US Army Corps
of Engineers®
Louisville District

SUPPLEMENT II TO THE

FINAL ENVIRONMENTAL IMPACT

STATEMENT

Proposed New Water Supply Reservoir
Williamson and Johnson Counties, Illinois

Applicant: City of Marion, Illinois
Permit Application Number 199401091

July 2000

U.S. Army Engineer District
Louisville, Kentucky

Supplement II to the
FINAL
ENVIRONMENTAL IMPACT STATEMENT

Proposed New Water Supply Reservoir
Williamson and Johnson Counties, Illinois

The responsible agency is the U.S. Army Engineers District, Louisville, Kentucky

Abstract:

The City of Marion, Illinois has applied to the US Army Corps of Engineers, Louisville District for a Department of the Army permit pursuant to Section 404 of the Clean Water Act for placement of material in Sugar Creek, Williamson County, as part of the construction of a new municipal water supply reservoir.

As part of the US Army Corps of Engineers review process, this Draft Supplement II to the Final Environmental Impact Statement (EIS) has been prepared. The document has been prepared under the procedures in the National Environmental Policy Act of 1969 (NEPA) (42 USC 4321 *et seq*.), the Council on Environmental Quality Regulations (40 CFR 1500-1507), U.S. Army Corps of Engineers Procedures for Implementing NEPA (33 CFR 230), U.S. Army Corps of Engineers NEPA Implementation Procedures for the Regulatory Program (33 CFR 325, Appendix B) and all applicable Federal and state laws and regulations.

The Louisville District prepared a Draft EIS and released it to the public for comment in October 1994. A public hearing was held in December 1994. A Final EIS was prepared and released to the public for comment in July 1995. A Draft Supplement I was prepared and released to the public for comment in February 1996. A Final Supplement I to the Final EIS was prepared and released to the public for comment in May 1996.

The proposed action by the City of Marion is a new 1172 acre water supply reservoir located in Williamson and Johnson Counties, Illinois, near the community of Creal Springs. The Lake of Egypt Water District has an agreement in principle with the City of Marion to purchase water if a new lake on Sugar Creek is built. Two pipelines would be constructed for transport of water for treatment.

This Draft Supplement II to the Final EIS was prepared at the direction of the US Court of Appeals for the Seventh Circuit. It examines single source options as well as combinations of separate alternatives to satisfy current and future water needs of Marion and the Lake of Egypt Water District as separate entities. This Draft Supplement II incorporates the Draft and Final EIS and the Draft and Final Supplement I by reference.

If you wish to provide comments on the Draft Supplement II to the Final EIS, please contact:

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SUMMARY

PURPOSE AND NEED FOR PROPOSED ACTION BY PERMIT APPLICANT

The City of Marion, Illinois has applied to the US Army Corps of Engineers, Louisville District for a Department of the Army permit pursuant to Section 404 of the Clean Water Act for placement of material in Sugar Creek, Williamson County, as part of the construction of a new municipal water supply reservoir. A Draft Environmental Impact Statement (EIS) was prepared for this permit application (October 1994) and circulated to Federal, state, and local agencies, interest groups, and the public for comment. A public hearing on the Draft EIS was held on December 15, 1994. A Final EIS was prepared for this application (July 1995) and was again circulated to Federal, state, and local agencies, interest groups, and the public for comment. A Draft Supplement I to the Final EIS was prepared (February 1996) and circulated to Federal, state, and local agencies, interest groups, and the public for comment. A Final Supplement II was prepared (May 1996) and was again circulated to Federal, state, and local agencies, interest groups, and the public for comment. These four documents, including their entire contents are incorporated into this Draft Supplement II to the Final EIS by reference.

The previous documents addressed the purpose and need of supplying Marion and Lake of Egypt Water District (LEWD) with a dependable water supply considering the City of Marion and LEWD as a single entity. This Draft Supplement II to the Final EIS addresses the water supply alternatives for the City of Marion and LEWD separate entities. LEWD has an agreement in principle to purchase water from the City of Marion if the new lake on Sugar Creek is constructed. Single source options as well as combined alternatives are examined to meet the needs of Marion or the Lake of Egypt Water District.

ALTERNATIVES INCLUDING PROPOSED ACTION

A number of alternatives have been identified in the process of development of the Draft and Final EIS, Draft and Final Supplement I to the Final EIS, and Draft Supplement II to the Final EIS. These alternatives, whether or not they can fulfill the applicant's purpose of providing the City of Marion water system and LEWD with a dependable water supply, were described in detail in the previous four documents. This document presents the single source alternatives and combinations of multiple sources capable of meeting the water needs of the City of Marion or LEWD. The previous documents presented the alternatives considering only a single supply for both Marion and LEWD.

The Corps of Engineers is neither an opponent nor proponent of the proposal by the City of Marion. Permit decision options are the alternatives open to the Corps of Engineers. These options are to issue the permit, issue the permit with modifications and/or conditions, or deny the permit.

The alternatives considered in this document to supply either the City of Marion or LEWD include: obtain raw or treated water from Rend Lake, obtain water from Cedar Lake via a northern or southern pipeline route, obtain water from the Cache River Aquifer, obtain raw or treated water from Saline Valley, develop a reservoir near Goreville, and develop a reservoir on Sugar Creek. Combinations of these alternatives (one source supplying Marion and a separate source supplying LEWD) are considered as well as combinations of multiple sources supplying Marion or LEWD.

AFFECTED ENVIRONMENT

Rend Lake Treated Water

City of Marion

The City of Marion would tie into the Rend Lake Conservancy District (RLCD) distribution system near Johnston City and install a 6.8 mile long 18-in. diameter pipeline system, including a still well and one pump station, to transport treated water to the City of Marion. This installation would require approximately 15 acres of additional land for pipeline right-of-way that includes 3 acres of woodlands, 4 acres of cropland, and 3 acres of managed lands. The pipeline would cross eight unnamed tributary streams and pass through habitat with the potential to support such protected species as the Indiana Bat, Bald Eagle, Gray Bat, and Copperbelly Watersnake.

Lake of Egypt Water District

LEWD would tie into the RLCD distribution system near Johnston City and install a 16 mile long 18-in. diameter pipeline system, including a stillwell and one pump station, to transport treated water to their system. This installation would require approximately 37 acres of additional land for pipeline right-of-way that includes 10 acres of woodlands, 14 acres of cropland, and three acres of managed lands. The pipeline would cross 16 unnamed tributary streams and pass through habitat with the potential to support such protected species as the Indiana Bat, Bald Eagle, Gray Bat, and Copperbelly Watersnake.

Rend Lake Raw Water

City of Marion

A new intake would be installed at the southern end of Rend Lake and require an approximately 25.9 mile long 20-in. pipeline to deliver raw water to the Marion treatment facilities. This installation would require approximately 63 acres of additional land for pipeline right-of-way that includes 19 acres of woodlands, 20 acres of cropland, and 8 acres of managed lands. The pipeline would require crossing the Big Muddy River, Lake Creek, Panel Creek, and Marcus Branch in addition to 25 unnamed tributary streams. The pipeline would pass through habitat with the potential to support such protected species as the Indiana Bat, Bald Eagle, Gray Bat, and Copperbelly Watersnake. The pipeline would impact approximately five acres of wetlands.

Lake of Egypt Water District

A new intake would be installed at the southern end of Rend Lake and require an approximately 35.1 mile long 18-in. pipeline to deliver raw water to the LEWD treatment facilities. This installation would require approximately 85 acres of additional land for pipeline right-of-way that includes 26 acres of woodlands, 30 acres of cropland, and 8 acres of managed lands. The pipeline would require crossing the Big Muddy River, Lake Creek, Panel Creek, and Marcus Branch in addition to 33 unnamed tributary streams. The pipeline would pass through habitat with the potential to support such protected species as the Indiana Bat, Bald Eagle, Gray Bat, and Copperbelly Watersnake. The pipeline would impact approximately 5 acres of wetlands.

Cedar Lake Northern Route

City of Marion

The City of Marion would connect into the Carbondale water treatment plant and install a 23.8 mile long 20-in. pipeline to their treatment facilities. This installation would require approximately 58 acres of additional land for pipeline right-of-way that includes 18 acres of woodlands, 14 acres of cropland, and 19 acres of managed lands. The pipeline would cross 18 unnamed tributary streams, 6 arms of Crab Orchard Lake, and a portion of Cedar Lake. The pipeline would pass through habitat with the potential to support such protected species as the Indiana Bat, Bald Eagle, Gray Bat, and Copperbelly Watersnake. The pipeline would impact approximately 4 acres of wetlands.

Lake of Egypt Water District

LEWD would connect into the Carbondale water treatment plant and install a 38 mile long 18-in. pipeline to their treatment facilities. This installation would require approximately 80 acres of additional land for pipeline right-of-way that includes 25 acres of woodlands, 17 acres of cropland, and 20 acres of managed lands. The pipeline would cross 22 unnamed tributary streams, 6 arms of Crab Orchard Lake, and a portion of Cedar Lake. The pipeline would pass through habitat with the potential to support such protected species as the Indiana Bat, Bald Eagle, Gray Bat, and Copperbelly Watersnake. The pipeline would impact approximately 4 acres of wetlands.

Cedar Lake Southern Route

City of Marion

The City of Marion would connect into the Carbondale water treatment plant and install a 26 mile long 20-in. pipeline to their treatment facilities. This installation would require approximately 64 acres of additional land for pipeline right-of-way that includes 26 acres of woodlands, 24 acres of cropland, and 2 acres of managed lands. The pipeline would cross 28 unnamed tributary streams and pass through habitat with the potential to support such protected species as the Indiana Bat, Bald Eagle, Gray Bat, and Copperbelly Watersnake. The pipeline would impact approximately 1 acre of wetlands.

Lake of Egypt Water District

LEWD would connect into the Carbondale water treatment plant and install a 21 mile long 18-in. or 16-in. pipeline to their treatment facilities. This installation would require approximately 51 acres of additional land for pipeline right-of-way that includes 36 acres of woodlands, 28 acres of cropland, and two acres of managed lands. The pipeline would cross 28 unnamed tributary streams and pass through habitat with the potential to support such protected species as the Indiana Bat, Bald Eagle, Gray Bat, and Copperbelly Watersnake. The pipeline would impact approximately 1 acre of wetlands.

Cache River

City of Marion

A 34.5 mile long 20-in. pipeline system would need to be built from the Cache River well field to water treatment facilities for the City of Marion. This installation would require approximately 84 acres of additional land for pipeline right-of-way and 70 acres for the well field. Current use of this land includes 7 acres of woodlands, 48 acres of cropland, and 18 acres of managed lands. The pipeline would cross 21 unnamed tributary streams and pass through habitat with the potential to support such protected species as the Indiana Bat, Bald Eagle, Gray Bat, and Copperbelly Watersnake. The pipeline would impact approximately 1 acre of wetlands.

Lake of Egypt Water District

A 25.7 mile long 20-in. diameter pipeline system would be needed to transport water from the well field to the LEWD treatment facilities. This installation would require approximately 64 acres of additional land for pipeline right-of-way and 70 acres for the well field. Current use of this land includes 7 acres of woodlands, 46 acres of cropland, and 18 acres of managed lands. The pipeline would cross 18 unnamed tributary streams and pass through habitat with the potential to support such protected species as the Indiana Bat, Bald Eagle, Gray Bat, and Copperbelly Watersnake. The pipeline would impact approximately 1 acre of wetlands.

Saline Valley Treated Water

City of Marion

In order for Saline Valley Conservancy District (SVCD) to secure the volume of water required by Marion, SVCD would have to install a new raw water line approximately 8 miles long from the well fields near Junction to the water treatment plant in Equality. The City of Marion would then install approximately 32 miles of 20-in. diameter water line to transport the treated water from Equality to the Marion treatment plant. Both segments of the line would be installed in easements along Illinois 13 in order to utilize road right-of-way and would require 97 acres of land. The pipeline would cross the North and Middle Forks of the Saline River and 35 tributary streams. The pipeline would pass through habitat with the potential to support such protected species as the Indiana Bat, Bald Eagle, Rice Rat, Loggerhead Shrike and Copperbelly Watersnake. The pipeline would impact approximately 4 acres of wetlands.

Lake of Egypt Water District

This alternative would require the installation of an approximately 38 mile long 18-in. diameter pipeline that connects into the SVCD water treatment plant at Equality and delivers water to LEWD. Water line installation would utilize a mixture of railroad and road right-of-way and require about 92 acres land. The corridor runs southwest from Harrisburg to Stonefort along the abandoned railroad line paralleling U.S. 45. The pipeline would cross the North and Middle Forks of the Saline River and 38 tributary streams. The pipeline would pass through habitat with the potential to support such protected species as the Indiana Bat, Bald Eagle, Rice Rat, Loggerhead Shrike, Copperbelly Watersnake, and Least Brook Lamprey. The pipeline would impact approximately 3.5 acres of wetlands.

Saline Valley Raw Water

City of Marion

This alternative would require installing an approximately 40 mile long 20-in. diameter raw water pipeline from the well fields near Junction to Marion. The corridor parallels Illinois 13 between the two cities and the water line would be placed in the highway right-of-way requiring approximately 97 acres of land. The pipeline would cross the North and Middle Forks of the Saline River and 35 tributary streams. The pipeline would pass through habitat with the potential to support such protected species as the Indiana Bat, Bald Eagle, Rice Rat, Loggerhead Shrike, and Copperbelly Watersnake. The pipeline would impact approximately 4 acres of wetlands.

Lake of Egypt Water District

This alternative would require the installation of an approximately 38 mile long 18-in. diameter pipeline that connects into the SVCD water treatment plant at Equality and delivers water to LEWD. Water line installation would utilize a mixture of railroad and road right-of-way requiring about 92 acres. The corridor runs southwest from Harrisburg to Stonefort along the abandoned railroad line paralleling U.S. 45. The pipeline would cross the North and Middle Forks of the Saline River and 38 tributary streams. The pipeline would pass through habitat with the potential to support such protected species as the Indiana Bat, Bald Eagle, Rice Rat, Loggerhead Shrike, Copperbelly Watersnake, and Least Brook Lamprey. The pipeline would impact approximately 3.5 acres of wetlands.

Goreville Reservoir

City of Marion

This alternative would require the development of a 585 acre reservoir and installation of an approximately 13 mile long 20-in. diameter raw water pipeline from the proposed reservoir to the City of Marion water treatment plant. Current land use in the Goreville Reservoir basin includes approximately 196 acres of bottomland forest, 105 acres of upland forest, 179 acres of cropland, 44.2 acres of wetlands, 42 acres of shrubland, 21 acres of pasture/hayland, 10 acres of intermittent riverine habitat, 10 acres of pond/borrow pit/lake habitat, 7 acres of residential/commercial/industrial lands, 4 acres of denuded ground, 1 acre of non-native grassland and 0.4 acres of forbland. Current land use for the proposed pipeline route is mostly existing road right-of-way. One residence and 3 structures would be lost due to the reservoir pool. Habitat in the reservoir basin has the potential to support such protected species as the Indiana Bat, Bald Eagle, Gray Bat, Copperbelly Watersnake, Henslow's Sparrow, Grass-leaved Lilly, and Black Cohosh. The pipeline corridor would impact approximately 1 acre of wetlands.

Lake of Egypt Water District

This alternative would require the development of a 585 acre reservoir and installation of an approximately 2.7 mile long 12 in. diameter raw water pipeline from the proposed reservoir to the Lake of Egypt. The pipeline would discharge directly into Lake of Egypt so that LEWD would avoid removing volumes of water in excess of their agreement with SIPC. Current land use in the Goreville Reservoir basin includes approximately 196 acres of bottomland forest, 105 acres of upland forest, 179 acres of cropland, 44.2 acres of wetlands, 42 acres of shrubland, 21 acres of pasture/hayland, 10 acres of intermittent riverine habitat, 10 acres of pond/borrow pit/lake habitat, 7 acres of residential/commercial/industrial lands, 4 acres of denuded ground, 1 acre of non-native grassland and 0.4 acres of forbland. Current land use for the proposed pipeline route is mostly existing road right-of-way. One residence and 3 structures would be lost due to the reservoir pool. Habitat in the reservoir basin has

the potential to support such protected species as the Indiana Bat, Bald Eagle, Gray Bat, Copperbelly Watersnake, Henslow's Sparrow, Grass-leaved Lilly, and Black Cohosh. The pipeline corridor would impact approximately 4 acres of wetlands.

Sugar Creek Reservoir

City of Marion

This alternative involves the construction of a reservoir on Sugar Creek with a normal pool elevation of 496 ft (msl) to supply water for the City of Marion. The reservoir would have a yield of approximately 8 mgd (50 year). A new reservoir on Sugar Creek would require a 20-in. diameter pipeline about 12.2 miles long to connect to the existing water treatment plant in Marion. Approximately 1,375 acres of land would be required for the reservoir with an additional 30 acres for pipeline right-of-way. Current use of this land includes 416.5 acres of woodlands and 536 acres of cropland. The pipeline would cross 14 tributary streams and require damming Sugar Creek. The reservoir site provides habitat with the potential to support such protected species as the Indiana Bat, Bald Eagle, Gray Bat, Copperbelly Watersnake, Least Brook Lamprey, and Indiana Crayfish. The reservoir and pipeline would impact approximately 41.4 acres of wetlands.

Lake of Egypt Water District

This alternative involves the construction of a reservoir on Sugar Creek with a normal pool elevation of 485 ft (msl) to supply water for LEWD. The reservoir would have a yield of approximately 4.3 mgd (50 year). A new reservoir on Sugar Creek would require a 12-in. diameter pipeline approximately 1.8 miles in length to transport water from the proposed new reservoir to the Lake of Egypt. The pipeline would discharge directly into Lake of Egypt so that LEWD would avoid removing volumes of water in excess of their agreement with SIPC. Approximately 1,067 acres of land would be required for the reservoir with an additional 4.5 acres for pipeline right-of-way. Current use of this land includes 253.5 acres of woodlands and 271 acres of cropland. The pipeline would cross one stream and require damming Sugar Creek. The reservoir site provides habitat with the potential to support such protected species as the Indiana Bat, Bald Eagle, Gray Bat, Copperbelly Watersnake, Least Brook Lamprey, and Indiana Crayfish. The reservoir and pipeline would impact approximately 41.4 acres of wetlands.

ENVIRONMENTAL CONSEQUENCES

Rend Lake Treated Water

City of Marion

Resources lost due to the pipeline installation include approximately three acres of woodland habitat. A 20 ft. wide corridor through existing stands of woods will be cleared and maintained with low growing species for maintenance reasons. Faunal species inhabiting the woodland corridor will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. Future land use of the 20 ft. wide corridor will be limited due to the pipeline.

Lake of Egypt Water District

Resources lost due to the pipeline installation include approximately ten acres of woodland habitat. A 20 ft. wide corridor through existing stands of woods will be cleared and maintained with low growing species for maintenance reasons. Faunal species inhabiting the woodland corridor will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. Future land use of the 20 ft. wide corridor will be limited due to the pipeline.

Rend Lake Raw Water

City of Marion

Resources lost due to the pipeline installation include approximately 19 acres of woodland habitat. A 20 ft. wide corridor through existing stands of woods will be cleared and maintained with low growing species for maintenance reasons. Faunal species inhabiting the woodland corridor will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. Approximately five acres of wetlands will be crossed, which will necessitate the removal of any wetland tree species for pipeline corridor maintenance. The corridor through wetland areas will be maintained with low growing wetland species. Future land use of the 20 ft. wide corridor will be limited due to the pipeline.

Lake of Egypt Water District

Resources lost due to the pipeline installation include approximately 26 acres of woodland habitat. A 20 ft. wide corridor through existing stands of woods will be cleared and maintained with low growing species for maintenance reasons. Faunal species inhabiting the woodland corridor will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. Approximately five acres of wetlands will be crossed, which will necessitate the removal of any wetland tree species for pipeline corridor maintenance. The corridor through wetland areas will be maintained with low growing wetland species. Future land use of the 20 ft. wide corridor will be limited due to the pipeline.

Cedar Lake Northern Route

City of Marion

Resources lost due to the pipeline installation include approximately 18 acres of woodland habitat. A 20 ft. wide corridor through existing stands of woods will be cleared and maintained with low growing species for maintenance reasons. Faunal species inhabiting the woodland corridor will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. If the City of Carbondale chooses to compensate for drawdown by reducing downstream releases into Cedar Creek, then species in

Cedar Creek would be adversely impacted with some loss in numbers likely. Approximately four acres of wetlands will be crossed, which will necessitate the removal of any wetland tree species for pipeline corridor maintenance. The corridor through wetland areas will be maintained with low growing wetland species. Future land use of the 20 ft. wide corridor will be limited due to the pipeline.

Lake of Egypt Water District

Resources lost due to the pipeline installation include approximately 25 acres of woodland habitat. A 20 ft. wide corridor through existing stands of woods will be cleared and maintained with low growing species for maintenance reasons. Faunal species inhabiting the woodland corridor will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. If the City of Carbondale chooses to compensate for drawdown by reducing downstream releases into Cedar Creek, then species in Cedar Creek would be adversely impacted with some loss in numbers likely. Approximately four acres of wetlands will be crossed, which will necessitate the removal of any wetland tree species for pipeline corridor maintenance. The corridor through wetland areas will be maintained with low growing wetland species. Future land use of the 20 ft. wide corridor will be limited due to the pipeline.

Cedar Lake Southern Route

City of Marion

Resources lost due to the pipeline installation include approximately 26 acres of woodland habitat. A 20 ft. wide corridor through existing stands of woods will be cleared and maintained with low growing species for maintenance reasons. Faunal species inhabiting the woodland corridor will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. If the City of Carbondale chooses to compensate for drawdown by reducing downstream releases into Cedar Creek, then species in Cedar Creek would be adversely impacted with some loss in numbers likely. Approximately one acre of wetlands will be crossed, which will necessitate the removal of any wetland tree species for pipeline corridor maintenance. The corridor through wetland areas will be maintained with low growing wetland species. Future land use of the 20 ft. wide corridor will be limited due to the pipeline.

Lake of Egypt Water District

Resources lost due to the pipeline installation include approximately 36 acres of woodland habitat. A 20 ft. wide corridor through existing stands of woods will be cleared and maintained with low growing species for maintenance reasons. Faunal species inhabiting the woodland corridor will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. If the City of Carbondale chooses to compensate for drawdown by reducing downstream releases into Cedar Creek, then species in Cedar Creek would be adversely impacted with some loss in numbers likely. Approximately one acre of wetlands will be crossed, which will necessitate the removal of any wetland tree species for pipeline corridor maintenance. The corridor through wetland areas will be maintained with low growing wetland species. Future land use of the 20 ft. wide corridor will be limited due to the pipeline.

Cache River

City of Marion

Resources lost due to the pipeline installation include approximately 7 acres of woodland habitat. A 20 ft. wide corridor through existing stands of woods will be cleared and maintained with low growing species for maintenance reasons. Faunal species inhabiting the woodland corridor will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. Approximately one acre of wetlands will be crossed, which will necessitate the removal of any wetland tree species for pipeline corridor maintenance. The corridor through wetland areas will be maintained with low growing wetlands species. Approximately one acre of cropland will be lost to provide for structure necessary at the proposed well field. Future land use of the 20 ft. wide corridor will be limited due to the pipeline.

Lake of Egypt Water Disrtict

Resources lost due to the pipeline installation include approximately 7 acres of woodland habitat. A 20 ft. wide corridor through existing stands of woods will be cleared and maintained with low growing species for maintenance reasons. Faunal species inhabiting the woodland corridor will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. Approximately one acre of wetlands will be crossed, which will necessitate the removal of any wetland tree species for pipeline corridor maintenance. The corridor through wetland areas will be maintained with low growing wetland species. Approximately one acre of cropland will be lost to provide for structure necessary at the proposed well field. Future land use of the 20 ft. wide corridor will be limited due to the pipeline.

Saline Valley Treated Water

City of Marion

The pipeline will be installed in existing road and railroad right-of-way. Any sections of woody vegetation within the pipeline corridor will be cleared and maintained as old field habitat. Faunal species inhabiting the woodland areas will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. Approximately four acres of wetlands will be crossed, which will necessitate the removal of any wetland tree species for pipeline corridor maintenance. The corridor through wetland areas will be maintained with low growing wetland species.

Lake of Egypt Water District

The pipeline will be installed in existing road and railroad right-of-way. Any sections of woody vegetation within the pipeline corridor will be cleared and maintained as old field habitat. Faunal species inhabiting the woodland areas will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird

species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. Approximately 3.5 acres of wetlands will be crossed, which will necessitate the removal of any wetland tree species for pipeline corridor maintenance. The corridor through wetland areas will be maintained with low growing wetland species.

Saline Valley Raw Water

City of Marion

The pipeline will be installed in existing road and railroad right-of-way. Any sections of woody vegetation within the pipeline corridor will be cleared and maintained as old field habitat. Faunal species inhabiting the woodland areas will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. Approximately four acres of wetlands will be crossed, which will necessitate the removal of any wetland tree species for pipeline corridor maintenance. The corridor through wetland areas will be maintained with low growing wetland species.

Lake of Egypt Water District

The pipeline will be installed in existing road and railroad right-of-way. Any sections of woody vegetation within the pipeline corridor will be cleared and maintained as old field habitat. Faunal species inhabiting the woodland areas will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. Approximately 3.5 acres of wetlands will be crossed, which will necessitate the removal of any wetland tree species for pipeline corridor maintenance. The corridor through wetland areas will be maintained with low growing wetland species.

Goreville Reservoir

City of Marion

The proposed reservoir basin contains approximately 301 acres of woodlands and 178.5 acres of croplands that will be lost to inundation of the area. About 1.25 miles of Little Saline Creek will also be inundated, converting the aquatic habitat from a lotic to lentic system supporting a differing species base. Approximately 44.2 acres of wetlands would be lost due to inundation. Faunal species inhabiting the reservoir basin will be forced to relocate. Animals with small territories will most likely experience overall population losses, assuming adjacent land is already inhabited. Species with dens included in the reservoir will also likely experience some population loss. Wooded areas within the pipeline corridor will also be cleared for pipeline installation and maintenance.

Lake of Egypt Water District

The proposed reservoir basin contains approximately 301 acres of woodlands and 178.5 acres of croplands that will be lost to inundation of the area. About 1.25 miles of Little Saline Creek will also be inundated, converting the aquatic habitat from a lotic to lentic system supporting a differing species base. Approximately 44.2 acres of wetlands would be lost due to inundation. Faunal species inhabiting the reservoir basin will be forced to relocate. Animals with small territories will most likely experience

overall population losses, assuming adjacent land is already inhabited. Species with dens included in the reservoir will also likely experience some population loss. Wooded areas within the pipeline corridor will also be cleared for pipeline installation and maintenance.

Sugar Creek Reservoir

City of Marion

The proposed reservoir basin contains approximately 415 acres of woodlands and 533 acres of agricultural lands that will be lost to inundation of the area. About 6.2 miles of Sugar Creek and 3 miles of Maple Branch will also be inundated, converting the aquatic habitat from a lotic to lentic system supporting a differing species base. Approximately 40.4 acres of wetlands would be lost due to inundation. Faunal species inhabiting the reservoir basin will be forced to relocate. Animals with small territories will most likely experience overall population losses, assuming adjacent land is already inhabited. Species with dens included in the reservoir will also likely experience some population loss. About 1.5 acres of wooded areas within the pipeline corridor will also be cleared for pipeline installation and maintenance.

Lake of Egypt Water District

The proposed reservoir basin contains approximately 415 acres of woodlands and 533 acres of agricultural lands that will be lost to inundation of the area. About 6.2 miles of Sugar Creek and 3 miles of Maple Branch will also be inundated, converting the aquatic habitat from a lotic to lentic system supporting a differing species base. Approximately 30 acres of wetlands would be lost due to inundation. Faunal species inhabiting the reservoir basin will be forced to relocate. Animals with small territories will most likely experience overall population losses, assuming adjacent land is already inhabited. Species with dens included in the reservoir will also likely experience some population loss. About 1.5 acres of wooded areas within the pipeline corridor will also be cleared for pipeline installation and maintenance.

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APPENDIX A - CORRESPONDENCE

PURPOSE AND NEED FOR ACTION

PROPOSED ACTION

1.001 The City of Marion, Illinois seeks to obtain a clean, safe, sufficient and dependable water supply to serve the residents and customers within its service area. The action proposed by the City of Marion is to develop a new water supply reservoir located in Williamson and Johnson Counties, Illinois near the community of Creal Springs. The City proposes to construct a dam on Sugar Creek less than one mile south of Creal Springs and about 10 miles southeast of the City of Marion. The proposed reservoir would have a water surface elevation of 496 ft mean sea level (msl) and have a surface area of about 1,172 acres. This lake would have a dependable yield of 8.0 million gallons per day (mgd, 50-year yield).

PURPOSE OF AND NEED FOR ACTION

1.002 The purpose and need of this project is to provide a clean, safe, sufficient and dependable water supply for the City of Marion and current and future customers.

1.003 To accomplish this goal, Marion has applied to the U.S. Army Corps of Engineers, Louisville District, (Corps) for a Department of the Army permit pursuant to Section 404 of the Clean Water Act for placement of material in Sugar Creek, Williamson County, as part of the construction of a new municipal water supply reservoir. The application has been designated Application No. 199401091 by the Corps.

PROJECT BACKGROUND

1.004 In 1983, the Illinois Environmental Protection Agency (IEPA) directed the City of Marion to obtain a new supply of water for its residents due to deteriorating water quality and inadequate capacity of the Marion City Reservoir. Marion subsequently applied to the Corps for a permit to construct a reservoir on Sugar Creek (Application No. 199401091). Approximately five years later, Lake of Egypt Water District (LEWD) began searching for an alternative water supply at the direction of the Southern Illinois Power Cooperative (SIPC), their present supplier of water. Marion and LEWD reached an agreement that if the Sugar Creek Reservoir was constructed, then Marion would supply water to LEWD.

1.005 The Corps prepared a Final Environmental Impact Statement (FEIS) and a Final Supplement I to the FEIS (Supplement I) prior to the issuance of a 404 permit in July 1996. The decision to issue the permit was challenged in the U.S. District Court for the Southern District of Illinois. U.S. District Court Judge Gilbert upheld the issuance of the permit and the adequacy of the FEIS and Supplement I. On appeal, the U.S. Court of Appeals for the Seventh Circuit reversed this decision, finding that all reasonable alternatives had not been considered In the FEIS. Consequently the Section 404 permit was vacated. This Draft Supplement II to the FEIS shall examine single source options as well as combinations of separate alternatives to satisfy current and future water needs of Marion and present and future customers, including LEWD. Marion and LEWD have entered into agreement whereby Marion will supply water LEWD. Although the Corps acknowledges the existence of this agreement, it will by no means influence the Corps' consideration of reasonable alternatives of water supply sources for the applicant. Proposed measures to mitigate unavoidable adverse effects will be identified, as will the Applicant's (City

of Marion) preferred alternative. This Draft Supplement II to the FEIS complies with the procedures in the National Environmental Policy Act of 1969 (NEPA) (42 USC 4321 *et seq*.), the Council on Environmental Quality Regulations (40 CFR 1500-1507), U.S. Army Corps of Engineers Procedures for Implementing NEPA (33 CFR 230), U.S. Army Corps of Engineers NEPA Implementation Procedures for the Regulatory Program (33 CFR 325, Appendix B) and all applicable Federal and state laws and regulations.

PROJECT LOCATION AND DESCRIPTION OF PROPOSED ACTION

1.006 Marion, Illinois is a community in south central Illinois located approximately 100 air miles southeast of St. Louis, Missouri, about 50 air miles north northwest of Paducah, Kentucky and about 40 miles south of Mt. Vernon, Illinois (see Exhibit 1-1). Interstate Highway 57 (a north-south highway) is located in the western portion of the city and Illinois Highway 13 (an east-west highway) is included in the northern portion of the city. Other communities in this region of Illinois include Harrisburg, Carbondale, West Frankfort and Benton.

1.007 The area served with potable (drinking quality) water by the City of Marion includes primarily the entire city, several neighboring developments and a rural water district. LEWD, located adjacent to the south of the City of Marion service area, includes a predominantly rural residential area. The service area of the City of Marion is wholly included in Williamson County while the LEWD includes parts of Williamson, Johnson, Jackson and Union Counties (see Exhibit 1-2).

PRESENT WATER CONSUMPTION

1.008 A full description of the City of Marion's water needs was included in the FEIS and the Supplement I. Also included was a similar description of potential customer LEWD's water needs. The average volume of raw water pumped by the City of Marion was 2.0 mgd in 1997, with a peak of 2.4 mgd. The average raw water volume pumped in 1998 was 2.1 mgd with a continuation of that volume (2.1 mgd) through the first four months of 1999. The average volume of raw water pumped by the LEWD in 1997 was 1.0 mgd, with a peak day of 1.5 million gallons. The average raw water volume pumped by LEWD in 1998 was 1.1 mgd and 1.0 mgd through the first five months of 1999.

FUTURE WATER DEMANDS

1.009 A full description of the future water needs of the City of Marion and the Lake of Egypt Water District was included in the FEIS and Supplement I.

1.010 Based on information reported in the FEIS and Supplement I, and an updated historical actual usage analysis, the "average day" need for raw water will be 2.9 mgd for the City of Marion and 2.0 mgd for LEWD by the year 2023. By this date, peak day requirements for raw water may reach 4.3 mgd for the City of Marion and 3.0 mgd for the Lake of Egypt Water District.

1.011 These numbers were determined based on a historic trend analysis conducted in 1994. Actual figures for 1995 to 1998 were within 3 percent of the trend analysis for the same time period. Exhibit 1-3 presents a trend line based on City of Marion water usage from 1980 to 1998. The City of Marion also examined water conservation measures that could potentially reduce the amount of water needed. However, since this would not solve the need for Marion to obtain a new

water supply, it was determined, for conservative planning purposes, that the City of Marion and LEWD should examine water sources that could, at a minimum, meet the projected "average day" volumes calculated from the historic trend analysis. The "average day" volumes were then multiplied by a factor of 1.5 to accommodate peak day demand as specified in Section 653.105(b), Subpart A, Part 653, Chapter 2, Subtitle F, Title 35, of the Illinois Administrative Code. These peak day volumes are used throughout this document as the minimum volumes needed to fulfill the water requirements of the City of Marion and LEWD either separately or in combination. The above-referenced Part of Illinois' Rules and Regulations offers technical guidance for the development of public water supplies and design criteria.

Exhibit 1-3.

