that outfall rates can be modified through an adaptive management process. Additional downstream flow will occur through minor seepage through the dam. The passive water releases would have altered physical and chemical water characteristics. Additionally, the dam would block aquatic species from moving upstream and restrict species' movement downstream. The East Locust Creek Reservoir Water Budget Model (Appendix D) describes the in-stream flow releases, reservoir stage outflow, and reservoir stage storage.

Changes in fish diversity below the reservoir may occur because of the altered stream flows, nutrient flows, sediment flows, and temperature changes. Changes in flow regime and temperature may adversely affect aquatic species that are sensitive to flow or temperature conditions. Reservoirs are susceptible to low dissolved oxygen in their deeper portions. If the dam releases flows through the bottom of the reservoir, the downstream water may be a reduction in temperature to the receiving stream and low in dissolved oxygen. If it is released from the top of

the dam, the flow could be warmer than the downstream water. Thermal shocks can adversely affect susceptible stream species in the receiving tributary.

Dam leakage and stable flows may maintain a stable stream flow during drought conditions, which may minimize impacts to current aquatic species populations. Recreational development and the water treatment plant are anticipated to avoid additional permanent stream impacts, although water transmission lines may result in temporary impacts.

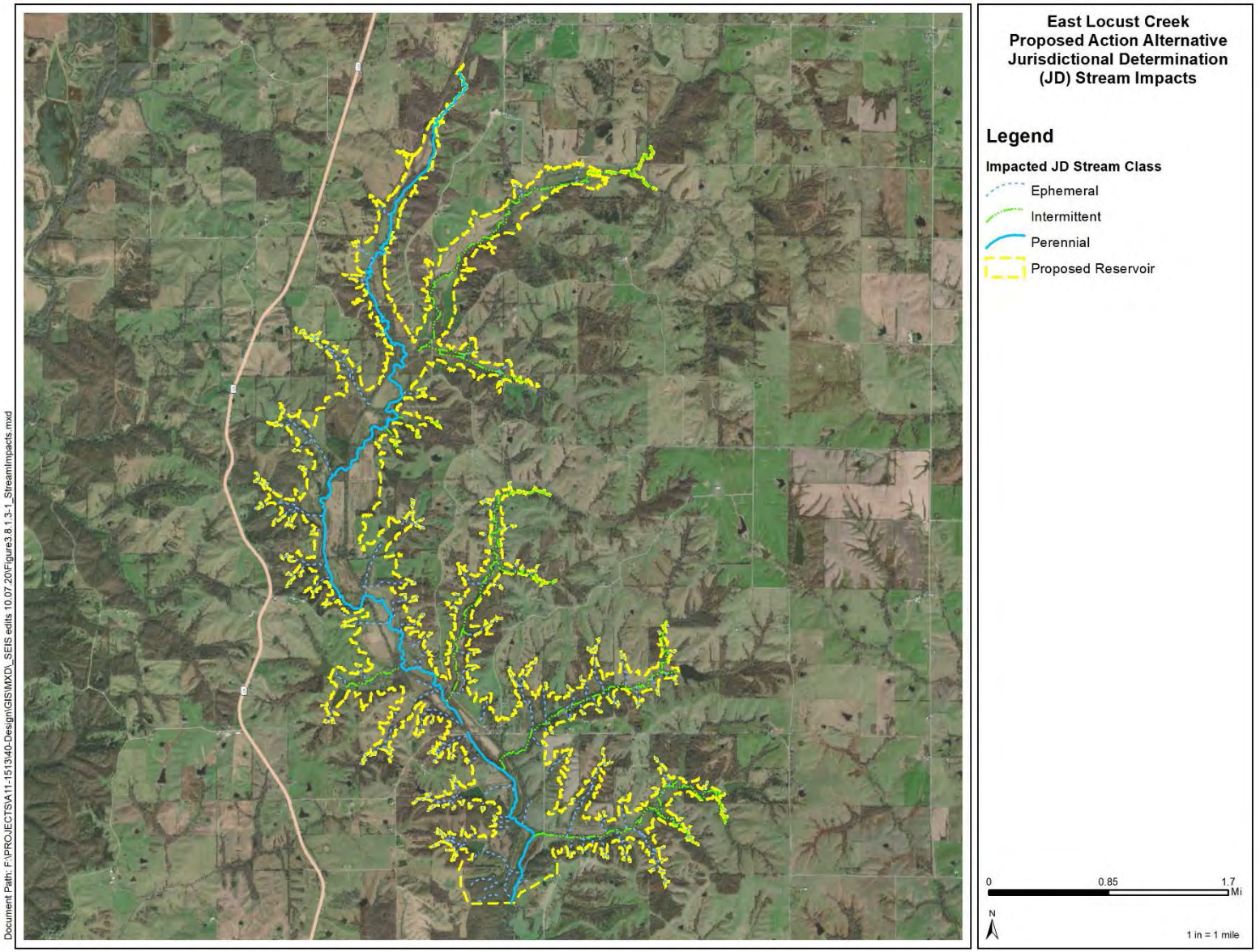

Figure 3.8.1.3-1. Stream Impacts in the Project Area.

3.8.2 Groundwater

3.8.2.1 Affected Environment

The 10-county region has three different types of groundwater sources; these are glacial drift, bedrock, and Missouri River alluvium aquifers. The percentage of each aquifer type within the region is as follows: 91.6 percent glacial drift, 7.1 percent bedrock, and 1.3 percent Missouri River alluvium.

Useable groundwater in this region is found in isolated pockets of remnant glacial aquifers and in alluvial aquifers adjacent to surface water streams. The glacial aquifers are somewhat randomly dispersed with no interconnectivity. Likewise, the alluvial aquifers may follow along surface water, but it is increasingly difficult to locate wells that produce useful yields.

3.8.2.2 Direct and Indirect Effects of the No Action Alternative

Groundwater concerns are not applicable to the No Action alternative.

3.8.2.3 Direct and Indirect Effects of the Proposed Action

There have been no substantial changes to groundwater resources within the proposed Project area since they were described in the affected environment and impact analysis portion of the FEIS and since the signing of the ROD in 2006.

Four registered groundwater wells are located within the project area. These wells were installed in the project area as part of a dam geological investigation and will be properly abandoned at the appropriate time. An unknown number of unregistered wells may be located along the project area. Approximately 20 shallow cisterns (< 20 feet deep) have been found within the project area and are in the process of being filled. No cisterns deeper than 20 feet have been found.

Any registered or unregistered wells affected by the project would be properly decommissioned according to Missouri Minimum Design Standards for Community Drinking Water Systems, paragraph 3.1.4.1.c, as well as the Code of State Regulations (CSR), 10 CSR 23-3.110 – Plugging of Water Wells (MDNR 2013b; MDNR 2014a). Proper decommissioning of affected wells would not have a significant impact on groundwater quality.

The next nearest groundwater public drinking water source, Princeton Municipal Water, is 28 miles northwest of the proposed dam. It is in the Weldon River alluvium. Given the distance and the lack of connectivity to the East Locust Creek alluvium, there is no chance of any impacts from the proposed dam.

3.8.3 Wetlands

For the purposes of the CWA and this DSEIS, wetlands are defined as “those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (33 Code of Federal Regulations [CFR] 328). Wetlands are determined in accordance with the methods set forth in the *1987 U.S. Army Corps of Engineers Wetlands Delineation Manual* (USACE 1987) and *Regional Supplement to the U.S. Army Corps of Engineers Wetland Delineation Manual: Midwest Region* (USACE 2010).

3.8.3.1 Affected Environment

A wetland delineation was completed for the Proposed Action's normal pool area in 2015 and 2016. As discussed earlier in the DSEIS, the numbers in this section are based on detailed site investigations rather than on the NWI, which was the source used for the alternative analysis section. The wetland delineation reports can be found on the NCMRWC website (NCMRWC 2017). Based on the wetland delineation conducted for the project (Olsson 2016), approximately 362 acres of wetlands were determined to be in the normal pool. Identified wetlands have been classified according to the Cowardin Wetlands Classification system (Cowardin *et al*. 1979). The 362 total wetland acres consist of 273 acres of PEM wetlands, which are dominated by herbaceous vegetation, 79 acres of PFO wetlands, which are dominated by trees, and 10 acres of PSS wetlands, which are dominated by small woody plants. An existing 181-acre Emergency Wetland Reserve Program easement (EWRP) would be mostly inundated by the RW1 alternative and is included in the wetland delineation values. According to federal rules at 7 CFR 1468.6 and NRCS program policy (Title 440, Conservation Programs Manual, Part 528.170), this easement must be replaced with a wetland of equal or greater functions and values; no net loss of program acres, and equal or greater economic value. The EWRP replacement is detailed in Appendix F. All CWA aspects of this easement replacement are addressed in the Compensatory Mitigation Plan. Figure 3.8.3.1-1 shows the delineated wetlands.

Wetland impacts were determined for the utilities relocations and the road relocations and improvements. NWI data shows that 3.05 acres of PEM wetlands and 9.19 acres of PFO wetlands are within the utility and road improvements. A wetland delineation is planned to confirm these values.

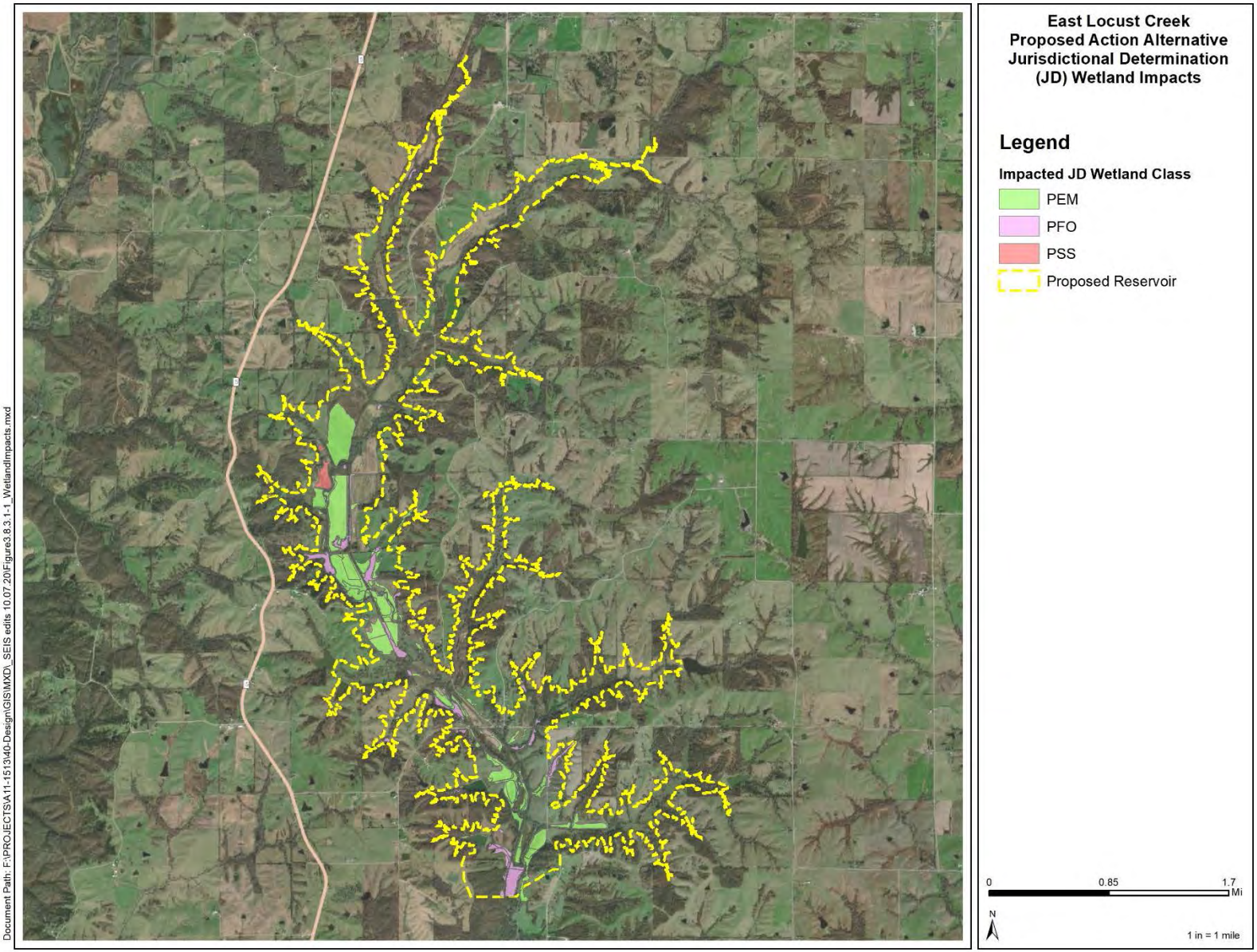

Figure 3.8.3.1-1 Wetland Impacts in the Project Area.

The wetlands had no standing water present or had water depths of less than 1 foot deep. Persistent standing water was not common among the wetlands delineated. An abandoned railroad line impacts the hydrology within part of the normal pool area and appears to contribute to the wetland development by pooling sheet flow across the area.

The wetland quality is reduced for 224.5 wetland acres, because the wetlands were previously farmed, are currently farmed, or consist of over 50 percent cover of reed canarygrass, which is an invasive species that does not provide many wetland functions.

A 39.5-acre PEM wetland was created by the NRCS EWRP and is included in the total PEM wetlands within the normal pool. The WRP program “offers landowners the opportunity to protect, restore, and enhance wetlands on their property” (NRCS 2014). The EWRP replacement is described in Appendix F. Figure 3.8.3.1-2 shows example wetlands identified with the proposed Project footprint.

Figure 3.8.3.1-2. Typical East Locust Creek Wetland Photographs.

3.8.3.2 Direct and Indirect Effects of No Action Alternative

The No Action alternative would have no impact on wetlands within the footprint of the Proposed Action.

3.8.3.3 Direct and Indirect Effects of the Proposed Action

The Proposed Action would affect 368 acres of wetlands that were determined by the wetland delineations in 2014, 2015, and 2020 (Olsson 2016 and Olsson 2020). The wetlands delineated within the normal pool generally did not have standing water over 1 foot deep. The Proposed Action would result in water with depths up to 56 feet. The wetlands would lose the ability to support vegetative communities except shoreline areas that were less than about 6 feet deep. Lake level fluctuation could limit the aquatic or wetland vegetative communities along the shoreline. Road improvements and utility relocations resulted in 6 acres of impacts.

The Proposed Action would alter the flow regime and remove water from the East Locust Creek watershed for water supply use. The change in flow and water available may impact the hydrology of wetlands downstream of the dam along East Locust Creek. The water budget model (Appendix D) has information on the stream flow and future changes. Downstream flow would be maintained through a passive flow system and seepage from the reservoir. High flow events would completely pass through the spill way and downstream flows would be consistent with current high-flow events.

3.8.4 Water Quality

Missouri state water quality regulations (10 CSR 20-7) classify waters by type, establish beneficial uses, and define general (10 CSR 20-7.031(3)) and specific water-quality criteria. Water bodies that fail to meet either general or numeric criteria are required to be listed as impaired water bodies under Section 303(d) of the federal CWA.

3.8.4.1 Affected Environment

East Locust Creek from Pollock to south of Milan has been included on the draft of Missouri's 2018 303(d) List of Impaired Waters because of low dissolved oxygen and high *E. coli* levels (MDNR 2017a). Missouri Highway 5 poses a risk of water pollution by deicers and by automotive and combustion byproducts through runoff from the highway. Though agricultural nonpoint source pollution has not been associated with any impairment to water quality in East Locust Creek, cropland or pasture mismanagement in close proximity to the reservoir poses a risk to water quality.

Phase I and Phase II Environmental Site Assessments (ESA) were done throughout the project area for the identification and assessment of recognized environmental conditions (RECs), including the town of Boynton. The Phase I and Phase II ESAs are provided on the NCMRWC website (NCMRWC 2017). The ESA results identified potential contaminants associated with an abandoned railroad line in excess of state established health-based benchmarks. Flooding along the abandoned railroad line may result in minor arsenic releases from the railroad bed. The releases are anticipated to be small and have negligible effects on water quality. A memo describing the arsenic releases is included in Appendix B.

Additional threats to water quality in the East Locust Creek watershed are from sediment, pathogens, nutrients, and toxic materials. Sediment sources include unstable channel banks, road ditches, and inadequately protected cropland, pasture, and forestland. Pathogens and nutrients can also arise from human, livestock, and wildlife sources.

3.8.4.2 Direct and Indirect Effects of the No Action Alternative

No streams or water bodies would be affected by the No Action alternative. Current water quality concerns include sediment, pathogens, nutrients, and toxic materials from unstable channel banks, road ditches, railroad lines, and inadequately protected cropland, pasture, and forestland.

3.8.4.3 Direct and Indirect Effects of the Proposed Action

It is likely that the Proposed Action would increase the dissolved oxygen level and reduce the *E. coli* concentration within the inundated section. The Proposed Action may provide sufficient flow to reduce summer effluent-dominated flow impairments downstream as well.

Sediment from the watershed and shoreline are primary pollutants that can compromise water quality. Erosion and sedimentation rates would be reduced in the watershed as a result of sediment capture in the reservoir and development of a vegetated buffer around the reservoir.