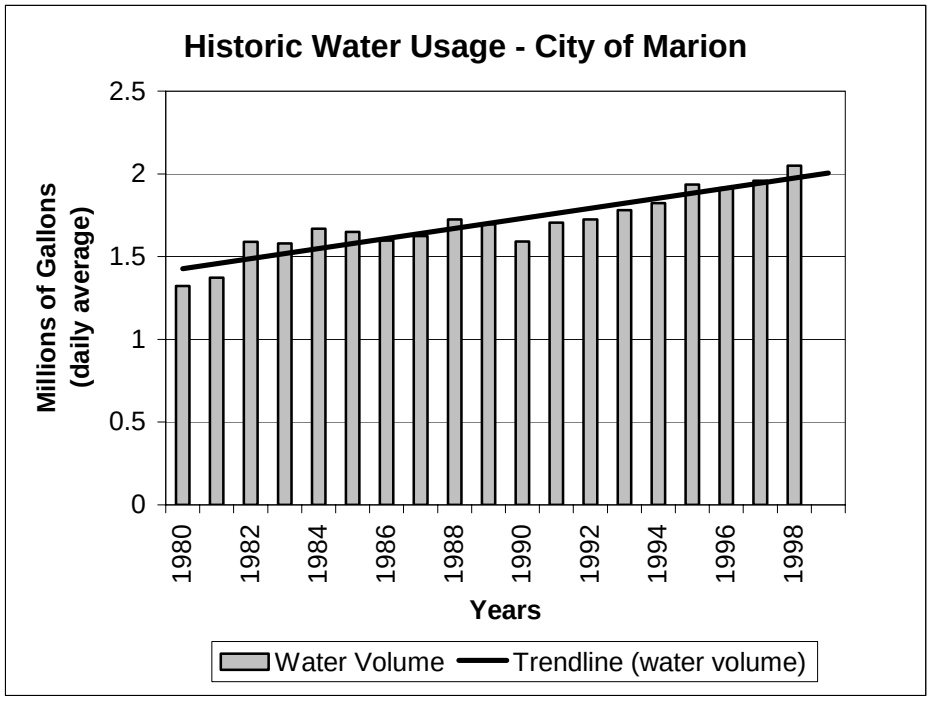

Exhibit 1-1 *(see link to drawings)*

Exhibit 1-2 *(see link to drawings)*

WATER SUPPLY ALTERNATIVES

INTRODUCTION

2.001 The minimum required yield of water for the present and future customers of the City of Marion is 4.3 mgd and the present and future customers of LEWD is 3.0 mgd through the year 2023. The required yield figures take into account water conservation estimates and reflect a design drought period of 50 years. For purposes of this document, these figures were used for both raw and treated water needs, since the projected treated water needs were less than 10 percent lower than the projected raw water needs of 4.3 mgd and 3.0 mgd. Alternatives were analyzed independently and in reasonable combinations to determine whether this minimum yield could be met.

2.002 A proposed water supply must meet the minimum Federal and state water quality standards. In addition, the source of water must have a low potential for contamination and should not be susceptible to service interruption related to system failures. Sources that are less susceptible to water main breaks related to subsidence or other factors were considered to provide a higher level of safety. Sources with known multiple sources of potential contamination were considered to provide the lowest margin of safety.

PRELIMINARY ALTERNATIVES

2.003 A number of alternatives have been identified in the process of development of the FEIS, Supplement I to the FEIS, and this Supplement II. These alternatives, whether or not they can fulfill the applicant's need of providing the City of Marion water system and/or LEWD with a clean, safe, sufficient and dependable water supply, are described in the following narrative. Those alternatives that cannot fulfill these needs are discussed, including the reasons that they were eliminated from further consideration. The alternatives that can provide solutions to the applicant's needs are also described, including alternatives outside the permit jurisdiction of the Corps.

2.004 This alternatives discussion is a consolidation of data and information that have been furnished to the U.S. Army Corps of Engineers, Louisville District, by the U.S. Army Corps of Engineers, St. Louis District; IEPA; Illinois Department of Transportation; City of Marion; Lake of Egypt Water District; Clarida Engineering Co., Marion, Illinois; ETI Corporation, Memphis, Tennessee; Development Strategies, Inc., St. Louis, Missouri; Wetland Science Applications, Inc., Bartlett, Tennessee; Rend Lake Conservancy District, Benton, Illinois; City of Carbondale, Illinois and Saline Valley Conservancy District, Harrisburg, Illinois.

2.005 The following discussion of alternatives includes (1) alternatives open to the Corps of Engineers; (2) alternatives open to the applicant that are No Action Alternatives; (3) alternatives that improve supply capability from the existing City of Marion water system and LEWD sources; (4) alternatives that obtain water from sources previously developed by others; and (5) alternatives that develop new source(s) of water. Numerous preliminary alternatives were examined as to the feasibility of supplying present and future customers of Marion and/or LEWD. A brief description of each preliminary alternative is provided along with the rationale for determining its feasibility.

2.006 The following preliminary alternatives were identified for evaluation. The locations of the preliminary alternatives are shown on Exhibit 2-1.

- No Action Alternative
- Increase Water Rates to Limit Consumption
- Improve and Expand Marion City Lake and/or Lake of Egypt
- Obtain Water from Crab Orchard Lake
- Obtain Water from Devil's Kitchen Lake
- Obtain Water from Little Grassy Lake
- Obtain Water from Rend Lake
- Obtain Water from Cedar Lake
- Obtain Water from Groundwater - Cache River Aquifer
- Obtain Water from Groundwater - Saline Valley Groundwater
- Obtain Water from Groundwater - Strip Mine Pits
- Develop a Site on Little Saline Creek as a New Reservoir
- Develop a Site Near Goreville as a New Reservoir
- Develop a Site on Crab Orchard Creek as a New Reservoir
- Develop a Site on Sugar Creek as a New Reservoir
- Develop a Site on White Oak Creek as a New Reservoir

2.007 The following discussions reference dependable water yields that could be provided based on a probability of occurrence in years. The amount of water needed on a daily basis (daily peak) through the year 2023, is 4.3 mgd for present and future customers of the City of Marion and 3.0 mgd for LEWD.

No Action Alternative

2.008 The City of Marion could prohibit any new users from connecting to their water supply, in order to maintain demand levels at current rates. However, this alternative does not provide a new source of water to the City of Marion, which the IEPA has directed them to obtain due to poor water quality and diminishing yield (IEPA letters dated January 7, 1993; January 18, 1995; and January 25, 1995).

2.009 Similarly, SIPC has informed LEWD that they need to obtain an alternative water source, since they are currently exceeding their 1 mgd maximum withdrawal during certain times of the year (Richard Myott, SIPC, letter dated September 30, 1988; Dale Shadowens, LEWD, letter dated May 17, 1994). The current contract between SIPC and LEWD is scheduled to expire in 2015.

2.010 The No Action Alternative is infeasible for the City of Marion based on the directives to locate an alternative water source as described in 2.008. Similarly, its potential customer LEWD must obtain a new water source based on contract restrictions as described in 2.009.

Exhibit 2-1 *(see link to drawings)*

Increase Water Rates to Limit Consumption

2.011 Water is required for personal consumption, sanitary uses, and commercial business activities. Use of water, like other utility commodities such as electricity, may be influenced by the cost of the delivered product. Consumption of water may be influenced by pricing delivered water so that consumption is either encouraged or discouraged.

2.012 The City of Marion water rates have been reviewed compared to neighboring communities to determine if the City of Marion has comparably lower rates that may encourage consumption. Cost of water for consumers in other regional cities were also compared to cost of water for City of Marion customers. These treated water costs are shown in Table 2-1.

TABLE 2-1
Comparison of Water Costs for the City of Marion with Other Communities

City/Community	Cost for 10,000 gallons per month	Cost for 100,000 gallons per month	Cost for 1,000,000 gallons per month
Marion	$ 35.00	$ 323.00	$ 2,913.00
Benton	35.50	280.55	2,485.55
Carbondale	24.00	240.00	2,400.00
Centralia	34.47	273.07	2,316.07
Harrisburg	29.57	295.97	2,959.57
Herrin	38.64	321.12	2,571.12
Mt. Vernon	39.30	333.45	2,147.45
Murphysboro	26.57	244.16	1,954.16
West Frankfort	29.86	229.96	2,182.96

Source: Glenn Clarida, Clarida Engineering Co., August 14, 1998.

2.013 The City of Marion significantly increased water rates in 1991 from rates that had been in effect since 1986 (City of Marion Water Department, memorandum dated May 5, 1995). For example, a customer using 5,000 gallons of water per month (typical Marion, Illinois family of four) had an increase in water rates of about 106 percent. Customers using 100,000 gallons per month had an identical increase. Customers using 0.5 million gallons per month had rates increased by about 62 percent. For the period 1990 (prior to the rate increase) to 1997, the City of Marion water system average daily water consumption has increased 23.1 percent.

2.014 Increased water rates have not dampened growth in demand for water by customers in the City of Marion water system, even with water rates that are now among the highest in the region. In addition, this alternative neither represents a solution to the need for the City of Marion to find a new water supply because of IEPA directives.

2.015 The Lake of Egypt Water District is experiencing a similar trend. LEWD has increased water rates twice in the past six years, on June 1, 1994 and March 1, 2000. The rate hikes have resulted in an approximately 23% rise in water rates since June 1994 for a family using 5,000 gallons a month. During this same period, the District has experienced a 27% increase in

average daily raw water usage and about an 11% growth in metered customers. The cost for 10,000 gallons of water from LEWD is currently $33.25, $0.70 above the average for the region when compared to Table 2-1. Approximately 70 percent of LEWD water sales are to residential users with the remainder bulk water sales to rural water districts. The increase in water rates has not curbed the growth in demand for water. This alternative does not eliminate the need to secure an alternate water source to replace Lake of Egypt when the contract with SIPC expires in 2015.

Improve and Expand Marion City Lake and/or Lake of Egypt

2.016 Marion provides water from its primary water source, Marion City Lake, a 230-acre reservoir located on Limb Branch in Williamson County, Illinois, approximately three miles south of the city limits. The lake was originally constructed in 1921 and renovated in 1968. At that time, the crest elevation of the dam was raised to increase storage. These actions approximately doubled the available water storage capacity.

2.017 The possibility of expanding the physical capacity of the existing Marion City Lake by dredging or excavation was examined. This type of action may also help alleviate persistent summer water quality problems associated with buildup of organic materials. However, this action would not increase the reservoir yield above the current 1.1 mgd (average based on 20 and 50 year drought cycle projections) since the watershed is limited in size (6.48 square miles) and includes a number of small ponds that reduce the runoff yields to Marion City Lake. In addition, the level of the lake cannot be raised due to the elevations of Interstate Highway 57 culverts and Burlington Northern railroad right-of-way culverts along the western portion of Marion City Lake.

2.018 Further, this option does not resolve the guidance from IEPA to the City of Marion to develop a new water supply source due to poor water quality (Thomas McSwiggin, IEPA, letters dated January 7, 1993; January 18, 1995; and January 25, 1995). Based on the above, the improvement or expansion of Marion City Lake does not present a reasonable alternative.

2.019 Lake of Egypt lies approximately six miles south of the city limits of Marion, on the border of Williamson and Johnson Counties, Illinois. The principal use of this lake is as a source of water for power plant heat exchangers for condenser and equipment cooling. The agreement between SIPC and LEWD that allows water withdrawal from Lake of Egypt by LEWD restricts withdrawals to 30 million gallons over a 30-day period of time. The 30-million gallon/30-day value was set to provide a safe margin of water withdrawal and to maintain satisfactory lake temperatures to protect power plant equipment.

2.020 The allowable volume that may be withdrawn from Lake of Egypt and treated for customer use is exceeded by LEWD during periods of high water consumption. SIPC notified LEWD that they will be held liable if excessive withdrawals are linked to equipment damage (Tim Reeves, SIPC, letter dated February 8, 1993). In spite of this potential liability, LEWD has withdrawn higher than agreed to volumes of water to satisfy user demands. SIPC has stated that they will not re-negotiate this agreement to allow greater withdrawals and that LEWD must find an alternative water supply (Richard Myott, SIPC, letter dated September 30, 1988; Dale Shadowens, Lake of Egypt Water District, letter dated May 17, 1994).

2.021 This alternative is not feasible for the City of Marion and/or LEWD, either separately or in combination with another alternative, since SIPC refuses to allow greater amounts of water to be

withdrawn from Lake of Egypt. The locations of Marion City Lake and Lake of Egypt are shown in Exhibit 2-1.

Obtain Water from Crab Orchard Lake

2.022 Crab Orchard Lake, owned by the U.S. Fish and Wildlife Service (USFWS), is located approximately two miles west of the city limits of Marion, in Williamson County, Illinois. The City of Marion initiated withdrawal of raw water from Crab Orchard Lake in 1954 but discontinued use of this source in 1983 following the discovery of PCBs in the sediments of the lake. The intake was placed in the upper reaches of the lake near former industrial facilities. During scoping meetings for the FEIS, the possibility of withdrawal of water from Crab Orchard Lake as an alternative was discussed. The position of the USFWS is that this is a feasible concept but no more than 2 mgd would be allowed to be withdrawn from Crab Orchard Lake (Richard Berry, USFWS, statement at interagency meeting, November 19, 1992). A volume not to exceed 2 mgd would not provide sufficient supply to support the projected individual demand of the City of Marion or LEWD.

2.023 IEPA had indicated that the use of raw water from Crab Orchard Lake as a primary source is not recommended because of the bioaccumulation of PCB contaminants (Thomas McSwiggin, IEPA, letter dated January 7, 1993). This follows a 1986 recommendation from IEPA to USFWS that they discontinue their use of Crab Orchard Lake as a raw water source due to these same contaminants (Thomas McSwiggin, IEPA, letter dated January 7, 1993). More recently, unpublished data from water samples collected near the dam in 1999 indicate that PCB levels have been reduced to non-detectable limits. The status of PCBs in lake sediment has not been made available. In addition, studies are currently underway at the Refuge to determine trichloroethene (TCE) contamination. The uncertain nature of environmental contamination and lack of current guidance from USFWS or other governmental bodies on the availability of this resource raises confidence issues and public health concerns for using Crab Orchard as a water source.

2.024 USFWS has also stated that right-of-way for water pipeline installation will only be granted if the proposed right-of-way use is compatible with the purposes for which the Refuge was established. Application procedures for obtaining right-of-way through Federal land are reviewed in accordance with 50 CFR Part 29 Subpart B. The regulations state that the information supplied to the Regional Director must be of a sufficient level of detail to allow the preparation of an environmental assessment or EIS. Currently there are no entities withdrawing water from Crab Orchard Lake for use as a public water supply, including USFWS. The potential PCB/TCE contamination and right-of-way concerns determined this alternative to be infeasible for Marion and/or LEWD either separately or in combination with another alternative. The location of Crab Orchard Lake is shown in Exhibit 2-1.

Obtain Water from Devil's Kitchen Lake

2.025 Devil's Kitchen Lake, owned by USFWS, is located approximately 9 miles southwest of the city limits of Marion, mostly within Williamson County, Illinois. The withdrawal of water from Devil's Kitchen Lake, located within the Crab Orchard National Wildlife Refuge, was the object of lengthy negotiations between the City of Marion and USFWS for many years. This lake could provide high quality water for municipal purposes and has an estimated dependable yield of about 7.75 mgd (40-year) (Thomas McSwiggin, IEPA, letter dated January 7, 1993). The USFWS determined that withdrawal of water by the City of Marion would be incompatible with the

operation of the lake, Crab Orchard Wildlife Refuge, and facilities associated with the refuge (Harvey K. Nelson, letter dated December 14, 1984; Frank Dunkle, USFWS, letter dated July 22, 1988; and Richard Berry, USFWS, letter dated December 4, 1992). It was determined by the USFWS that withdrawal of water could adversely affect lake fisheries, potentially cause erosion of shorelines, and degrade users wilderness experience if lake water levels fluctuate due to water withdrawal.

2.026 In 1986, Congress approved legislation that included a provision that would allow the City of Marion to create an intake below the spillway of Devil's Kitchen Lake and use any water that passed over the spillway. However, during long periods of time each year, no water passes over the spillway. In 1987, the City of Marion determined that an impoundment below the dam, creating a reservoir of spilled water, would be needed to implement this action. Because of local topography, a reservoir of sufficient size would require water to occasionally be stored against the downstream face of the dam. The possible impact that such storage might have on the Devil's Kitchen Lake Dam was reviewed by the U.S. Department of the Interior, Bureau of Reclamation. Because of engineering concerns, the review concluded with a recommendation that no water be allowed to be stored against the downstream face of the dam (J.R. Graham, Bureau of Reclamation, letter dated December 7, 1987). Since no water can be stored against the dam, this option is precluded as a feasible alternative either separately or in combination with another alternative.

2.027 Negotiations continued until 1988 with the Department of the Interior regarding a water intake in Devil's Kitchen Lake when the USFWS refused to consider any further requests by the City of Marion (Frank Dunkle, USFWS, letter dated July 22, 1988). This action effectively precluded any alternative, either singularly or in combination with other alternatives, involving the withdrawal of water from Devils Kitchen Lake. The location of Devil's Kitchen Lake is shown in Exhibit 2-1.

Obtain Water from Little Grassy Lake

2.028 Little Grassy Lake, owned by USFWS, is located approximately 11 miles southwest of the city limits of Marion, on the border of Williamson, Jackson and Union Counties, Illinois. The withdrawal of water from Little Grassy Lake, also located in the Crab Orchard National Wildlife Refuge, was considered during the scoping process of the FEIS. This lake could provide high quality water for municipal purposes and has an established dependable yield of about 6.40 mgd (40-year) (Thomas McSwiggin, IEPA, letter dated January 7, 1993). The USFWS examined the use of this alternative (Richard Berry, USFWS, letter dated February 12, 1993). Concerns addressed included shoreline erosion, potential adverse effects on water quality, aquatic vegetation, and resultant direct and indirect effects on a very high quality sport fishery.

2.029 In addition, a fish hatchery located immediately adjacent to the dam of Little Grassy Lake is operated by the State of Illinois and uses water from Little Grassy Lake. The hatchery is required to pump water used in their operation back into the lake whenever the lake falls below certain water surface elevations. Concern was noted by the USFWS that if the City of Marion withdraws water from the lake, additional pumping by the hatchery may be necessary and could cause an adverse economic impact on the hatchery. Concern was also raised regarding the possible adverse effects on the significant recreational and environmental educational use of USFWS facilities, concession operated camping and marina facilities, five youth camps, and the Southern Illinois University Environmental Education Center. Additional concerns were raised

regarding short- and long-term impacts of a raw water pipeline from Little Grassy Lake to the City of Marion through Crab Orchard Wildlife Refuge (Richard Berry, USFWS, letter dated February 12, 1993).

2.030 The USFWS has concluded that the removal of amounts of water needed by the City of Marion and/or LEWD would "...cause significant adverse effects on the existing natural resource and public use values of Little Grassy Lake" (Richard Berry, USFWS, letter dated February 12, 1993). It was the position of the USFWS that Little Grassy Lake was neither created nor suited for use as a municipal water source. As was the case with Devil's Kitchen Lake, the USFWS has effectively precluded any alternative involving the use of another lake as a source of water, either singularly or in combination with other alternatives, for the City of Marion. The location of Little Grassy Lake is shown in Exhibit 2-1.

Obtain Water from Rend Lake

2.031 Rend Lake is located approximately 20 miles north of the city limits of Marion in Franklin and Jefferson Counties, Illinois. Rend Lake is a large multi-purpose reservoir completed by the Corps, St. Louis District in 1972 and is located on the Big Muddy River. It was constructed primarily for flood control, but also for water supply, recreation, fish and wildlife and area development. The lake has a surface area of about 18,900 acres at summer pool.

2.032 The water supply storage in Rend Lake is under contract to the Illinois Department of Natural Resources (IDNR), Division of Water Resources. They in turn have a contract with the Rend Lake Conservancy District (RLCD) for this storage. The Conservancy District has indicated that consumption by users in the Rend Lake Intercity Water System in 1993 was 11.99 mgd and is expected to grow to 12.41 mgd in the year 2000 and to 13.05 mgd by 2010 (Kevin Davis, RLCD, letter dated May 28, 1993). The volume available for water supply is 40 mgd (100-year) (U.S. Army Corps of Engineers, St. Louis District, Rend Lake Reservoir, Design Memorandum No. 1, approval date January 30, 1963).

2.033 IDNR has provided information indicating that RLCD has the authority to market and consume up to 17.5 mgd from Rend Lake and that the remaining water supply capability has been retained by the State of Illinois. The State of Illinois has not entered into any agreements for any portion of the remaining water supply capability.

2.034 Since Rend Lake appears to have sufficient water capacity to supply the City of Marion and/or the Lake of Egypt Water District, it was considered a feasible alternative to be evaluated in greater detail for both raw water and treated water options. The location of Rend Lake is shown in Exhibit 2-1.

Obtain Water from Cedar Lake

2.035 Cedar Lake is a water supply reservoir constructed by the City of Carbondale in 1974, located approximately 18 miles southwest of the city limits of Marion in Jackson County, Illinois. It has a surface area of approximately 1,750 acres and is an impoundment of Cedar and Poplar Creeks. It replaced an old city reservoir that was located on Piles Fork. The water supply storage in Cedar Lake is estimated to be about 14 mgd (30-year) and the present raw water withdrawal is about 6 mgd. The City of Carbondale has an existing raw water intake structure with the capability to pump about 20 mgd (Jeff Doherty, City of Carbondale, letter dated April 13, 1993).

2.036 The water supply storage in Cedar Lake is under direct control of the City of Carbondale. The City of Carbondale has indicated that consumption (billed gallons) by users in its service area in 1993 was 4.5 mgd. While no formal planning studies have been completed, the City of Carbondale is expecting demand to grow to 5.3 mgd in the year 2000, an increase of about 2.5 percent annually. Future demand is expected to reach 6.8 mgd by 2020, an annual increase after the year 2000 of about 1.25 percent (Jeff Doherty, City of Carbondale, letter dated April 13, 1993).

2.037 The City of Carbondale has facilities to treat an average of about 8 mgd and the City considers that these facilities can be expanded to treat up to 20 mgd (Jeff Doherty, City of Carbondale, letter dated April 13, 1993). Since the City of Carbondale is projecting billed consumption at an average of about 5.3 mgd by the year 2000 and about 6.8 mgd by 2020 for their system, capacity for also serving the needs of the City of Marion and potential customers appears feasible. Thus, obtaining water from Cedar Lake was considered a feasible alternative to be evaluated in greater detail. The location of Cedar Lake is shown in Exhibit 2-1.

Obtain Water from Groundwater - Cache River Aquifer

2.038 Groundwater resources in the vicinity of the City of Marion and LEWD are minimal because of regional geological conditions. Shallow sand and gravel aquifers are not available in the immediate area to support single resident use, much less support a municipal water system. Deep rock wells also have limited production potential.

2.039 Sand and gravel wells are drilled into unconsolidated materials overlying bedrock. In the vicinity of Marion, few of these resources are present. Groundwater resources accessible for large public water supply include either Mississippi River or Ohio River lowlands or the Cache River aquifer, sites that are about 30 to 45 miles from the City of Marion.

2.040 At the direction of the Corps, the City of Marion identified a site on the Cache River aquifer south of the City of Marion and LEWD as the best groundwater alternative. A location near the community of Perks (Pulaski County, Illinois) approximately 29 miles from the city limits of Marion, was identified as the nearest location for a new well field that could produce a clean, safe, adequate and dependable supply of water. Since this alternative would provide sufficient water capacity to meet the needs of the City of Marion and potential customers, it was considered a feasible alternative to be evaluated in greater detail. Exhibit 2-1 shows the proposed location of this well field.

Obtain Water from Groundwater - Saline Valley Groundwater

2.041 Community water systems closer to major rivers such as the Saline Valley Conservancy District (SVCD) are much more likely to use groundwater as a raw water source as compared to water systems distant from such resources. SVCD includes the City of Harrisburg, several smaller communities, much of Saline and Gallatin Counties, as well as parts of Hardin and Hamilton Counties. SVCD operates five wells located on three separate well fields. The well fields are located near the community of Junction, approximately four miles from the Ohio River, and 37 miles east of the city limits of Marion in Gallatin County, Illinois. Billed consumption of water is presently about 3 mgd in the SVCD (Shirley Ligon, SVCD, telephone interview dated June 1, 1994).

2.042 It was determined that SVCD has enough capacity to meet the water requirements of the City of Marion and/or the Lake of Egypt Water District. Thus, it was considered a feasible alternative to be considered in greater detail. Exhibit 2-1 shows the location of the Saline Valley well fields.

Obtain Water from Groundwater - Strip Mine Pits

2.043 Several suggestions have been made to the City of Marion that they could potentially use abandoned strip mine pits as a source of water, in particular the Delta Mine - West Harrisburg Field. The Delta Mine is located approximately 18 miles east of the city limits of Marion in Saline County, Illinois. While the strip mine pits contain a large amount of water, there is inadequate watershed and recharge to these pits for a sustained yield necessary to supply the City of Marion and/or LEWD, either separately or in combination with another alternative. In addition, water quality in strip mine pits is usually poor and not suited for potable water, containing high amounts of iron, sulfates and dissolved solids (Corps, Louisville District, EIS for Amax Coal Company, Delta Mine - West Harrisburg Field, 1996). Thus, this alternative was considered infeasible and eliminated from further consideration. Exhibit 2-1 shows the location of the Delta Mine - West Harrisburg Field.

Develop a Site on Little Saline Creek as a New Reservoir

2.044 In late 1987, the City of Marion began efforts to identify sites where a reservoir could be built to supply future needs. A site on Little Saline Creek in Johnson County, Illinois, approximately 11 miles south of the city limits of Marion and proximal to Lake of Egypt, was reviewed. This site is located below the ash basins for the SIPC power plant located at Lake of Egypt. Outfalls from the ash basins would feed into tributaries of the proposed reservoir. The raw water yield of this site was determined to be no more than 4.0 mgd (50-year) (Glenn Clarida, Clarida Engineering Co., statement at interagency meeting, November 19, 1992). The yield is insufficient to meet the needs of the City of Marion, but adequate for LEWD. However, the potential for contamination from materials contained in the ash basins, in particular heavy metals, indicated that this site had little merit. Thus, this alternative was considered infeasible either separately or in combination with another alternative and eliminated from further consideration (Glenn Clarida, Clarida Engineering Co., statement at interagency meeting, November 19, 1992). Exhibit 2-1 shows the location of the Little Saline Creek site.

Develop a Site Near Goreville as a New Reservoir

2.045 In 1988, a site on Little Saline Creek north of the community of Goreville was identified. This site is located approximately 10 miles south of the city limits of Marion in Johnson County, Illinois. The site is upstream of the Lake of Egypt and avoids the SIPC ash ponds. It is located immediately east of Interstate Highway 57. A reservoir of about 585 acres could be developed at this site. The raw water yield of this lake was determined to be about 3.6 mgd (50-year) (Glenn Clarida, Clarida Engineering Co., statement at interagency meeting, November 19, 1992).

2.046 While this site could not meet the needs of both the City of Marion and potential customers, it could meet the individual needs of either the City of Marion (using an additional source as a backup for peak flows) or LEWD. Thus, it was considered a feasible alternative to be evaluated in greater detail. The location of the Goreville site is shown in Exhibit 2-1.

Develop a Site in the Crab Orchard Creek Watershed as a New Reservoir

2.047 During the scoping process of the FEIS, several other impoundment sites on Crab Orchard Creek tributaries were suggested to the Corps. These sites are within four miles of the city limits of Marion in the Crab Orchard Creek watershed area in Williamson County, Illinois. One site on the immediate north side of the City of Marion was suggested. A second site (with multiple water elevations) near the community of Pittsburg was also identified (see Exhibit 2-1).

2.048 The site immediately north of the Marion city limits has an area of about 100 acres. It is significantly limited as a water reservoir site because it has an extremely limited drainage basin, approximately 1,134 acres. A lake at this site would be extremely shallow, a feature that would limit available water storage. In addition, the shallow nature of the lake would encourage growth of organic material and would require significant treatment measures.

2.049 The site near Pittsburg was also suggested with several possible water surface levels. The alternative with the greatest area and storage volume was reviewed to assess its potential to meet present and future water supply needs. A 500-foot elevation (mean sea level), 1,000-acre reservoir was analyzed and found to have storage and watershed capacity capable of providing a dependable yield of about 4.3 mgd (50-year). The site has sufficient water to supply the City of Marion or LEWD; however, is located in an area with significant historic underground coal mining. The entire area where a dam could be sited is undermined and would not provide a suitable foundation for a structure.

2.050 Since the first site would not provide sufficient capacity and it would be impossible to construct an impoundment at the second site, it was determined that these sites were infeasible and eliminated from further consideration either separately or in combination with another alternative.

Develop a Site on Sugar Creek as a New Reservoir

2.051 This site is located on Sugar Creek, with the proposed location of the dam less than one mile south of the community of Creal Springs and about 10 miles southeast of the City of Marion in Johnson County, Illinois. Two proposed reservoir elevations have been proposed. The largest proposed reservoir would have a water surface elevation of 496 ft (mean sea level) and have a surface area of about 1,172 acres. This lake would have a dependable yield of 8.0 mgd (50-year). The second smaller proposed reservoir would have a water surface elevation of 485 ft (msl), a surface area of about 1,067 acres and a dependable yield of 4.3 mgd (50-year).

2.052 Since these alternatives would provide sufficient capacity to fulfill the water requirements of the City of Marion and/or the LEWD, these were considered feasible alternatives to be evaluated in greater detail. Exhibit 2-1 shows the location of the Sugar Creek site.

Develop a Site on White Oak Creek as a New Reservoir

2.053 A 240-acre site on White Oak Creek was investigated by LEWD for a new reservoir (see Exhibit 2-1). This site is located approximately four miles southeast of the city limits of Marion in Williamson County, Illinois and could be developed for a reservoir with a dependable yield of 1.8 mgd (50-year). This site was rejected due to an inadequate yield of water (Glenn Clarida, Clarida Engineering Co., letter dated January 28, 1993).

2.054 This site was not investigated by the City of Marion since the watershed area and potential reservoir would be of insufficient size. The White Oak Creek site would not provide sufficient reserves to support the demand of either the City of Marion water system or LEWD, either separately or in combination with another alternative, and was eliminated from further consideration.

SUMMARY

2.055 Table 2-2 summarizes the preliminary alternatives examined, and identifies the alternatives considered feasible and those eliminated from consideration. If an alternative could supply sufficient water to meet the requirements of the City of Marion's present and future customers, and if it could provide acceptable water quality, the alternative was considered feasible and identified for further evaluation. If an alternative could not meet the needs of either the City of Marion or LEWD, or if it had unacceptable water quality, it was eliminated from further consideration. As Table 2-2 indicates, six alternatives were considered feasible and were analyzed in greater detail.

TABLE 2-2 Summary of Preliminary Alternatives Examined				
Preliminary Alternative	**Capacity to Meet City of Marion's Water Needs**	**Capacity to Meet LEWD Water Needs**	**Capacity to Meet City of Marion's and LEWD Water Needs**	**Alternative Identified to be Feasible for Further Evaluation**
No Action Alternative	No	No	No	No (Capability)
Increase Water Rates	No	No	No	No (Capability)
Improve and Expand Marion City Lake	No	No	No	No (Capability)
Increase Withdrawal from Lake of Egypt	No	No	No	No (Capability)
Obtain Water from Crab Orchard Lake	No	No	No	No (Capability)
Obtain Water from Devil's Kitchen Lake	Permission Denied by USFWS	Permission Denied by USFWS	Permission Denied by USFWS	No (Non-Availability)
Obtain Water from Little Grassy Lake	Permission Denied by USFWS	Permission Denied by USFWS	Permission Denied by USFWS	No (Non-Availability)
Obtain Water from Rend Lake	Yes	Yes	Yes	Yes
Obtain Water from Cedar Lake	Yes	Yes	Yes	Yes
Obtain Water from Cache River Aquifer	Yes	Yes	Yes	Yes
Obtain Water from Saline Valley	Yes	Yes	Yes	Yes
Obtain Water from Strip Mine Pits	No	No	No	No (Capability)
Develop Reservoir on Little Saline Creek	No	Yes	No	No (Capability)
Develop Reservoir Near Goreville	Yes	Yes	No	Yes
Develop Reservoir on Crab Orchard Creek Watershed	No	No	No	No (Capability)
Develop Reservoir on Sugar Creek	Yes	Yes	Yes	Yes
Develop Reservoir on White Oak Creek	No	No	No	No (Capability)

FEASIBLE ALTERNATIVES

2.056 The six feasible alternatives identified (shown on Exhibit 2-2) for further evaluation for Marion and/or LEWD either separately or in combination were:

1. Obtain Raw or Treated Water from Rend Lake
2. Obtain Water from Cedar Lake
3. Obtain Water from Cache River Aquifer
4. Obtain Water from Saline Valley
5. Develop a Reservoir Near Goreville
6. Develop a Reservoir on Sugar Creek

2.057 These six alternatives were evaluated to determine their potential impacts on the human and natural environment. The following environmental impact categories were considered:

- Soils and Geology
- Social and Socioeconomic Impacts
- Biotic Communities
- Threatened and Endangered Species
- Surface and Groundwater Resources
- Jurisdictional Wetlands
- Floodplains
- Historic, Archaeological and Cultural Resources
- Visual, Aesthetic and Recreational Impacts
- Infrastructure
- Construction Impacts

2.058 The following discussion presents a brief synopsis of the six feasible alternatives identified and provides pipeline route exhibits. Detailed discussion of these impacted resources is presented in Sections 3 and 4.

Treated Water From Rend Lake Conservancy District

2.059 The FEIS and Supplement I provide a complete description of Rend Lake and the facilities available through RLCD (water treatment plant and distribution system) to supply potable water.

2.060 The Illinois Emergency Management Agency (IEMA) Region Eleven Coordinator has raised several safety issues with using Rend Lake as a source of water (Robert Pippins, IEMA Region 11, letter dated 1/25/95). The agency is concerned that too much of the region is dependent on Rend Lake for its sole source of water. IEMA is also concerned that Rend Lake is susceptible to interruption of service due to the fact that southern Illinois is in an active fault area and that a large portion of the Rend Lake distribution system is underlain by mined-out areas (see Exhibit 2-3).

Exhibit 2-2 *(see link to drawings)*

Exhibit 2-3 *(see link to drawings)*

2.061 65 ILCS 5/11-138-1 states, "Any water company organized under the laws of this state for the purposes of supplying any municipality or the inhabitants thereof with water, may locate its source of supply at, or change its source of supply to, a point not more than 20 miles beyond the corporate limits of the municipality…" The RLCD draw-off point from Rend Lake is located approximately 20 miles from the corporate limits of the City of Marion. In accordance with 65 ILCS 5/11-138-1, the City of Marion may be prohibited from utilizing Rend Lake to supply their water needs.

City of Marion

2.062 The City of Marion would tie into the RLCD distribution system near Johnston City and install a 6.8 mile long 18-in. diameter pipeline system, including a still well and one pump station, to transport treated water to the City of Marion. The pipeline route from the junction point with the RLCD system to the City of Marion is depicted in Exhibit 2-4a (labeled Alternative 1). Approximately four miles of pipeline would be installed through mined areas.

The FEIS and Supplement I provide a complete description of the environmental resources affected by the Rend Lake treated water alternative. Table 2-3a provides a summary of the resources impacted by this alternative.