The proposed Project is a long, narrow reservoir that may be susceptible to shoreline erosion. Planning activities include a conservative approach based on consultation with lake managers from Iowa and Nebraska. All operational and structural mechanisms to enhance shoreline protection are being explored. These mechanisms include restricting the number of boats allowed; motor size restrictions; displacement restrictions; zonal prohibitions; extensive use of no-wake zones that allow wave energy dissipation; wing dikes; planning ramp locations; dock licenses and dock configuration; minimal tree clearing in portions of the lake above 911 feet MSL; vertical abutment bridge structures; shoreline and maintenance and strategic shoreline protection that includes hard structures, rip rap, and vegetation establishment. A Shoreline Protection Plan is included in Appendix G.

In 2009, the NCMRWC began contemplating water protection, source water protection, land oversight and habitat preservation when it drafted and advocated for passage of first-of-kind Lake Authority Legislation that provides the NCMRWC the ability to control and prevent contamination threats from the top of the watershed to the dam even on private property (NCMRWC 2017). The Lake Authority was passed as Revised Statute of Missouri 67.4520 and allows zoning and planning powers. The NCMRWC advocated for the Lake Authority legislation that was signed into law on August 28, 2011. This legislation enabled the NCMRWC to reduce the footprint of its property from 5,800 acres to approximately 4,550 acres by removing the need for a 300-foot buffer. In essence, in exchange for buffer acreage, the Lake Authority can exercise control over development and potential contaminating activities in the East Locust Creek Watershed from the top of the watershed to the dam.

The NCMRWC has also implemented a 100-foot buffer along streams within the High Impact Zone. The High Impact Zone extends 500 feet outside NCMRWC-owned property and surrounds the reservoir. The High Impact Zone was established through Resolution #6-2018 by the NCMRWC. The 100-foot buffer preserves 50 forest acres and will protect water quality within the High Impact Zone.

A source water protection plan was developed to protect existing water sources and public health and keep water treatment costs to a minimum. The source water protection plan followed MDNR

guidelines for developing a source water protection plan and for community water systems. A steering committee consisting of seven citizens and affiliate members consisting of eight resource professionals were consulted for guidance. A copy of the source water protection plan is included in Appendix H.

The National Pollutant Discharge Elimination System (NPDES) rules require a Storm Water Pollution Prevention Plan (SWPPP) on construction sites disturbing one or more acres. Although this plan would be prepared for the site, a short-term decline in water quality may occur as a result of sediment discharge associated with construction activities.

3.9 Fisheries

PL 83-566 projects are local projects installed with federal assistance and are exempt from the provisions of the Fish and Wildlife Coordination Act (FWCA; 16 USC 661-667e, Ch. 55 *as amended*). However, PL 85-624, which contained the 1958 amendments to the FWCA, added section 12 to PL 83-566. Section 12 (16 U.S.C. Section 1008) applies the principles of the FWCA to the PL 83-566 program. The NRCS state conservationist must notify the USFWS so it may provide recommendations for fish and wildlife resources, in accordance with the provisions of PL 83-566 Section 12.

Affected Environment

East Locust Creek is the primary stream within the project area and would be affected. From the mouth of the creek to Missouri Highway 6 in Milan, East Locust Creek is classified as perennial, which means it can provide habitat value for aquatic resources (NRCS 2006). However, no threatened or endangered fish species, fisheries of concern, or essential fish habitat (EFH) are known to be present within the water bodies in the project area (USFWS 2017).

During drought conditions, East Locust Creek has no flow and pools are dry. Restocking the stream when flow returns occurs from downstream reaches and from ponds and lakes in the watershed. The current fish community is described in section 3.8.1.1

3.9.1 Direct and Indirect Effects of the No Action Alternative

No threatened or endangered fish species, fisheries of concern, or EFH would be affected by the No Action alternative.

3.9.2 Direct and Indirect Effects of the Proposed Action

The Proposed Action will inundate approximately 13 acres of ponds that contain fish. No threatened or endangered fish species, fisheries of concern, or EFH would be affected by the Proposed Action.

The Proposed Action would provide recreational fishing opportunities to the residents of the 10-county region. See the purpose and need section for the recreational demand. Lakes in Missouri provide habitat for largemouth bass (*Micropterus salmoides*), white crappie (*Pomoxis annularis*), bluegill (*Lepomis macrochirus*), and channel catfish (*Ictalurus punctatus*), among other species. A stocking program with similar species is anticipated in coordination with MDC.

3.10 Terrestrial Vegetation

3.10.1 Affected Environment

There have been no substantial changes to terrestrial vegetation within the project area since it was described in the affected environment and impact analysis portion of the FEIS and since the signing of the ROD in 2006. The Forest and Field Inventory Report for the Proposed Action described the forested areas within the project area as “highly fragmented, consisting mainly of riparian corridors and upland drainageways” (Arndt 2016). Further, NLCD included in Figure 3.3.3-1 (Section 3.3) shows the normal pool is predominantly hay/pastureland, deciduous forest, and cultivated crop land.

A 2016 study of potential habitat for Mead’s milkweed, which is federally threatened and state-endangered, found the current land use to be upland pasture on the steep terrain and crop fields on the flat ground. Upland pastures were found to primarily be reseeded with and have more than 80 percent establishment of tall fescue. Prairie species-dominated grassland was identified at four locations that totaled 18.7 acres.

3.10.2 Direct and Indirect Effects of No Action Alternative

The No Action alternative would have no impacts on terrestrial vegetation.

3.10.3 Direct and Indirect Effects of the Proposed Action

The Proposed Action will affect terrestrial vegetation in areas of inundation and dam construction. Additional areas would be indirectly affected by a change in land use.

None of the terrestrial vegetation species located in this area are federally threatened or endangered.

Disturbance of vegetation for construction activities could result in the introduction of nonnative or invasive species into unvegetated areas. BMPs and restoration of vegetation will be incorporated into the project to minimize this potential impact.

3.11 Wildlife

Migratory Bird Treaty Act

Under the Migratory Bird Treaty Act (MBTA; 16 USC 703-712: Ch. 128 *as* amended), construction activities in grassland, wetland, stream, and woodland habitats and those that occur on bridges (which may affect swallow nests on bridge girders, for example) that would otherwise result in the taking of migratory birds, eggs, young, and/or active nests, should be avoided. Although the provisions of MBTA are applicable year-round, most migratory bird nesting activity in Missouri occurs during the period of April 1 to July 15. However, some migratory birds are known to nest outside the aforementioned primary nesting season period. For example, raptors (hawks, falcons, and owls) can be expected to nest in woodland habitats during February 1 through July 15, whereas sedge wrens (*Cistothorus platensis*), which occur in some wetland habitats, normally nest from July 15 to September 10.

Bald and Golden Eagle Protection Act

Bald and golden eagles have specific protection under the Bald and Golden Eagle Protection Act (BGEPA; 16 USC 668-668c), which is administered by the USFWS. Protections under this act prohibit "take" of bald and golden eagles. Bald eagles (*Haliaeetus leucocephalus*) use tall trees for roosting or nesting and nearby open water for foraging; golden eagles (*Aquila chrysaetos*) use shortgrass and mixed-grass prairies for foraging and rock cliffs, tall trees, and other high places for nesting.

There are no known bald or golden eagle nest locations within the project area. According to a USFWS data request, the nearest bald eagle nest is 2.5 miles from the Proposed Action.

3.11.1 Affected Environment

There have been no substantial changes to terrestrial vegetation within the project area since it was described in the affected environment and impact analysis portion of the FEIS and since the signing of the ROD in 2006. Typical wildlife for the project area includes deer, coyote, raccoon, opossum, skunk, squirrels, snakes, turtles, and frogs. The most common wildlife habitats that would be affected are cultivated cropland, pastureland, and deciduous forest.

The area lying within the normal pool is primarily agricultural fields consisting of hay/pasture field and deciduous forest. Forested areas, trees, and brush thickets associated with the riparian corridor may provide nesting habitat for migratory bird and eagle species. Further, the Proposed Action and the adjacent forested areas could provide suitable habitat for bald eagles.

3.11.2 Direct and Indirect Effects of the No Action Alternative

The No Action alternative would have no impacts on wildlife.

3.11.3 Direct and Indirect Effects of the Proposed Action

Vegetation removal for construction of the Proposed Action would decrease the amount of upland habitat available in the project area. The deciduous forest may provide nesting, foraging, and cover habitat for many species of birds, raptors, bats, deer, coyote, and small mammals. Sullivan County has approximately 95,530 acres of forest habitat. The Proposed Action would affect 1,410 acres of forest habitat, which is 1.5 percent of the forest habitat within the county. In addition, hay/pastureland may provide suitable grassland habitat for wildlife.