Lake of Egypt Water District

2.063 LEWD would tie into the RLCD distribution system near Johnston City and install a 16 mile long 18-in. diameter pipeline system, including a stillwell and one pump station, to transport treated water to their system. The pipeline route from the junction point with the RLCD system to LEWD is depicted in Exhibit 2-4a (labeled Alternative A). Approximately 4 miles of pipeline would be installed through mined areas. The FEIS and Supplement I provide a complete description of the environmental resources affected by the Rend Lake treated water alternative. Table 2-3a provides a summary of the resources impacted by this alternative.

Raw Water From Rend Lake

2.064 If raw water would be withdrawn from Rend Lake for use by the City of Marion and/or Lake of Egypt Water District, a new intake structure and pipeline system would need to be built from Rend Lake to the City of Marion and/or Lake of Egypt Water District water treatment plants.

2.065 IEMA Region Eleven Coordinator has raised several safety issues with using Rend Lake as a source of water (Robert Pippins, IEMA Region 11, letter dated 1/25/95). The agency is concerned that too much of the region is dependent on Rend Lake for its sole source of water. IEMA is also concerned that Rend Lake is susceptible to interruption of service due to the fact that southern Illinois is in an active fault area and that a large portion of the Rend Lake distribution system is underlain by mined-out areas (see Exhibit 2-3).

Exhibit 2-4a *(see link to drawings)*

Exhibit 2-4b *(see link to drawings)*

2.066 The proposed draw off point from Rend Lake is located approximately 22 miles from the corporate limits of the City of Marion. In accordance with 65 ILCS 5/11-138-1, the City of Marion may be prohibited from utilizing this alternative to supply their water needs.

City of Marion

2.067 A new intake would be installed at the southern end of Rend Lake and require an approximately 25.9 mile long 20-in. pipeline to deliver the raw water to the Marion treatment facilities. The pipeline route from Rend Lake to the City of Marion is depicted in Exhibit 2-4a and 2-4b (Alternative 2). Approximately 15 miles of pipeline would be installed through mined areas. The FEIS and Supplement I provide a complete description of the environmental resources affected by the Rend Lake raw water alternative. Table 2-3 at the end of this section provides a summary of the resources impacted by this alternative.

Lake of Egypt Water District

2.068 A new intake would be installed at the southern end of Rend Lake and require an approximately 35.1 mile long 18-in. pipeline to deliver the raw water to the LEWD treatment facilities. The pipeline route from Rend Lake to LEWD is depicted in Exhibit 2-4a and 2-4b (Alternative B). Approximately 15 miles of pipeline would be installed through mined areas. The FEIS and Supplement I provide a complete description of the environmental resources affected by the Rend Lake raw water alternative. Table 2-3 at the end of this section provides a summary of the resources impacted by this alternative.

Obtain Water From Cedar Lake

2.069 For this alternative, a raw or treated water pipeline system would need to be built from the City of Carbondale water treatment facility to water treatment facilities for the City of Marion and/or LEWD. Two pipeline routes, a northern and southern option, were identified to minimize impacts to the Crab Orchard National Wildlife Refuge which resides between these two points. Mr. Daniel Doshier, manager of the Crab Orchard National Wildlife Refuge, was contacted to provide an opinion from USFWS as to the availability and procedures for obtaining right-of-way through the Refuge (Daniel Doshier, USFWS, letter dated November 5, 1998, Appendix A). Mr. Doshier states that the USFWS discourages use of Refuge land for right-of-way requests. Right-of-way will only be granted if the proposed use is compatible with the purposes for which the Refuge was established. Application procedures for obtaining right-of-way through Federal land are reviewed in accordance with 50 CFR Part 29 Subpart B. The regulations state that the information supplied to the Regional Director must be of a sufficient level of detail to allow the preparation of an environmental assessment or EIS. Further analysis of the Cedar Lake alternative would be required to submit an application to the Service for a granting of right-of-way determination.

City of Marion - Northern Route

2.070 The City of Marion would connect into the Carbondale water treatment plant and install a 23.8 mile long 20-in. pipeline to their treatment facilities. The pipeline route from Cedar Lake to the City of Marion is depicted in Exhibit 2-5 (Alternative 3). The FEIS provides a complete description of the environmental resources affected by the Cedar Lake - Northern Route alternative. Table 2-3 at the end of this section provides a summary of the resources impacted by this alternative.

City of Marion - Southern Route

2.071 The City of Marion would connect into the Carbondale water treatment plant and install a 26 mile long 20-in. pipeline to their treatment facilities. The pipeline route from Cedar Lake to the City of Marion is depicted in Exhibit 2-5 (Alternative 4). The FEIS and Supplement I provide a complete description of the environmental resources affected by the Cedar Lake - Southern Route alternative. Table 2-3 at the end of this section provides a summary of the resources impacted by this alternative.

Lake of Egypt Water District - Northern Route

2.072 LEWD would connect into the Carbondale water treatment plant and install a 38 mile long 18-in. pipeline to their treatment facilities. The pipeline route from Cedar Lake to LEWD is depicted in Exhibit 2-5 (Alternative C). The FEIS and Supplement I provide a complete description of the environmental resources affected by the Cedar Lake - Northern Route alternative. Table 2-3 at the end of this section provides a summary of the resources impacted by this alternative.

Lake of Egypt Water District - Southern Route

2.073 LEWD would connect into the Carbondale water treatment plant and install a 21 mile long 18-in. or 16-in. pipeline to their treatment facilities. The pipeline route from Cedar Lake to LEWD is depicted in Exhibit 2-5 (Alternative D). The FEIS and Supplement I provide a complete description of the environmental resources affected by the Cedar Lake - Southern Route alternative. Table 2-3 at the end of this section provides a summary of the resources impacted by this alternative.

Obtain Water From Cache River Aquifer

2.074 The City of Marion initially rejected the use of groundwater as a primary raw water source primarily due to concerns about water quality. The use of groundwater would require substantial modifications to the existing City of Marion and/or LEWD treatment plants, including equipment to reduce levels of manganese, iron, water hardness, and to control pH. Also required would be bulk lime storage facilities, lime treatment equipment, lime sludge

EXHIBIT 2-5 *(see link to drawings)*

handling and removal equipment, and a location for disposal of lime sludge. These factors, in addition to the length of pipeline needed resulted in the rejection of this option by the City of Marion (Glenn Clarida, Clarida Engineering Co., statement at interagency meeting, November 19, 1992 and interview dated June 3, 1994). Based on comment received during review of the DEIS, the Corps directed the City of Marion to completely evaluate this feasible alternative.

2.075 The existing geological conditions and setbacks needed to protect wells from contaminants (Illinois Groundwater Protection Act) would require approximately 70 acres of land. This land would either be purchased outright or be a combination of purchased lands with the remaining area having significantly restricted easements.

2.076 The Cache River aquifer is located approximately 22 miles from the corporate limits of the City of Marion. In accordance with 65 ILCS 5/11-138-1, the City of Marion may be prohibited from utilizing this alternative to supply their water needs.

City of Marion

2.077 A 34.5 mile long 20-in. pipeline system would need to be built from the Cache River well field to water treatment facilities for the City of Marion. The pipeline route from the well field to Marion is shown in Exhibit 2-6a and 2-6b (Alternative 5). The FEIS and Supplement I provide a complete description of the environmental resources affected by the Cache River alternative. Table 2-3 at the end of this section provides a summary of the resources impacted by this alternative.

Lake of Egypt Water District

2.078 A 25.7 mile long 20-in. diameter pipeline system would be needed to transport water from the well field to the LEWD treatment facilities. The pipeline route to LEWD is shown in Exhibit 2-6a and 2-6b (Alternative E). The FEIS and Supplement I provide a complete description of the environmental resources affected by the Cache River alternative. Table 2-3 at the end of this section provides a summary of the resources impacted by this alternative.

Obtain Water From Saline Valley

2.079 Utilizing Saline Valley Conservancy District (SVCD) as a water source would require either tying in to the existing SVCD water system (treated water) or installing a new raw water line from the SVCD well field to Marion and/or LEWD. Several options for connecting Marion or LEWD to SVCD are possible, but all involve the installation of new water line.

2.080 The SVCD well field is located approximately 33 miles from the corporate limits of the City of Marion. In accordance with 65 ILCS 5/11-138-1, the City of Marion may be prohibited from utilizing this alternative to supply their water needs.

EXHIBIT 2-6a *(see link to drawings)*

EXHIBIT 2-6b *(see link to drawings)*

Treated Water From Saline Valley Conservancy District

City of Marion

2.081 In order for SVCD to secure the volume of water required by Marion, SVCD would have to install a new raw water line approximately 8 miles long from the well fields near Junction to the water treatment plant in Equality. The City of Marion would then install approximately 32 miles of 20-in. diameter water line to transport the treated water from Equality to the Marion treatment plant. Both segments of the line would be installed in easements along Illinois 13 in order to utilize the road right-of-way. The pipeline route is shown in Exhibit 2-7a and 2-7b (Alternative 6). Table 2-3 at the end of this section provides a summary of the resources impacted by this alternative.

2.082 A substantial portion of the pipeline would need to be installed through areas that have been mined (See Exhibit 2-8a and 2-8b). Approximately 15.5 miles of pipeline would cross mined out areas. Subsidence of the mined areas could increase the chance of line ruptures and the amount of maintenance required to operate the pipeline.

Lake of Egypt Water District

2.083 This alternative would require the installation of an approximately 38 mile long 18-in. diameter pipeline that connects into the SVCD water treatment plant at Equality and delivers water to LEWD. Water line installation would utilize a mixture of railroad and road right-of-way. The corridor runs southwest from Harrisburg to Stonefort along the abandoned railroad line paralleling U.S. 45. The pipeline route is shown in Exhibit 2-7a and 2-7b (Alternative F). Table 2-3 at the end of this section provides a summary of the resources impacted by this alternative.

2.084 Approximately five miles of pipeline would be installed through mined out areas. Subsidence of the mined areas could increase the chance of line ruptures and the amount of maintenance required to operate the pipeline (See Exhibit 2-8a and 2-8b).

Raw Water From The Saline Valley Conservancy District

City of Marion

2.085 This alternative would require installing an approximately 40 mile long 20-in. diameter raw water pipeline from the well fields near Junction to Marion. The corridor parallels Illinois 13 between the two cities and the water line would be placed in the highway right-of-way. The pipeline route is shown in Exhibit 2-9a and 2-9b (Alternative 7). Table 2-3 at the end of this section provides a summary of the resources impacted by this alternative.

2.086 The pipeline route would cross areas of surface and underground mines located east of Marion, along the Illinois 13 corridor between Marion and Junction (see Exhibits 2-8a and 2-8b). Approximately 15.5 miles of pipeline would be installed through mined out areas. Subsidence of

EXHIBIT 2-7a *(see link to drawings)*

EXHIBIT 2-7b *(see link to drawings)*

EXHIBIT 2-8a *(see link to drawings)*

EXHIBIT 2-8b *(see link to drawings)*

EXHIBIT 2-9a *(see link to drawings)*

EXHIBIT 2-9b *(see link to drawings)*

the mined areas could increase the chance of line ruptures and the amount of maintenance required to operate the pipeline.

Lake of Egypt Water District

2.087 This alternative would require the installation of an approximately 38 mile long 18-in. diameter pipeline that connects into the SVCD water treatment plant at Equality and delivers water to LEWD. Water line installation would utilize a mixture of railroad and road right-of-way. The corridor runs southwest from Harrisburg to Stonefort along the abandoned railroad line paralleling U.S. 45. The pipeline route is shown in Exhibit 2-9a and 2-9b (Alternative G). Table 2-3 at the end of this section provides a summary of the resources impacted by this alternative.

2.088 Approximately 6.5 miles of pipeline would be installed through mined out areas. Subsidence of the mined areas could increase the chance of line ruptures and the amount of maintenance required to operate the pipeline (See Exhibit 2-8a and 2-8b).

Develop a Reservoir Near Goreville

2.089 A proposed reservoir at this site would require the damming of Little Saline Creek, a small perennial stream. The normal pool elevation of the reservoir would be 600 ft msl creating an approximately 585 acre lake with a raw water yield of about 3.6 mgd (50-year). The reservoir would have the capacity to supply either the City of Marion (using an additional source as a backup for peak flows) or LEWD. This pool elevation would inundate six intermittent tributaries of Little Saline Creek upstream of the dam site. Approximately 1.3 miles of the perennial Little Saline Creek streambed would be lost due to the reservoir. Little Saline Creek flows northeasterly from the proposed reservoir site and joins with the South Fork of the Saline River just north of Lake of Egypt. A Clean Water Act Section 404 Permit would be required for the placement of material into Little Saline Creek to construct the impoundment.

City of Marion

2.090 This alternative would require the installation of an approximately 13 mile long 20-in. diameter raw water pipeline from the proposed reservoir to the City of Marion water treatment plant. The pipeline route is shown in Exhibit 2-10 (Alternative 8).

2.091 Current land use in the Goreville Reservoir basin includes approximately 196 acres of bottomland forest, 105 acres of upland forest, 179 acres of cropland, 44.2 acres of wetlands, 42 acres of shrubland, 21 acres of pasture/hayland, 10 acres of intermittent riverine habitat, 10 acres of pond/borrow pit/lake habitat, 7 acres of residential/commercial/industrial lands, 4 acres of denuded ground, 1 acre of non-native grassland and 0.4 acres of forbland. Current land use for the proposed pipeline route is mostly existing road right-of-way. Table 2-3 at the end of this section provides a summary of the resources impacted by this alternative.

EXHIBIT 2-10 *(see link to drawings)*

Lake of Egypt Water District

2.092 This alternative would require the installation of an approximately 2.7 mile long 12 in. diameter raw water pipeline from the proposed reservoir to the Lake of Egypt. The pipeline route is shown in Exhibit 2-10 (Alternative H). The pipeline would discharge directly into Lake of Egypt so that LEWD would avoid removing volumes of water in excess of their agreement with SIPC.

2.093 Current land use in the Goreville Reservoir basin includes approximately 196 acres of bottomland forest, 105 acres of upland forest, 179 acres of cropland, 44.2 acres of wetlands, 42 acres of shrubland, 21 acres of pasture/hayland, 10 acres of intermittent riverine habitat, 10 acres of pond/borrow pit/lake habitat, 7 acres of residential/commercial/industrial lands, 4 acres of denuded ground, 1 acre of non-native grassland and 0.4 acres of forbland. Current land use for the proposed pipeline route is mostly existing road right-of-way. Table 2-3 at the end of this section provides a summary of the resources impacted by this alternative.

Develop a Reservoir On Sugar Creek

2.094 The City of Marion has submitted an application for a Department of the Army permit pursuant to Section 404 of the Clean Water Act, 33 USC 1344 to construct a reservoir on Sugar Creek.

City of Marion

2.095 This alternative involves the construction of a reservoir on Sugar Creek with a normal pool elevation of 496 ft (msl) to supply water for the City of Marion. The reservoir would have a yield of approximately 8 mgd (50 year). A new reservoir on Sugar Creek would require a 20-in. diameter pipeline about 12.2 miles long to connect to the existing water treatment plant in Marion. The pipeline route is shown in Exhibit 2-11 (Alternative 9). The FEIS and Supplement I provide a complete description of the environmental resources affected by the Sugar Creek alternative. Table 2-3 at the end of this section provides a summary of the resources impacted by this alternative.

Lake of Egypt Water District

2.096 This alternative involves the construction of a reservoir on Sugar Creek with a normal pool elevation of 485 ft (msl) to supply water for LEWD. The reservoir would have a yield of approximately 4.3 mgd (50 year). A new reservoir on Sugar Creek would require a 12-in. diameter pipeline approximately 1.8 miles in length to transport water from the proposed new reservoir to the Lake of Egypt. The pipeline route is shown in Exhibit 2-11 (Alternative I). The pipeline would discharge directly into Lake of Egypt so that LEWD would avoid removing volumes of water in excess of their agreement with SIPC. The FEIS and Supplement I provide a complete description of the environmental resources affected by the Sugar Creek alternative. Table 2-3 at the end of this section provides a summary of the resources impacted by this alternative.

EXHIBIT 2-11 *(see link to drawings)*

TABLE 2-3a Summary of Affected Resources – Each Alternative Rend Lake Treated Water Alternative		
	City of Marion	**Lake of Egypt Water District**
Additional Land Required	15 acres	37 acres
Surface Water Resources	8 unnamed tributary streams	16 unnamed tributary streams
Aquatic Resources	See text for a discussion of habitat and species	See text for a discussion of habitat and species
Wetland Resources	0 acres	0 acres
Terrestrial Biological Resources	See text for a discussion of species and community types	See text for a discussion of species and community types
Threatened and Endangered Species	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake *(Nerodia erythrogaster neglecta)*	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake *(Nerodia erythrogaster neglecta)*
Soils	Specific soil types cannot be identified	Specific soil types cannot be identified
Geology	Big Muddy River basin post-glacial till 4 miles of pipeline through mined areas	Big Muddy River basin post-glacial till; Shawnee Hills and associated bedrock strata 4 miles of pipeline through mined areas
Land Use	3 acres woodlands 4 acres cropland 0 structures 3 acres managed lands	10 acres woodland 14 acres cropland 0 structures 3 acres managed lands
Transportation	1 Interstate highway (I-57) 2 state highways 15 urban roads 2 rural roads 157 driveways 15 railroad crossings	1 Interstate highway (I-57) 2 state highways 21 urban roads 19 rural roads 193 driveways 15 railroad crossings
Cultural Resources	Phase I survey has not been conducted	Phase I survey has not been conducted
Recreation Opportunities	Rend Lake provides for water-sports as well as hunting, camping, and hiking	Rend Lake provides for water-sports as well as hunting, camping, and hiking

TABLE 2-3b Summary of Affected Resources – Each Alternative Rend Lake Raw Water Alternative		
	City of Marion	**Lake of Egypt Water District**
Additional Land Required	63 acres	85 acres
Surface Water Resources	29 river or stream crossings including: Big Muddy River Lake Creek Panel Creek Marcus Branch	37 river or stream crossings including: Big Muddy River Lake Creek Panel Creek Marcus Branch
Aquatic Resources	See text for a discussion of habitat and species	See text for a discussion of habitat and species
Wetland Resources	5 acres	5 acres
Terrestrial Biological Resources	See text for a discussion of species and community types	See text for a discussion of species and community types
Threatened and Endangered Species	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake *(Nerodia erythrogaster neglecta)*	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake *(Nerodia erythrogaster neglecta)*
Soils	Specific soil types cannot be identified	Specific soil types cannot be identified
Geology	Big Muddy River basin post-glacial till 15 miles of pipeline through mined areas	Big Muddy River basin post-glacial till; Shawnee Hills and associated bedrock strata 15 miles of pipeline through mined areas
Land Use	19 acres woodlands 20 acres cropland 0 structures 8 acres managed lands	26 acres woodland 30 acres cropland 0 structures 8 acres managed lands
Transportation	1 Interstate highway (I-57) 4 state highways 17 urban roads 11 rural roads 26 driveways 9 railroad crossings	1 Interstate highway (I-57) 4 state highways 23 urban roads 28 rural roads 62 driveways 9 railroad crossings
Cultural Resources	Phase I survey has not been conducted	Phase I survey has not been conducted
Recreation Opportunities	Rend Lake provides for water-sports as well as hunting, camping, and hiking	Rend Lake provides for water-sports as well as hunting, camping, and hiking

TABLE 2-3c
Summary of Affected Resources – Each Alternative
Cedar Lake Alternative

	City of Marion		Lake of Egypt Water District	
	North Route	South Route	North Route	South Route
Additional Land Required	58 acres	64 acres	80 acres	51 acres
Surface Water Resources	18 stream crossings 6 crossings of Crab Orchard Lake arms 1 crossing of Carbondale Reservoir	28 stream crossings	22 stream crossings 6 crossings of Crab Orchard Lake arms 1 crossing of Carbondale Reservoir	28 stream crossings
Aquatic Resources	See text for a discussion of habitat and species	See text for a discussion of habitat and species	See text for a discussion of habitat and species	See text for a discussion of habitat and species
Wetland Resources	4 acres	1 acre	4 acres	1 acre
Terrestrial Biological Resources	See text for a discussion of species and community types	See text for a discussion of species and community types	See text for a discussion of species and community types	See text for a discussion of species and community types
Threatened and Endangered Species	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake *(Nerodia erythrogaster neglecta)*	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake *(Nerodia erythrogaster neglecta)*	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake *(Nerodia erythrogaster neglecta)*	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake *(Nerodia erythrogaster neglecta)*
Soils	Specific soil types cannot be identified	Specific soil types cannot be identified	Specific soil types cannot be identified	Specific soil types cannot be identified
Geology	Big Muddy River basin post-glacial till	Big Muddy River basin post-glacial till; Shawnee Hills and associated bedrock strata	Big Muddy River basin post-glacial till	Big Muddy River basin post-glacial till; Shawnee Hills and associated bedrock strata
Land Use	18 acres woodlands 14 acres cropland 0 structures 19 acres managed lands	26 acres woodlands 24 acres cropland 0 structures 2 acres managed lands	25 acres woodlands 17 acres cropland 0 structures 20 acres managed lands	36 acres woodlands 28 acres cropland 0 structures 2 acres managed lands
Transportation	1 Interstate highway (I-57) 1 federal highway 2 state highways 15 urban roads 40 rural roads 157 driveways 2 railroad crossings	1 Interstate highway (I-57) 1 federal highway 6 state highways 15 urban roads 43 rural roads 50 driveways 2 railroad crossings	1 Interstate highway (I-57) 1 federal highway 2 state highways 15 urban roads 54 rural roads 193 driveways 2 railroad crossings	1 Interstate highway (I-57) 1 federal highway 2 state highways 6 urban roads 48 rural roads 61 driveways 3 railroad crossings
Cultural Resources	Phase I survey has not been conducted	Phase I survey has not been conducted	Phase I survey has not been conducted	Phase I survey has not been conducted
Recreation Opportunities	Crab Orchard Lake/ Wildlife Refuge provides for water-sports as well as hunting, camping, and hiking.	Crab Orchard Lake/ Wildlife Refuge provides for water-sports as well as hunting, camping, and hiking.	Crab Orchard Lake/ Wildlife Refuge provides for water-sports as well as hunting, camping, and hiking.	Crab Orchard Lake/ Wildlife Refuge provides for water-sports as well as hunting, camping, and hiking.

TABLE 2-3d Summary of Affected Resources – Each Alternative Cache River Alternative		
	City of Marion	**Lake of Egypt Water District**
Additional Land Required	84 acres for pipeline 70 acres for well field	64 acres 70 acres for well field
Surface Water Resources	21 stream crossings	18 stream crossings
Aquatic Resources	See text for a discussion of habitat and species	See text for a discussion of habitat and species
Wetland Resources	1 acre	1 acre
Terrestrial Biological Resources	See text for a discussion of species and community types	See text for a discussion of species and community types
Threatened and Endangered Species	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*): protected under 17 Ill. Adm. Code 880.70	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*): protected under 17 Ill. Adm. Code 880.70
Soils	Specific soil types within the corridor cannot be identified Well field soils include: Ginat silt loam, Weinbach silt loam, Wheeling silt loam	Specific soil types within the corridor cannot be identified Well field soils include: Ginat silt loam, Weinbach silt loam, Wheeling silt loam
Geology	Cache River basin, sand and gravel aquifer	Cache River basin, sand and gravel aquifer
Land Use	7 acres woodlands 48 acres cropland 0 structures 18 acres managed lands	7 acres woodland 46 acres cropland 0 structures 18 acres managed lands
Transportation	1 Interstate highway (I-57) 2 state highways 15 urban roads 50 rural roads 113 driveways	1 Interstate highway (I-57) 2 state highways 7 urban roads 34 rural roads 55 driveways
Cultural Resources	Phase I survey has not been conducted	Phase I survey has not been conducted
Recreation Opportunities	No recreational opportunities associated with this alternative	No recreational opportunities associated with this alternative

TABLE 2-3e Summary of Affected Resources – Each Alternative Saline Valley Conservancy District Treated Water Alternative		
	City of Marion	**Lake of Egypt Water District**
Additional Land Required	97 acres	92 acres
Surface Water Resources	37 river and stream crossings including: North Fork of the Saline River, Middle Fork of the Saline River	40 river and stream crossings including: North Fork of the Saline River, Middle Fork of the Saline River
Aquatic Resources	See text for a discussion of habitat and species	See text for a discussion of habitat and species
Wetland Resources	4 acres	3.5 acres
Terrestrial Biological Resources	See text for a discussion of species and community types	See text for a discussion of species and community types
Threatened and Endangered Species	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Rice Rat *(Oryzomys palustrine)* Loggerhead Shrike *(Lanius ludovicianus)* Copperbelly Watersnake (*Nerodia erythrogaster neglecta*): protected under 17 Ill. Adm. Code 880.70	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Rice Rat *(Oryzomys palustris)* Loggerhead Shrike *(Lanius ludovicianus)* Copperbelly Watersnake (*Nerodia erythrogaster neglecta*): protected under 17 Ill. Adm. Code 880.70 Least Brook Lamprey (*Lampetra aepytera*)
Soils	Specific soil types cannot be identified	Specific soil types cannot be identified
Geology	Mount Vernon Hill Country of the Central Lowland province 15.5 miles of pipeline through mined areas Oil fields in vicinity of well field	Mount Vernon Hill Country of the Central Lowland province 6.5 miles of pipeline through mined areas Oil fields in vicinity of well field
Land Use	Road/railroad right-of-way 0 structures	Road/railroad right-of-way 0 structures
Transportation	1 federal highway 23 urban roads 45 rural roads 204 driveways 4 railroad crossings	15 urban roads 23 rural roads 60 driveways 4 railroad crossings
Cultural Resources	Phase I survey has not been conducted	Phase I survey has not been conducted
Recreation Opportunities	No recreational opportunities associated with this alternative	No recreational opportunities associated with this alternative

TABLE 2-3f Summary of Affected Resources – Each Alternative Saline Valley Conservancy District Raw Water Alternative		
	City of Marion	**Lake of Egypt Water District**
Additional Land Required	97 acres	92 acres
Surface Water Resources	37 river and stream crossings including: North Fork of the Saline River, Middle Fork of the Saline River	40 river and stream crossings including: North Fork of the Saline River, Middle Fork of the Saline River
Aquatic Resources	See text for a discussion of habitat and species	See text for a discussion of habitat and species
Wetland Resources	4 acres	3.5 acres
Terrestrial Biological Resources	See text for a discussion of species and community types	See text for a discussion of species and community types
Threatened and Endangered Species	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Rice Rat *(Oryzomys palustris)* Loggerhead Shrike *(Lanius ludovicianus)* Copperbelly Watersnake (*Nerodia erythrogaster neglecta*): protected under 17 Ill. Adm. Code 880.70	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Rice Rat *(Oryzomys palustris)* Loggerhead Shrike *(Lanius ludovicianus)* Copperbelly Watersnake (*Nerodia erythrogaster neglecta*): protected under 17 Ill. Adm. Code 880.70 Least Brook Lamprey (*Lampetra aepytera*)
Soils	Specific soil types cannot be identified	Specific soil types cannot be identified
Geology	Mount Vernon Hill Country of the Central Lowland province 15.5 miles of pipeline through mined areas Oil fields in vicinity of well field	Mount Vernon Hill Country of the Central Lowland province 6.5 miles of pipeline through mined areas Oil fields in vicinity of well field
Land Use	Road/railroad right-of-way 0 structures	Road/railroad right-of-way 0 structures
Transportation	1 federal highway 23 urban roads 45 rural roads 204 driveways 4 railroad crossings	15 urban roads 23 rural roads 60 driveways 4 railroad crossings
Cultural Resources	Phase I survey has not been conducted	Phase I survey has not been conducted
Recreation Opportunities	No recreational opportunities associated with this alternative	No recreational opportunities associated with this alternative

TABLE 2-3g Summary of Affected Resources – Each Alternative Goreville Reservoir Alternative		
	City of Marion	**Lake of Egypt Water District**
Additional Land Required	585 acres for reservoir 32 acres for pipeline	585 acres for reservoir 6.5 acres for pipeline
Surface Water Resources	13 stream crossings Damming of Little Saline Creek	5 stream crossings Damming of Little Saline Creek
Aquatic Resources	See text for a discussion of habitat and species	See text for a discussion of habitat and species
Wetland Resources	44.2 acres for reservoir 1 acre for pipeline	44.2 acres for reservoir 4 acres for pipeline
Terrestrial Biological Resources	See text for a discussion of species and community types	See text for a discussion of species and community types
Threatened and Endangered Species	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*): protected under 17 Ill. Adm. Code 880.70 Henslow's sparrow (*Ammodramus henslowii*) Grass-leaved Lilly (*Stenanthium gramineum*) Black cohosh (*Cimicifuga rublifolia*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*): protected under 17 Ill. Adm. Code 880.70 Henslow's sparrow (*Ammodramus henslowii*) Grass-leaved Lilly (*Stenanthium gramineum*) Black cohosh (*Cimicifuga rublifolia*)
Soils	Reservoir soils include silty loams Specific soil types within the corridors cannot be identified	Reservoir soils include silty loams Specific soil types within the corridors cannot be identified
Geology	Southern Rim of the Illinois Basin, underlain with Pennsylvania bedrock	Southern Rim of the Illinois Basin, underlain with Pennsylvania bedrock
Land Use	Reservoir contains 301 acres woodlands, 178.5 acres croplands, 1 house and 3 structures Road/railroad right-of-way for pipeline	Reservoir contains 301 acres woodlands, 178.5 acres croplands, 1 house and 3 structures Road/railroad right-of-way for pipeline
Transportation	1 interstate highway 9 urban roads 24 rural roads 76 driveways 1 railroad crossing Reservoir inundates 5 local roads	1 interstate highway 4 rural roads 14 driveways 1 railroad crossing Reservoir inundates 5 local roads
Cultural Resources	Phase I survey has not been conducted	Phase I survey has not been conducted
Recreation Opportunities	No recreational opportunities associated with this alternative	No recreational opportunities associated with this alternative

TABLE 2-3h Summary of Affected Resources – Each Alternative Sugar Creek Reservoir Alternative		
	City of Marion	**Lake of Egypt Water District**
Additional Land Required	1,375 acres for reservoir 30 acres for pipeline	1,067 acres for reservoir 4.5 acres for pipeline
Surface Water Resources	14 stream crossings Damming of Sugar Creek	1 stream crossing Damming of Sugar Creek
Aquatic Resources	See text for a discussion of habitat and species	See text for a discussion of habitat and species
Wetland Resources	40.38 acres for reservoir 1 acre for pipeline	30 acres for reservoir <1 acre for pipeline
Terrestrial Biological Resources	See text for a discussion of species and community types	See text for a discussion of species and community types
Threatened and Endangered Species	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*): protected under 17 Ill. Adm. Code 880.70 Least Brook Lamprey (*Lampetra aepytera*) Indiana Crayfish (*Orconectes indianesis*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*): protected under 17 Ill. Adm. Code 880.70 Least Brook Lamprey (*Lampetra aepytera*) Indiana Crayfish (*Orconectes indianesis*)
Soils	Reservoir soils include Sharon silt loam and Belknap silt loam Specific soil types within the corridors cannot be identified	Reservoir soils include Sharon silt loam and Belknap silt loam Specific soil types within the corridors cannot be identified
Geology	Reservoir site is at the southern limit of the Illinois Basin	Reservoir site is at the southern limit of the Illinois Basin
Land Use	Reservoir contains 415 acres woodlands and 533 acres agricultural land Pipeline corridor contains 1.5 acres woodlands and 3 acres agricultural land	Reservoir contains 250 acres woodlands and 271 acres agricultural land Pipeline corridor contains 3.5 acres woodlands
Transportation	1 state highway 6 urban roads 8 rural roads 2 driveways	2 rural roads 2 driveways
Cultural Resources	Phase III mitigation activities have been completed	Phase III mitigation activities have been completed
Recreation Opportunities	Reservoir site is used for hunting and fishing, Tunnel Hill Bike Trail will pass through the area	Reservoir site is used for hunting and fishing, Tunnel Hill Bike Trail will pass through the area

COMBINATIONS OF FEASIBLE ALTERNATIVES

2.097 The preceding discussion of feasible alternatives presented the affected resources for each feasible alternative as a separate action, supplying either the City of Marion or LEWD. In considering the six feasible alternatives, several combinations can be devised to supply the City of Marion from one source and LEWD from a separate source. Table 2-4 presents the resource impacts associated with the scenario of utilizing two of the six feasible alternatives to supply both the City of Marion and LEWD. Most of the environmental categories established in paragraph 2.055 are covered, a separate page for each category. Four of the categories (aquatic resources, terrestrial resources, soils, and cultural resources) are not summarized on these tables. The length and depth of the aquatic and terrestrial resources information prohibits its presentation in tabular form. Soils data are not included because the narrow width of the pipeline corridors limits the ability to determine the actual soil types on available mapping for the majority of the feasible alternatives. Cultural resources are not presented since none of the feasible alternatives, except for the Sugar Creek alternative, have had field surveys conducted. The data presented in Table 2-4 is thoroughly discussed in Sections three and four of this document. The gray-shaded boxes in Table 2-4 represent supplying both the City of Marion and potential customer LEWD from a single, common source. A discussion of this option is presented below.

SINGLE SOURCE SUPPLYING THE CITY OF MARION AND POTENTIAL CUSTOMER LAKE OF EGYPT WATER DISTRICT

2.098 Five of the six feasible alternatives possess sufficient water to supply both the City of Marion and LEWD from a single source. A brief discussion of the actions necessary to provide this supply is presented in the following paragraphs. The gray-shaded boxes in Table 2-4 provide a summary of the resource impacts associated with supplying Marion and LEWD with water from the same single source.

Treated Water From Rend Lake Conservancy District

2.099 The City of Marion would tie into the RLCD distribution system near Johnston City and install a 6.8 mile long 24-in. diameter pipeline system, including a stillwell and one pump station, to transport treated water to the City of Marion. An additional 9.2 miles of 18-in. diameter pipeline is needed to transport treated water to LEWD. The pipeline route from the junction point with the RLCD system to LEWD is depicted in Exhibit 2-4a and 2-4b (labeled Alternative A). Approximately 4 miles of pipeline would be installed through mined areas. The FEIS and Supplement I provide a complete description of the environmental resources affected by the Rend Lake treated water alternative. Table 2-4 at the end of this section provides a summary of the resources impacted by this alternative.

Raw Water From Rend Lake

2.100 A new intake at the southern end of the lake would require an approximately 25.9 mile long 24-in. diameter pipeline system and one pump station to transport water to the City of Marion treatment facilities. An additional 9.2 mile long 18-in. diameter pipeline and one additional pump station would be needed to transport raw water to the LEWD treatment

facilities. The pipeline route from Rend Lake to the City of Marion and LEWD is depicted in Exhibit 2-4a and 2-4b (Alternative B). Approximately 15 miles of pipeline would be installed through mined areas. The FEIS and Supplement I provide a complete description of the environmental resources affected by the Rend Lake raw water alternative. Table 2-4 at the end of this section provides a summary of the resources impacted by this alternative.

Obtain Water From Cedar Lake

Northern Route

2.101 New easements would be required for an approximately 23.8 mile long 24-in. diameter pipeline system along the north border of the Crab Orchard Wildlife Refuge to the City of Marion water treatment facilities. An additional 6.7 mile long 18-in. diameter pipeline would be needed to transport water to the LEWD treatment facilities. The pipeline route from Cedar Lake to Marion and LEWD is shown in Exhibit 2-5 (Alternatives 3 and C). The FEIS and Supplement I provide a complete description of the environmental resources affected by the Cedar Lake - Northern Route alternative. Table 2-4 at the end of this section provides a summary of the resources impacted by this alternative.

Southern Route

2.102 New easements would be required for an approximately 26 mile long 24-in. diameter pipeline system to the City of Marion water treatment facilities. An additional 3.3 mile long 14-in. pipeline would be needed to transport water to the LEWD treatment facilities. The pipeline route from Cedar Lake to Marion and LEWD is shown in Exhibit 2-5 (Alternatives 4 and D). The FEIS and Supplement I provide a complete description of the environmental resources affected by the Cedar Lake - Southern Route alternative. Table 2-4 at the end of this section provides a summary of the resources impacted by this alternative.

Obtain Water From Cache River Aquifer

2. 103 A pipeline system would need to be built from the Cache River well field to water treatment facilities for both the City of Marion and LEWD. New easements would be required for an approximately 34.5 mile long 24-in. diameter pipeline system to transport water to the City of Marion treatment facilities. This pipeline route passes proximal to the LEWD treatment facilities. A 14-in. diameter branch pipeline approximately 3.1 miles in length would be needed to transport raw water to the LEWD treatment facilities. The pipeline route from the well field to Marion and LEWD is shown in Exhibit 2-6a and 2-6b (Alternatives 5 and E). The FEIS and Supplement I provide a complete description of the environmental resources affected by the Cache River alternative. Table 2-4 at the end of this section provides a summary of the resources impacted by this alternative.

Treated Water From Saline Valley

2.104 This option involves the purchase of treated water from SVCD. In order for SVCD to secure the volume of water demanded by Marion and LEWD, SVCD would have to install a new raw water line approximately 8 miles long from the well fields near Junction to the water treatment plant in Equality. Additional water lines would then be installed to deliver the finished

water from Equality to the Marion treatment plant and from Marion to the LEWD treatment plant. Approximately 32 miles of 24-in. diameter pipeline would need to be installed from the water treatment plant in Equality to Marion. Approximately nine miles of 18-in. diameter pipeline would need to be installed to deliver the water from Marion to the LEWD treatment plant. The three segments of water line would be installed in easements along Illinois 13 and various existing county and state roads in order to utilize the right-of-way. The pipeline route is shown in Exhibit 2-7a and 2-7b (Alternatives 6 and 6F). Table 2-4 at the end of this section provides a summary of the resources impacted by this alternative.

2.105 Approximately 15.5 miles of pipeline would be installed through mined out areas. Subsidence of the mined areas could increase the chance of line ruptures and the amount of maintenance required operating the pipeline.

Raw Water From Saline Valley

2.106 This alternative would require installing an approximately 40 mile long 24-in. diameter raw water pipeline from the well fields near Junction to Marion. The corridor parallels Illinois 13 between the two cities and the water line would be placed in the highway right-of-way. An additional 9 mile long 18-in. diameter pipeline would connect the City of Marion water treatment plant with the LEWD treatment facilities. The pipeline corridor is shown in Exhibit 2-9a and 2-9b (Alternatives 7 and 7G). Table 2-4 at the end of this section provides a summary of the resources impacted by this alternative.

2.107 The pipeline route would cross areas of surface and underground mines located east of Marion, along the Illinois 13 corridor between Junction and Marion (see Exhibit 2-8a and 2-8b). Approximately 15.5 miles of pipeline would be installed through mined out areas. Subsidence of the mined areas could increase the chance of line ruptures and the amount of maintenance required to operate the pipeline.

Develop a Reservoir on Sugar Creek

2.108 A new reservoir with a 496 ft (msl) pool elevation would provide a sufficient water supply for the City of Marion and LEWD. The City of Marion would be responsible for the construction and operation of the project. A new reservoir on Sugar Creek would require a 20-in. diameter pipeline corridor about 12.2 miles long to connect to the existing water treatment plant in Marion. A 12-in. diameter pipeline approximately 1.1 miles in length would be used to transport water from the proposed new reservoir on Sugar Creek to the Lake of Egypt. The pipeline would discharge directly into Lake of Egypt so that LEWD would avoid removing volumes of water in excess of their agreement with SIPC. The pipeline routes are shown in Exhibit 2-11 (Alternatives 9 and I). The FEIS and Supplement I provide a complete description of the environmental resources affected by the Sugar Creek alternative. Table 2-4 at the end of this section provides a summary of the resources impacted by this alternative.

SUMMARY

2.109 The gray shaded boxes in Table 2-4 present a summary of the affected resources for utilizing a single water source to supply both the City of Marion and LEWD. Each page of the table presents a different resource.

TABLE 2-4
Land Resources Required
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

			Lake of Egypt Water District							
			Rend Lake Alternative		Cedar Lake Alternative		Cache River Alternative	Saline Valley Conservancy District Alternative	Goreville Reservoir Alternative	Sugar Creek Reservoir Alternative
			Treated Water	Raw Water	Northern Route	Southern Route				
City of Marion	Sugar Creek Reservoir Alternative		67 acres for pipeline 1,375 acres for reservoir	115 acres for pipeline 1,375 acres for reservoir	110 acres for pipeline 1,375 acres for reservoir	81 acres for pipeline 1,375 acres for reservoir	94 acres for pipeline 70 acres for well field 1,375 acres for reservoir	112 acres for pipeline 1,375 for reservoir	36.5 acres for pipeline 585 acres for reservoir 1,375 acres for reservoir	33 acres for pipeline 1,375 acres for reservoir
City of Marion	Goreville Reservoir Alternative		69 acres for pipeline 585 acres for reservoir	117 acres for pipeline 585 acres for reservoir	112 acres for pipeline 585 acres for reservoir	83 acres for pipeline 585 acres for reservoir	96 acres for pipeline 70 acres for well field 585 acres for reservoir	124 acres for pipeline 585 acres for pipeline	NOT APPLICABLE	36.5 acres for pipeline 585 acres for reservoir 1,067 acres for reservoir
City of Marion	Saline Valley Conservancy District Alternative		134 acres for pipeline	182 acres for pipeline	177 acres for pipeline	148 acres for pipeline	161 acres for pipeline 70 acres for well field	119 acres for pipeline	103.5 acres for pipeline 585 acres for reservoir	101.5 acres for pipeline 1,067 acres for reservoir
City of Marion	Cache River Alternative		121 acres for pipeline 70 acres for well field	169 acres for pipeline 70 acres for well field	164 acres for pipeline 70 acres for well field	135 acres for pipeline 70 acres for well field	87 acres for pipeline 70 acres for well field	176 acres for pipeline 70 acres for well field	90.5 acres for pipeline 70 acres for well field 585 acres for reservoir	88.5 acres for pipeline 70 acres for well field 1,067 acres for reservoir
City of Marion	Cedar Lake Alternative	Southern Route	101 acres for pipeline	149 acres for pipeline	144 acres for pipeline	72 acres for pipeline	128 acres for pipeline 70 acres for well field	156 acres for pipeline	72.5 acres for pipeline 585 acres for reservoir	68.5 acres for pipeline 1,067 acres for reservoir
City of Marion	Cedar Lake Alternative	Northern Route	95 acres for pipeline	143 acres for pipeline	80 acres for pipeline	109 acres for pipeline	122 acres for pipeline 70 acres for well field	150 acres for pipeline	64.5 acres for pipeline 585 acres for reservoir	62.5 acres for pipeline 1,067 acres for reservoir
City of Marion	Rend Lake Alternative	Raw Water	100 acres for pipeline	85 acres for pipeline	143 acres for pipeline	114 acres for pipeline	127 acres for pipeline 70 acres for well field	155 acres for pipeline	69.5 acres for pipeline 585 acres for reservoir	67.5 acres for pipeline 1,067 acres for reservoir
City of Marion	Rend Lake Alternative	Treated Water	37 acres for pipeline	100 acres for pipeline	95 acres for pipeline	66 acres for pipeline	79 acres for pipeline 70 acres for well field	107 acres for pipeline	21.5 acres for pipeline 585 acres for reservoir	19.5 acres for pipeline 1,067 acres for reservoir

- Shaded cells indicate the City of Marion and Lake of Egypt Water District developing the same source.

TABLE 2-4
Surface Water Resources Affected
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

			Lake of Egypt Water District							
			Rend Lake Alternative		Cedar Lake Alternative		Cache River Alternative	Saline Valley Conservancy District Alternative	Goreville Reservoir Alternative	Sugar Creek Reservoir Alternative
			Treated Water	Raw Water	Northern Route	Southern Route				
City of Marion	Sugar Creek Reservoir Alternative		16 unnamed tributary stream crossings 14 stream crossings Damming of Sugar Creek	51 river or stream crossings Damming of Sugar Creek	36 stream crossings 6 crossings of Crab Orchard Lake 1 crossing of Carbondale Reservoir Damming of Sugar Creek	42 stream crossings Damming of Sugar Creek	32 stream crossings Damming of Sugar Creek	54 river or stream crossings Damming of Sugar Creek	19 stream crossings Damming of Sugar Creek Damming of Little Saline Creek	14 stream crossings Damming Sugar Creek
	Goreville Reservoir Alternative		16 unnamed tributary stream crossings 13 stream crossings Damming of Little Saline Creek	50 river or stream crossings Damming of Little Saline Creek	35 stream crossings 6 crossings of Crab Orchard Lake 1 crossing of Carbondale Reservoir Damming of Little Saline Creek	41 stream crossings Damming of Little Saline Creek	31 stream crossings Damming of Little Saline Creek	53 river or stream crossings Damming of Little Saline Creek	NOT APPLICABLE	14 stream crossings Damming of Little Saline Creek Damming of Sugar Creek
	Saline Valley Conservancy District Alternative		16 unnamed tributary stream crossings 37 river or stream crossings	74 river or stream crossings	59 river or stream crossings 6 crossings of Crab Orchard Lake 1 crossing of Carbondale Reservoir	65 river or stream crossings	55 river or stream crossings	42 river or stream crossings North and Middle Forks of the Saline River	23 river or stream crossings Damming of Little Saline Creek	19 river or stream crossings Damming of Sugar Creek
	Cache River Alternative		16 unnamed tributary stream crossings 21 stream crossings	58 river or stream crossings	43 stream crossings 6 crossings of Crab Orchard Lake 1 crossing of Carbondale Reservoir	49 stream crossings	22 stream crossings	61 river or stream crossings	26 river or stream crossings Damming of Little Saline Creek	22 stream crossings Damming of Sugar Creek
	Cedar Lake Alternative	Southern Route	16 unnamed tributary stream crossings 28 stream crossings	65 river or stream crossings	50 stream crossings 6 crossings of Crab Orchard Lake 1 crossing of Carbondale Reservoir	28 stream crossings	46 stream crossings	68 river or stream crossings	33 stream crossings Damming of Little Saline Creek	29 stream crossings Damming of Sugar Creek
		Northern Route	16 unnamed tributary stream crossings 18 stream crossings 6 crossings of Crab Orchard Lake 1 crossing of Carbondale Reservoir	55 river or stream crossings 6 crossings of Crab Orchard Lake 1 crossing of Carbondale Reservoir	22 stream crossings 6 crossings of Crab Orchard Lake 1 crossing of Carbondale Reservoir	46 stream crossings 6 crossings of Crab Orchard Lake 1 crossing of Carbondale Reservoir	36 stream crossings 6 crossings of Crab Orchard Lake 1 crossing of Carbondale Reservoir	58 river or stream crossings 6 crossings of Crab Orchard Lake 1 crossing of Carbondale Reservoir	23 stream crossings 6 crossings of Crab Orchard Lake 1 crossing of Carbondale Reservoir Damming of Little Saline Creek	19 stream crossings 6 crossings of Crab Orchard Lake 1 crossing of Carbondale Reservoir Damming of Sugar Creek
	Rend Lake Alternative	Raw Water	16 unnamed tributary stream crossings 29 river or stream crossings	37 river or stream crossings Big Muddy River Marcus Branch Panel CreeK	29 river or stream crossings	57 river or stream crossings	47 river or stream crossings	69 river or stream crossings	34 river or stream crossings Damming of Little Saline Creek	30 river or stream crossings Damming of Sugar Creek
		Treated Water	16 unnamed tributary stream crossings	8 unnamed tributary stream crossings 37 river or stream crossings	8 unnamed tributary stream crossings	8 unnamed tributary stream crossings 18 stream crossings	8 unnamed tributary stream crossings 18 stream crossings	8 unnamed tributary stream crossings 40 river or stream crossings	8 unnamed tributary stream crossings 5 stream crossings Damming of Little Saline Creek	8 unnamed tributary stream crossings 1 stream crossing Damming of Sugar Creek

- Shaded cells indicate the City of Marion and Lake of Egypt Water District developing the same source.

TABLE 2-4
Geological Resources Affected
Combinations of Feasible Alternatives (Separate Actions for the City of Marion and LEWD) and Combined Single Sources

			Lake of Egypt Water District							
			Rend Lake Alternative		Cedar Lake Alternative		Cache River Alternative	Saline Valley Conservancy District Alternative	Goreville Reservoir Alternative	Sugar Creek Reservoir Alternative
			Treated Water	Raw Water	Northern Route	Southern Route				
City of Marion	Sugar Creek Reservoir Alternative		Pipeline: 11.5 acres of woodlands 17 acres of cropland 3 acres of managed lands 0 homes/structures Reservoir: 415 acres of woodland 533 acres of cropland	Pipeline: 27.5 acres of woodlands 33 acres of cropland 8 acres of managed lands 0 homes/structures Reservoir: 415 acres of woodland 533 acres of cropland	Pipeline: 26.5 acres of woodlands 20 acres of cropland 20 acres of managed lands 0 homes/structures Reservoir: 415 acres of woodland 533 acres of cropland	Pipeline: 37.5 acres of woodlands 31 acres of cropland 2 acres of managed lands 0 homes/structures Reservoir: 415 acres of woodland 533 acres of cropland	Pipeline: 8.5 acres of woodlands 49 acres of cropland 18 acres of managed lands 0 homes/structures Reservoir: 415 acres of woodland 533 acres of cropland	Pipeline: 1.5 acres of woodlands 3 acres of cropland Road and railroad right-of-way 0 homes/structures Reservoir: 415 acres of woodland 533 acres of cropland	Pipeline: 1.5 acres of woodlands 3 acres of cropland Road and railroad right-of-way 1 home, 3 structures Reservoirs: 716 acres of woodland 711.5 acres of cropland	Pipeline: 5 acres of woodlands 3 acres of cropland Reservoir: 415 acres of woodlands 533 acres ofcropland
	Goreville Reservoir Alternative		Pipeline: 10 acres of woodlands 14 acres of cropland 3 acres of managed lands Road and railroad right-of-way Reservoir: 301 acres of woodland 178.5 acres of cropland 1 home, 3 structures	Pipeline: 26 acres of woodlands 30 acres of cropland 8 acres of managed lands Road and railroad right-of-way Reservoir: 301 acres of woodland 178.5 acres of cropland 1 home, 3 structures	Pipeline: 25 acres of woodlands 17 acres of cropland 20 acres of managed lands Road and railroad right-of-way Reservoir: 301 acres of woodland 178.5 acres of cropland 1 home, 3 structures	Pipeline: 36 acres of woodlands 28 acres of cropland 2 acres of managed lands Road and railroad right-of-way Reservoir: 301 acres of woodland 178.5 acres of cropland 1 home, 3 structures	Pipeline: 7 acres of woodlands 46 acres of cropland 18 acres of managed lands Road and railroad right-of-way Reservoir: 301 acres of woodland 178.5 acres of cropland 1 home, 3 structures	Pipeline: Road and railroad right-of-way Reservoir: 301 acres of woodland 178.5 acres of cropland 1 home, 3 structures	NOT APPLICABLE	Pipeline: 3.5 acres of woodlands Road and railroad right-of-way Reservoirs: 551 acres of woodland 449.5 acres of cropland 1 home, 3 structures
	Saline Valley Conservancy District Alternative		10 acres of woodlands 14 acres of cropland 3 acres of managed lands Road and railroad right-of-way 0 homes/structures	26 acres of woodlands 30 acres of cropland 8 acres of managed lands Road and railroad right-of-way 0 homes/structures	25 acres of woodlands 17 acres of cropland 20 acres of managed lands Road and railroad right-of-way 0 homes/structures	36 acres of woodlands 28 acres of cropland 2 acres of managed lands Road and railroad right-of-way 0 homes/structures	7 acres of woodlands 46 acres of cropland 18 acres of managed lands Road and railroad right-of-way 0 homes/structures	Road and railroad right-of-way	Pipeline: Road and railroad right-of-way Reservoir: 301 acres of woodland 178.5 acres of cropland 1 home, 3 structures	Pipeline: 3.5 acres of woodlands Road and railroad right-of-way Reservoir: 250 acres of woodland 271 acres of cropland 0 homes/structures
	Cache River Alternative		17 acres of woodlands 62 acres of cropland 21 acres of managed lands 0 homes/structures	33 acres of woodlands 78 acres of cropland 26 acres of managed lands 0 homes/structures	32 acres of woodlands 65 acres of cropland 38 acres of managed lands 0 homes/structures	43 acres of woodlands 76 acres of cropland 20 acres of managed lands 0 homes/structures	8 acres of woodlands 50 acres of cropland 18 acres of managed lands 0 homes/structures	7 acres of woodlands 48 acres of cropland 18 acres of managed lands 0 homes/structures Road and railroad right-of-way	Pipeline: 7 acres of woodlands 48 acres of cropland 18 acres of managed lands Road and railroad right-of-way Reservoir: 301 acres of woodland 178.5 acres of cropland 1 home, 3 structures	Pipeline: 10.5 acres of woodlands 48 acres of cropland 18 acres of managed lands Reservoir: 250 acres of woodland 271 acres of cropland 0 homes/structures
	Cedar Lake Alternative	Southern Route	36 acres of woodlands 38 acres of cropland 5 acres of managed lands 0 homes/structures	52 acres of woodlands 54 acres of cropland 10 acres of managed lands 0 homes/structures	51 acres of woodlands 41 acres of cropland 22 acres of managed lands 0 homes/structures	36 acres of woodlands 28 acres of cropland 2 acres of managed lands 0 homes/structures	33 acres of woodlands 70 acres of cropland 20 acres of managed lands 0 homes/structures	26 acres of woodlands 24 acres of cropland 2 acres of managed lands 0 homes/structures Road and railroad right-of-way	Pipeline: 26 acres of woodlands 24 acres of cropland 2 acres of managed lands Road and railroad right-of-way Reservoir: 301 acres of woodlands 178.5 acres of cropland 1 home, 3 structures	Pipeline: 29.5 acres of woodlands 24 acres of cropland 2 acres of managed lands Reservoir: 250 acres of woodland 271 acres of cropland 0 homes/structures
		Northern Route	28 acres of woodlands 28 acres of cropland 22 acres of managed lands 0 homes/structures	44 acres of woodlands 44 acres of cropland 27 acres of managed lands 0 homes/structures	25 acres of woodlands 17 acres of cropland 20 acres of managed lands 0 homes/structures	54 acres of woodlands 42 acres of cropland 21 acres of managed lands 0 homes/structures	25 acres of woodlands 60 acres of cropland 37 acres of managed lands 0 homes/structures	18 acres of woodlands 14 acres of cropland 19 acres of managed lands 0 homes/structures Road and railroad right-of-way	18 acres of woodlands 14 acres of cropland 19 acres of managed lands 0 homes/structures	Pipeline: 21.5 acres of woodlands 14 acres of cropland 19 acres of managed lands Reservoir: 250 acres of woodland 271 acres of cropland 0 homes/structures
	Rend Lake Alternative	Raw Water	29 acres of woodlands 34 acres of cropland 11 acres of managed lands 0 homes/structures	26 acres of woodlands 30 acres of cropland 8 acres of managed lands 0 homes/structures	44 acres of woodlands 37 acres of cropland 28 acres of managed lands 0 homes/structures	55 acres of woodlands 48 acres of cropland 10 acres of managed lands 0 homes/structures	26 acres of woodlands 66 acres of cropland 26 acres of managed lands 0 homes/structures	19 acres of woodlands 20 acres of cropland 8 acres of managed lands 0 homes/structures Road and railroad right-of-way	19 acres of woodlands 20 acres of cropland 8 acres of managed lands 0 homes/structures	Pipeline: 22.5 acres of woodlands 20 acres of cropland 8 acres of managed lands Reservoir: 250 acres of woodland 271 acres of cropland 0 homes/structures
		Treated Water	10 acres of woodlands 14 acres of cropland 3 acres of managed lands 0 homes/structures	29 acres of woodlands 34 acres of cropland 11 acres of managed lands 0 homes/structures	28 acres of woodlands 21 acres of cropland 23 acres of managed lands 0 homes/structures	39 acres of woodlands 32 acres of cropland 5 acres of managed lands 0 homes/structures	10 acres of woodlands 50 acres of cropland 21 acres of managed lands 0 homes/structures	3 acres of woodlands 4 acres of cropland 3 acres of managed lands 0 homes/structures Road and railroad right-of-way	3 acres of woodlands 4 acres of cropland 3 acres of managed lands 0 homes/strucutres	Pipeline: 6.5 acres of woodlands 4 acres of cropland 3 acres of managed lands Reservoir: 250 acres of woodland 271 acres of cropland 0 homes/structures

TABLE 2-4
Geological Resources Affected
Combinations of Feasible Alternatives (Separate Actions for the City of Marion and LEWD) and Combined Single Sources

City of Marion		Lake of Egypt Water District							
		Rend Lake Alternative		Cedar Lake Alternative		Cache River Alternative	Saline Valley Conservancy District Alternative	Goreville Reservoir Alternative	Sugar Creek Reservoir Alternative
		Treated Water	Raw Water	Northern Route	Southern Route				
Sugar Creek Reservoir Alternative		Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata 4 miles of pipeline through mined areas Southern limit of the Illinois Basin	Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata 15 miles of pipeline through mined areas Southern limit of the Illinois Basin	Big Muddy River basin post-glacial till Southern limit of the Illinois Basin	Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata Southern limit of the Illinois Basin	Cache River basin, sand and gravel aquifer Southern limit of the Illinois Basin	Mount Vernon Hill Country of the Central Lowland province 6.5 miles of pipeline through mined areas Oil fields in vicinity of well field Southern limit of the Illinois Basin	Southern Rim of the Illinois Basin – underlain with Pennsylvania bedrock	Southern limit of the Illinois basin
Goreville Reservoir Alternative		Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata 4 miles of pipeline through mined areas Southern Rim of the Illinois Basin – underlain with Pennsylvania bedrock	Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata 15 miles of pipeline through mined areas Southern Rim of the Illinois Basin – underlain with Pennsylvania bedrock	Big Muddy River basin post-glacial till Southern Rim of the Illinois Basin – underlain with Pennsylvania bedrock	Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata Southern Rim of the Illinois Basin – underlain with Pennsylvania bedrock	Cache River basin, sand and gravel aquifer Southern Rim of the Illinois Basin – underlain with Pennsylvania bedrock	Mount Vernon Hill Country of the Central Lowland province 6.5 miles of pipeline through mined areas Oil fields in vicinity of well field Southern Rim of the Illinois Basin – underlain with Pennsylvania bedrock	NOT APPLICABLE	Southern Rim of the Illinois Basin – underlain with Pennsylvania bedrock
Saline Valley Conservancy District Alternative		Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata 19.5 miles of pipeline through mined areas Mount Vernon Hill Country of the Central Lowland province Oil fields in vicinity of well field	Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata 30.5 miles of pipeline through mined areas Mount Vernon Hill Country of the Central Lowland province Oil fields in vicinity of well field	Big Muddy River basin post-glacial till Mount Vernon Hill Country of the Central Lowland province 15.5 miles of pipeline through mined areas Oil fields in vicinity of well field	Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata Mount Vernon Hill Country of the Central Lowland province 15.5 miles of pipeline through mined areas Oil fields in vicinity of well field	Cache River basin, sand and gravel aquifer Mount Vernon Hill Country of the Central Lowland province 15.5 miles of pipeline through mined areas Oil fields in vicinity of well field	Mount Vernon Hill Country of the Central Lowland province 15.5 miles of pipeline through mined areas Oil fields in vicinity of well field	Southern Rim of the Illinois Basin – underlain with Pennsylvania bedrock Mount Vernon Hill Country of the Central Lowland province 15.5 miles of pipeline through mined areas Oil fields in vicinity of well field	Southern limit of the Illinois basin Mount Vernon Hill Country of the Central Lowland province 15.5 miles of pipeline through mined areas Oil fields in vicinity of well field
Cache River Alternative		Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata 4 miles of pipeline through mined areas Cache River basin, sand and gravel aquifer	Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata 15 miles of pipeline through mined areas Cache River basin, sand and gravel aquifer	Big Muddy River basin post-glacial till Cache River basin, sand and gravel aquifer	Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata Cache River basin, sand and gravel aquifer	Cache River basin, sand and gravel aquifer	Mount Vernon Hill Country of the Central Lowland province 6.5 miles of pipeline through mined areas Oil fields in vicinity of well field Cache River basin, sand and gravel aquifer	Southern Rim of the Illinois Basin – underlain with Pennsylvania bedrock Cache River basin, sand and gravel aquifer	Southern limit of the Illinois basin Cache River basin, sand and gravel aquifer
Cedar Lake Alternative	Southern Route	Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata 4 miles of pipeline through mined areas	Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata 15 miles of pipeline through mined areas	Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata	Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata	Cache River basin, sand and gravel aquifer Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata	Mount Vernon Hill Country of the Central Lowland province Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata 6.5 miles of pipeline through mined areas Oil fields in vicinity of well field	Southern Rim of the Illinois Basin – underlain with Pennsylvania bedrock Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata	Southern limit of the Illinois basin Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata
	Northern Route	Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata 4 miles of pipeline through mined areas	Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata 15 miles of pipeline through mined areas	Big Muddy River basin post-glacial till	Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata	Cache River basin, sand and gravel aquifer Big Muddy River basin post-glacial till	Mount Vernon Hill Country of the Central Lowland province 6.5 miles of pipeline through mined areas Oil fields in vicinity of well field Big Muddy River basin post-glacial till	Southern Rim of the Illinois Basin – underlain with Pennsylvania bedrock Big Muddy River basin post-glacial till	Southern limit of the Illinois basin Big Muddy River basin post-glacial till
Rend Lake Alternative	Raw Water	Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata 19 miles of pipeline through mined areas	Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata 15 miles of pipeline through mined areas	Big Muddy River basin post-glacial till 15 miles of pipeline through mined areas	Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata 15 miles of pipeline through mined areas	Cache River basin, sand and gravel aquifer Big Muddy River basin post-glacial till 15 miles of pipeline through mined areas	Mount Vernon Hill Country of the Central Lowland province Big Muddy River basin post-glacial till 21.5 miles of pipeline through mined areas Oil fields in vicinity of well field	Southern Rim of the Illinois Basin – underlain with Pennsylvania bedrock Big Muddy River basin post-glacial till 15 miles of pipeline through mined areas	Southern limit of the Illinois basin Big Muddy River basin post-glacial till 15 miles of pipeline through mined areas
	Treated Water	Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata 4 miles of pipeline through mined areas	Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata 19 miles of pipeline through mined areas	Big Muddy River basin post-glacial till 4 miles of pipeline through mined areas	Big Muddy River basin post-glacial till Shawnee Hills and associated bedrock strata 4 miles of pipeline through mined areas	Cache River basin, sand and gravel aquifer Big Muddy River basin post-glacial till 4 miles of pipeline through mined areas	Mount Vernon Hill Country of the Central Lowland province 10.5 miles of pipeline through mined areas Oil fields in vicinity of well field Big Muddy River basin post-glacial till	Southern Rim of the Illinois Basin – underlain with Pennsylvania bedrock Big Muddy River basin post-glacial till 4 miles of pipeline through mined areas	Southern limit of the Illinois basin Big Muddy River basin post-glacial till 4 miles of pipeline through mined areas

- Shaded cells indicated the City of Marion and Lake of Egypt Water District developing the same source.

TABLE 2-4
Recreation Opportunities Affected
Combinations of Feasible Alternatives (Separate Actions for the City of Marion and LEWD) and Combined Single Sources

City of Marion			Lake of Egypt Water District							
			Rend Lake Alternative		Cedar Lake Alternative		Cache River Alternative	Saline Valley Conservancy District Alternative	Goreville Reservoir Alternative	Sugar Creek Reservoir Alternative
			Treated Water	Raw Water	Northern Route	Southern Route				
Sugar Creek Reservoir Alternative			Rend Lake provides for water sports as well as hunting, camping, and hiking Reservoir site is used for hunting and fishing IDNR Tunnel Hill Bike Trail will pass through the area	Rend Lake provides for water sports as well as hunting, camping, and hiking Reservoir site is used for hunting and fishing IDNR Tunnel Hill Bike Trail will pass through the area	Crab Orchard Lake and Wildlife Refuge provides for water sports as well as camping and hiking Reservoir site is used for hunting and fishing IDNR Tunnel Hill Bike Trail will pass through the area	Crab Orchard Lake and Wildlife Refuge provides for water sports as well as camping and hiking Reservoir site is used for hunting and fishing IDNR Tunnel Hill Bike Trail will pass through the area	Reservoir site is used for hunting and fishing IDNR Tunnel Hill Bike Trail will pass through the area	Reservoir site is used for hunting and fishing IDNR Tunnel Hill Bike Trail will pass through the area	Reservoir site is used for hunting and fishing IDNR Tunnel Hill Bike Trail will pass through the area	Reservoir site is used for hunting and fishing IDNR Tunnel Hill Bike Trail will pass through the area
Goreville Reservoir Alternative			Rend Lake provides for water sports as well as hunting, camping, and hiking	Rend Lake provides for water sports as well as hunting, camping, and hiking	Crab Orchard Lake and Wildlife Refuge provides for water sports as well as camping and hiking	Crab Orchard Lake and Wildlife Refuge provides for water sports as well as camping and hiking	No recreation opportunities are associated with this combination of alternatives	No recreation opportunities are associated with this combination of alternatives	NOT APPLICABLE	Reservoir site is used for hunting and fishing IDNR Tunnel Hill Bike Trail will pass through the area
Saline Valley Conservancy District Alternative			Rend Lake provides for water sports as well as hunting, camping, and hiking	Rend Lake provides for water sports as well as hunting, camping, and hiking	Crab Orchard Lake and Wildlife Refuge provides for water sports as well as camping and hiking	Crab Orchard Lake and Wildlife Refuge provides for water sports as well as camping and hiking	No recreation opportunities are associated with this combination of alternatives	No recreation opportunities are associated with this alternative	No recreation opportunities are associated with this combination of alternatives	Reservoir site is used for hunting and fishing IDNR Tunnel Hill Bike Trail will pass through the area
Cache River Alternative			Rend Lake provides for water sports as well as hunting, camping, and hiking	Rend Lake provides for water sports as well as hunting, camping, and hiking	Crab Orchard Lake and Wildlife Refuge provides for water sports as well as camping and hiking	Crab Orchard Lake and Wildlife Refuge provides for water sports as well as camping and hiking	No recreation opportunities are associated with this alternative	No recreation opportunities are associated with this combination of alternatives	No recreation opportunities are associated with this combination of alternatives	Reservoir site is used for hunting and fishing IDNR Tunnel Hill Bike Trail will pass through the area
Cedar Lake Alternative	Southern Route		Rend Lake and Crab Orchard Lake and Wildlife Refuge provide for water sports as well as hunting, camping and hiking	Rend Lake and Crab Orchard Lake and Wildlife Refuge provide for water sports as well as hunting, camping and hiking	Crab Orchard Lake and Wildlife Refuge provides for water sports as well as camping and hiking	Crab Orchard Lake and Wildlife Refuge provides for water sports as well as camping and hiking	Crab Orchard Lake and Wildlife Refuge provides for water sports as well as camping and hiking	Crab Orchard Lake and Wildlife Refuge provides for water sports as well as camping and hiking	Crab Orchard Lake and Wildlife Refuge provides for water sports as well as camping and hiking	Reservoir site is used for hunting and fishing IDNR Tunnel Hill Bike Trail will pass through the area Crab Orchard Lake and Wildlife Refuge provides for water sports as well as camping and hiking
Cedar Lake Alternative	Northern Route		Rend Lake and Crab Orchard Lake and Wildlife Refuge provide for water sports as well as hunting, camping and hiking	Rend Lake and Crab Orchard Lake and Wildlife Refuge provide for water sports as well as hunting, camping and hiking	Crab Orchard Lake and Wildlife Refuge provides for water sports as well as camping and hiking	Rend Lake and Crab Orchard Lake and Wildlife Refuge provide for water sports as well as hunting, camping and hiking	Crab Orchard Lake and Wildlife Refuge provides for water sports as well as camping and hiking	Crab Orchard Lake and Wildlife Refuge provides for water sports as well as camping and hiking	Crab Orchard Lake and Wildlife Refuge provides for water sports as well as camping and hiking	Reservoir site is used for hunting and fishing IDNR Tunnel Hill Bike Trail will pass through the area Crab Orchard Lake and Wildlife Refuge provides for water sports as well as camping and hiking
Rend Lake Alternative	Raw Water		Rend Lake provides for water sports as well as hunting, camping, and hiking	Rend Lake provides for water sports as well as hunting, camping, and hiking	Rend Lake and Crab Orchard Lake and Wildlife Refuge provide for water sports as well as hunting, camping and hiking	Rend Lake and Crab Orchard Lake and Wildlife Refuge provide for water sports as well as hunting, camping and hiking	Rend Lake provides for water sports as well as hunting, camping, and hiking	Rend Lake provides for water sports as well as hunting, camping, and hiking	Rend Lake provides for water sports as well as hunting, camping, and hiking	Reservoir site is used for hunting and fishing IDNR Tunnel Hill Bike Trail will pass through the area Rend Lake provides for water sports as well as hunting, camping, and hiking
Rend Lake Alternative	Treated Water		Rend Lake provides for water sports as well as hunting, camping, and hiking	Rend Lake provides for water sports as well as hunting, camping, and hiking	Rend Lake and Crab Orchard Lake and Wildlife Refuge provide for water sports as well as hunting, camping and hiking	Rend Lake and Crab Orchard Lake and Wildlife Refuge provide for water sports as well as hunting, camping and hiking	Rend Lake provides for water sports as well as hunting, camping, and hiking	Rend Lake provides for water sports as well as hunting, camping, and hiking	Rend Lake provides for water sports as well as hunting, camping, and hiking	Reservoir site is used for hunting and fishing IDNR Tunnel Hill Bike Trail will pass through the area Rend Lake provides for water sports as well as hunting, camping, and hiking

- Shaded cells indicated the City of Marion and Lake of Egypt Water District developing the same source.