Given the limited nature of the Proposed Action's impact on wildlife habitat in Sullivan County and the availability of similar habitat in the general area, the Proposed Action would generally have a minimal impact on the region's wildlife. Mobile species, such as most birds and larger mammals, would be expected to move out of the project area once construction activities commence. The site would diversify the available habitat for many species by providing a reliable source of water, even in drought conditions. The open water habitat and flooded timber would provide feeding and roosting habitat for waterfowl, shorebirds, and bald and golden eagles that migrate through the area. The construction of the project would be done in compliance with the MBTA and the BGEPA.

INVASIVE SPECIES

Because of the change in land use from private, agricultural land to public, recreational land, invasive species have the potential to colonize the project area. The public aspect of the land use

change allows invasive species to be transferred from different geographic areas through public use. The recreational project purpose that includes boating and fishing could introduce aquatic invasive species including zebra mussels, hydrilla, and invasive fishes. Additionally, the upland land cover could be susceptible to colonization of invasive trees and shrubs, land invertebrates, forbs, and mammals. Invasive species currently present within the Project area include:

- Common carp (*Cyprinus carpio)*
- Sericea lespedeza (*Lespedeza cuneata*)
- Musk thistle (*Carduus nutans*)
- Reed canarygrass (*Phalaris arundinacea)*
- Multiflora rose (*Rosa multiflora)*
- Japanese honeysuckle (*Lonicera japonica)*
- Tall fescue (*Festuca arundinacea)*
- White sweet clover (*Melilotus albus)*
- Yellow sweet clover (*Melilotus officinale)*

Invasive species problematic to Missouri include the following species (MDC 2020):

Fishes		**Forbs and Grasses**	
Bighead Carp	*Hypophthalmichthys nobilis*	Canada Thistle	*Cirsium arvense*
Black Carp	*Mylopharyngodon piceus*	Chinese Yam	*Dioscorea oppositifolia*
Grass Carp	*Ctenopharyngodon Idella*	Crown Vetch	*Securigera varia*
Common Carp	*Cyprinus carpio*	Japanese Knotweed	*Fallopia japonica*
Silver Carp	*Hypophthalmichthys molitrix*	Johnson Grass	*Sorghum halepense*
Snakehead Carp	*Channa* spp.	Leafy Spurge	*Euphorbia esula*
Land Invertebrates		Reed Canarygrass	*Phalaris arundinacea*
Asian Long-horned Beetle	*Anoplophora glabripennis*	Sesbania	*Sesbania herbacea*
Emerald Ash Borer	*Agrilus planipennis*	Tall Fescue	*Festuca arundinacea*
European Wood Wasp	*Sirex noctilio*	White Sweet Clover	*Melilotus albus*
Gypsy Moth	*Lymantria dispar*	Yellow Sweet Clover	*Melilotus officinalis*
Trees and Shrubs		Yellow Bluestem	*Bothriochloa ischaemum*
Autumn Olive	*Elaeagnus umbellata*	Teasel	*Dipsacus fullonum*
Bradford Pear	*Pyrus calleryana*	Spotted Knapweed	*Centaurea stoebe*
Golden Rain Tree	*Koelreuteria paniculata*	Sericea Lespedeza	*Lespedeza cuneata*
Japanese Honeysuckle	*Lonicera japonica*	Purple Loosestrife	*Lythrum salicaria*
Multiflora Rose	*Rosa multiflora*	Musk Thistle	*Carduus nutans*
Tree-of-heaven	*Ailanthus altissima*	Kudzu	*Pueraria montana*
Wintercreeper	*Euonymus fortunei*	Japanese Stiltgrass	*Microstegium vimineum*
Russian Olive	*Elaeagnus angustifolia*	Indian Strawberry	*Duchesnea indica*
Mimosa	*Albizia julibrissin*	Garlic Mustard	*Alliaria petiolata*
Heavenly Bamboo	*Nandina domestica*	Common Reed	*Phragmites australis australis*
Common Buckthorn	*Rhamnus cathartica*	Caucasian Bluestem	*Bothriochloa bladhii*
Bush Honeysuckles	*Lonicera* spp.	**Aquatic Invertebrates**	
Mammals		Zebra Mussel	*Dreissena polymorpha*
Feral Hogs	*Sus scrofa*	Chinese Mystery Snail	*Cipangopaludina chinensis malleata*
Nutria	*Myocastor coypus*	**Aquatic Vegetation**	
		Hydrilla	*Hydrilla verticillata*

3.12 Threatened and Endangered Species

Federally listed threatened and endangered species are protected under the Endangered Species Act of 1973 as amended (16 USC 1531 et seq.). Adverse effects on a federally listed species or its habitat would require consultation with the USFWS under Section 7 of the Endangered Species Act. Section 7 of this act, as amended, requires federal agencies to ensure that actions that they authorize, fund, or carry out are not likely to jeopardize the continued existence of proposed, endangered, or threatened species or result in the destruction or adverse modification of their critical habitat.

3.12.1 Affected Environment

The USFWS generates an Information for Planning and Conservation document that lists federally listed threatened and endangered species for the project area and the MDC Missouri Natural Heritage Program provides state-listed threatened and endangered species for Sullivan County (USFWS 2017, MDC 2017b). Both resources were used for further analysis of potential threatened and endangered species impacts. Table 3.12.1-1 identifies state and federally listed threatened and endangered species that may be located within the project area.

Table 3.12.1-1. Federal- and State-listed Species in Sullivan County.

Common Name	Scientific Name	Status	Habitat
Indiana Bat	*Myotis sodalis*	FE, SE	Migrates from colonial caves to summer roost trees. Summer roost trees are typically large trees, often dead, with exfoliating bark. Roost trees are typically found in riparian zones, bottomland and flood plain habitats, forested wetlands, and upland communities. Foraging habitat typically includes semi-open to closed forest habitat, forest edges, and riparian areas.
Northern Long-eared Bat	*Myotis septentrionalis*	FT	Prefer mature forests for foraging, but they also use open spaces such as small forest clearings, water, and along roads. Summer habitats consist of roost trees of varying sizes and species.
Gray Bat	*Myotis grisescens*	FE	The gray bat inhabits caves year-round and occupies cold hibernating caves in the winter and warm caves during the summer. Maternity colonies are formed on the cave ceilings and range from a few hundred individuals to a few thousand individuals. Summer foraging habitat includes open water of rivers, streams, and lakes or reservoirs.
Plains Spotted Skunk	*Spilogale putorius interrupta*	SE	Found in open grasslands, brushy areas, and cultivated lands. Dens located below ground in grassy banks, rocky crevices, or along fence rows.
Mead's Milkweed	*Asclepias meadii*	FT, SE	Occurs along with dry-mesic to mesic tallgrass virgin prairie or glade/barren habitat.

FE – Federally Endangered
FT – Federally Threatened
SE – State Endangered

The project area is upland pastures and woodland on the steep terrain and crop fields on the flat ground. The upland pastures have been reseeded with and have more than 80 percent establishment of tall fescue. Wooded areas consist of American elm, white oak, burr oak (*Quercus macrocarpa*), black walnut, green ash, and shagbark hickory. There are no critical habitats, wildlife refuges, or fish hatcheries within the project area.

The USFWS provided information stating that the Indiana bat and the Mead's milkweed, which are both federal and state endangered species, may occur in the watershed. Further studies have been conducted to determine the presence of the Indiana bat and Mead's milkweed. In addition, the project area provides potential habitat for the state-listed plains spotted skunk.

Indiana Bat, Gray Bat, and Northern Long-eared Bat

Surveys were conducted to determine the presence of Indiana bat, gray bat, and northern long-eared bat habitat following the USFWS Range-wide Indiana Bat Summer Survey Guidelines (USFWS 2016). The woodland habitat within the reservoir area was divided into nine regions; each survey region is approximately 123 acres in size, per USFWS regulations. Bat survey methodology for the nine regions consisted of acoustic monitoring, mist netting, radio tracking, emergence counts, and bat habitat assessments. The use of multiple survey collection methods ensured that each region was surveyed as thoroughly as possible.

Acoustic surveys were conducted from June 2, 2016 to June 11, 2016, prior to mist netting a given region. Mist net surveys were then completed from June 15, 2016 to July 10, 2016, in locations where the acoustic survey recorded potential Indiana bat calls. During the mist net surveys, radio transmitters were attached to pregnant or lactating female bats and/or appropriately sized juveniles captured in the net to better locate maternity colonies and roost locations. Emergence counts were then conducted at each identified maternity roost and secondary roost. In addition, a total of three bat habitat assessments were completed in each region.

Five of the nine regions had positive Indiana bat detections through both acoustic monitoring and mist netting. These five regions contain approximately 595 acres of woodland habitat. Indiana bats were detected through acoustic surveys in an additional three regions; however, no species were caught during the mist-netting surveys. These three regions contain 463 acres of woodland habitat.

Roost trees were identified for Indiana bats in three regions and maternity roost trees were identified in two regions. The two regions with identified maternity roost trees contain a total of approximately 217 acres of woodland habitat that would be inundated by the Proposed Action. Two additional maternity roost trees were identified just outside the project boundary in a large woodland area. This area would not be affected by the Proposed Action.

Northern long-eared bat species were detected through acoustic monitoring in seven of nine regions. This species was also caught through mist netting in four of the nine regions. No gray bats were detected through acoustic monitoring or caught through mist netting.

Mead's Milkweed

Mead's milkweed surveys were conducted through an initial desktop review and a field verification. The desktop review identified areas that could likely contain Mead's milkweed and eliminated areas that would not provide suitable habitat. Following the desktop review, a field

verification survey was performed during the probable blooming period of the species, from June 14, 2016 to July 7, 2016. The field verification survey did not identify any occurrence of the species within the project area (Olsson 2017).

Plains Spotted Skunk

Based on the NLCD, cropland, hay/pasture, and forested areas exist within the project area. Surveys and habitat assessments have not been done for the plains spotted skunk.

3.12.2 Direct and Indirect Effects of the No Action Alternative

The No Action alternative would have no impacts on threatened and endangered species.

3.12.3 Direct and Indirect Effects of the Proposed Action

Northern Long-eared Bat

Direct Effects

Direct effects are defined as Project impacts that occur immediately (i.e., injuring or killing northern long-eared bats). Tree clearing activities for all Project elements will occur during the northern long-eared bat hibernation period (November 1 – March 31) and thus minimize direct effects on northern long-eared bats. A reservoir water budget model indicates inundation will occur over a period of 2 to 10 years and the timing cannot be determined ahead of time or controlled. The model shows the reservoir would fill slowly over time and that during the wettest period since 1900, the reservoir would take 1.9 years to fill. Based on the model results, the bats would likely be able to avoid direct impact.

Indirect Effects

Indirect effects are defined as Project impacts that are reasonably certain to occur but occur later in time (i.e., forest loss that reduces maternity roost habitat and causes lower population size). Forest loss and impacts to maternity roosting colonies are the indirect effects further described.

Potential Forest Impacts

The Project will affect northern long-eared bat summer foraging and roosting habitat. The forest loss caused by Project construction and predicted future forest loss would reduce the available forest habitat by 1,341 acres and represents a 0.17 percent forest decline in the 10-county region and a 1.36 percent forest decline in Sullivan County.

Maternity Roosts and Home Range Impacts

Northern long-eared bats were not tracked during the field study and the maternity roost locations are not known. Two lactating northern long-eared bats were captured at the same mist-net site, but in separate nets. Based on the 3-mile range of capture sites, there are assumed to be primary and alternative maternity roost trees nearby or affected by the Project elements.

Within the 3-mile home range, there are 5,727 forest acres and 1,013 forest acres affected by Project elements. This represents a loss of 18 percent of the northern long-eared bat colony's forested home range.

Loss of Individuals and Reduction in Population Size

The loss of roosting and foraging habitat could result in lower fecundity (reproductively) or lower survivorship. The loss of roosting and foraging habitat would require northern long-eared bats to find alternative maternity roosts and foraging areas. Depending on the populations' health following hibernation, the energy requirements to find alternative maternity roosting and foraging habitat could result in lower fecundity or survivorship of the existing population. Emergence counts were not conducted for northern long-eared bats, so population estimates are not available within the Project area.

Winter Habitat

Northern long-eared bat winter habitat consists of large hibernacula. Because of the increased presence of white-nose syndrome (WNS), hibernacula have become of primary interest for northern long-eared bat conservation efforts. The closest winter habitat is in Howard County, placing the 10-county region outside winter habitat.

Conservation

The forest planting and preserving and associated permanent conservation easements would occur on 683 acres for forest preservation and 553 acres for forest tree planting. Permanent conservation easements would be established on 1,236 acres of tree planting and forest preservation. Within the 3-mile buffer there are 1,013 forest acres affected that equals 18 percent of the total forest. Tree plantings within the 3-mile buffer total 201 acres and tree preservation totals 496 acres. The tree plantings and preservation total 697 acres and equal 69 percent of the forest loss in the 3-mile buffer.

Additional conservation will occur through the stream and wetland mitigation and by the zoning in the High Impact Zone. The High Impact Zone is a 500-foot buffer around land owned by the NCMRWC that will have restricted tree clearing in riparian areas. The wetland mitigation will include a minimum of 79 acres of PFO wetland and the High Impact Zone will include 50 acres of forest preservation.

Indiana Bat

Direct Effects

Direct effects are defined as Project impacts that result in direct injury to or killing Indiana bats. Tree clearing activities for all Project elements will occur during the Indiana bat hibernation period (November 1 – March 31) and thus have no direct effects on Indiana bats. Inundation will occur over a period of 2 to 10 years and the timing cannot be determined or controlled. The reservoir would fill slowly over time and the bats would be able to avoid direct impact.

Indirect Effects

Maternity Roost Impacts

The 2017 East Locust Creek Bat Survey Report (Olsson 2017) documented the capture of 10 Indiana bats within the normal pool. The Indiana bats were tracked back to their maternity roost trees and their maternity roost trees were classified by their emergence counts as primary (more than five bats observed) and alternative (five or fewer bats observed). Two Indiana bats were tracked to four primary maternity roost trees within or near the Project area. Two of the primary

maternity roosts were located within the normal pool. Additionally, there were nine alternative maternity roost trees identified with three alternative maternity roost trees in the normal pool. The two primary maternity roost trees and three alternative maternity roost trees within the normal pool would be inundated by the Project and would no longer provide roost tree habitat. To avoid inundation during the maternity roosting period, the trees would be cut down during the November 1 to March 31 hibernation period.

Potential Forest Impacts

The Project will affect Indiana bat summer foraging and roosting habitat. The forest loss caused by Project construction and predicted future forest loss would reduce the available forest habitat by 1,341 acres and represents a 0.17 percent forest decline in the 10-county region and a 1.36 percent forest decline in Sullivan County.

Home Range Impacts

Project elements would result in the loss of approximately 1,341 acres within the 10-county region. Forest loss within the home range of Laela's and Sushi's (names given to captured Indiana bats) maternity roost trees include 1,039 acres. There are 6,611 total forested acres within Laela's and Sushi's 2.5-mile home range, with 92 acres of overlap. The loss of 1,039 acres represents 16 percent of the total forested acres in the two bats' home ranges. Laela's home range has 3,778 forested acres and Sushi's home range has 2,925 forested acres. For Laela, the loss of 813 forested acres represents 22 percent of the forested home range, and for Sushi, the loss of 226 forested acres represents 8 percent of the forested home range.

Forest impacts within the 2.5-mile colony forest buffer would be partially offset by tree planting and tree preservation. There are 1,236 acres of tree plantings and tree preservation within Laela's and Sushi's home ranges. There are 179 acres of tree plantings planned for Laela's home range, which equals 21 percent of the forest impacts. There are 301 acres of tree plantings planned for Sushi's home range, which equals 130 percent of the forest impacts. All tree plantings would result in a temporal loss, which includes the amount of time required for a tree planting to fully replace the forest loss. The temporal loss is estimated at 15 to 30 years for tree plantings to establish and provide roosting and foraging habitat.

Loss of Individuals and Reduction in Population Size

The loss of roosting and foraging habitat could result in lower fecundity or lower survivorship. The loss of roosting and foraging habitat would require Indiana bats to find alternative maternity roosts and foraging areas. Depending on the populations' health following hibernation, the energy requirements to find alternative maternity roosting and foraging habitat could result in lower fecundity or survivorship of the existing population.

The existing Indiana bat population size, based on the emergence counts, is estimated to be two colonies of 31 and 40 individuals. The colonies are likely slightly larger because of individual Indiana bats roosting in alternative maternity roost trees.

Winter Habitat

Indiana bat winter habitat consists of large hibernacula. Because of the increased presence of WNS, hibernacula have become of primary interest for Indiana bat conservation efforts. There are no known Indiana bat hibernacula within the 10-county region.

Conservation

The forest planting and preserving and associated permanent conservation easements would occur on 683 acres for forest preservation and 553 acres for forest tree planting. Permanent conservation easements would be established on 1,236 acres of tree planting and forest preservation. Forest preservation and planting within the 2.5-mile buffers total 1,202 acres, and the forest loss within the 2.5-mile buffers totals 1,039 forest acres.