TABLE 2-4
Wetland Resources Affected (Acres)
Combinations of Feasible Alternatives (Separate Actions for the City of Marion and LEWD) and Combined Single Sources

			Lake of Egypt Water District							
			Rend Lake Alternative		Cedar Lake Alternative		Cache River Alternative	Saline Valley Conservancy District Alternative	Goreville Reservoir Alternative	Sugar Creek Reservoir Alternative
			Treated Water	Raw Water	Northern Route	Southern Route				
City of Marion	Sugar Creek Reservoir Alternative		41.38	46.38	45.38	42.38	42.38	44.88	89.58	41.38
City of Marion	Goreville Reservoir Alternative		45.2	50.2	49.2	46.2	46.2	48.7	NOT APPLICABLE	75.2
City of Marion	Saline Valley Conservancy District Alternative		4	9	8	5	5	5.5	52.2	34
City of Marion	Cache River Alternative		1	6	5	2	5	4.5	49.2	31
City of Marion	Cedar Lake Alternative	Southern Route	1	6	5	1	2	4.5	49.2	31
City of Marion	Cedar Lake Alternative	Northern Route	4	9	4	5	5	7.5	52.2	34
City of Marion	Rend Lake Alternative	Raw Water	5	5	9	6	6	8.5	53.2	35
City of Marion	Rend Lake Alternative	Treated Water	0	5	4	1	1	3.5	48.2	30

- Shaded cells indicated the City of Marion and Lake of Egypt Water District developing the same source.

TABLE 2-4
Protected Species Potentially Affected
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

		Lake of Egypt Water District							
		Rend Lake Alternative		Cedar Lake Alternative		Cache River Alternative	Saline Valley Conservancy District Alternative	Goreville Reservoir Alternative	Sugar Creek Reservoir Alternative
		Treated Water	Raw Water	Northern Route	Southern Route				
City of Marion	Sugar Creek Reservoir Alternative	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Least Brook Lamprey (*Lampetra aepytera*) Indiana Crayfish (*Orconectes indianesis*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Least Brook Lamprey (*Lampetra aepytera*) Indiana Crayfish (*Orconectes indianesis*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Least Brook Lamprey (*Lampetra aepytera*) Indiana Crayfish (*Orconectes indianesis*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Least Brook Lamprey (*Lampetra aepytera*) Indiana Crayfish (*Orconectes indianesis*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Least Brook Lamprey (*Lampetra aepytera*) Indiana Crayfish (*Orconectes indianesis*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Least Brook Lamprey (*Lampetra aepytera*) Indiana Crayfish (*Orconectes indianesis*) Rice Rat (*Oryzomys palustris*) Loggerhead Shrike (*Lanius ludovicianus*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Henslow's Sparrow (*Ammodramus henslowii*) Grass-leaved Lilly (*Stenanthium gramineum*) Black Cohosh (*Cimicifuga rublifolia*) Least Brook Lamprey (*Lampetra aepytera*) Indiana Crayfish (*Orconectes indianesis*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Least Brook Lamprey (*Lampetra aepytera*) Indiana Crayfish (*Orconectes indianesis*)
	Goreville Reservoir Alternative	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Henslow's Sparrow (*Ammodramus henslowii*) Grass-leaved Lilly (*Stenanthium gramineum*) Black Cohosh (*Cimicifuga rublifolia*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Henslow's Sparrow (*Ammodramus henslowii*) Grass-leaved Lilly (*Stenanthium gramineum*) Black Cohosh (*Cimicifuga rublifolia*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Henslow's Sparrow (*Ammodramus henslowii*) Grass-leaved Lilly (*Stenanthium gramineum*) Black Cohosh (*Cimicifuga rublifolia*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Henslow's Sparrow (*Ammodramus henslowii*) Grass-leaved Lilly (*Stenanthium gramineum*) Black Cohosh (*Cimicifuga rublifolia*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Henslow's Sparrow (*Ammodramus henslowii*) Grass-leaved Lilly (*Stenanthium gramineum*) Black Cohosh (*Cimicifuga rublifolia*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Henslow's Sparrow (*Ammodramus henslowii*) Grass-leaved Lilly (*Stenanthium gramineum*) Black Cohosh (*Cimicifuga rublifolia*) Rice Rat (*Oryzomys palustris*) Loggerhead Shrike (*Lanius ludovicianus*) Least Brook Lamprey (*Lampetra aepytera*)	NOT APPLICABLE	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Henslow's Sparrow (*Ammodramus henslowii*) Grass-leaved Lilly (*Stenanthium gramineum*) Black Cohosh (*Cimicifuga rublifolia*) Least Brook Lamprey (*Lampetra aepytera*) Indiana Crayfish (*Orconectes indianesis*)
	Saline Valley Conservancy District	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Rice Rat (*Oryzomys palustris*) Loggerhead Shrike (*Lanius ludovicianus*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Rice Rat (*Oryzomys palustris*) Loggerhead Shrike (*Lanius ludovicianus*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Rice Rat (*Oryzomys palustris*) Loggerhead Shrike (*Lanius ludovicianus*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Rice Rat (*Oryzomys palustris*) Loggerhead Shrike (*Lanius ludovicianus*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Rice Rat (*Oryzomys palustris*) Loggerhead Shrike (*Lanius ludovicianus*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Rice Rat (*Oryzomys palustris*) Loggerhead Shrike (*Lanius ludovicianus*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Henslow's Sparrow (*Ammodramus henslowii*) Grass-leaved Lilly (*Stenanthium gramineum*) Black Cohosh (*Cimicifuga rublifolia*) Rice Rat (*Oryzomys palustris*) Loggerhead Shrike (*Lanius ludovicianus*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Least Brook Lamprey (*Lampetra aepytera*) Indiana Crayfish (*Orconectes indianesis*) Rice Rat (*Oryzomys palustris*) Loggerhead Shrike (*Lanius ludovicianus*)
	Cahce River Alternative	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Rice Rat (*Oryzomys palustris*) Loggerhead Shrike (*Lanius ludovicianus*) Least Brook Lamprey (*Lampetra aepytera*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Henslow's Sparrow (*Ammodramus henslowii*) Grass-leaved Lilly (*Stenanthium gramineum*) Black Cohosh (*Cimicifuga rublifolia*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Least Brook Lamprey (*Lampetra aepytera*) Indiana Crayfish (*Orconectes indianesis*)

- Shaded cells indicated the City of Marion and Lake of Egypt Water District developing the same source.

TABLE 2-4
Protected Species Potentially Affected (Continued)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

			Lake of Egypt Water District							
			Rend Lake Alternative		Cedar Lake Alternative		Cache River Alternative	Saline Valley Conservancy District Alternative	Goreville Reservoir Alternative	Sugar Creek Reservoir Alternative
			Treated Water	Raw Water	Northern Route	Southern Route				
City of Marion	Cedar Lake Alternative	Southern Route	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Rice Rat (*Oryzomys palustris*) Loggerhead Shrike (*Lanius ludovicianus*) Least Brook Lamprey (*Lampetra aepytera*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Henslow's Sparrow (*Ammodramus henslowii*) Grass-leaved Lilly (*Stenanthium gramineum*) Black Cohosh (*Cimicifuga rublifolia*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Least Brook Lamprey (*Lampetra aepytera*) Indiana Crayfish (*Orconectes indianesis*)
		Northern Route	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Rice Rat (*Oryzomys palustris*) Loggerhead Shrike (*Lanius ludovicianus*) Least Brook Lamprey (*Lampetra aepytera*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Henslow's Sparrow (*Ammodramus henslowii*) Grass-leaved Lilly (*Stenanthium gramineum*) Black Cohosh (*Cimicifuga rublifolia*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Least Brook Lamprey (*Lampetra aepytera*) Indiana Crayfish (*Orconectes indianesis*)
	Rend Lake Alternative	Raw Water	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Rice Rat (*Oryzomys palustris*) Loggerhead Shrike (*Lanius ludovicianus*) Least Brook Lamprey (*Lampetra aepytera*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Henslow's Sparrow (*Ammodramus henslowii*) Grass-leaved Lilly (*Stenanthium gramineum*) Black Cohosh (*Cimicifuga rublifolia*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Least Brook Lamprey (*Lampetra aepytera*) Indiana Crayfish (*Orconectes indianesis*)
		Treated Water	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Rice Rat (*Oryzomys palustris*) Loggerhead Shrike (*Lanius ludovicianus*) Least Brook Lamprey (*Lampetra aepytera*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Henslow's Sparrow (*Ammodramus henslowii*) Grass-leaved Lilly (*Stenanthium gramineum*) Black Cohosh (*Cimicifuga rublifolia*)	Indiana Bat (*Myotis sodalis*) Bald Eagle (*Haliaeetus leucocephalus*) Gray Bat (*Myotis grisecens*) Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Least Brook Lamprey (*Lampetra aepytera*) Indiana Crayfish (*Orconectes indianesis*)

- Shaded cells indicated the City of Marion and Lake of Egypt Water District developing the same source.

TABLE 2-4
Transportation Resources Affected
Combinations of Feasible Alternatives (Separate Actions for the City of Marion and LEWD) and Combined Single Source

		Lake of Egypt Water District							
		Rend Lake Alternative		Cedar Lake Alternative		Cache River Alternative	Saline Valley Conservancy District	Goreville Reservoir Alternative	Sugar Creek Reservoir Alternative
		Treated Water	Raw Water	Northern Route	Southern Route				
City of Marion	Sugar Creek Reservoir Alternative	LEWD: 1 Interstate highway (I-57) 2 State highways 15 urban roads 2 rural roads 157 driveways 15 railroad crossings MARION: 1 State highway 6 urban roads 8 rural roads 2 driveways	LEWD: 1 Interstate highway (I-57) 4 State highways 23 urban roads 28 rural roads 62 driveways 9 railroad crossings MARION: 1 State highway 6 urban roads 8 rural roads 2 driveways	LEWD: 1 Interstate highway (I-57) 1 Federal highway 2 State highways 15 urban roads 54 rural roads 193 driveways 2 railroad crossings MARION: 1 State highway 6 urban roads 8 rural roads 2 driveways	LEWD: 1 Interstate highway (I-57) 1 Federal highway 2 State highways 6 urban roads 48 rural roads 61 driveways 3 railroad crossings MARION: 1 State highway 6 urban roads 8 rural roads 2 driveways	LEWD: 1 Interstate highway (I-57) 2 State highways 7 urban roads 34 rural roads 55 driveways MARION: 1 State highway 6 urban roads 8 rural roads 2 driveways	LEWD: 15 urban roads 23 rural roads 60 driveways 4 railroad crossings MARION: 1 State highway 6 urban roads 8 rural roads 2 driveways	LEWD: 1 Interstate highway (I-24) 4 rural roads 14 driveways 1 railroad crossing Reservoir inundates 5 local roads MARION: 1 State highway 6 urban roads 8 rural roads 2 driveways	1 State highway 6 urban roads 10 rural roads 4 driveways
	Goreville Reservoir Alternative	LEWD: 1 Interstate highway (I-57) 2 State highways 15 urban roads 2 rural roads 157 driveways 15 railroad crossings MARION: 1 Interstate highway 9 urban roads 24 rural roads 76 driveways 1 railroad crossing Reservoir inundates 5 local roads	LEWD: 1 Interstate highway (I-57) 4 State highways 23 urban roads 28 rural roads 62 driveways 9 railroad crossings MARION: 1 Interstate highway 9 urban roads 24 rural roads 76 driveways 1 railroad crossing Reservoir inundates 5 local roads	LEWD: 1 Interstate highway (I-57) 1 Federal highway 2 State highways 15 urban roads 54 rural roads 193 driveways 2 railroad crossings MARION: 1 Interstate highway 9 urban roads 24 rural roads 76 driveways 1 railroad crossing Reservoir inundates 5 local roads	LEWD: 1 Interstate highway (I-57) 1 Federal highway 2 State highways 6 urban roads 48 rural roads 61 driveways 3 railroad crossings MARION: 1 Interstate highway 9 urban roads 24 rural roads 76 driveways 1 railroad crossing Reservoir inundates 5 local roads	LEWD: 1 Interstate highway (I-57) 2 State highways 7 urban roads 34 rural roads 55 driveways MARION: 1 Interstate highway 9 urban roads 24 rural roads 76 driveways 1 railroad crossing Reservoir inundates 5 local roads	LEWD: 15 urban roads 23 rural roads 60 driveways 4 railroad crossings MARION: 1 Interstate highway 9 urban roads 24 rural roads 76 driveways 1 railroad crossing Reservoir inundates 5 local roads	NOT APPLICABLE	LEWD: 2 rural roads 2 driveways MARION: 1 Interstate highway 9 urban roads 24 rural roads 76 driveways 1 railroad crossing Reservoir inundates 5 local roads
	Saline Valley Conservancy District Alternative	LEWD: 1 Interstate highway (I-57) 2 State highways 15 urban roads 2 rural roads 157 driveways 15 railroad crossings MARION: 1 Federal highway 23 urban roads 45 rural roads 204 driveways 4 railroad crossings	LEWD: 1 Interstate highway (I-57) 4 State highways 23 urban roads 28 rural roads 62 driveways 9 railroad crossings MARION: 1 Federal highway 23 urban roads 45 rural roads 204 driveways 4 railroad crossings	LEWD: 1 Interstate highway (I-57) 1 Federal highway 2 State highways 15 urban roads 54 rural roads 193 driveways 2 railroad crossings MARION: 1 Federal highway 23 urban roads 45 rural roads 204 driveways 4 railroad crossings	LEWD: 1 Interstate highway (I-57) 1 Federal highway 2 State highways 6 urban roads 48 rural roads 61 driveways 3 railroad crossings MARION: 1 Federal highway 23 urban roads 45 rural roads 204 driveways 4 railroad crossings	LEWD: 1 Interstate highway (I-57) 2 State highways 7 urban roads 34 rural roads 55 driveways MARION: 1 Federal highway 23 urban roads 45 rural roads 204 driveways 4 railroad crossings	1 Federal highway 24 urban roads 45 rural roads 204 driveways 4 railroad crossings	LEWD: 1 Interstate highway (I-24) 4 rural roads 14 driveways 1 railroad crossing Reservoir inundates 5 local roads MARION: 1 Federal highway 23 urban roads 45 rural roads 204 driveways 4 railroad crossings	LEWD: 2 rural roads 2 driveways MARION: 1 Federal highway 23 urban roads 45 rural roads 204 driveways 4 railroad crossings
	Cache River Alternative	LEWD: 1 Interstate highway (I-57) 2 State highways 15 urban roads 2 rural roads 157 driveways 15 railroad crossings MARION: 1 Interstate highway (I-57) 2 State highways 15 urban roads 50 rural roads 113 driveways	LEWD: 1 Interstate highway (I-57) 4 State highways 23 urban roads 28 rural roads 62 driveways 9 railroad crossings MARION: 1 Interstate highway (I-57) 2 State highways 15 urban roads 50 rural roads 113 driveways	LEWD: 1 Interstate highway (I-57) 1 Federal highway 2 State highways 15 urban roads 54 rural roads 193 driveways 2 railroad crossings MARION: 1 Interstate highway (I-57) 2 State highways 15 urban roads 50 rural roads 113 driveways	LEWD: 1 Interstate highway (I-57) 1 Federal highway 2 State highways 6 urban roads 48 rural roads 61 driveways 3 railroad crossings MARION: 1 Interstate highway (I-57) 2 State highways 15 urban roads 50 rural roads 113 driveways	1 Interstate highway (I-57) 2 State highways 15 urban roads 50 rural roads 113 driveways	LEWD: 15 urban roads 23 rural roads 60 driveways 4 railroad crossings MARION: 1 Interstate highway (I-57) 2 State highways 15 urban roads 50 rural roads 113 driveways	LEWD: 1 Interstate highway (I-24) 4 rural roads 14 driveways 1 railroad crossing Reservoir inundates 5 local roads MARION: 1 Interstate highway (I-57) 2 State highways 15 urban roads 50 rural roads 113 driveways	LEWD: 2 rural roads 2 driveways MARION: 1 Interstate highway (I-57) 2 State highways 15 urban roads 50 rural roads 113 driveways

- Shaded cells indicated the City of Marion and Lake of Egypt Water District developing the same source.

TABLE 2-4
Transportation Resources Affected
Combinations of Feasible Alternatives (Separate Actions for the City of Marion and LEWD) and Combined Single Source

			Lake of Egypt Water District							
			Rend Lake Alternative		Cedar Lake Alternative		Cache River Alternative	Saline Valley Conservancy District	Goreville Reservoir Alternative	Sugar Creek Reservoir Alternative
			Treated Water	Raw Water	Northern Route	Southern Route				
City of Marion	Cedar Lake Alternative	Southern Route	LEWD: 1 Interstate highway (I-57) 2 State highways 15 urban roads 2 rural roads 157 driveways 15 railroad crossings MARION: 1 Interstate highway (I-57) 1 Federal highway 6 State highways 15 urban roads 43 rural roads 50 driveways 2 railroad crossings	LEWD: 1 Interstate highway (I-57) 4 State highways 23 urban roads 28 rural roads 62 driveways 9 railroad crossings MARION: 1 Interstate highway (I-57) 1 Federal highway 6 State highways 15 urban roads 43 rural roads 50 driveways 2 railroad crossings	LEWD: 1 Interstate highway (I-57) 1 Federal highway 2 State highways 15 urban roads 54 rural roads 193 driveways 2 railroad crossings MARION: 1 Interstate highway (I-57) 1 Federal highway 6 State highways 15 urban roads 43 rural roads 50 driveways 2 railroad crossings	1 Interstate highway (I-57) 1 Federal highway 2 State highways 6 urban roads 48 rural roads 61 driveways 3 railroad crossings	LEWD: 1 Interstate highway (I-57) 2 State highways 7 urban roads 34 rural roads 55 driveways MARION: 1 Interstate highway (I-57) 1 Federal highway 6 State highways 15 urban roads 43 rural roads 50 driveways 2 railroad crossings	LEWD: 15 urban roads 23 rural roads 60 driveways 4 railroad crossings MARION: 1 Interstate highway (I-57) 1 Federal highway 6 State highways 15 urban roads 43 rural roads 50 driveways 2 railroad crossings	LEWD: 1 Interstate highway (I-24) 4 rural roads 14 driveways 1 railroad crossing Reservoir inundates 5 local roads MARION: 1 Interstate highway (I-57) 1 Federal highway 6 State highways 15 urban roads 43 rural roads 50 driveways 2 railroad crossings	LEWD: 2 rural roads 2 driveways MARION: 1 Interstate highway (I-57) 1 Federal highway 6 State highways 15 urban roads 43 rural roads 50 driveways 2 railroad crossings
		Northern Route	LEWD: 1 Interstate highway (I-57) 2 State highways 15 urban roads 2 rural roads 157 driveways 15 railroad crossings MARION: 1 Interstate highway (I-57) 1 Federal highway 2 State highways 15 urban roads 40 rural roads 157 driveways 2 railroad crossings	LEWD: 1 Interstate highway (I-57) 4 State highways 23 urban roads 28 rural roads 62 driveways 9 railroad crossings MARION: 1 Interstate highway (I-57) 1 Federal highway 2 State highways 15 urban roads 40 rural roads 157 driveways 2 railroad crossings	1 Interstate highway (I-57) 1 Federal highway 2 State highways 15 urban roads 54 rural roads 193 driveways 2 railroad crossings	LEWD: 1 Interstate highway (I-57) 1 Federal highway 2 State highways 6 urban roads 48 rural roads 61 driveways 3 railroad crossings MARION: 1 Interstate highway (I-57) 1 Federal highway 2 State highways 15 urban roads 40 rural roads 157 driveways 2 railroad crossings	LEWD: 1 Interstate highway (I-57) 2 State highways 7 urban roads 34 rural roads 55 driveways MARION: 1 Interstate highway (I-57) 1 Federal highway 2 State highways 15 urban roads 40 rural roads 157 driveways 2 railroad crossings	LEWD: 15 urban roads 23 rural roads 60 driveways 4 railroad crossings MARION: 1 Interstate highway (I-57) 1 Federal highway 2 State highways 15 urban roads 40 rural roads 157 driveways 2 railroad crossings	LEWD: 1 Interstate highway (I-24) 4 rural roads 14 driveways 1 railroad crossing Reservoir inundates 5 local roads MARION: 1 Interstate highway (I-57) 1 Federal highway 2 State highways 15 urban roads 40 rural roads 157 driveways 2 railroad crossings	LEWD: 2 rural roads 2 driveways MARION: 1 Interstate highway (I-57) 1 Federal highway 2 State highways 15 urban roads 40 rural roads 157 driveways 2 railroad crossings
	Rend Lake Alternative	Raw Water	LEWD: 1 Interstate highway (I-57) 2 State highways 15 urban roads 2 rural roads 157 driveways 15 railroad crossings MARION: 1 Interstate highway (I-57) 4 State highways 17 urban roads 11 rural roads 26 driveways 9 railroad crossings	1 Interstate highway (I-57) 4 State highways 23 urban roads 28 rural roads 62 driveways 9 railroad crossings	LEWD: 1 Interstate highway (I-57) 1 Federal highway 2 State highways 15 urban roads 54 rural roads 193 driveways 2 railroad crossings MARION: 1 Interstate highway (I-57) 4 State highways 17 urban roads 11 rural roads 26 driveways 9 railroad crossings	LEWD: 1 Interstate highway (I-57) 1 Federal highway 2 State highways 6 urban roads 48 rural roads 61 driveways 3 railroad crossings MARION: 1 Interstate highway (I-57) 4 State highways 17 urban roads 11 rural roads 26 driveways 9 railroad crossings	LEWD: 1 Interstate highway (I-57) 2 State highways 7 urban roads 34 rural roads 55 driveways MARION: 1 Interstate highway (I-57) 4 State highways 17 urban roads 11 rural roads 26 driveways 9 railroad crossings	LEWD: 15 urban roads 23 rural roads 60 driveways 4 railroad crossings MARION: 1 Interstate highway (I-57) 4 State highways 17 urban roads 11 rural roads 26 driveways 9 railroad crossings	LEWD: 1 Interstate highway (I-24) 4 rural roads 14 driveways 1 railroad crossing Reservoir inundates 5 local roads MARION: 1 Interstate highway (I-57) 4 State highways 17 urban roads 11 rural roads 26 driveways 9 railroad crossings	LEWD: 2 rural roads 2 driveways MARION: 1 Interstate highway (I-57) 4 State highways 17 urban roads 11 rural roads 26 driveways 9 railroad crossings
		Treated Water	1 Interstate highway (I-57) 2 State highways 21 urban roads 19 rural roads 193 driveways 15 railroad crossings	LEWD: 1 Interstate highway (I-57) 4 State highways 23 urban roads 28 rural roads 62 driveways 9 railroad crossings MARION: 1 Interstate highway (I-57) 2 State highways 15 urban roads 2 rural roads 157 driveways 15 railroad crossings	LEWD: 1 Interstate highway (I-57) 1 Federal highway 2 State highways 15 urban roads 54 rural roads 193 driveways 2 railroad crossings MARION: 1 Interstate highway (I-57) 2 State highways 15 urban roads 2 rural roads 157 driveways 15 railroad crossings	LEWD: 1 Interstate highway (I-57) 1 Federal highway 2 State highways 6 urban roads 48 rural roads 61 driveways 3 railroad crossings MARION: 1 Interstate highway (I-57) 2 State highways 15 urban roads 2 rural roads 157 driveways 15 railroad crossings	LEWD: 1 Interstate highway (I-57) 2 State highways 7 urban roads 34 rural roads 55 driveways MARION: 1 Interstate highway (I-57) 2 State highways 15 urban roads 2 rural roads 157 driveways 15 railroad crossings	LEWD: 15 urban roads 23 rural roads 60 driveways 4 railroad crossings MARION: 1 Interstate highway (I-57) 2 State highways 15 urban roads 2 rural roads 157 driveways 15 railroad crossings	LEWD: 1 Interstate highway (I-24) 4 rural roads 14 driveways 1 railroad crossing Reservoir inundates 5 local roads MARION: 1 Interstate highway (I-57) 2 State highways 15 urban roads 2 rural roads 157 driveways 15 railroad crossings	LEWD: 2 rural roads 2 driveways MARION: 1 Interstate highway (I-57) 2 State highways 15 urban roads 2 rural roads 157 driveways 15 railroad crossings

- Shaded cells indicated the City of Marion and Lake of Egypt Water District developing the same source.

COMBINATIONS OF MULTIPLE SOURCES

2.110 Combinations of alternatives, supplying Marion from one source and LEWD from a separate source, were previously discussed. This section will examine the potential for supplying Marion individually from multiple sources and LEWD individually from multiple sources. Seventeen preliminary single source alternatives have been previously identified (paragraph 2.006). Combining two of these preliminary alternatives generates 136 possible combinations for the City of Marion and 136 combinations for LEWD. Utilizing three sources in combination to supply either Marion or LEWD generates 680 possible combinations for Marion and 680 combinations for LEWD. This large number of combinations is impractical and unreasonable for analysis.

2.111 The majority of the preliminary single source alternatives can be eliminated from consideration in combination with another source using the same reasoning presented in paragraphs 2.008-2.052 to eliminate them as a feasible source on their own. Table 2-5 presents those alternatives considered infeasible for analysis in combination with other alternatives and the reasons for their exclusion.

Table 2-5 Preliminary Alternatives Eliminated from Consideration in Combination

Preliminary Alternative	Reasons For Exclusion	
	City of Marion	Lake of Egypt Water District
No Action	Does not address the need for more water or satisfy IEPA directive to locate a new water source.	Does not address the need for more water. LEWD's contract with SIPC will expire in 2015.
Increase Water Rates to Limit Consumption	Past rate increases have not controlled demand and does not satisfy IEPA directive to locate a new source.	Past rate increases have not controlled demand and LEWD's contract with SIPC will expire in 2015.
Improve/Expand Marion City Lake	Lake yield can not be increased and IEPA has stated that Marion Lake should be abandoned.	Lake yield can not be increased and IEPA has stated that Marion Lake should be abandoned.
Lake of Egypt	SIPC, the lake's owner, limits withdrawl to no more than 30 million gallons in a 30-day period. LEWD currently utilizes all available water from this lake.	Feasible for consideration in combination with another source capable of supplementing current LEWD withdrawl.
Devil's Kitchen Lake	USFWS, owner of the lake, has refused to consider an intake in the lake and a basin to catch spillway water is excluded due to engineering constraints.	USFWS, owner of the lake, refused to consider an intake in the lake and a basin to catch spillway water is excluded due to engineering constraints.
Little Grassy Lake	USFWS, owner of the lake, has precluded its consideration as a municipal water source.	USFWS, owner of the lake, has precluded its consideration as a municipal water source.
Crab Orchard Lake	History of contamination (PCB) raises human health issues. Also, the USFWS (the lake and refuge owner) must grant right-of-way for pipeline installation, making the practicability of this source suspect.	History of contamination (PCB) raises human health issues. Also, the USFWS (the lake and refuge owner) must grant right-of-way for pipeline installation, making the practicability of this source suspect.
Strip Mine Pits	Limited recharge area and poor water quality make this alternative undesirable.	Limited recharge area and poor water quality make this alternative undesirable.
New Reservoir on Little Saline Creek	Concerns over the potential for contamination from SIPC ash ponds as indicated by IEPA raise safety questions regarding this alternative.	Concerns over the potential for contamination from SIPC ash ponds as indicated by IEPA raise safety questions regarding this alternative.
New Reservoir in Crab Orchard Creek Watershed	Limited drainage basin for watershed and prior underground coal mining has limited locations where a dam could be sited.	Limited drainage basin for watershed and prior underground coal mining has limited locations where a dam could be sited.
Obtain Water from Rend Lake	Capacity of lake is sufficient to supply all required water as a single source.	Capacity of lake is sufficient to supply all required water as a single source.
Obtain Water from Cedar Lake	Capacity of lake is sufficient to supply all required water as a single source.	Capacity of lake is sufficient to supply all required water as a single source.
Develop a Reservoir Near Goreville	Reasonable to consider in combination with another source to supply water.	Capacity of lake would be sufficient to supply all required water as a single source.
Develop a Reservoir on Sugar Creek	Capacity of lake would be sufficient to supply all required water as a single source.	Capacity of lake would be sufficient to supply all required water as a single source.

City of Marion

2.112 From the original 17 preliminary alternatives, the four reasonable alternatives available for consideration in combination to supply Marion include: Cache River Groundwater, Saline Valley Groundwater, develop a reservoir near Goreville, and develop a reservoir on White Oak Creek. These four alternatives translate into six possible combinations. One combination involves the construction of two new reservoirs (White Oak and Goreville) and would require impacting 962 acres of land. The current land use at the proposed reservoir sites includes 323 acres of agricultural land, 502 acres of woodlands, and 52 acres of wetlands. In addition, several endangered species, the bald eagle, Indiana bat, gray bat, and copperbelly watersnake among them, have been noted for these areas. Another combination involves the development of two separate groundwater sources (Cache River and Saline Valley). As previously stated in paragraphs 2.038 and 2.040, either groundwater source has sufficient capacity to supply all the water required by Marion and LEWD.

2.113 The remaining four combinations (Cache River and Goreville Reservoir, Saline Valley and Goreville Reservoir, Cache River and White Oak Reservoir, Saline Valley and White Oak Reservoir) consider the construction of one of the reservoir alternatives in conjunction with developing a groundwater source. The most logical combination is the construction of the Goreville Reservoir and supplementing its 3.6 mgd yield with water from either groundwater source to meet peak demands. This was determined the most logical combination for several reasons. All the required water, other than that needed for peak demand, would be located near Marion. The relatively short pipeline from the lake to Marion would lower pumping costs and minimize the chance of line ruptures. The long pipeline necessary to transport water from either groundwater source increases the chances of system failure in this region with considerable mine subsidence. The Marion water treatment plant is currently designed to treat a surface water source. From a design and cost perspective, the Goreville site is more conducive than the White Oak site to a dam structure, simplifying construction.

2.114 Technical difficulties are introduced when combining groundwater and surface water resources. Table 2-6 provides the chemical analysis of the raw water from the Cache River Basin, Saline Valley Basin, and the Lake of Egypt. The Lake of Egypt is used as the representative surface water example as its watershed is similar to that of the proposed Goreville Reservoir.

Table 2-6 Raw Water Chemical Analysis (in ppm unless specified)

Parameter	Lake of Egypt	Saline Valley Basin	Cache River Basin
pH	7.06	7.6	7.00
Turbidity	3 NTU	--	2 NTU
CO_2	16.3	--	50.0
Hardness	43.0	317.0	260.0
Calcium	23.0	78.0	160.0
Magnesium	20.0	34.4	100.0
Alkalinity	16.0	329.0	280.0
Color	5.0	--	5.0
Iron	0.36	2.60	0.3
Manganese	0.06	0.23	0.04
Flouride	0.13	0.21	0.20

2.115 The water chemistry of the two source types is considerably different when comparing alkalinity, hardness, iron, and manganese. Saline Valley and Cache River groundwater would require lime softening to eliminate hardness problems, while surface water would not. Also, the low alkalinity of the surface water supply would make it susceptible to pH fluctuations with the addition of chemical treatments. Saline Valley groundwater would require additional iron and manganese removal to meet IEPA standards. The City of Marion water treatment plant would require substantial modification to treat such a dual source system. The modifications necessary for water softening would include the addition of an aeration/header tank, a lime feeder system, a recarbonization system, a CO_2 storage and metering system, and the installation of a conveyor and belt press to prepare lime sludge for disposal.

2.116 The environmental impacts associated with developing the Goreville Reservoir in combination with a groundwater source are summarized in Table 2-7, with detailed discussion available in Sections 3 and 4. Readers must recognize that the loss of resources required and project costs associated with construction and operation of the proposed Goreville Reservoir must be combined with the loss of resources and costs of developing a groundwater source to fully evaluate the impact of this combination.

Lake of Egypt Water District

2.117 From the original 17 preliminary alternatives, the remaining reasonable alternatives available for consideration in combination to supply LEWD include: the Lake of Egypt, Cache River Groundwater, Saline Valley Groundwater, and developing a reservoir on White Oak Creek. As previously stated, either groundwater source has sufficient capacity to supply all the water required by LEWD eliminating the need to develop both sources. The continued use of Lake of Egypt is limited by SIPC, the lake's owner, as discussed in paragraphs 2.018-2.019. The existing contract will expire in 2015 and is not scheduled for renewal. SIPC has suggested that they may renegotiate the contract if an acceptable source can be located to supplement LEWD withdrawls from Lake of Egypt, but renewal is solely at the discretion of SIPC. The unreliability of source renewal eliminates this alternative from being considered in combination with another source.

2.118 The remaining most reasonable combination is the construction of a reservoir on White Oak Creek and supplementing its 1.8 mgd yield with a groundwater source. This combination places the majority of the required water near its users, decreasing the chances of pipeline failure. A longer pipeline would be required to reach either groundwater source, increasing the possibility of line ruptures in subsidence prone areas. The LEWD water treatment plant is currently designed to treat surface water, the majority of the source water with this combination. This combination again introduces the previously discussed technical difficulties of mixing a groundwater and surface water source. The LEWD water treatment plant would require substantial modification to treat such a dual source system. The modifications would include the addition of an aeration/header tank, a lime feeder system, a recarbonization system, a CO_2 storage and metering system, and the installation of a conveyor and belt press to prepare lime sludge for disposal.

2.119 The environmental impacts associated with developing the White Oak Reservoir in combination with a groundwater source are summarized in Table 2-7. The White Oak Creek site is similar in habitat to the Goreville Reservoir site. The White Oak Reservoir alternative would require approximately 377 acres of land for the reservoir pool. The pool area contains the following approximated land use acreage: 145 acres of agricultural land, 201 acres of woodlands,

and 7 acres of wetlands. The cost to construct White Oak Reservoir is estimated at $2,649,000[1]. Readers must recognize that the loss of resources required and project costs associated with construction and operation of the proposed White Oak Creek Reservoir must be combined with the loss of resources and costs of developing a groundwater source to fully evaluate the impact of this combination.

COST OF FEASIBLE ALTERNATIVES

2.120 Costs have been developed for the six feasible alternatives by ETI Corporation and are presented in Table 2-8. Table 2-9 presents the costs for combinations of feasible alternatives (a separate action for each the City of Marion and LEWD) and the costs for supplying both Marion and LEWD from a single source (gray-shaded boxes). All costs have been adjusted to 2023 figures. The costs to develop and operate each alternative, for volumes of 2.04 mgd (LEWD requirements), 2.85 mgd (City of Marion requirements) and 4.89 mgd (combination of LEWD and City of Marion requirements) were calculated. These volumes reflect the projected average day volume requirements for Marion and LEWD, which are less than the peak day volume (peak day volume = average day volume x 1.5) used as the screening criteria to identify feasible sources that can supply sufficient volumes of water (Marion – 4.3 mgd, LEWD – 3 mgd). Costs were developed using the average day volumes because these volumes reflect more realistic operating volumes. Peak volumes are a municipal planning tool and occur infrequently, providing an unrealistic operating cost figure. Annualized life-cycle costs include all costs anticipated over the life of the facility, which are then converted to uniform annual costs. This costing method is an approach used to evaluate the economic consequences of various alternatives over time. In order for an alternative to be acceptable, it must be affordable to the users. The costs have been updated since the FEIS and Supplement I to make them consistent with the additional feasible alternatives presented in this document.