Additional conservation will occur through the stream and wetland mitigation and by the zoning in the High Impact Zone. The wetland mitigation will include a minimum of 79 acres of PFO wetland and the High Impact Zone will include 50 acres of forest preservation.

Mead's Milkweed

There are approximately 452 grassland acres at 58 sites within the East Locust Creek normal pool. Native vegetation is present at four of the 58 sites and totals 18.7 acres. The native vegetation indicates the sites may provide potential Mead's milkweed habitat that includes virgin, tallgrass prairies that is managed for light grazing and hay production. The four sites were traversed for 30 minutes, but no Mead's milkweed ramets were identified.

The Project elements will affect 1,236 grassland acres in Sullivan County. All grassland impacts outside Sullivan County will be temporary; however, temporary impacts could have permanent impacts on Mead's milkweed habitat. The impacts outside Sullivan County are anticipated to occur on existing utility corridors that would not provide habitat for Mead's milkweed because the utility corridors would have already been disturbed. Because Mead's milkweed has not been documented within the Project area, the proposed Project will have no effect on Mead's milkweed.

Plains Spotted Skunk

Species impacts are unknown. The MDC has produced a list of BMPs to use during project construction, and these will be followed (MDC 2015b). The BMPs are as follows:

- Limit the use of pesticides and herbicides.
- Avoid burning or clearing fence rows, brush piles, and downed logs or trees where skunks may be present, especially during the late spring and summer months when young skunks may be in dens.
- Where skunks are unwanted, remove scrap lumber piles, haystacks, and unused farm machinery to eliminate potential skunk habitat.

3.13 Economic and Social Resources

Issues to be considered include such items as permanent or temporary changes or impacts on travel patterns or accessibility; school districts or their operations (busing); recreational facilities; police and fire services; highway safety; impacts on businesses; and impacts related to the available water supply of the 10-county region.

3.13.1 Affected Environment

The 10-county region is comprised of communities that fit the MDNR definition of a disadvantaged community, which is defined as "a community with a population less than 3,300, whose [water] user rates will be at or above 2 percent of the state median household income, and the

community's median household income is at or below 75 percent of the state average median household income" (NCMRWC 2013).

As reported by the MDED, the 10-county region had a labor force of 48,373 as of May 2017. Unemployment in the region was 2,017 (4.2 percent) that year, compared to 4.1 percent both statewide and nationally (MDED 2015). The region's 10-county 2015 median household income averaged approximately $38,895. Median household income in 2015 for Missouri was $48,173, while the 2015 U.S. median household income was $56,277 (U.S. Census 2015).

The lack of available and sustainable water sources in the region is a significant factor leading to the region having some of the highest water rates in the state. Counties in the 10-county region all display water rates that equal or exceed 1 percent of the median household income. The region includes three counties that display water rates that equal or exceed 2 percent of the median household income, which is the highest percentage category recorded (NCMRWC 2013).

3.13.2 Direct and Indirect Effects of the No Action Alternative

The No Action alternative would not provide a dependable long-term water supply and therefore would not meet a projected 100-year demand for the 10-county region. The No Action alternative would also lead to a continuation of the need for water by rural businesses, which could result in businesses closing or moving elsewhere (Section 1.5.1).

3.13.3 Direct and Indirect Effects of the Proposed Action

The Proposed Action would supplement or replace the existing water supply for the 10-county region. The new water supply system would be an economically efficient, regional, sustainable, long-term water supply. A reliable water supply could increase business development, diversify the economic base of the region, and increase jobs available in the region. Increased recreational opportunities could also contribute to economic stability (NCMRWC 2013). The Proposed Action is also expected to reduce flood damage by approximately $86,800 annually (Section 2.2.3).

According to MDNR (2015), "the value-added contribution to the regional economy due to East Locust Creek Reservoir is $118.5 million". The Proposed Action is estimated to support 1,144 jobs paying 26.3 million annually. Approximately 550 jobs would be short-term and related to project construction activities (MDNR 2015).

The Proposed Action would be built with minimal disruption to the traveling public. Traffic would be maintained on the existing Missouri Highway 5, Missouri Highway M, Missouri Highway B, and Missouri Highway Y. School and emergency service routes, truck delivery for manufacturing and businesses, traffic transporting goods and services, and general traffic would be minimally inconvenienced during construction equipment movements and material deliveries. Lane closures may be necessary to accommodate specific construction activities/phases. These activities could include delivery of materials, equipment mobilization, and the construction of tie-ins and cross-overs and would be temporary.

The Proposed Action would close Missouri Highway N for approximately 0.86 mile. Approximately 2.46 miles of local road would also be inundated and approximately 1.2 miles of local road would be elevated to keep the road open. A midlake infrastructure crossing is planned that would carry roads and utilities across the center portion of the Proposed Action.

Project construction activities may lead to short-term impacts. These impacts typically include such things as construction noise, traffic accommodations during construction activities, access to adjoining properties, and construction accommodations needed to build the project. No long-term noise impacts are anticipated. Noise associated with heavy equipment is common in the agricultural region during planting and harvest periods. An increase in recreational opportunity within the area may result in an increase of visitors; however, traffic and noise associated with recreation would be incremental and seasonal in nature.

Some field and residential drives would be temporarily affected during construction and during necessary regrading or realigning of drive approaches.

3.14 Recreation and Visual Resources

3.14.1 Affected Environment

The 10-county region has an unmet demand of 1,226,859 user-days for fishing and boating water-based recreation (Purpose and Need, Section 1.5). Supply and demand data were used to quantify the need for water-based recreation. Results were incorporated in this report as part of Section 2.3, Recreation Alternatives Analysis. The analysis used a population within the 10-county region surrounding the proposed East Locust Creek reservoir site.

No federal, state, or locally designated visual resources of significance, such as scenic highways or National Wild and Scenic Rivers, and no historic properties that would have a viewscape within the vicinity of the project.

3.14.2 Direct and Indirect Effects of the No Action Alternative

No significant change in the amount of public or private recreational area is expected with the No Action alternative. The community's desire for additional recreational development would not be addressed.

3.14.3 Direct and Indirect Effects of the Proposed Action

Development of the Proposed Action and recreational facilities would provide much-needed opportunities for fishing and boating recreation. The reservoir would supply approximately 91,956 annual user-days for fishing and boating. Recreational facilities and fish and wildlife habitat development would include facilities such as a boat ramp, parking facilities, restroom facilities, a hiking trail, a shelter house, a fishing pier (platform), and tree, shrub, and other vegetative plantings. Hunting or trapping may also be available if the sponsors determine those activities would be allowed.

The existing visual resources associated with the project area would change incrementally, but they would be consistent with the existing land use. Construction and operational visual impacts would be limited to the project boundaries.

3.15 Public Safety and Hazardous Materials

Hazardous materials are defined as substances that because of their quantity, concentration, or physical, chemical, or infectious characteristics may present an imminent threat to public health or the environment if released. Solid wastes are designated as hazardous if they are corrosive,

ignitable, explosive, chemically reactive, or toxic, as defined in 40 CFR 261, Subpart C. The EPA and other federal and state agencies regulate hazardous materials under the Toxic Substances Control Act; Comprehensive Environmental Response, Compensation, and Liability Act; Resource Conservation and Recovery Act (RCRA); Superfund Amendments and Reauthorization Act; and Emergency Planning and Community Right-to-Know Act. RCRA gives the EPA the authority to control hazardous waste from the "cradle to grave." RCRA controls the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also sets forth a framework for the management of nonhazardous solid wastes. Amendments to RCRA in 1986 enabled the EPA to address environmental problems that could result from underground storage tanks containing petroleum and other hazardous substances. Hazardous wastes are regulated through the MDNR.

The MDNR Brownfields Voluntary Cleanup Program (BVCP) was first established in 1994 and is administered by the MDNR Hazardous Waste Program's BVCP Section to provide oversight for voluntary cleanups of properties contaminated with hazardous substances. Property owners, business operators, or prospective buyers initiate cleanup to reach standards acceptable to the state and receive certification of the cleanup from MDNR (MDNR 2017b).

3.15.1 Affected Environment

The Proposed Action is located in a rural section of Sullivan County, in an area largely comprised of agricultural land. The City of Milan is located approximately 5 miles south of the project site, and Missouri Highway 5 is directly west of the Proposed Action. MDNR's *Hazardous Substance Site Locator Map* was used to identify parcels of land within the project area that are possible hazardous substance investigation or cleanup sites (MDNR 2017c). Between February 2012 and August 2016, 25 separate investigations of these parcels, including Phase I ESAs, Phase II ESAs, and Brownfields Targeted Assessments, have been conducted on these properties to more fully characterize their potential environmental impacts. All hazardous material reports are available on the NCMRWC website (NCMRWC 2017).

The February 23, 2012, Phase I ESA Report, *East Locust Creek Phase IA Property Acquisitions* (Olsson 2012a), and the subsequent Limited Phase II ESA report, dated April 23, 2012 (Olsson 2012c), produced for the NCMRWC, are summarized here. The Phase I ESA report identified nine RECs that warranted further investigation. The Phase II ESA report presented information concerning the detection of arsenic and lead in soils above State of Missouri Risk-Based Corrective Action (MRBCA) default target levels (DTLs), but below residential risk-based threshold levels, which are based on the groundwater pathway for exposure under a residential land use scenario. The report also described how concentrations of arsenic and lead in soils were within the margins of concentrations normally found in soils. The Phase II ESA report concluded "results of the field observations and laboratory analyses are that the soils underlying the evaluated portions of the assessment properties have not been affected by contaminants."

An additional report, the June 19, 2012, Phase I ESA Report, *East Locust Creek Round 2 Property Acquisitions* (Olsson 2012b), identified no additional RECs for these properties.

Between August 2012 and August 2016, Tetra Tech Inc. (Tetra Tech) completed 11 additional Phase 1 Targeted Brownfields Assessments (the equivalent of a Phase I ESA), and 11 subsequent Phase II Targeted Brownfields Assessments (the equivalent of a Phase II ESA).

These reports can be found on the NCMRWC website (NCMRWC 2017). According to the analytical data contained in these reports, arsenic, barium, chromium, mercury, motor oil, and lead were detected in the soil at several different locations. However, the reported concentrations of barium, chromium, mercury, and motor oil were all below MRBCA DTLs. Arsenic and lead were reported at all locations in concentrations above their respective screening DTLs, but in most locations, below the MRBCA Tier 1 risk-based threshold levels (RBTLs) established for nonresidential land use. The arsenic and lead concentrations in most of the soil samples were also determined to be within the range of "normal" background concentrations for these metals in native soils in Sullivan County, as published in 2013 by the USGS (USGS 2013). Thirteen soil samples collected by Tetra Tech along the former Chicago Burlington & Quincy (CB&Q) railroad corridor consistently exhibited arsenic concentrations exceeding all MRBCA RBTLs and in concentrations generally greater than the average background soil arsenic concentrations in Sullivan County. These 13 samples had a mean arsenic concentration of 46.74 mg/kg, compared with the USGS average background arsenic concentration of 8.469 mg/kg.

Of the contaminants identified, the only one present at a high enough concentration to suggest a need for further investigation is arsenic that is located along the former CB&Q rail line. Additional arsenic investigation of the rail line was completed in 2017. Arsenic was again identified at concentrations above residential risk-based standards; however, no concentrations were detected at high enough levels to negatively affect water quality in the Proposed Action. A memo describing the arsenic concentrations is included in Appendix B.

Other contaminants detected in notable concentrations include lead and various compounds in the category of semivolatile organic compounds. For example, one soil sample collected at a former residence was reported to contain lead at a concentration of 9,100 mg/kg. The sample location was identified as 2E05-REC-1, a location reported to be within the "drip zone" of the house, and therefore likely the result of lead-based paint. However, because the property is located outside the inundation zone of the proposed reservoir, this detection is not considered to be a REC relevant to this study. These other contaminants detected within the normal pool are highly localized and are therefore not expected to negatively affect water quality in the proposed reservoir. Additionally, these localized impacts are all associated with existing structures within the normal pool and are expected to be mitigated as structures are demolished prior to construction of the proposed reservoir, further reducing any potential impacts to water quality.

Samples collected by Tetra Tech at some locations were reported to contain slightly elevated concentrations of semivolatile organic compounds, such as benzo(a)pyrene, benzo(b)flouranthene, and dibenzo(a,H)anthracene. Some of these samples were collected from isolated locations such as adjacent to former trash-burning locations; more commonly, however, they were collected along the former CB&Q railroad corridor. Reported concentrations for these contaminants are slightly greater than their respective MRBCA Tier 1 RBTLs for residential soils in nearly all instances. Such compounds are commonly attributed to burned wood products and are also often associated with wood preservatives, such as would be found in railroad ties. These compounds are slow to degrade, they adhere very tightly to soil and organic particles, and generally have low solubility constants, which means they don't easily dissolve into water. Because of these characteristics, they are very immobile in the environment and therefore not prone to migration.

3.15.2 Direct and Indirect Effects of the No Action Alternative

Under the No Action alternative, arsenic contamination along the CB&Q railroad corridor that exceeds MRBCA RBTLs would remain in the soil. No impacts to public safety are anticipated to occur and no change in hazardous materials would occur.

3.15.3 Direct and Indirect Effects of the Proposed Action

Based on the assessment reports, arsenic appears to be the only contaminant of concern for properties within the proposed East Locust Creek reservoir inundation zone. The former CB&Q railroad corridor, which is the location of all 13 samples with elevated arsenic concentrations, extends through much of the proposed inundation zone. Likely sources of the arsenic found in these samples is railroad ties treated with chromated copper arsenate or arsenic-based herbicides that may have been used to control weed growth along the tracks. As the railroad ties have degraded over time, it is possible that arsenic may have leached into the soil.

In addition to potential arsenic contamination along the CB&Q railroad corridor, other hazardous material impacts identified in the 25 previously conducted environmental assessments include the presence of asbestos-containing materials and household hazardous wastes (HHW) in some now-vacant structures within the project area. Identified affected properties have been enrolled in MDNR's BVCP to address the contamination. Asbestos abatement has included the removal of floor tile with associated mastic, ceiling texture, and window caulk from these structures. The HHW has been or is scheduled to be packaged and transported off-site for proper disposal.

It is unlikely any hazardous materials would be generated by construction or operation of the Proposed Action. Asbestos and HHW concerns within the project area have been or are currently being addressed through the MDNR BVCP. If any additional hazardous materials are identified during construction, appropriate agencies would be notified.

No potential water quality concerns or hazardous materials issues are expected to result from the Proposed Action. There would be no impacts to public health from implementation of the Proposed Action.

3.16 Air Quality and Noise

The Clean Air Act (CAA) was enacted in 1970 to control air pollution on a national level. The CAA identified six common air pollutants of concern (criteria pollutants): carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_x), and sulfur dioxide (SO_2). National air quality standards define allowable concentrations of criteria pollutants in ambient air (EPA 2018a).

3.16.1 Affected Environment

Most of the Proposed Action is in a rural environment with agricultural land uses. No noise-sensitive areas (residences, commercial properties, or industry) exist in the immediate vicinity of the Proposed Action. Highway traffic influences ambient noise levels in these rural areas. Milan, Missouri, is south of the project area and has a variety of land uses that influence ambient noise, including industrial and residential.

3.16.2 Direct and Indirect Effects of the No Action Alternative

The No Action alternative would have no noise impacts.

3.16.3 Direct and Indirect Effects of the Proposed Action

Implementation and operation of the Proposed Action would result in emissions associated with personnel transport vehicles, visitor vehicles, and recreational activities. Visitor vehicle traffic and recreational activities would be seasonal and would vary day to day. Operational emissions would result in an incremental increase in criteria pollutants; however, Sullivan County is currently in attainment for all criteria pollutants (EPA 2018b). The Proposed Action would result in marginal impact to air quality; therefore, this issue was eliminated from further study.

Construction of the Proposed Action would result in temporary emissions of criteria air pollutants and fugitive dust as a result of soil disturbance and the use of on-site construction equipment. Additionally, emissions of criteria pollutants would result from off-site trucks hauling water and construction materials to the project site. Construction emissions can vary substantially from day to day, depending on the level of activity and the specific type of operation and with regard to dust, the prevailing weather conditions (i.e., wind conditions). Fugitive dust ($PM_{2.5}$) emissions would primarily result from site preparation and road construction activities. NOx and CO emissions would primarily result from the use of construction equipment and motor vehicles. Construction is anticipated to commence June 2019 and would require approximately 15 months to complete.

Prior to commencement of construction activities, a construction permit must be obtained from the Missouri Department of Natural Resources, Air Pollution Control Program. Construction activities would be subject to several control measures per the requirements of the Missouri Air Conservation Commission.

3.17 Cultural Resources

Section 106 of the National Historic Preservation Act (NHPA), as amended, and implementing regulations found at 36 CFR Part 800, require that federal agencies consider any effect a Proposed Action may have on historic properties. This is accomplished through the Section 106 compliance process, which are the following:

- Identify consulting parties.
- Identify and evaluate historic properties located within the Area of Potential Effect established for an undertaking.
- Assess adverse effects on properties that are listed, or are eligible for listing, on the National Register of Historic Places (NRHP).
- Consult with the State Historic Preservation Officer, federally recognized Indian tribes, and, as appropriate, the Advisory Council on Historic Preservation and other interested parties to resolve adverse effects.