2.121 An analysis of the costs for each alternative reveals that the least expensive water supply alternatives on a total annual cost basis for the City of Marion individually are: developing a reservoir on Sugar Creek ($3,470,000), developing a reservoir near Goreville ($3,505,000), and obtaining raw water from Rend Lake ($3,740,000).

2.122 The least expensive alternatives on a total annual cost basis for LEWD individually are: developing a reservoir on Little Saline Creek near Goreville ($2,382,000), developing a reservoir on Sugar Creek ($2,501,000) and obtaining raw water from Cedar Lake Reservoir utilizing the Southern pipeline route ($2,767,000).

2.123 The least expensive option for supplying the City of Marion and LEWD from a combination of separate actions and separate sources are: developing a reservoir on Sugar Creek to supply Marion and a second reservoir near Goreville to supply LEWD ($5,852,000), developing a reservoir near Goreville to supply Marion and a second reservoir on Sugar Creek to supply LEWD ($6,006,000), and obtaining raw water from Rend Lake to supply Marion and developing a reservoir near Goreville to supply LEWD ($6,122,000).

[1] This cost estimate was developed by Clarida Engineering (6/9/00). This estimate was not derived based on the methodology used in the ETI Report to develop all other cost estimates in this document. This estimate does not include water line and pumping costs.

2.124 The least expensive alternatives on a total annual cost basis for supplying both the City of Marion and LEWD from a single source are: developing a reservoir on Sugar Creek ($5,394,000), obtaining raw water from Rend Lake ($6,273,000), and obtaining raw water from Cedar Lake utilizing the southern pipeline route ($6,327,000).

2.125 Based on the total annual cost analysis, the most cost effective option is to develop a single water source on Sugar Creek to supply both the City of Marion and LEWD.

Table 2-7 Summary of Affected Resources for Combinations of Multiple Sources						
	Land Resources	**Surface Water Resources**	**Land Use**	**Wetlands**	**Transportation**	**Total Cost**
City of Marion						
Goreville Reservoir and Cache River Groundwater	116 acres for pipeline 70 acres for well field 585 acres for reservoir	34 stream crossings Damming of Little Saline Creek	308 acres of woodlands 226.5 acres of cropland 18 acres of managed lands 1 home; 3 structures	44.2 acres for reservoir 2 acre for pipeline	2 interstate highways 2 state highways 24 urban roads 74 rural roads 189 driveways 1 railroad	$7,794,000
Goreville Reservoir and Saline Valley Groundwater	129 acres for pipeline 585 acres for reservoir	50 river and stream crossing including the North and Middle Forks of the Saline River Damming of Little Saline Creek	301 acres of woodlands 178.5 acres of croplands 1 home; 3 structures road and railroad right-of-way for pipeline	44.2 acres for reservoir 5 acres for pipeline	1 interstate highway 1 federal highway 32 urban roads 69 rural roads 280 driveways 4 railroads	$8,242,000
LEWD						
White Oak Reservoir and Cache River Groundwater	377 acres for reservoir 70 acres for well field 66.4 acres for pipeline	18 river and stream crossings including the South Fork of the Saline River	208 acres of woodlands 193 acres of croplands 18 acres of managed lands	7 acres for reservoir 1 acre for pipeline	1 interstate highway 2 state highways 15 urban roads 56 rural roads 113 driveways	$5,760,000*
White Oak Reservoir and Saline Valley Groundwater	377 acres for reservoir 94.4 acres for pipeline	40 river and stream crossings including the North and Middle Forks of the Saline River	201 acres of woodlands 145 acres of cropland road and railroad right-of-way for pipeline	7 acres for reservoir 3.5 acres for pipeline	15 urban roads 29 rural roads 60 driveways 4 railroads	$6,380,000*

* Total cost figure includes estimate for White Oak Reservoir – Please refer to footnote on page 69 for more detail

TABLE 2-8 Estimated Costs by Alternative Marion or LEWD as an Individual Action			
Alternative	**Annualized Cost of Construction**	**Annual Operation & Maintenance Costs**	**Total Annual Cost**
Rend Lake - Treated Water			
Marion	457,000	3,967,000	4,425,000
LEWD	526,000	2,898,000	3,424,000
Rend Lake - Raw Water			
Marion	963,000	2,777,000	3,740,000
LEWD	975,000	2,051,000	3,026,000
Cedar Lake - North Pipeline Route - Raw Water			
Marion	903,000	2,959,000	3,862,000
LEWD	825,000	2,176,000	3,001,000
Cedar Lake - South Pipeline Route - Raw Water			
Marion	904,000	2,964,000	3,868,000
LEWD	626,000	2,140,000	2,767,000
Cedar Lake - South Pipeline Route - Treated Water			
Marion	925,000	5,824,000	6,750,000
LEWD	535,000	4,202,000	4,738,000
Cache River Aquifer			
Marion	1,108,000	3,181,000	4,289,000
LEWD	796,000	2,314,000	3,111,000
Saline Valley - Treated Water			
Marion	1,574,000	3,277,000	4,851,000
LEWD	1,202,000	2,511,000	3,714,000
Saline Valley - Raw Water			
Marion	1,290,000	3,447,000	4,737,000
LEWD	1,087,000	2,644,000	3,731,000
Goreville Site			
Marion	947,000	2,557,000	3,505,000
LEWD	557,000	1,825,000	2,382,000
Sugar Creek Site			
Marion	891,000	2,579,000	3,470,000
LEWD	679,000	1,821,000	2,501,000

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

City of Marion			Lake of Egypt Water District									
			Rend Lake Alternative		Cedar Lake Alternative			Cache River Alternative	Saline Valley Conservancy District Alternative		Goreville Reservoir Alternative	Sugar Creek Reservoir Alternative
			Treated Water	Raw Water	Northern Route	Southern Route			Raw Water	Treated Water		
						Raw Water	Treated Water					
Sugar Creek Reservoir Alternative			6,894,000	6,496,000	6,471,000	6,237,000	8,208,000	6,581,000	7,201,000	7,184,000	5,852,000	5,394,000
Goreville Reservoir Alternative			6,929,000	6,531,000	6,506,000	6,272,000	8,243,000	6,616,000	7,236,000	7,219,000	NOT APPLICABLE	6,006,000
Saline Valley Conservancy District Alternative	Raw Water		8,161,000	7,763,000	7,738,000	7,504,000	9,475,000	7,848,000	Raw Water: 7,879,000		7,119,000	7,238,000
	Treated Water		8,275,000	7,877,000	7,852,000	7,618,000	9,589,000	7,962,000	Treated Water: 8,144,000		7,233,000	7,352,000
Cache River Alternative			7,713,000	7,315,000	7,290,000	7,056,000	9,027,000	6,948,000	8,020,000	8,003,000	6,671,000	6,790,000
Cedar Lake Alternative	Southern Route	Raw Water	7,292,000	6,894,000	6,869,000	Raw Water: 6,327,000		6,979,000	7,599,000	7,582,000	6,250,000	6,369,000
		Treated Water	10,174,000	9,776,000	9,751,000	Treated Water: 11,464,000		9,861,000	10,481,000	10,464,000	9,132,000	9,251,000
	Northern Route		7,286,000	6,888,000	6,457,000	6,629,000	8,600,000	6,973,000	7,593,000	7,576,000	6,244,000	6,363,000
Rend Lake Alternative	Raw Water		7,164,000	6,273,000	6,741,000	6,507,000	8,478,000	6,851,000	7,471,000	7,454,000	6,122,000	6,241,000
	Treated Water		7,653,000	7,451,000	7,426,000	7,192,000	9,163,000	7,536,000	8,156,000	8,139,000	6,807,000	6,926,000

- All costs adjusted to 2023 figures for comparison

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

ENVIRONMENT

3.000 The following affected environment section provides discussion of the environmental resources potentially affected by each of the six feasible alternatives. The discussion of each feasible alternative is subdivided into a discussion of the resources affected in supplying the City of Marion as one action and LEWD as a separate action. The resources affected utilizing the feasible alternatives as a single source for both Marion and LEWD was addressed in the FEIS and Supplement I to the FEIS, in addition to the summary information provided beginning with paragraph 2.096 and Table 2-4 of this document.

REND LAKE ALTERNATIVE RESOURCES

Introduction

3.001 Rend Lake is a multi-purpose reservoir constructed by the U.S. Army Corps of Engineers and was completed in 1972. It has a surface area of approximately 18,900 acres and is an impoundment of the main branch of the Big Muddy River. The project was authorized by the Flood Control Act of 1962, Public Law 87-874 which was subsequently amended by Public Law 88-122. The project was authorized for the following purposes: flood control, downstream water quality control, water supply, recreation, fish and wildlife, and area redevelopment.

3.002 Water from Rend Lake is withdrawn and pumped to a water treatment plant located near the southeastern end of the reservoir. RLCD has facilities to treat up to 18 mgd and these facilities can be expanded to treat up to 27 mgd.

3.003 No modifications to the existing raw water withdrawal structure at Rend Lake or the water treatment plant would be required to supply treated water needed by the City of Marion water system and/or LEWD for average day water usage. The capacity of the present Rend Lake water treatment plant is 18 mgd. While the average day consumption by the present RLCD users (about 12 mgd) and City of Marion and LEWD users (over 2.5 mgd) is within the capabilities of the existing withdrawal and treatment plant, peak day consumption by existing RLCD users (almost 16 mgd) and City of Marion and LEWD systems (3.5 to 4 mgd) would exceed its capacity. However, the water withdrawal structure and treatment plant are capable of being expanded to serve the foreseeable future needs of the existing users of Rend Lake as well as the users of the City of Marion and/or LEWD.

Treated Water From Rend Lake

City of Marion

3.004 A new treated water pipeline connecting the existing RLCD system near Johnston City to the City of Marion water treatment facility would require a total of about 15 acres.

Surface Water Resources

3.005 A new treated water pipeline corridor from the Johnston City junction point to the City of Marion water treatment plant would require crossings of eight small unnamed tributary streams.

Aquatic Biological Resources

3.006 The streams that would be crossed by pipeline corridors from Rend Lake or the RLCD System would likely be populated with species such as redfin shiner (*Lythurus umbratilis*), ribbon shiner (*Notropis fumeus*), longear sunfish (*Lepomis megalotis*), creek chubsucker (*Erimyzon oblongus*), green sunfish (*Lepomis cyanellus*), bluntnose minnow (*Pimephales notatus*), and creek chub (*Semotilus atromaculatus*). Few of these streams likely have high gradients and rock bottoms. Those portions of streams that do have these characteristics would likely also include species such as orangethroat darter (*Etheostoma spectabile*), blackspotted topminnow (*Fundulus olivaceous*), and stripetail darter (*Etheostoma kennicotti*).

3.007 The Illinois Natural History Survey (INHS) has published information regarding important aquatic resources for the state in a report entitled *Biologically Significant Illinois Streams, An Evaluation of the Streams of Illinois Based on Aquatic Diversity* (Page, et al., Illinois Natural History Survey, Technical Report 1992(1)). This report includes a review of available data regarding many of the 2,700 named streams in Illinois. It also includes a stream quality indicator for those streams for which data were available, a rating referred to as Biological Stream Characterization (BSC). Using the BSC, the INHS ranked Illinois streams from "A" (highest quality) to "E" (lowest quality). Twenty-four streams were deemed by INHS to have an "A" rating and an additional 50 streams were determined to have a "B" rating. The INHS report did not include any of the streams or rivers that would be crossed with either the raw water or the treated water corridors as Biologically Significant Streams.

3.008 INHS expanded its list with the addition of 108 streams from which Federal or state threatened or endangered species or "watch list" species (likely to be listed) had been collected. None of the streams and rivers that would be crossed with either corridor are included in the expanded list of 132 Biologically Significant Streams.

Wetland Resources

3.009 The treated water corridor does not include any wetlands.

Terrestrial Biological Resources

3.010 The treated water pipeline corridor would include approximately 3 acres that are woodlands. Approximately 4 acres of land within the limits of the treated water pipeline corridor are considered cropland. An additional 3 acres of existing rights-of-way that are managed lands are included in the treated water corridor.

3.011 About 3 acres of the non-agriculture vegetated lands included in the treated water pipeline corridor are woods. These areas are characterized as riparian, mesic woods, and mesic to dry woods.

3.012 Riparian woods are those areas which line stream banks. Dominant trees on these stream banks are river birch (*Betula nigra*), American elm (*Ulmus americana*), and red maple (*Acer rubrum*). The tops of banks commonly include black walnut (*Juglans nigra*), northern red oak (*Quercus rubra*), tulip poplar (*Liriodendron tulipifera*), bitternut hickory (*Carya cordiformis*), sugar maple (*Acer saccharum*), and white oak (*Quercus alba*).

3.013 Wooded areas that are somewhat drier in nature (mesic) have tulip poplar, white oak, sweetgum (*Liquidambar styraciflua*), and red maple as dominant species. Less dominant are Northern red oak (*Quercus rubra*), shagbark hickory (*Carya ovata*), sugar maple, American elm, wild black cherry (*Prunus serotina*), and beech (*Fagus grandifolia*). Understory plants include flowering dogwood (*Cornus florida*) and hop hornbeam (*Ostrya virginiana*).

3.014 Plant species in the drier woodland areas of the treated water pipeline corridor are dominated by white oak, southern red oak (*Quercus falcata*), and sugar maple. Upper slopes and ridge tops typically include or are dominated by black oak (*Quercus velutina*), pignut hickory (*Carya glabra*), and black gum (*Nyssa sylvatica*). The understory of these drier woods is generally open with species such as sugar maple, hop hornbeam, and flowering dogwood typically present.

3.015 Specific surveys to identify wildlife that may utilize the habitats included in the pipeline corridors have not been conducted since the corridors are of such narrow width (about 20 ft wide). Characterization of available habitat and identification of those species which may use the habitats present is presented in this document.

3.016 Large mammals that typically occur in the available habitats include whitetail deer (*Odocoileus virginianus*), gray fox (*Urocyon cinereoargenteus*), red fox (*Vulpes vulpes*), raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), fox squirrel (*Sciurus niger*), gray squirrel (*Sciurus carolinensis*), eastern cottontail rabbit (*Sylvilagus floridanus*), striped skunk (*Mephitis mephitis*), woodchuck (*Marmota monax*), and eastern chipmunk (*Tamias striatus*). Small mammals that typically occur in these areas would be white-footed mouse (*Peromyscus leucopus*), prairie vole (*Microtus ochrogaster*), eastern mole (*Scalopus aquaticus*), least shrew (*Cryptotis parva*), and short-tailed shrew (*Blarina brevicauda*).

3.017 Birds that would occur in the area either as residents or during specific seasons and use the available habitats for some portion of their life requisites include red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), turkey vulture (*Cathartes aura*), barred owl (*Strix varia*), northern bobwhite (*Colinus virginianus*), mourning dove (*Zenaida macroura*), northern flicker (*Colaptes auratus*), blue jay (*Cyanocitta cristata*), whip-poor-will (*Caprimulgus vociferus*), eastern wood-peewee (*Contopus virens*), great crested flycatcher (*Myiarchus crinitus*), northern cardinal (*Cardinalis cardinalis*), American crow (*Corvus brachyrhynchos*), white-throated sparrow (*Zonotrichia albicollis*), blue-gray gnatcatcher (*Polioptila caerulea*), summer tanager (*Piranga rubra*), Carolina chickadee (*Poecile carolinensis*), tufted titmouse (*Baeolophus bicolor*), Carolina wren (*Thryothorus ludovicianus*), northern mockingbird (*Mimus polyglottos*), American robin (*Turdus migratorius*), eastern meadowlark (*Sturnella magma*), horned lark (*Eremophila alpestris*), downy woodpecker (*Picoides pubescens*), red-bellied woodpecker (*Melanerpes carolinus*), red-headed woodpecker (*Melanerpes erythrocephalus*), pileated woodpecker (*Dryocopus pileatus*), and white-breasted nuthatch (*Sitta carolinensis*).

3.018 Reptiles that likely use these habitats include eastern box turtle (*Terrapene carolina*), black rat snake (*Elaphe obsoleta*), speckled kingsnake (*Lampropeltis getula*), blue racer (*Coluber constrictor*), eastern garter snake (*Thamnophis sirtalis*), eastern hognose snake (*Heterodon platirhinos*), northern fence lizard (*Sceloporus undulatus*), and five-line skink (*Eumeces fasciatus*).

3.019 Amphibians would include American toad (*Bufo americanus*), northern spring peeper (*Pseudacris crucifer*), western chorus frog (*Pseudacris triseriata*), eastern gray treefrog (*Hyla versicolor*), and small-mouthed salamander (*Ambystoma texanum*).

Threatened and Endangered Species

3.020 The proposed pipeline corridor traverses the range of two species that are listed as federally endangered, one that is federally threatened, and one that has been proposed for listing.

3.021 Suitable habitat occurs within the area of the pipeline corridor for the federally endangered Indiana bat (*Myotis sodalis*). Various mines and caves that are used by this species during winter hibernation have been identified as critical habitat for its continued existence. None of these designated critical habitats occur in the area of the pipeline corridor. The wintering colonies of this species disperse during the summer months when the young are born and raised. Summer maternal colonies make significant use of habitats that include bottomland riparian forests with small- to medium-sized streams. Use of these areas begins to decline by August, and summer habitat is typically abandoned by the end of September. Optimum foraging habitat is believed to be the areas over small- to medium-sized streams that do not become dry and have mature overhanging trees along both stream banks.

3.022 The federally endangered Gray bat (*Myotis grisescens*) roosts in caves or cave-like habitats throughout the year. In the region that includes this proposed project, gray bats are known to seasonally use caves in southern and southwestern Illinois and Missouri. Female gray bats use caves (or cave-like areas) with high humidity as nursery areas. No caves or cave-like habitat occurs in the area included as part of the proposed water supply reservoir. Gray bats forage in riparian areas near roost sites.

3.023 The federally threatened bald eagle (*Haliaeetus leucocephalus*) is typically found in riparian areas along large streams, rivers, and lakes. Breeding areas are expanding southward from the northern United States and Canada as a result of improvements in habitat conditions and management activities by various government and private organizations. Summer occurrences of bald eagles are becoming more common in the region. Winter habitat preferences include riparian areas that are ice-free for feeding purposes. Large water bodies such as the Wabash and Ohio rivers and the large regional lakes provide feeding opportunities for this species.

3.024 The copperbelly watersnake *(Nerodia erythrogaster neglecta)* has been proposed for federal listing, twice in the 1990's, but is currently protected by a conservation plan created by USFWS and other cooperating agencies. In Illinois, 17 Ill. Adm. Code 880.70 protects the watersnake prohibiting its collection from designated counties within the state. The counties involved with this alternative are not designated in 17 Ill. Adm. Code 880.70. This species is one of the least aquatic of the water snakes, typically inhabiting bottomland hardwood forested wetlands and shrub swamps. *N.e. neglecta* emerges from hibernation in late March or early April, bear young in September and re-enter hibernation in October.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Soils

3.025 The soils of the pipeline corridor are difficult to specifically identify since the width of the corridor is within the limits of the width of lines in soil survey maps. The soils within the glacial fill areas (the majority of the corridor) consist of clays and silts, interlaced with fine sands.

Geology

3.026 The pipeline corridor is almost entirely located within the Big Muddy River basin. The geologic formation underlying the proposed pipeline corridor is predominantly post-glacial till.

Land Use

3.027 No homes would be acquired as part of this alternative. Approximately 3 acres of woodland would be included in the treated water pipeline route from the junction point near Johnston City to the City of Marion water treatment facility. Approximately 4 acres of cropland would also be included in the pipeline corridor.

Transportation

3.028 The treated water route from the Johnston City junction point to the City of Marion water treatment facility would require crossing Interstate Highway 57, two state highways, 15 urban roads, two rural roads, and 157 driveways. Fifteen railroad crossings would also be needed.

Historic and Prehistoric Cultural Resources

3.029 The alignment of the corridor has not had specific reconnaissance efforts to characterize individual historic or prehistoric cultural resources. If this alternative is selected, a Phase I archaeological survey would need to be completed.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Recreation Opportunities

3.030 Rend Lake is a large multiple use reservoir that includes opportunities for swimming, boating, water-skiing, and fishing. Hunting, hiking, and camping are additional recreational activities afforded on lands proximal to that reservoir.

Lake of Egypt Water District

3.031 A new treated water pipeline connecting the existing RLCD system near Johnston City to the LEWD treatment plant would require a total of about 37 acres.

Surface Water Resources

3.032 A new treated water pipeline corridor from the Johnston City junction point to the LEWD water treatment plant would require crossings of 16 small unnamed tributary streams.

Aquatic Biological Resources

3.033 The aquatic biological resources potentially affected by this alternative are described in paragraphs 3.006 – 3.008.

Wetland Resources

3.034 The treated water corridor does not include any wetlands.

Terrestrial Biological Resources

3.035 The treated water pipeline corridor would include approximately 10 acres that are woodlands and approximately 14 acres of cropland. An additional 3 acres of existing rights-of-way that are managed lands are included in the treated water corridors. The 10 acres of woodlands included in the corridor are characterized as riparian, mesic woods, and mesic to dry woods. Community and species descriptions for these areas are described in paragraphs 3.012 – 3.019.

Threatened and Endangered Species

3.036 A discussion of threatened and endangered species possibly affected by this alternative is included in paragraphs 3.020 – 3.024.

Soils

3.037 A discussion of soils in the affected area is included in paragraph 3.025.

Geology

3.038 The pipeline corridor is almost entirely included in the Big Muddy River basin. The land included in the corridor is predominantly post-glacial till with small portions included in the Shawnee Hills and associated bedrock strata.

Land Use

3.039 No homes would be acquired as part of this proposed pipeline corridor. Approximately 10 acres of woodland and 14 acres of cropland would be included in the treated water pipeline route from the junction point near Johnston City to the LEWD water treatment plant.

Transportation

3.040 The treated water route from the Johnston City junction point to the LEWD water treatment facility would require crossing Interstate Highway 57, two state highways, 21 urban roads, 19 rural roads, and 193 driveways. Fifteen railroad crossings would also be needed.

Historic and Prehistoric Cultural Resources

3.041 Historic and prehistoric cultural resources potentially affected by this alternative are discussed in paragraph 3.029.

Recreation Opportunities

3.042 Recreation opportunities in the project area are discussed in paragraph 3.030.

Raw Water From Rend Lake

City of Marion

3.043 If raw water would be withdrawn from Rend Lake for use by the City of Marion, a new intake structure and pipeline system would need to be built from Rend Lake to the City's water treatment facilities. A location proximal to the RLCD intake at the southern end of the lake would result in the shortest pipeline needs, an approximately 25.9 mile pipeline system to transport water to the City of Marion treatment facilities.

3.044 A new raw water pipeline route from Rend Lake to the City of Marion water treatment facility would require a total of about 63 acres.

Surface Water Resources

3.045 A new raw water pipeline corridor from the southern end of Rend Lake to the City of Marion water treatment plant would require crossing 29 streams or rivers, including a crossing of the Middle Fork of the Big Muddy River. Crossings of Lake Creek, Panel Creek, and Marcus Branch would be needed as would 25 additional small unnamed tributary streams.

Aquatic Biological Resources

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

3.046 Aquatic biological resources in the area are discussed in paragraphs 3.006 – 3.008.

Wetland Resources

3.047 The Rend Lake raw water alternative corridor would include approximately five acres of jurisdictional wetlands. The vegetation of these areas is described below, beginning with paragraph 3.050.

Terrestrial Biological Resources

3.048 The raw water pipeline corridor would include approximately 24 acres that are either wetlands or woodlands. Approximately 20 acres of land within the limits of the raw water pipeline corridor are considered cropland. An additional 8 acres of existing rights-of-way that are managed lands are included in the raw water corridor.

3.049 Of the 24 acres of non-agriculture vegetated lands included in the raw water pipeline corridor, 5 acres are (jurisdictional) wetlands and 19 acres are wooded. The wetlands are primarily wooded wetlands with limited wet meadows. Woods in the raw water pipeline corridor are predominantly characterized as riparian and mesic woods, with smaller areas of mesic to dry woods.

3.050 The wooded wetlands are primarily communities dominated by river birch, box elder, red maple, and green ash (*Fraxinus pennsylvanica*). Some areas include eastern cottonwood (*Populus deltoides*), black willow (*Salix nigra*), and sycamore (*Platanus occidentalis*). The understory in areas with canopy typically consists of red maple and green ash. In areas with a developed canopy, green ash is the typical dominant canopy tree, frequently associated with eastern cottonwood, box elder, and sycamore. In some areas buttonbush (*Cephalanthus occidentalis*) is the dominant understory.

3.051 Riparian woods are those areas which line stream banks. Dominant trees on these stream banks are river birch, American elm, and red maple. Other trees that may be found include sugarberry (*Celtis laevigata*), box elder, and sycamore. The tops of banks commonly include black walnut, northern red oak, tulip poplar, bitternut hickory, sugar maple, white oak, and American elm.

3.052 Wooded areas that are somewhat drier in nature (mesic) have tulip poplar, white oak, sweetgum, and red maple as dominant species. Less dominant are Northern red oak, shagbark hickory, sugar maple, American elm, and wild black cherry. In more disturbed sites, box elder, river birch, green ash, and sugarberry are more common. Understory plants include flowering dogwood and hop hornbeam.

3.053 Faunal species typical in these habitats are discussed in paragraphs 3.016 – 3.019.

Threatened and Endangered Species

3.054 Threatened and endangered species are discussed in paragraphs 3.020 – 3.024.

Soils

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

3.055 Soils are discussed in paragraph 3.025.

Geology

3.056 Geology is discussed in paragraph 3.026.

Land Use

3.057 No homes would be acquired as part of this pipeline corridor. Approximately 19 acres of woodland and 20 acres of cropland would be included in the route from Rend Lake to the City of Marion water treatment facility.

Transportation

3.058 The raw water pipeline route would require crossing Interstate Highway 57, two state highways, 17 urban roads, 11 rural roads, and 26 driveways to reach the City of Marion water treatment facility. Nine railroad crossings would also be needed.

Historic and Prehistoric Cultural Resources

3.059 Historic and prehistoric cultural resources are discussed in paragraph 3.029.

Recreation Opportunities

3.060 Recreation opportunities are discussed in paragraph 3.030.

Lake of Egypt Water District

3.061 If raw water would be withdrawn from Rend Lake for use by LEWD, a new intake structure and pipeline system would need to be built from Rend Lake to water treatment facilities for LEWD. A location proximal to the RLCD intake at the southern end of the lake would result in the shortest pipeline needs, an approximately 35.1 mile pipeline system to transport water to the LEWD treatment facilities.

3.062 A new raw water pipeline route from Rend Lake to the LEWD treatment plant would require a total of about 85 acres.

Surface Water Resources

3.063 A new raw water pipeline corridor from the southern end of Rend Lake to the LEWD water treatment plant would require crossing 37 streams or rivers, including a crossing of the Middle Fork of the Big Muddy River. Crossings of Lake Creek, Panel Creek, and Marcus Branch would be needed as would 33 additional small unnamed tributary streams.

Aquatic Biological Resources

3.064 The aquatic biological resources for this alternative are discussed in paragraphs 3.006 – 3.008.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Wetland Resources

3.065 The Rend Lake raw water alternative corridor includes approximately five acres of jurisdictional wetlands. The vegetation of these wetlands is described in paragraph 3.050.

Terrestrial Biological Resources

3.066 The raw water pipeline corridor includes approximately 31 acres that are either wetlands or woodlands and approximately 30 acres of cropland. An additional 8 acres of existing rights-of-way that are managed lands are included in the raw water corridor.

3.067 Approximately 5 acres of (jurisdictional) wetlands and 26 acres of woods are included in the raw water pipeline corridor. The wetlands are primarily wooded wetlands with limited wet meadows. Woods in the raw water pipeline corridor are predominantly characterized as riparian and mesic woods, with smaller areas of mesic to dry woods.

3.068 Community and species descriptions for these areas are included in paragraphs 3.012 – 3.019.

Threatened and Endangered Species

3.069 A discussion of threatened and endangered species possibly affected by this alternative is included in paragraphs 3.020 – 3.024.

Soils

3.070 A discussion of soils in the affected area is included in paragraph 3.025.

Geology

3.071 The pipeline corridor is almost entirely included in the Big Muddy River basin. The land included in the corridor is predominantly post-glacial till with small portions included in the Shawnee Hills and associated bedrock strata.

Land Use

3.072 No homes would be acquired as part of this proposed pipeline corridor. Approximately 26 acres of woodland and 30 acres of cropland would be included in the raw water pipeline route from Rend Lake to the LEWD water treatment plant.

Transportation

3.073 The raw water pipeline route would require crossing Interstate Highway 57, four state highways, 23 urban roads, 28 rural roads, and 62 driveways to reach the Lake of Egypt water treatment facility. Nine railroad crossings would also be needed.

Historic and Prehistoric Cultural Resources

3.074 Historic and prehistoric cultural resources are discussed in paragraph 3.029.

Recreation Opportunities

3.075 Recreation opportunities are discussed in paragraph 3.030.

CEDAR LAKE ALTERNATIVE RESOURCES

Introduction

3.076 Cedar Lake is a water supply reservoir constructed by the City of Carbondale in 1974. It has a surface area of approximately 1,750 acres and is an impoundment of Cedar and Poplar Camp Creeks. The water supply storage in Cedar Lake is estimated to be about 14 mgd (30-year) and the present raw water withdrawal is about 6 mgd. The City of Carbondale has an existing raw water intake structure that has the capability to pump about 20 mgd (Jeff Doherty, City of Carbondale, letter dated April 13, 1993).

3.077 Water from Cedar Lake is pumped to a water treatment plant located near the old reservoir that Cedar Lake replaced. The City of Carbondale has facilities to treat an average of about 8 mgd and the city considers that these facilities can be expanded to treat up to 20 mgd (Jeff Doherty, City of Carbondale, letter dated April 13, 1993). Since the City of Carbondale has projected daily average billed consumption to reach about 5.3 mgd by 2000 and about 6.8 mgd by 2020 for their system, capacity for also serving the needs of the City of Marion and/or LEWD would be possible.

3.078 No modifications to Cedar Lake, the raw water withdrawal structure at Cedar Lake, or the City of Carbondale water treatment plant would be required for initial volumes of water that may be needed by the City of Marion water system and/or LEWD. The water withdrawal structure and

treatment plant are capable of being expanded to serve the foreseeable future needs of Carbondale, Marion, and/or LEWD.

3.079 A raw or treated water pipeline system would need to be built from the City of Carbondale water treatment facility to water treatment facilities for the City of Marion and/or LEWD. As indicated in the FEIS, two routes between the City of Carbondale plant and the City of Marion plant have been considered since Crab Orchard National Wildlife Refuge and Crab Orchard Lake lie in the path of pipelines between these points. Mr. Daniel Doshier, manager of the Crab Orchard National Wildlife Refuge, was contacted to provide an opinion from USFWS as to the availability and procedures for obtaining right-of-way through the Refuge (see U.S. Department of Interior letter dated November 5, 1998 in Appendix C). Mr. Doshier states that the service discourages use of Refuge land for right-of-way requests. Right-of-way will only be granted if the proposed use is compatible with the purposes for which the Refuge was established. Application procedures for obtaining right-of-way through Federal land are granted in accordance with 50 CFR Part 29 Subpart B. The regulations say that the information supplied to the Regional Director must be of a sufficient level of detail to allow the preparation of an environmental assessment or EIS as called for by NEPA of 1969. Further analysis of the Cedar Lake alternative would be required to submit an application to the Service for a granting of right-of-way determination.

City of Marion - Northern Route

3.080 A northern pipeline route would cross several arms of Crab Orchard Lake and would have a considerable portion within the limits of Federal refuge property. A pipeline route of approximately 23.8 miles would parallel the northern border of Crab Orchard Refuge to the City of Marion water treatment facilities. A new northern pipeline corridor to the City of Marion water treatment facility would require approximately 59 acres of land.

Surface Water Resources

3.081 A northern pipeline corridor would require crossing two lakes and a number of streams. These include six crossings of tributary arms of Crab Orchard Lake as the corridor parallels the northern refuge boundary and State Highway 13. The corridor also crosses a portion of the old Carbondale Reservoir. Two crossings of Crab Orchard Creek, one upstream and one downstream of Crab Orchard Lake would be needed. Both Piles Fork and Pigeon Creek would be crossed as would 14 additional small unnamed tributary streams.

Aquatic Biological Resources

3.082 The streams that would be crossed by the proposed pipeline corridor from the City of Carbondale water treatment plant to the City of Marion water treatment plant would likely be populated with species such as redfin shiner, ribbon shiner, longear sunfish, creek chubsucker, green sunfish, bluntnose minnow, and creek chub. Those portions of streams with higher gradients, rock bottoms, and/or minimal silt deposition would likely also include species such as orangethroat darter, blackspotted topminnow, and stripetail darter.

3.083 The northern route would include crossings of Carbondale Reservoir and Crab Orchard Lake. Species that would be expected to be included in these reservoirs include largemouth bass (*Micropterus salmoides*), bullheads (*Ictalurus sp.*), carp (*Cyprinus carpio*), catfishes (*Ictalurus*

sp.), crappie (*Pomoxis sp*.), shiners (*Notropis sp*.), and sunfishes (*Lepomis sp*.), among other species that prefer lacustrine habitats.

3.084 The INHS did not classify any of the streams that would be crossed as Biologically Significant Streams.

Wetland Resources

3.085 The northern pipeline corridor would include approximately four acres of jurisdictional wetlands. This route is closely associated with Crab Orchard Lake and would be located in an area of limited relief.

Terrestrial Biological Resources

3.086 The northern route pipeline corridor would include approximately 26 acres that are either wetlands, woodlands, or old fields (previous agricultural land not actively being farmed). Approximately 14 acres of land within the limits of the northern pipeline corridor would be considered cropland. An additional 19 acres of existing rights-of-way that are managed lands are included in the northern corridor.

3.087 Of the 26 acres of non-agriculture vegetated lands included in the northern pipeline corridor, approximately 4 acres are (jurisdictional) wetlands, 18 acres are woods, and 4 acres are old fields. Wetlands are wooded wetlands and wet meadows. Woods in the northern pipeline corridor are predominantly characterized as riparian and mesic woods, with smaller areas of mesic to dry woods. Old fields are abandoned agricultural lands in either early or late successional stage.

3.088 Wooded wetlands are communities that are predominantly river birch, box elder, red maple, and green ash. Some areas include eastern cottonwood, black willow, and sycamore. The understory in areas with canopy typically consists of red maple and green ash. Green ash is the dominant tree in areas with a developed canopy, and is frequently associated with eastern cottonwood, box elder, and sycamore. In some areas, buttonbush is the dominant understory.

3.089 Riparian woods are those which line stream banks. Dominant trees on these stream banks are river birch, American elm, and red maple. Other trees that may be found include sugarberry, box elder, and sycamore. The tops of banks commonly include black walnut, northern red oak, tulip poplar, bitternut hickory, sugar maple, white oak, and American elm.

3.090 Wooded areas that are somewhat drier in nature (mesic) have tulip poplar, white oak, sweetgum, and red maple as dominant species. Less dominant are Northern red oak, shagbark hickory, sugar maple, American elm, and wild black cherry. In more disturbed sites, box elder, river birch, green ash, and sugarberry are more common. Understory plants include flowering dogwood and hop hornbeam.

3.091 Old fields are areas of abandoned agricultural lands that will eventually revert to woodlands if natural succession is allowed to continue. Most of this habitat is characterized as open and grass dominated with widely scattered trees. Dominant grasses include little bluestem (*Schizachyrium scoparium*) and common broomsedge (*Andropogon virginicus*). Disturbed sites include iron-weed (*Vernonia gigantea*), field thistle (*Circium discolor*), and Canada goldenrod

(*Solidago canadensis*). These areas also include widely spaced eastern red cedar (*Juniperus virginiana*).

3.092 Specific surveys to identify wildlife that may utilize the habitats included in the pipeline corridors have not been conducted since the corridor is of such narrow width (about 20 ft wide). Characterization of available habitat and identification of those species which may use the habitats present is presented in this document.

3.093 Large mammals that typically occur in the available habitats include whitetail deer, gray fox, red fox, raccoon, opossum, fox squirrel, gray squirrel, eastern cottontail rabbit, striped skunk, woodchuck, and eastern chipmunk. Small mammals that typically occur in these areas would be the white-footed mouse, prairie vole, eastern mole, least shrew, and short-tailed shrew.

3.094 Birds that would occur in the area either as residents or during specific seasons and use the available habitats for some portion of their life requisites include red-tailed hawk, American kestrel, turkey vulture, barred owl, northern bobwhite, mourning dove, northern flicker, blue jay, whip-poor-will, eastern wood-peewee, great crested flycatcher, northern cardinal, American crow, white-throated sparrow, blue-gray gnatcatcher, summer tanager, Carolina chickadee, tufted titmouse, Carolina wren, northern mockingbird, American robin, eastern meadowlark, horned lark, downy woodpecker, red-bellied woodpecker, red-headed woodpecker, pileated woodpecker, and white-breasted nuthatch.

3.095 Reptiles that likely use these habitats include eastern box turtle, black rat snake, speckled kingsnake, blue racer, eastern garter snake, eastern hognose snake, northern fence lizard, and five-line skink.

3.096 Amphibians would include American toad, northern spring peeper, western chorus frog, eastern gray treefrog, and small-mouthed salamander.

Threatened and Endangered Species

3.097 The proposed pipeline corridor traverses the range of two species that are listed as federally endangered, one that is federally threatened, and one that has been proposed for listing.

3.098 Suitable habitat occurs within the area of the pipeline corridor for the federally endangered Indiana bat. Various mines and caves that are used by this species during winter hibernation have been identified as critical habitat for its continued existence. None of these designated critical habitats occur in the area of the pipeline corridor. The wintering colonies of this species disperse during the summer months when the young are born and raised. Summer maternal colonies make significant use of habitats that include bottomland riparian forests with small- to medium-sized streams. Use of these areas begins to decline by August, and summer habitat is typically abandoned by the end of September. Optimum foraging habitat is believed to be the areas over small- to medium-sized streams that do not become dry and have mature overhanging trees along both stream banks.

3.099 The federally endangered gray bat roosts in caves or cave-like habitats throughout the year. In the region that includes this proposed project, gray bats are known to seasonally use caves in southern and southwestern Illinois and Missouri. Female gray bats use caves (or cave-like areas)

with high humidity as nursery areas. No caves or cave-like habitat occurs in the area included as part of the northern route pipeline corridor. Gray bats forage in riparian areas near roost sites.

3.100 The federally threatened bald eagle is typically found in riparian areas along large streams, rivers, and lakes. Breeding areas are expanding southward from the northern United States and Canada as a result of improvements in habitat conditions and management activities by various government and private organizations. Summer occurrences of bald eagles are becoming more common in the region. Winter habitat preferences include riparian areas that are ice-free for feeding purposes. Large water bodies such as the Wabash and Ohio rivers and the large regional lakes provide feeding opportunities for this species.

3.101 The copperbelly watersnake *(Nerodia erythrogaster neglecta)* has been proposed for federal listing, twice in the 1990's, but is currently protected by a conservation plan created by USFWS and other cooperating agencies. In Illinois, 17 Ill. Adm. Code 880.70 protects the watersnake prohibiting its collection from designated counties within the state. The counties involved with this alternative are not designated in 17 Ill. Adm. Code 880.70. This species is one of the least aquatic of the water snakes, typically inhabiting bottomland hardwood forested wetlands and shrub swamps. *N.e. neglecta* emerges from hibernation in late March or early April, bear yound in September and re-enter hibernation in October.

Soils

3.102 The soils of the pipeline corridor are difficult to specifically identify since the width of the corridor is within the limits of the width of lines in soil survey maps. The soils within the glacial fill areas (the majority of the corridor) consist of clays and silts, interlaced with fine sands.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Geology

3.103 The proposed pipeline corridor is almost entirely included in the Big Muddy River Basin and is predominantly post-glacial till.

Land Use

3.104 No homes would be acquired as part of this alternative. Approximately 18 acres of woodland and 14 acres of cropland would be included in the northern route corridor to the City of Marion water treatment plant.

Transportation

3.105 The northern route would require crossing Interstate Highway 57, one federal highway (U.S. 51), two state highways (IL 148 and 37), 15 urban roads, 40 rural roads, and 157 driveways to reach the City of Marion water treatment facility. Two railroad crossings would also be needed.

Historic and Prehistoric Cultural Resources

3.106 The alignment of the pipeline corridor has not had specific reconnaissance efforts to characterize individual historic or prehistoric cultural resources. The proposed corridor is of narrow width (approximately 20 ft) and the ability to modify final pipeline alignments to avoid any located sites would preclude these resources from occurring in a final selected corridor. Further, approximately one-fourth of the northern route corridor follows existing rights-of-way that have been previously disturbed.

Recreation Opportunities

3.107 Crab Orchard Lake is a large multiple use reservoir that includes opportunities for swimming, boating, water-skiing, and fishing. The Crab Orchard Wildlife Refuge includes not only Crab Orchard Lake but also Devil's Kitchen Lake and Little Grassy Lake. Hunting, hiking, camping, and wilderness experience are additional recreational opportunities afforded on lands proximal to the pipeline corridor routes.

City of Marion - Southern Route

3.108 A southern pipeline corridor would pass south of Crab Orchard Lake and north of Devil's Kitchen Lake and Little Grassy Lake. This route would also cross Federal refuge property at several locations. This corridor would be approximately 26.0 miles in length to the City of Marion treatment facilities. Approximately 64 acres of land would be needed for the southern pipeline route to the City of Marion water treatment facility.

Surface Water Resources

3.109 A southern pipeline corridor would include crossings of Piles Fork, Drury Creek, Indian Creek, Sycamore Creek, Little Grassy Creek, Grassy Creek, Caney Branch, Little Wolf Creek, Middle Wolf Creek, Limb Branch, Little Saline Creek, and two crossings of Crab Orchard Creek upstream of Crab Orchard Lake. In addition, 15 more crossings of small unnamed tributary streams would be included.

Aquatic Biological Resources

3.110 Aquatic Biological Resources for this alternative are discussed in paragraphs 3.082 – 3.084.

Wetland Resources

3.111 The southern route corridor would include approximately one acre of jurisdictional wetlands. The wetland acreage in this corridor is the cumulative area of wetlands at stream crossings.

Terrestrial Biological Resources

3.112 The southern route pipeline corridor would include approximately 27 acres that are either wetlands, woodlands, or old fields. Approximately 24 acres of land within the limits of the southern pipeline corridor would be considered cropland. An additional 2 acres of existing rights-of-way that are managed lands are included in the southern corridor.

3.113 Of the 27 acres of non-agriculture vegetated lands included in the southern pipeline corridor, about one acre is (jurisdictional) wetland and 26 acres are woods. The wetlands can be described as wooded wetlands. Woods in the southern route corridor are characterized as riparian, mesic woods, and mesic to dry woods. The southern route corridor follows a more upland route and has a greater amount of mesic to dry woods as compared to the northern route corridor.

3.114 The limited area of wooded wetlands in the southern route corridor are characterized primarily with river birch, red maple, green ash, black willow, and sycamore. Understory in the areas with a canopy typically consist of red maple and green ash.

3.115 Riparian woods in the southern corridor pipeline are also more limited in area as compared to the northern pipeline corridor. Dominant trees on these stream banks are river birch, American elm, and red maple. The tops of banks commonly include black walnut, northern red oak, tulip poplar, bitternut hickory, sugar maple, and white oak.

3.116 Wooded areas that are mesic in nature include such species as tulip poplar, white oak, sweetgum, and red maple. Less dominant are Northern red oak, shagbark hickory, sugar maple, American elm, wild black cherry, and beech (*Fagus grandifolia*). Understory plants include flowering dogwood and hop hornbeam.

3.117 Plant species in the drier woodland areas of the southern pipeline corridor are dominated by white oak, southern red oak, and sugar maple. Upper slopes and ridge tops typically include or are dominated with black oak, pignut hickory, and black gum. The understory of these drier

woods is generally open with species such as sugar maple, hop hornbeam, and flowering dogwood typically present.

3.118 Fauna typical to these areas is described in paragraphs 3.093 – 3.096.

Threatened and Endangered Species

3.119 Threatened and endangered species potentially affected by this alternative are discussed in paragraphs 3.097 – 3.101.

Soils

3.120 Soils information for this area is discussed in paragraph 3.102.

Geology

3.121 The proposed pipeline corridor is almost entirely included in the Big Muddy River Basin and is predominantly post-glacial till with small portions including areas of the Shawnee Hills and associated bedrock strata.

Land Use

3.122 No homes would be acquired as part of this alternative. Approximately 26 acres of woodland and 24 acres of cropland would be included in the southern pipeline route to the City of Marion water treatment facility.

Transportation

3.123 The southern route to the City of Marion water treatment facility would require crossing Interstate Highway 57, one federal highway (U.S. 51), two state highways (IL 148 and 37), six urban roads, 43 rural roads, and 50 driveways. Two railroad crossings would also be needed.

Historic and Prehistoric Cultural Resources

3.124 The alignment of the southern route corridor has not had specific reconnaissance efforts to characterize individual historic or prehistoric cultural resources. If this alternative is selected, a Phase I archaeological survey of the pipeline route will need to be performed.

Recreation Opportunities

3.125 Recreation opportunities for this alternative are discussed in paragraph 3.107.

Lake of Egypt Water District - Northern Route

3.126 A northern pipeline route would cross several arms of Crab Orchard Lake and would have a considerable portion within the limits of Federal refuge property. A pipeline route of approximately 38 miles would parallel the northern border of Crab Orchard Wildlife Refuge to the LEWD's treatment facilities.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

3.127 A new northern pipeline corridor to the LEWD water treatment facility would require approximately 80 acres of land.

Surface Water Resources

3.128 A northern pipeline corridor would require crossing two lakes and a number of streams. These include 6 crossings of tributary arms of Crab Orchard Lake as the corridor parallels the northern refuge boundary and State Highway 13. The corridor also crosses a portion of the old Carbondale Reservoir. Two crossings of Crab Orchard Creek, one upstream and one downstream of Crab Orchard Lake would be needed. Both Piles Fork and Pigeon Creek would be crossed as would 18 additional small unnamed tributary streams.

Aquatic Biological Resources

3.129 Aquatic biological resources are discussed in paragraphs 3.082 – 3.084.

Wetland Resources

3.130 Approximately four acres of jurisdictional wetlands would be traversed by the northern pipeline corridor. The northern route is closely associated with Crab Orchard Lake and would be located in an area of limited relief.

Terrestrial Biological Resources

3.131 The northern route pipeline corridor would include approximately 33 acres that are either wetlands, woodlands, or old fields (previous agricultural land not actively being farmed). Approximately 17 acres of land within the limits of the northern pipeline corridor would be considered cropland. An additional 20 acres of existing rights-of-way that are managed lands would also be traversed by this pipeline.

3.132 Of the 33 acres of non-agriculture vegetated lands included in the northern pipeline corridor, 4 acres are (jurisdictional) wetlands, 25 acres are woods, and 4 acres are old fields. Wetlands are wooded wetlands and wet meadows. Woods in the northern pipeline corridor are predominantly characterized as riparian and mesic woods, with smaller areas of mesic to dry woods. Old fields are abandoned agricultural lands in either early or late successional stage.

3.133 Flora and fauna composition of these habitat areas is discussed in paragraphs 3.088 – 3.096.

Threatened and Endangered Species

3.144 The threatened and endangered species that may be affected by this alternative are discussed in paragraphs 3.097 – 3.101.

Soils

3.145 Soils information for the area is discussed in paragraph 3.102.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Geology

3.146 The proposed pipeline corridor is almost entirely included in the Big Muddy River Basin and is predominantly post-glacial till.

Land Use

3.147 No homes would be acquired as part of this alternative. For the northern route, approximately 25 acres of woodland and 17 acres of cropland would be included in the pipeline route to the Lake of Egypt water treatment plant.

Transportation

3.148 The northern route would require crossing Interstate Highway 57, one federal highway (U.S. 51), 2 state highways (IL 148 and 37), 15 urban roads, 54 rural roads, and 193 driveways to reach the City of Marion water treatment facility. Two railroad crossings would also be needed.

Historic and Prehistoric Cultural Resources

3.149 Cultural resources are discussed in paragraph 3.106.

Recreation Opportunities

3.150 Recreation opportunities are discussed in paragraph 3.107.

Lake of Egypt Water District - Southern Route

3.151 A southern pipeline corridor would pass south of Crab Orchard Lake and north of Devil's Kitchen Lake and Little Grassy Lake. This route would also cross Federal refuge property at several locations. This corridor would be approximately 21 miles in length.
3.152 Approximately 72 acres of land would be needed for the southern pipeline route to the LEWD water treatment facility.

Surface Water Resources

3.153 A southern pipeline corridor would include crossings of Piles Fork, Drury Creek, Indian Creek, Sycamore Creek, Little Grassy Creek, Grassy Creek, Caney Branch, Little Wolf Creek, Middle Wolf Creek, Limb Branch, Little Saline Creek, two crossings of Crab Orchard Creek upstream of Crab Orchard Lake and the spillway below Lake of Egypt. In addition, 15 more crossings of small unnamed tributary streams would be included.

Aquatic Biological Resources

3.154 Aquatic biological resources for this alternative are discussed in paragraphs 3.082 – 3.084.

Wetland Resources

3.155 The southern route corridor includes approximately one acre of jurisdictional wetlands. The wetland acreage in this corridor is the cumulative area of wetlands at stream crossings.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Terrestrial Biological Resources

3.156 The southern route pipeline corridor would include approximately 37 acres that are either wetlands, woodlands, or old fields. Approximately 28 acres of land within the limits of the southern pipeline corridors would be considered cropland. An additional 2 acres of existing rights-of-way that are managed lands are included in the southern corridors.

3.157 Of the 37 acres of non-agriculture vegetated lands included in the southern pipelines corridors, about one acre is (jurisdictional) wetland and 36 acres are woods. The limited area of wetlands is described as wooded wetlands. Woods in the southern pipeline are characterized as riparian, mesic woods, and mesic to dry woods. The southern pipeline corridor follows a more upland route and has a greater amount of mesic to dry woods as compared to the northern pipeline corridor.

3.158 Floral and faunal communities typical to the area are discussed in paragraphs 3.114 – 3.118.

Threatened and Endangered Species

3.159 See paragraphs 3.097 – 3.101 for a discussion of threatened and endangered species found in the area.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Soils

3.160 See paragraph 3.102 for a discussion of soils in the area.

Geology

3.161 See paragraph 3.121 for a discussion of the geology of the area.

Land Use

3.162 No homes would be acquired as part of this alternative. Approximately 36 acres of woodland and 28 acres of cropland would be included in the southern pipeline route to the LEWD water treatment plant.

Transportation

3.163 The southern route to the LEWD water treatment facility would require crossing Interstate Highway 57, one federal highway (U.S. 51), two state highways (IL 148 and 37), six urban roads, 48 rural roads, and 61 driveways. Three railroad crossings would also be needed.

Historic and Prehistoric Cultural Resources

3.164 See paragraph 3.124 for a discussion of historic and prehistoric cultural resources.

Recreation Opportunities

3.165 See paragraph 3.107 for a discussion of recreation opportunities.

CACHE RIVER GROUNDWATER AQUIFER ALTERNATIVE RESOURCES

Introduction

3.166 Groundwater resources in the vicinity of the City of Marion and LEWD are minimal because of regional geological conditions. In the vicinity of Marion, groundwater resources accessible for large public water supply include either Mississippi River or Ohio River lowlands or the Cache River aquifer, sites that are about 30 to 45 air miles from the City of Marion.

3.167 A location for a new well field near the community of Perks (Pulaski County) was identified as the nearest location for a dependable supply of groundwater. The well field site would require approximately 70 acres of land. These lands would either be purchased directly or be a combination of purchased lands with the remainder having significantly restricted easements.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

City of Marion

3.168 A pipeline system would need to be built from the Cache River well field to the City of Marion water treatment facilities. An approximately 34.5 mile pipeline system would be required to transport water to the City of Marion treatment facilities. Approximately 84 acres of land would be needed for the pipeline route to the City of Marion water treatment facility.

3.169 Modifications and additions would be needed at the City of Marion water treatment plant. Bulk lime storage facilities, lime treatment equipment, and lime sludge handling and removal equipment would be required. A location or locations for disposal of lime sludge would also be needed.

Surface Water Resources

3.170 A pipeline corridor from the Cache River Aquifer well field to the City of Marion water treatment plant would require 21 stream crossings. Stream crossings would be required for Cypress Creek, Cache River (near West Vienna), Bear Branch, two locations of Crab Orchard Creek, and 16 unnamed small, mostly intermittent flow tributary streams.

Aquatic Biological Resources

3.171 The streams that would be crossed by the proposed pipeline corridor from the Cache River aquifer would likely be populated with species such as redfin shiner, ribbon shiner, longear sunfish, creek chubsucker, green sunfish, bluntnose minnow, and creek chub. Those portions of streams with higher gradients, rock bottoms, and/or minimal silt deposition would likely also include species such as orangethroat darter, blackspotted topminnow, and stripetail darter.

3.172 The segment of the Cache River near the well fields has been classified as a Biologically Significant Stream. This area includes the state endangered cypress minnow (*Hybognathus hayi*) and the clubtail dragonfly (*Arigomphus maxwelli*).

Wetland Resources

3.173 The Cache River aquifer pipeline route would include approximately one acre of jurisdictional wetlands based on the cumulative stream crossings for the pipeline corridor.

Terrestrial Biological Resources

3.174 The area that would be included in the proposed well field (approximately 70 acres) is predominantly cropland with about one-third of the lands non-cropped property. The well field site would include approximately 25 acres that are old fields (previous agricultural land not actively being farmed).

3.175 The area in the pipeline corridor would include approximately 13 acres that are either wetlands, woodlands, or old fields. Approximately 48 acres of land within the limits of the pipeline corridor would be considered cropland. An additional 18 acres of existing rights-of-way that are managed lands would be included in the corridor.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

3.176 Approximately one acre of (jurisdictional) wetlands, 7 acres of woods, and 5 acres of old fields are included in the pipeline corridor. Wetlands are described as wooded wetlands. Woods in the pipeline corridor are riparian, mesic woods, with smaller areas of mesic to dry woods. The more upland portions of the route would be mesic to dry woods. Old fields are abandoned agricultural lands of either early or late successional stage.

3.177 The limited area of wooded wetlands in the pipeline corridor are characterized primarily with river birch, red maple, green ash, black willow, and sycamore. Understory in areas with canopy typically consist of red maple and green ash.

3.178 Dominant trees in the riparian areas include river birch, American elm, and red maple. The tops of banks commonly include black walnut, northern red oak, tulip poplar, bitternut hickory, sugar maple, and white oak.

3.179 Wooded areas that are mesic in nature include such species as tulip poplar, white oak, sweetgum, and red maple. Less dominant are Northern red oak, shagbark hickory, sugar maple, American elm, wild black cherry, and beech. Understory plants include flowering dogwood and hop hornbeam.

3.180 Plant species in the drier woodland areas of the pipeline corridor are dominated by white oak, southern red oak, and sugar maple. Upper slopes and ridge tops typically include or are dominated with black oak, pignut hickory, and black gum. The understory of these drier woods is generally open with species such as sugar maple, hop hornbeam, and flowering dogwood typically present.

3.181 Old fields are areas of abandoned agricultural lands that will eventually revert to woodlands if natural succession is allowed to continue. Most of this habitat is characterized as open and grass dominated with widely scattered trees. Dominant grasses include little bluestem and common broomsedge. Disturbed sites include iron-weed, field thistle, and Canada goldenrod. These areas also include widely spaced eastern red cedar.

3.182 Specific surveys to identify wildlife that may utilize the habitats included in the pipeline corridor have not been conducted since the corridor is of such narrow width (about 20 ft wide). Characterization of available habitat and identification of those species which may use the habitats present is presented in this document.

3.183 Large mammals that typically occur in the available habitats include whitetail deer, gray fox, red fox, raccoon, opossum, fox squirrel, gray squirrel, eastern cottontail rabbit, striped skunk, woodchuck, and eastern chipmunk. Small mammals that typically occur in these areas would be white-footed mouse, prairie vole, eastern mole, least shrew, and short-tailed shrew.

3.184 Birds that would occur in the area either as residents or during specific seasons and use the available habitats for some portion of their life requisites include red-tailed hawk, American kestrel, turkey vulture, barred owl, northern bobwhite, mourning dove, northern flicker, blue jay, whip-poor-will, eastern wood-peewee, great crested flycatcher, northern cardinal, American crow, white-throated sparrow, blue-gray gnatcatcher, summer tanager, Carolina chickadee, tufted titmouse, Carolina wren, northern mockingbird, American robin, eastern meadowlark, horned lark, downy woodpecker, red-bellied woodpecker, red-headed woodpecker, pileated woodpecker, and white-breasted nuthatch.

3.185 Reptiles that likely use these habitats include eastern box turtle, black rat snake, speckled kingsnake, blue racer, eastern garter snake, eastern hognose snake, northern fence lizard, and five-line skink.

3.186 Amphibians would include American toad, northern spring peeper, western chorus frog, eastern gray treefrog, and small-mouthed salamander.

Threatened and Endangered Species

3.187 The proposed pipeline corridor traverses the range of two species that are listed as federally endangered, one that is federally threatened, and one that has been proposed for listing.

3.188 Suitable habitat occurs within the area of the pipeline corridor for the federally endangered Indiana bat. Various mines and caves that are used by this species during winter hibernation have been identified as critical habitat for its continued existence. None of these designated critical habitats occur in the area of the pipeline corridor. The wintering colonies of this species disperse during the summer months when the young are born and raised. Summer maternal colonies make significant use of habitats that include bottomland riparian forests with small- to medium-sized streams. Use of these areas begins to decline by August, and summer habitat is typically abandoned by the end of September. Optimum foraging habitat is believed to be the areas over small- to medium-sized streams that do not become dry and have mature overhanging trees along both stream banks.

3.189 The federally endangered Gray bat roosts in caves or cave-like habitats throughout the year. In the region that includes this proposed project, gray bats are known to seasonally use caves in southern and southwestern Illinois and Missouri. Female gray bats use caves (or cave-like areas) with high humidity as nursery areas. Gray bats forage in riparian areas proximal to roost sites.

3.190 The federally threatened bald eagle is typically found in riparian areas along large streams, rivers, and lakes. Breeding areas are expanding southward from the northern United States and Canada as a result of improvements in habitat conditions and management activities by various government and private organizations. Summer occurrences of bald eagles are becoming more common in the region. Winter habitat preferences include riparian areas that are ice-free for feeding purposes. Large water bodies such as the Wabash and Ohio rivers and the large regional lakes provide feeding opportunities for this species.

3.191 The copperbelly watersnake is protected by 17 Ill. Adm. Code 880.70, which prohibits its collection from designated counties within the state. Pulaski and Johnson counties are two of the designated counties in Illinois. The protection granted by the administrative rule is part of a conservation plan created by the USFWS and other cooperating entities for protection of the species while not officially designating it as a listed species.

Soils

3.192 The soils of the proposed corridor are difficult to specifically identify since the width of the corridor is within the limits of the widths of lines in soil survey maps. The soils are a variety of silt loams with loess as the parent material over sandstone or limestone to silty/clayey soils in

bottomlands. Soils present in the area of the well field are Ginat silt loam, Weinbach silt loam, and Wheeling silt loam.

Geology

3.193 The Cache river basin area in which a well field could be constructed has been heavily influenced by glacial meltwater and sediment deposit. During the Wisconsin age, massive amounts of material were deposited in a channel of what was once part of the present Ohio and Mississippi Rivers system. During at least part of the glacial period, the Ohio River flowed west from near Golconda, Illinois to the northern part of what is now Pulaski County and then southwest to meet the Mississippi River northwest of the present location of Cairo, Illinois. The channel gradually filled with glacial outwash deposits. The present Ohio River valley along the southern border of Illinois was originally the Tennessee River valley until silting of the older Ohio River valley allowed a divide to be cut and the Ohio river captured the channel occupied by the Tennessee River. The Cache River now drains this valley that is filled with deposits of sands and gravels up to 150-200 ft deep.

Land Use

3.194 No homes would be acquired as part of this alternative. Approximately 7 acres of woodland would be included in the route to the City of Marion water treatment plant. About one acre of jurisdictional wetland would be included.

3.195 Approximately 48 acres of cropland would be included in the pipeline route to the City of Marion water treatment facility.

Transportation

3.196 The pipeline route to the City of Marion water treatment facility would require a number of road crossings, including Interstate Highway 24, two state highways (IL 37 and 146), 15 urban roads, 50 rural roads, and 113 driveways.

Historic and Prehistoric Cultural Resources

3.197 The alignment of the proposed pipeline corridor has not had specific reconnaissance efforts to characterize individual historic or prehistoric cultural resources. If this alternative is selected, a Phase I archaeological survey would need to be conducted of the proposed pipeline route. Approximately one-fifth of the alignment follows existing rights-of-way that have previously been disturbed.

3.198 The 70-acre area that would be used as a well field has also not been subject to a specific reconnaissance to determine presence/absence of historic or prehistoric cultural resources. Development of a well field (five wells) would require disturbance of only a small area (less than one-fourth acre per well). Since there is great flexibility in the siting of the pump station, any resources that may be found on site could most likely be avoided.

Recreation Opportunities

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

3.199 The well field occurs in an agricultural area and the corridor for the pipeline generally follows existing roadway corridors. The features of this alternative would not impact any recreational resources.

Lake of Egypt Water District

3.200 A pipeline system would need to be built from the Cache River well field to the water treatment facilities of the LEWD. An approximately 25.7 mile long pipeline system would be required to transport water to the LEWD treatment facilities.

3.201 Approximately 79 acres of land would be needed for the pipeline route to the LEWD treatment plant.

3.202 Modifications and additions would be needed at the LEWD water treatment plant. Bulk lime storage facilities, lime treatment equipment, and lime sludge handling and removal equipment would be required. A location or locations for disposal of lime sludge would also be needed.

Surface Water Resources

3.203 Pipeline corridors from the Cache River Aquifer well field to the LEWD water treatment plant would require 18 stream crossings. Stream crossings would be required for Cypress Creek, Cache River (near West Vienna), Bear Branch, two locations of Saline Creek, the spillway of the Lake of Egypt and 13 unnamed small, mostly intermittent flow tributary streams.

Aquatic Biological Resources

3.204 See paragraphs 3.171 – 3.172 for a discussion of aquatic biological resources.

Wetland Resources

3.205 See paragraph 3.173 for a discussion of wetland resources.

Terrestrial Biological Resources

3.206 The area that would be included in a well field (approximately 70 acres) is predominantly cropland with about one-third of the lands non-cropped property. The well field site would include approximately 25 acres that are old fields, previous agricultural land not actively being farmed.

3.207 The area that would be included in the pipeline corridor would include approximately 14 acres that are either wetlands, woodlands, or old fields. Approximately 46 acres of land within the limits of the pipeline corridor would be considered cropland. An additional 18 acres of existing rights-of-way that are managed lands are included in the corridor.

3.208 Of the total acres of non-agriculture vegetated lands included in the pipeline corridor, about one acre is (jurisdictional) wetlands, 8 acres are woods, and 5 acres are old fields. Wetlands are described as wooded wetlands. Woods in the pipeline corridor are riparian, mesic woods, with

smaller areas of mesic to dry woods. The more upland portions of the route would be mesic to dry woods. Old fields are abandoned agricultural lands of either early or late successional stage.

3.209 See paragraphs 3.177 – 3.186 for a discussion of the community and species composition of these areas.

Threatened and Endangered Species

3.210 See paragraphs 3.187 – 3.191 for a discussion of threatened and endangered species.

Soils

3.211 See paragraph 3.192 for a discussion of soils.

Geology

3.212 See paragraph 3.193 for a discussion of geology.

Land Use

3.213 No homes would be acquired as part of this alternative. Approximately 7 acres of woodland would be included in the portion to the LEWD water treatment plant. About one acre of jurisdictional wetland would be included.

3.214 Approximately 46 acres of cropland would be included in the pipeline route to the LEWD water treatment plant.

Transportation

3.215 The pipeline route to the LEWD water treatment facility would require a number of road crossings, including Interstate Highway 24, two state highways (IL 37 and 146), 15 urban roads, 50 rural roads, and 113 driveways.

Historic and Prehistoric Cultural Resources

3.216 See paragraph 3.197 – 3.198 for a discussion of historic and prehistoric cultural resources.

Recreation Opportunities

3.217 See paragraph 3.199 for a discussion of recreation opportunities.

SALINE VALLEY GROUNDWATER ALTERNATIVE RESOURCES

Introduction

3.218 Utilizing Saline Valley as a water source would require either tying into existing SVCD water lines for a treated water supply or installing a new raw water line from the well field near Junction to the Marion or LEWD water treatment facilities. Several options for connecting Marion or LEWD to SVCD are possible, but all involve the installation of new waterline.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Treated Water From Saline Valley Conservancy District

City of Marion

3.219 This alternative involves installing a new finished water line from the SVCD treatment plant in Equality to the City of Marion treatment plant and a new raw water line from the well fields near Junction to the Equality treatment plant. The proposed pipeline corridor for this alternative would parallel Illinois 13 between Marion and Equality, with the new water line located in easements within the highway right-of-way. This alternative would require approximately 97 acres of land (assuming a pipeline corridor width of 20 ft).

Surface Water Resources

3.220 The installation of new water lines will involve the crossing of 37 perennial and intermittent waterways. The proposed line from the Junction well fields to the Equality treatment plant would require the crossing of Cypress Ditch and the North Fork of the Saline River. The new finished water line to Marion from Equality would require crossing Cockerel Branch, the Middle Fork of the Saline River, Pankey Branch, the West Harrisburg Ditch, Bankston Fork and Crab Orchard Creek perennial stream beds. In addition, an intermittent portion of Cypress Ditch, eight unnamed perennial tributaries, three unnamed intermittent tributaries of the North Fork and 17 intermittent waterways would be crossed.

Aquatic Resources

3.221 Fish species common to the Saline River Basin include: the bluntnose minnow, redfin shiner, longear sunfish, green sunfish, bluegill (*Lepomis macrochirus*), redear sunfish (*Lepomis microlophus*), largemouth bass (*Micropterus salmoides*), spotted bass (*Micropterus punctulatus*), smallmouth bass (*Micropterus dolomieu*), striped shiner (*Luxilus chrysocephalus*), ribbon shiner, creek chub, bluntnose darter (*Etheostoma chlorosomum*), spottail darter (*Etheostoma squamiceps*), creek chubsucker, blackspotted topminnow, and orangethroat darter.

3.222 The Saline River Basin is home to several species of crayfish including: *Orconectes immunis*, *Orconectes virilis*, and *Orconectes indianensis*. The state endangered Indiana crayfish (*O. indianensis*) has historically been found within streams in the Basin.

3.223 The state threatened least brook lamprey has also historically been found within the Saline River Basin.

Wetland Resources

3.224 Wetland resources in the project area are associated with the various permanent and intermittent streams crossed by the pipeline corridors. These wetlands are typically emergent palustrine or riverine habitats. Approximately 4 acres of wetlands will require crossing.

Terrestrial Biological Resources

3.225 Specific surveys of animal and plant life in the vicinity of the proposed pipeline corridor have not been conducted, but Gallatin, Saline, and Williamson Counties typically support

mammals such as whitetail deer, gray fox, red fox, raccoon, opossum, fox squirrel, gray squirrel, eastern cottontail rabbit, striped skunk, woodchuck, eastern chipmunk, prairie vole, eastern mole, least shrew, and short-tailed shrew.

3.226 Bird species that can be found in this area include: red-tailed hawk, American kestrel, turkey vulture, barred owl, northern bobwhite, mourning dove, northern flicker, blue jay, whip-poor-will, eastern wood-peewee, great crested flycatcher, northern cardinal, American crow, white-throated sparrow, blue-gray gnatcatcher, summer tanager, Carolina chickadee, tufted titmouse, Carolina wren, northern mockingbird, American robin, eastern meadowlark, horned lark, downy woodpecker, red-bellied woodpecker, red-headed woodpecker, pileated woodpecker, and white-breasted nuthatch.

3.227 Reptiles and amphibians common to this area include eastern box turtle, black rat snake, speckled kingsnake, blue racer, eastern garter snake, eastern hognose snake, northern fence lizard, five-lined skink, American toad, northern spring peeper, western chorus frog, eastern gray treefrog, and small-mouthed salamander.

Threatened and Endangered Species

3.228 Specific surveys for threatened and endangered species relating to this project have not been conducted but several state and federally listed threatened and endangered species have been recorded for Williamson, Saline, and Gallatin counties. The federally endangered Indiana Bat, the federally threatened Bald Eagle, and the Copperbelly water snake (formerly a candidate for federal threatened listing) all have had recent (post 1990) sightings in Williamson, Saline and/or Gallatin Counties. State listed species known to occur in the vicinity of the Illinois 13 corridor include the threatened Loggerhead Shrike *(Lanius ludovicianus)* and Rice Rate *(Oryzomys palustris)*. State listed species with records of occurrence in the three county area include the endangered Northern Harrier (*Circus cyaneus)*, endangered River Otter (*Lutra canadensis*) and the Indiana Bat. State listed plant species include the threatened Virginia Snakeroot (*Aristolochia serpentaria*), endangered Southern Grape Fern (*Botrychium biternatum*), threatened Carolina Thistle (*Cirsium carolinianum*), threatened Climbing Milkweed (*Matelea obliqua*), endangered Heart-leaved Plantain (*Plantago cordata*), threatened Rock Chestnut Oak (*Quercus prinus*), and the endangered Arching Dewberry (*Rubus enslenii*).