Cultural resources include archaeological sites, historic properties, traditional culture places, and other places where significant historic activities have taken place. These sites are often

considered valuable to the human environment, and measures must be taken to ensure they are treated appropriately.

Congress passed the American Indian Religious Freedom Act of 1978 (PL 95-341) to protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise their traditional religions including, but not limited to, access to sites, use and possession of sacred objects, and the freedom to worship through ceremonial and traditional sites. The law requires that the effects of a federal undertaking on Native American sites or places (prehistoric or historic) that have religious, ceremonial, or sacred aspects be evaluated within the context of this law.

3.17.1 Affected Environment

The Proposed Action is located in a rural section of Sullivan County in an area largely comprised of agricultural land. The city of Milan is located approximately 5 miles south of the project area, and Missouri Highway 5 is directly west of the Proposed Action.

Archaeological evidence shows that humans have occupied the Sullivan County area for at least the last 10,000 years. Previously recorded sites in the watershed vary in age from Archaic through Euro-American. One highly eroded lithic scatter site suggests a Mississippian/Oneota component. Two lithic scatters suggest Woodland materials. The rest were lithic scatters listed as unknown prehistoric. The first Euro-American settlement in the project area began in the 1830s. Sullivan County was organized in 1845, with a county seat at Milan. Other 19th-century settlements in the watershed include the towns of Pollock, Boynton, and Cora (NRCS 2006).

The NRHP lists six sites in Sullivan County. Four of the sites are buildings within either Green City or Milan. The other two listings are located outside the project area (NPS 2014).

3.17.2 Direct and Indirect Effects of the No Action Alternative

The No Action alternative would have no impact to cultural resources.

3.17.3 Direct and Indirect Effects of the Proposed Action

2006 Cultural Resources Survey

A Phase I cultural resource survey was completed in October and November 2006. The NRHP does not list any historic sites within the project area; however, one cemetery is adjacent to the project area (NPS 2014). Construction of the Proposed Action would avoid this cemetery and the cemetery is in an upland location; therefore, there would be no impacts to the cemetery as a result. The survey identified eight previously unreported prehistoric open habitation sites and relocated four of five previously recorded sites; the fifth site was not found. All thirteen of these prehistoric sites contained very low-density lithic materials and appeared to be located within disturbed, plowed land. The sites do not meet any NRHP criteria and it was recommended that none be considered for NRHP status. Additional historic resources found during the investigation include the town of Boynton, railroad bridges and bridge remnants, a sandstone quarry, a church building, and farmstead remnants. The church building will be relocated to a public access area. None of the historic resources meet NRHP eligibility criteria. The survey produced no evidence of the presence or previously reported possibly significant cultural resources within the project area.

2020 Cultural Resources Survey

The cultural resource survey was updated in 2020 and included additional field surveys. The updated cultural resource investigations for the proposed East Locust Creek Reservoir resulted in the recording of 86 cultural resources. These consisted of four properties with standing architecture, nine road bridges, four road culverts, 17 previously recorded archaeological sites (recorded in previous 2006 cultural resources survey), 34 newly discovered archaeological sites, and 18 isolated finds. One of the sites represented the remains of the Burlington and Southwestern Railroad (originally Chicago, Burlington, and Kansas City Railroad), which included the additional recording of the railroad berm, 17 bridges, two culverts, and two rail yards with remains of depots, located in the communities of Boynton and Pollack.

According to the SHPO, there are eight sites were eligible for the NRHP, including the railroad, seven farmsteads, two habitations, the city of Boynton, and glyphs.

2020 BUILD Roads Cultural Resources Survey

The East Locust Creek Reservoir cultural resource survey for the proposed road improvements recorded 35 properties with at least one building over 40 years old (constructed prior to 1981). These buildings are within 200 feet of the proposed road center line and may be affected by indirect impacts. MoDOT and SHPO are determining if any of these buildings are eligible for the NRHP. Also, within the viewshed, there are four cemeteries: Mt. Zion, Hamilton-Gridstaff, Campbell, and Pollack. A previously unknown family plot, the Bingham family plot, was identified just south of Route N. The Bingham family plot is within the proposed construction corridor but will not be impacted by the proposed road improvements. In addition to the Bingham family plot, the survey resulted in the identification of six other previously unknown archaeological sites: two Precontact camp sites, three farmsteads, and the Fairview School.

3.18 Environmental Justice

President Clinton signed Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, in 1994. This EO focuses the attention of federal agencies on human health and environmental conditions in minority communities and low-income communities. Environmental justice analyses are performed to identify the potential for disproportionately high and adverse impacts on minority and low-income populations from Proposed Actions and to identify alternatives that might mitigate these impacts.

The analysis of environmental justice impacts relies primarily on 1997 definitions: Low-income populations in an affected area should be identified with the annual statistical poverty thresholds from the U.S. Census Bureau's current population reports. Minority individuals are defined as members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. A minority population should be identified where either (a) the minority population of the affected area exceeds 50 percent; or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis (CEQ 1997). Note that the 2000 census updated minority definitions to include the following: Black or African

American; American Indian or Alaska Native; Asian; Native Hawaiian or Other Pacific Islander; some other race; and two or more races (U.S. Census 2000).

Minority populations included in the census are identified as Black or African American; American Indian and Alaska native; Asian; native Hawaiian and other Pacific Islander; some other race; and two or more races. Hispanic or Latino populations, which can be of any race, are also considered. Poverty status, used in this SEIS to define low-income status, is reported as the number of people with income below the poverty level. The 2010 census defines the poverty level as a weighted average annual threshold of $11,139 or less for an individual and a weighted average of $22,314 or less for a family of four (U.S. Census 2010). The poverty-weighted average annual threshold for a family of four in 2015 was $24,257 (U.S. Census 2015). However, demographics and income data from the 2010 Census of Population and Housing were used for portions of this analysis. Data from the 2000 census and the 2010 census are the latest reliable and consistent data regarding the ethnic composition and poverty status of the population, especially for subcounty divisions such as towns. Later estimates from various sources may use different methodologies and do not provide accurate comparisons.

These definitions and assessment methodologies follow the Council on Environmental Quality's Environmental Justice Guidance under NEPA (CEQ 1997).

3.18.1 Affected Environment

The 10-county region consists largely of agricultural and/or rural land. According to the 2010 census, the population density of the 10-county region averages 19.04 persons per square mile. Several communities are located within the region; the largest is Kirksville (2010 population 17,505), which is located in the southwestern portion of the region in Adair County (U.S. Census 2010).

According to the U.S. Census Bureau's 2010 data, the population of the region is 107,130. The population over 65 years of age in the region is an average of 18.9 percent, compared to 13.7 percent for the state of Missouri and 12.7 percent for the nation. The region's population is approximately 96 percent white, 1.5 percent Black or African American, 0.6 percent Asian, 0.2 percent American Indian or Alaska Native, 0.1 percent Native Hawaiian and other Pacific Islander, 0.4 percent some other race, and 1.2 percent two or more races. This is compared to Missouri's population, which is approximately 83 percent white, 11.5 percent Black or African American, 0.4 percent American Indian or Alaska Native, 1.6 percent Asian, 0.09 percent Native Hawaiian and other Pacific Islander, 1.0 percent some other race, and 2.1 percent two or more races. The Hispanic population comprises 2.4 percent of the 10-county region. The Hispanic population of Missouri is 3.5 percent of the total population.

The U.S. Census 2010 data indicates that an average of 18.0 percent of individuals in the 10-county region are below the poverty level and an average of 13.7 percent of all families of three to four persons are below the poverty level. This is compared to 13.9 percent of individuals and 11.1 percent of all families in the state of Missouri and 13.8 percent of individuals and 10.6 percent of families in the nation (U.S. Census 2010). Though not as consistent as the 2010 census data, 2015 data shows that an average of 19.02 percent of individuals in the 10-county region and an average of 13.3 percent of families are below the poverty level, compared to 15.6

percent of individuals and 12 percent of families in Missouri and 15.5 percent of individuals and 12 percent of families in the nation.

3.18.2 Direct and Indirect Effects of the No Action Alternative

Because the 10-county region consistently has a higher percentage of population below the poverty level as compared to the state and the national data and has a high cost of water because of limited water supply, the No Action alternative would not benefit minority or low-income populations.

3.18.3 Direct and Indirect Effects of the Proposed Action

There are no anticipated environmental justice factors that would influence major changes in land use or result in disproportionately adverse impacts to minority or low-income populations. In fact, the Proposed Action would provide a reliable water supply to an area that is considered economically disadvantaged. The selection of the lowest cost alternative benefits the population by generating the lowest possible water costs.