Soils

3.229 The pipeline corridor will be located in an area generally composed of fill material from the existing road and railroad rights-of-way. The general soil associations encountered along the proposed water line include Alvin-Roby-Raurk, Darwin-Shiloh-Wabash, Karnak-Allison-Wakeland, Reesville-Patton-Uniontown, Alford-Wellston, Hasmer-Wellston-Berks, McGary-Montgomery-Markland, Zipp-Patton-Hurst, Hosmer-Zanesville, Belknap-Banlic-Bonnie, Sharon-Belknap, Grantsburg-Manitou, Ava-Bluford, and Hoyleton-Cisne.

3.230 Specific soil types in the pipeline corridor are difficult to identify since the width of the corridor is within the limits of the soil survey map lines.

Geology

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

3.231 Gallatin, Saline, and Williamson Counties are located in the Mount Vernon Hill Country of the Central Lowland province. This area is at the southern rim of the Illinois Basin. Bedrock in this area is part of the Pennsylvania system. The northern portion of these counties was generally covered with glacial till and loess from the Mississippi and Ohio River valleys.

3.232 The three counties include areas of coal mining which would be crossed by the pipeline route. Surface and underground mines are located along the Illinois 13 corridor between Junction and Marion and between Harrisburg and Stonefort.

3.233 Oil fields are located in Gallatin, Saline, and Williamson Counties. The majority of the fields are located north of Junction and Shawnetown in Gallatin County.

Land Use

3.234 No homes would be acquired as part of this alternative. The majority of land required for the proposed corridor is currently road or railroad right-of-way. Right-of-way from Illinois 13, various county and local routes, and a railroad line would be utilized for waterline installation.

Transportation

3.235 The project area is serviced by a variety of federal, state, and county routes. Illinois 13 is the major connector between Harrisburg and Marion. Interstate 57 and U.S. Highway 45 are the other primary transportation routes in the project area.

Historic and Prehistoric Cultural Resources

3.236 A cultural resources survey of the proposed water line route has not been conducted. If this alternative is selected, a Phase I archaeological survey would need to be completed for the proposed pipeline. Based on other studies in the general area, there is good potential of locating cultural resources in the project area.

Recreation Opportunities

3.237 Saline, Gallatin, and Williamson Counties do not offer a wide variety of recreational opportunities. Williamson County has several large lakes and the Crab Orchard National Wildlife Refuge. These counties are at the northern limit of the Shawnee National Forest and its associated recreational activities (hiking, camping, etc.).

Lake of Egypt Water District

3.238 This alternative would require the installation of a finished water line that connects into the SVCD line at Equality and delivers water to LEWD. The proposed water line route would utilize a mixture of railroad and road right-of-way. The corridor runs southwest from Harrisburg to Stonefort along an abandoned railroad paralleling U.S. 45. The corridor then turns west at Stonefort and follows various county and state roads to the LEWD water treatment plant.

Surface Water Resources

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

3.239 The installation of a new raw water line would involve the crossing of perennial and intermittent waterways. This alternative would require the crossing of Cypress Ditch, the North Fork of the Saline River, Cockerel Branch, the Middle Fork of the Saline River, the Pankey Branch, the South Fork of the Saline River, Grassy Creek, Brushy Creek, Sugar Creek, Cana Creek, an intermittent portion of Cypress Ditch, three unnamed intermittent tributaries of the North Fork of the Saline River, two perennial unnamed waterways, and 24 intermittent waterways.

Aquatic Resources

3.240 See paragraphs 3.221 – 3.223 for a discussion of aquatic resources.

Wetland Resources

3.241 Wetland resources in the project area are associated with the various permanent and intermittent streams crossed by the pipeline corridors. These wetlands are typically emergent palustrine or riverine habitats. Approximately 3.5 acres of wetlands will require crossing.

Terrestrial Biological Resources

3.242 See paragraphs 3.225 – 3.227 for a discussion of terrestrial biological resources in the area.

Threatened and Endangered Species

3.243 The pipeline corridor will require crossing Sugar Creek near the Rout 166 bridge east of Creal Springs, a sample point for a recent least brook lamprey survey (Division of Natural Heritage report dated June 30, 1998). Individual lampreys have recently and historically been collected from this site. See paragraph 3.228 for further discussion of threatened and endangered species.

Soils

3.244 The proposed pipeline corridor would be located primarily within existing road and railroad right-of-way which is generally composed of fill material. The general soil associations encountered along the proposed corridor are Alvin-Roby-Raurk, Darwin-Shiloh-Wabash, Karnak-Allison-Wakeland, Reesville-Patton-Uniontown, Alford-Wellston, Hosmer-Wellston-Berks, McGary-Montgomery-Markland, Zipp-Patton-Hurst, Hosmer-Zanesville, Belknap-Banlic-Bonnie, Hosmer-Zanesville, Orthents, and Grantsburg-Zanesville.

3.245 Specific soil types in the pipeline corridor are difficult to identify since the width of the corridor is within the limits of the soil survey map lines.

Geology

3.246 See paragraphs 3.231 – 3.233 for a discussion of geology.

Land Use

3.247 No homes would be acquired as part of this alternative. The majority of land required for this alternative is currently road or abandoned railroad right-of-way. Right-of-way from Route

166, various county routes, and the railroad line paralleling U.S. 45 would be utilized for waterline installation.

Transportation

3.248 The project area is serviced by a variety of federal, state, and county routes. U.S. Highway 45, Illinois 13, and Interstate 57 are the primary transportation routes in the project area.

Historic and Prehistoric Cultural Resources

3.249 See paragraph 3.236 for a discussion of historic and prehistoric cultural resources.

Recreation Opportunities

3.250 See paragraph 3.237 for a discussion of recreational resources.

Raw Water From Saline Valley Conservancy District

City of Marion

3.251 This alternative would require the installation of a new raw water line from the well fields near Junction to the Marion water treatment facility. The proposed pipeline would be installed in easements within the Illinois 13 right-of-way.

Surface Water Resources

3.252 The installation of this proposed water line would involve the crossing of perennial and intermittent waterways. This alternative would require the crossing of Cypress Ditch, the North Fork of the Saline River, Cockerel Branch, the Middle Fork of the Saline River, Pankey Branch, West Harrisburg Ditch, Bankston Fork, Crab Orchard Creek, and twenty-nine intermittent waterways.

Aquatic Resources

3.253 See paragraphs 3.221 – 3.223 for a discussion of aquatic resources.

Wetland Resources

3.254 Wetland resources in the project area are associated with the various permanent and intermittent streams crossed by the pipeline corridors. These wetlands are typically emergent palustrine or riverine habitats. Approximately 4 acres of wetlands will require crossing.

Terrestrial Biological Resources

3.255 See paragraphs 3.225 – 3.227 for a discussion of terrestrial biological resources.

Threatened and Endangered Species

3.256 See paragraph 3.228 for a discussion on threatened and endangered species.

Soils

3.257 The pipeline corridor will be located primarily within existing road right-of-way which is generally composed of fill material. The general soil associations encountered along the proposed corridor for this alternative are Alvin-Roby-Ruark, Darwin-Shiloh-Wabash, Karnak-Allison-Wakeland, Reesville-Patton-Uniontown, Ava-Bluford, Alford-Wellston, Hosmer-Wellston-Berks, Sharon-Belknap, McGary-Montgomery-Markland, Zipp-Patton-Hurst, Hosmer-Zanesville, Belknap-Banlic-Bonnie, Grantsburg-Manitou, and Hoyleton-Cisne. Specific soil types in the pipeline corridor are difficult to identify since the width of the corridor is within the limits of the soil survey map lines.

Geology

3.258 Gallatin, Saline, and Williamson Counties are located in the Mount Vernon Hill Country of the Central Lowland province. This area is at the southern rim of the Illinois Basin. Bedrock in this area is part of the Pennsylvania system. The northern portion of these three counties was generally covered with glacial till and loess from the Mississippi and Ohio River valleys.

3.259 The three counties include areas of coal mining which would be crossed by the pipeline routes. Surface and underground mines are located along the Illinois 13 corridor between Marion and Junction and between Harrisburg and Stonefort.

3.260 Oil fields are located in Gallatin, Saline, and Williamson Counties. The majority of the fields are located north of Junction and Shawneetown in Gallatin County.

Land Use

3.261 No homes would be acquired as part of this alternative. The majority of land required for this alternative is currently road right-of-way. Right-of-way from Illinois 13, various county routes, and a railroad line will be utilized for waterline installation.

Transportation

3.262 The project area is serviced by a variety of federal, state, and county routes. Illinois 13, Interstate 57, and Highway 37 are the primary transportation routes in the area.

Historic and Prehistoric Cultural Resources

3.263 See paragraph 3.236 for a discussion of historic and prehistoric cultural resources.

Recreation Opportunities

3.264 See paragraph 3.237 for a discussion of recreation opportunities.

Lake of Egypt Water District

3.265 This alternative would require the construction of a new raw water line from the SVCD Equality water treatment plant to the LEWD water treatment plant. This corridor will parallel

Illinois 13 from Junction to Harrisburg and then follow the same alignment as the treated water for LEWD from Harrisburg to the water treatment facility.

Surface Water Resources

3.266 The installation of a new raw water line would involve the crossing of perennial and intermittent waterways. This alternative would require the crossing of Cypress Ditch, the North Fork of the Saline River, Cockerel Branch, the Middle Fork of the Saline River, the Pankey Branch, the South Fork of the Saline River, Grassy Creek, Brushy Creek, Sugar Creek, Cana Creek, an intermittent portion of Cypress Ditch, three unnamed intermittent tributaries of the North Fork of the Saline River, two perennial unnamed waterways, and 24 intermittent waterways.

Aquatic Resources

3.267 See paragraphs 3.221 – 3.223 for a discussion of aquatic resources.

Wetland Resources

3.268 Wetland resources in the project area are associated with the various permanent and intermittent streams crossed by the pipeline corridors. These wetlands are typically emergent palustrine or riverine habitats. Approximately 3.5 acres of wetland will require crossing.

Terrestrial Biological Resources

3.269 See paragraphs 3.225 – 3.227 for a discussion of terrestrial biological resources.

Threatened and Endangered Species

3.270 The pipeline corridor will require crossing Sugar Creek near the Rout 166 bridge east of Creal Springs, a sample point for a recent least brook lamprey survey (Division of Natural Heritage report dated June 30, 1998). Individual lampreys have recently and historically been collected from this site. See paragraph 3.228 for further discussion of threatened and endangered species.

Soils

3.271 See paragraphs 3.244 – 3.245 for a discussion of soils.

Geology

3.272 See paragraphs 3.231 – 3.233 for a discussion of geology.

Land Use

3.273 No homes will be acquired as part of this alternative. The majority of land required for this alternative is currently road or abandoned railroad right-of-way. Right-of-way from Illinois 13, various county routes, Route 166, and the railroad line paralleling U.S. 45 would be utilized for waterline installation.

Transportation

3.274 The project area is serviced by a variety of federal, state, and county routes. U.S. Highway 45, Illinois 13, and Interstate 57 are the primary transportation routes in the project area.

Historic and Prehistoric Cultural Resources

3.275 See paragraph 3.236 for a discussion of historic and prehistoric cultural resources.

Recreation Opportunities

3.276 See paragraph 3.237 for a discussion of recreational opportunities.

GOREVILLE ALTERNATIVE RESOURCES

Introduction

3.277 The Goreville site is located upstream of Lake of Egypt and the SIPC ash ponds. A reservoir of about 585 acres could be developed at this site. It was determined that the raw water yield of this reservoir would be approximately 3.6 mgd. This reservoir would be large enough to meet the requirements of either the City of Marion or LEWD.

3.278 New water lines would be required to transport the water from the proposed reservoir to the Marion or LEWD water treatment plant. The water lines would be installed primarily in existing road or railroad right-of-way to minimize impacts.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

City of Marion

Surface Water Resources

3.279 The proposed reservoir would require the damming of Little Saline Creek, a small perennial stream. The reservoir would inundate the intermittent tributaries of Little Saline Creek upstream of the dam site. The proposed pipeline route from the draw-off point to the Marion water treatment plant would impact two perennial waterways and eleven intermittent waterways.

Aquatic Resources

3.280 Little Saline Creek is recognized as a class C stream (a moderate aquatic resource) on the Biological Stream Characterization of Illinois Streams map (2nd edition, 1995). The Illinois Water Quality Report (IEPA, 1996) designated Little Saline Creek as a full support waterway.

3.281 Published reports documenting the biological diversity of Little Saline Creek specifically are unavailable. An unpublished survey of the Saline River basin was conducted in 1993 cooperatively by the IEPA and IDNR. The survey looked at fish habitat associations in the area. Based on this survey, fish species common to the Saline River Basin include: the steelcolor shiner (*Cyprinella whipplei*), silverjaw shiner (*Ericymba buccata*), bluntnose minnow, redfin shiner, longear sunfish, gizzard shad (*Dorosoma cepedianum*), green sunfish, bluegill, redear sunfish, largemouth bass, spotted bass, ribbon shiner, creek chub, sand shiner (*Notropis ludibundus*) creek chubsucker, blackspotted topminnow, blackstripe topminnow, and orangethroat darter.

3.282 The Saline River Basin is home to several species of crayfish including: *Orconectes immunis*, *Orconectes virilis*, and *Orconectes indianensis*. The state endangered Indiana crayfish (*O. indianensis*) has historically been found within streams in the Basin.

3.283 The state threatened least brook lamprey has also historically been found within the Saline River Basin.

Wetland Resources

3.284 The damming of Little Saline Creek will inundate approximately 574 acres of land. Based on National Wetland Inventory maps, approximately 44.2 acres of wetlands would be inundated due to the proposed reservoir. The wetlands impacted by the water pipeline to the Marion water treatment facility are associated with Little Saline Creek, Crab Orchard Creek, and various intermittent waterways. Approximately one acre of wetlands will impacted by pipeline installation.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Terrestrial Biological Resources

3.285 The site of the proposed reservoir contains areas of bottomland forest, upland forest, cropland, shrubland, pasture/hayland, intermittent riverine habitat, pond/borrow pit/lake habitat, non-native grassland, and forbland.

3.286 Surveys of animal and plant life in the project area have not been conducted, but Johnson County typically supports mammals such as whitetail deer, gray fox, red fox, raccoon, opossum, fox squirrel, gray squirrel, eastern cottontail rabbit, striped skunk, woodchuck, eastern chipmunk, prairie vole, eastern mole, least shrew, and short-tailed shrew.

3.287 Bird species that can be found in the Johnson County area include: red-tailed hawk, American kestrel, turkey vulture, barred owl, northern bobwhite, mourning dove, northern flicker, blue jay, whip-poor-will, eastern wood-peewee, great crested flycatcher, northern cardinal, American crow, white-throated sparrow, blue-gray gnatcatcher, summer tanager, Carolina chickadee, tufted titmouse, Carolina wren, northern mockingbird, American robin, eastern meadowlark, horned lark, downy woodpecker, red-bellied woodpecker, red-headed woodpecker, pileated woodpecker, and white-breasted nuthatch.

3.288 Reptiles and amphibians in the area include eastern box turtle, black rat snake, speckled kingsnake, blue racer, eastern garter snake, eastern hognose snake, northern fence lizard, five-lined skink, American toad, northern spring peeper, western chorus frog, eastern gray treefrog, and small-mouthed salamander.

Threatened and Endangered Species

3.289 The copperbelly watersnake (*Nerodia erythrogaster neglecta*) is protected by 17 Ill. Adm. Code 880.70, which prohibits its collection from designated counties within the state. The protection granted by the administrative rule is part of a conservation plan created by the USFWS and other cooperating entities for protection of the species while not officially designating it as a listed species. The preferred habitat for the Copperbelly water snake is quiet pools of forested river bottoms that provide healthy populations of fish and amphibians. A close proximity to wooded uplands is also important.

3.290 The proposed Goreville site may also contain habitat for the endangered Henslow's sparrow (*Ammodramus henslowii*). Henslow's sparrow nests in prairie habitat or abandoned fields and hayfields. Fallow fields in the project area could provide suitable nesting habitat for this species.

3.291 Habitat suitable to support the endangered Grass-leaved lilly (*Stenanthium gramineum*) and threatened Black cohosh (*Cimicifuga rublifolia*) may exist at the Goreville site. Both species can be found at Happy Hollow, approximately 1.5 miles south of the Goreville site. *S. gramineum* grows in rich mesic floodplains and forests. *C. rublifolia* prefers mesic woods, especially in limestone rich areas.

Soils

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

3.292 The soils in the area of the proposed reservoir are generally silt loam. The topography of the area is rolling hills and the soils on the slopes have typically eroded away. The soils are acidic and relatively low in plant nutrients.

3.293 The proposed pipeline corridor would follow existing road or railroad right-of-way, which has presumably been graded and filled where necessary. The narrowness of the pipeline corridor makes it difficult to determine the soils that would be encountered.

Geology

3.294 Johnson County is located near the southern rim of the Illinois Basin. The northern portion of Johnson County is underlain with Pennsylvanian bedrock. Most of Johnson County was not glaciated, but extensions of the ice fringe may have reached upstream into the small valleys in the northeast part of the county. The bedrock is covered with loess from the Mississippi River valley and the ancient Ohio river valley.

3.295 Mining resources in Johnson County are limited to coal and limestone. Coal mining is located in the northeast part of the county. Limestone quarries are located in the central and southern portions of the county.

3.296 The Goreville Geological Area Illinois Natural Area Inventory site is located just east of the proposed Goreville Reservoir site. This site is noted for its outstanding exposure of the southern margin of Illinoian till.

Land Use

3.297 Current land use in the proposed Goreville Reservoir basin includes approximately 196.4 acres of bottomland forest, 104.5 acres of upland forest, 178.5 acres of cropland, 41.6 acres of shrubland, 20.8 acres of pasture/hayland, 10.3 acres of intermittent riverine habitat, 9.8 acres of pond/borrow pit/lake habitat, 6.6 acres of residential/commercial/industrial lands, 4.4 acres of denuded ground, 1.1 acres of non-native grassland, and 0.4 acres of forbland. Approximately four structures, including one home, are present in the proposed reservoir construction site.

3.298 The proposed pipeline route makes use of existing road and railroad right-of-way for most of its length. The northern end of this corridor traverses some undeveloped land prior to reaching the Marion Water Treatment Plant. No homes would be acquired for pipeline installation.

Transportation

3.299 The proposed reservoir would eliminate the use of portions of about five county/local roads. The reservoir would not impact any of the state highways or interstates in the area. The proposed pipeline corridor will follow existing roads in the area to minimize impacts.

Historic and Prehistoric Cultural Resources

3.300 The Illinois Archaeological Site files were reviewed in May 1998. No sites are recorded within the project area. However, the majority of the area has not been formally surveyed for cultural resources. Based on results of surveys of similar sites in Southern Illinois, it is likely that potentially significant prehistoric sites exist within the pool area.

3.301 The proposed pipeline corridor would primarily use road and railroad rights-of-way. If this alternative is selected, a Phase I archaeological survey of the proposed pipeline route would need to be completed.

Recreation Opportunities

3.302 The area of the proposed reservoir does not offer any recreational opportunities at the present time. Ferne Clyffe State Park and the Shawnee National Forest are located several miles south of the reservoir site. Crab Orchard National Wildlife Refuge is located several miles north of the reservoir site.

Lake of Egypt Water District

Surface Water Resources

3.303 The proposed reservoir would require the damming of Little Saline Creek, a small perennial stream. The reservoir would inundate the intermittent tributaries of Little Saline Creek upstream of the dam site.

3.304 The proposed pipeline route from the draw-off point to the Lake of Egypt would impact four intermittent unnamed tributaries of Little Saline Creek and the perennial channel of Little Saline Creek.

Aquatic Resources

3.305 See paragraphs 3.280 – 3.283 for a discussion of aquatic resources.

Wetland Resources

3.306 The damming of Little Saline Creek will inundate approximately 574 acres of land. Based on National Wetland Inventory maps, approximately 44.2 acres of wetlands would be inundated due to the proposed reservoir.

3.307 The wetlands impacted from installation of the pipeline from the draw-off point to the Lake of Egypt are associated with the intermittent tributaries of Little Saline Creek. Less than one acre of wetlands will be impacted.

Terrestrial Biological Resources

3.308 See paragraphs 3.285 – 3.288 for a discussion of terrestrial biological resources.

Threatened and Endangered Species

3.309 See paragraphs 3.289 – 3.291 for a discussion for a discussion of threatened and endangered species.

Soils

3.310 See paragraphs 3.292 – 3.293 for a discussion of soils.

Geology

3.311 See paragraphs 3.294 – 3.296 for a discussion of geology.

Land Use

3.312 See paragraph 3.297 for a discussion of land use in the proposed reservoir basin. The proposed pipeline route makes use of existing right-of-way for most of its length. No homes would be acquired for pipeline installation.

Transportation

3.313 The proposed reservoir would eliminate the use of portions of about five county/local roads. The reservoir would not affect any of the state highways or interstates in the area.

3.314 The proposed pipeline corridor will follow existing roads in the area to minimize impacts.

Historic and Prehistoric Cultural Resources

3.315 See paragraphs 3.300 – 3.301 for a discussion of historic and prehistoric cultural resources.

Recreation Opportunities

3.316 See paragraph 3.302 for a discussion of recreational resources.

SUGAR CREEK ALTERNATIVE RESOURCES

Introduction

3.317 A new reservoir on Sugar Creek would require the acquisition of approximately 1,172 acres of land for a lake with a pool elevation of 496 ft (msl) to supply water to Marion alone or Marion and LEWD. An additional 203 acres of land in a strip surrounding the lake are needed to provide a 100-year floodplain to accommodate lake levels that may occur with a storm that has a one percent chance of occurring in a 100-year period of time. A smaller reservoir with a pool elevation of 485 ft (msl) could be developed to supply LEWD individually. This lake would require approximately 1,067 acres for the lake proper and 100-year floodplain.

City of Marion

3.318 A reservoir with a normal pool elevation of 496 ft (msl) would be required to supply sufficient volumes of water. A new pipeline approximately 12.2 miles long would need to be constructed from the site of the proposed reservoir to the City of Marion water treatment plant.

Surface Water Resources

3.319 Sugar Creek is a medium-sized stream that has its headwaters near the community of Tunnel Hill. It flows generally north toward the community of Creal Springs and then northeast to its confluence with the South Fork of the Saline River. Sugar Creek is approximately 16.7 miles

in length. The site of the dam for the proposed new water supply reservoir is approximately 7.9 miles upstream of the confluence of Sugar Creek with the South Fork of the Saline River. The stream is characterized by pools and riffles for its entire length. About three-fourths of the stream is pool-type habitat with the remainder riffle habitat.

3.320 Approximately 6.2 miles of Sugar Creek is contained within the limits of the proposed water supply reservoir. A small unnamed tributary joins Sugar Creek from the east and would form one arm of the reservoir. Another tributary, Maple Branch, flows into Sugar Creek from the west; approximately 3 miles of Maple Branch would be included within the reservoir.

3.321 No gaging station exists on Sugar Creek. For comparison purposes, the Draft Environmental Impact Statement referenced a nearby gaging station located on Crab Orchard Creek upstream of the City of Marion. While the topography of that basin is not identical to the Sugar Creek basin, the general land cover and runoff characteristics are quite similar. Forty years of data were available for Crab Orchard Creek (U.S. Geological Survey, Water-Data Report IL-92-1) to infer Sugar Creek discharge. Comments on the Draft Environmental Impact Statement resulted in a search for an additional or replacement stream(s) for estimation of Sugar Creek discharge patterns.

3.322 Another stream has been identified that may also be used to infer discharge rates for Sugar Creek. Hayes Creek, a tributary to Bay Creek, is a stream in the Shawnee National Forest that had a gage maintained from 1949 to 1975 near the community of Glendale. The watershed of Hayes Creek is very similar to Sugar Creek upstream from the proposed dam site and is about 80 percent the size of the Sugar Creek watershed. Twenty-six years of data are available (U.S. Geological Survey, Water-Data Report IL-75-1) for Hayes Creek.

3.323 Annual mean discharge for Hayes Creek for the period 1949-1975 has averaged 25.7 cubic ft per second (cfs). The highest annual mean value during this period was 63 cfs (1950) and the lowest annual mean discharge was 10 cfs (1954). Based on Hayes Creek record for the period of 1949-1975, Sugar Creek annual mean discharge in the reach near the dam site is estimated to be about 32.9 cfs.

3.324 Based on Hayes Creek 1949-1975 data, the daily mean stream flow in Sugar Creek likely varies from about 3 cfs in October (typically the driest month) to about 70 cfs in March (typically the wettest month). During drier times of the year, daily flows in many streams in this part of Illinois, including Hayes and Sugar Creeks, drop to zero flow. Based on data for Hayes Creek, periods of no flow could be expected to occur in Sugar Creek at the site of the proposed dam for about 18 percent of the year.

3.325 The City of Marion has pursued the development of a new water supply reservoir on Sugar Creek because the capacity of the creek is sufficient to supply their present and future needs and the water quality of this stream is considered to be high. Sufficient water quality sampling has been performed by the City of Marion to ascertain that this stream and its associated watershed would provide an acceptable municipal raw water source. Sampling of water quality in the Saline River basin in 1993 was accomplished by the Illinois Environmental Protection Agency. The water quality in Sugar Creek upstream from Creal Springs is generally considered to be among the best found in the basin, due in large part to the land cover in the basin (forested and pasture land) and limited agricultural use of the watershed (Robert Hite, Illinois Environmental Protection

Agency, telephone interview dated October 4, 1994). The water quality of Sugar Creek is also demonstrated by the aquatic biological resources present.

3.326 Concern was raised during the Draft Environmental Impact Statement review period regarding the potential for acidic runoff from an abandoned mine in the upper portion of the drainage basin. This mined area represents less than one percent of the drainage basin for the proposed reservoir and contributes little to the overall water quality of Sugar Creek. The high water quality of Sugar Creek is reflected by the aquatic community present, described below.

3.327 The required pipeline connecting the proposed new reservoir on Sugar Creek with the existing City of Marion water treatment plant would have 14 stream crossings: two crossings of Sugar Creek below the dam, nine crossings of intermittent unnamed streams, Crab Orchard Creek, the South Fork of Saline River, and Cana Creek. With the exception of the two Sugar Creek crossings, all stream crossings would occur within the old railroad grade crossings.

Aquatic Biological Resources

3.328 IEPA and IDNR conducted an intensive study of the fishery and available habitat of much of the Saline River basin during 1993. Thirty-seven individual sites were sampled in this effort by either or both agencies. IEPA staff sampled 31 of these sites while the IDNR staff conducted their work at 34 of these sites.

3.329 The intent of these efforts was to characterize the quality of the various streams of the basin as part of an overall statewide effort to develop data regarding Illinois rivers and streams. The overall goal of this effort is to develop a numerical stream quality rating, utilizing the Index of Biotic Integrity (IBI) or Potential Index of Biotic Integrity (PIBI), for many of Illinois' streams. The IBI and PIBI are objective ratings based on measured indicators of environmental health and/or degradation of rivers and streams. Greater numerical scores reflect higher quality streams.

3.330 The IDNR develops an IBI score based directly on the organisms captured at a sampling site. Agency staff conducted fish sampling using electric seines, boat-mounted electro-fishing equipment, and seine hauls. Based on the efforts and equipment employed and the numbers and diversity of the observed fish population, an IBI score was calculated for each sampling station.

3.331 For the 34 sites in the Saline River basin sampled by the IDNR (David Day, Illinois Department of Conservation, letter dated April 19, 1994), IBI scores from 12 to 48 were determined. Almost one-half of the sites (16 of 34) had an IBI score of 40 or more and about one-fourth of the sites (8 of 34) had an IBI score of 44 to 48. Sites with the highest IBI scores were Contrary Creek (IBI=48) in the drainage of the North Fork (Hamilton County), Sugar Creek downstream of Creal Springs (IBI=48) in the drainage of the South Fork (Williamson County), the North Fork of the Saline River near Ridgeway (IBI=46) (Gallatin County), Sugar Creek upstream of Creal Springs (IBI=46), the North Fork of the Saline River in the southeast corner of Hamilton County (IBI=44), Cane Creek in the drainage of the North Fork in northwest Gallatin County (IBI=44), Little Saline River near Stonefort in the drainage of the South Fork (IBI=44) (Saline County), and Sugar Creek upstream of Creal Springs (IBI=44).

3.332 The IEPA developed a PIBI score based on the habitat characteristics needed to support aquatic life at each site. These PIBI scores were developed based on measurements of physical habitat stream width, percent pool, and bottom substrate.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

3.333 For the 31 sites in the Saline River basin sampled by the IEPA (Robert Hite, IEPA, letter dated April 27, 1994), PIBI scores from 35.4 to 44.6 were calculated. Almost two-thirds of the sites (19 of 31) had a PIBI score of 40 or more. One site was assigned a PIBI score greater than 44. Sites with the highest PIBI scores were the Middle Fork of the Saline River near the confluence with the South Fork (PIBI=44.6) (Saline County), Sugar Creek downstream from Creal Springs (PIBI=43.5), Little Saline Creek in the South Fork drainage (PIBI=43.4) (Williamson County), the South Fork of the Saline River just upstream of the confluence with the Middle Fork (PIBI=43.2) (Saline County), the North Fork of the Saline River in southeast Saline County (PIBI=42.8), and the North Fork of the Saline River near Ridgeway (PIBI=42.5).

3.334 The techniques used by these agencies each have merits and limitations. Sampling for fish can be an unpredictable science since conditions can change day-to-day at a particular site providing variable results. The measuring of aquatic habitat captures features that are more static but requires a presumption that suitable habitat is a good indication that it is also occupied by aquatic organisms. With the combination of both sampling techniques, a better estimate for stream quality can be developed.

3.335 Most of the 37 Saline River basin sites were sampled by both agencies, including two sites in the area proposed for the new water supply lake. IDNR staff sampled four sites within the limits of the proposed reservoir while two of these sites were also measured by employees of the IEPA. These sites are shown in Figure 11 (page 55) of the FEIS and are referenced as Sites 1 through 4. Figure 11 also indicates the location of a fifth sample site, located on Sugar Creek downstream from the site of the proposed reservoir near the Illinois Highway 166 bridge. This site was also sampled by both agencies.

3.336 Site 1 is located on Sugar Creek 1.5 miles upstream of the proposed dam site. Site 2 is located on Sugar Creek, 3 miles upstream of site 1. Site 3 is located in the upper limits of the proposed reservoir on Sugar Creek at a low water road crossing near Parker. The remaining site within the bounds of the proposed reservoir, site 4, is located on Maple Branch. Sites 3 and 4 were sampled by IEPA. Both agencies sampled site 5.

3.337 Sixteen of the 34 sites sampled by the IDNR in the Saline River basin had an IBI score of 40 or higher, including three of the four sites within the limits of the proposed reservoir. Site 1 was determined to have an IBI score of 46, site 2 an IBI score of 44, and site 3 an IBI score of 42. The sample location on tributary Maple Branch, site 4, had an IBI score of 38. Site 5, downstream of the proposed reservoir, had the highest IBI score, 48, of the sites on Sugar Creek.

3.338 Twenty of the 31 sites in the Saline River basin sampled by the IEPA had a PIBI score greater than 40. Sites 3 and 4, in the limits of the proposed lake, were determined by IEPA to have PIBI scores of 41.9 and 42.5, respectively. Site 5 also had the highest PIBI score, 43.5 of the sites sampled by Illinois EPA in the area of the proposed reservoir.

3.339 Eleven to 16 species of fish were reported by the IDNR at each of the four sample sites within the limits of the proposed reservoir (David Day, IDNR, letter dated April 19, 1994). A total of 26 species were found at these four sites, indicating that a range of diversity exists within the area of the proposed lake. The sampling techniques used were not identical at all sites; additional seining was conducted as site 1. The combined sampling results for site 1 included 16 species with a total of 260 individual fish captured dominated by redfin shiner, ribbon shiner,

longear sunfish, and creek chubsucker. Site 2 had 14 species with 103 individuals captured, dominated by redfin shiner, green sunfish, bluntnose minnow, and longear sunfish. The uppermost site on Sugar Creek, site 3, had 16 species with 159 individuals captured, dominated by orangethroat darter, creek chubsucker, longear sunfish, blackspotted topminnow, and green sunfish. The site on Maple Branch, site 4, had 14 species with 245 individuals captured, dominated by bluntnose minnow, redfin shiner, creek chub, green sunfish, and creek chubsucker. Sample site 5, downstream from the proposed reservoir, had 21 species with 819 individuals captured, dominated by bluntnose minnow, longear sunfish, redfin shiner, creek chubsucker, orangethroat darter, and stripetail darter.

3.340 A report regarding the biological resources of Sugar Creek was compiled based on sample data by the IDNR (Randy Sauer and Robert Schanzle, IDNR, report dated September 1993). This report identifies the reach of Sugar Creek from Creal Springs to the most upstream sample site as a "highly valued aquatic resource" and the reach of Sugar Creek below Creal Springs to Palzo as a "moderate aquatic resource." Maple Branch was similarly classified as a "moderate aquatic resource."

3.341 Freshwater mussels were also investigated in Sugar Creek by the IDNR (Randy Sauer and Robert Schanzle, IDNR, report dated September 1993). Three individuals of the same species, the paper pondshell (*Anodonta imbecilis*), were found in Sugar and Maple Creek sampling. All three were found at sample site 5 downstream from the proposed reservoir. No individuals were found during investigations at the sample sites within the limits of the proposed reservoir.

3.342 Because of the presence of both state threatened and state endangered species, Sugar Creek was included in the INHS expanded list of 132 Biologically Significant Streams. The portion of Sugar Creek designated by the INHS is a reach 5.0 miles long, 2.5 miles on either side of Illinois Highway 166. About one mile of this reach is included in the area of the proposed reservoir. The remaining portion is downstream of the proposed project.

3.343 The proposed pipeline corridor to the City of Marion water treatment plant includes a crossing of the South Fork of the Saline River, also identified as an INHS Biologically Significant Stream based on historical sampling that included Indiana crayfish in a 5.0 mile reach of that stream centered on Illinois Highway 166. Sampling by IDNR on the South Fork of the Saline River in the area of the Illinois Highway 166 bridge resulted in an IBI score of 42.5 (David Day, IDNR, letter dated April 19, 1994). INHS had described this portion of this stream as having a low biological diversity, principally because of pollution associated with former mining activities. None of the other stream crossings have been identified as a significant aquatic resource.

3.344 Further discussion regarding threatened and endangered aquatic species is included beginning with paragraph 3.367.

Wetland Resources

3.345 The area of the proposed reservoir includes wetlands that fall within the regulatory jurisdiction of the Corps. It was determined in 1990 that 49.06 acres of jurisdictional wetlands were included within the limits of the proposed project based on the regulatory guidance in effect at that time. The definition of jurisdictional wetlands has been modified since that delineation.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

3.346 On September 1, 1993, representatives of the Corps, USFWS, and Wetland Science Applications, Inc., a contractor employed by the City of Marion, conducted a delineation of wetlands within the proposed reservoir. This recent delineation based on current guidance (U.S. Army Corps of Engineers Wetland Delineation Manual, Technical Report Y-87-1, January 1987), determined that 40.38 acres should be classified as jurisdictional wetlands. The plants that predominate the various wetland communities are described below in the section entitled "Terrestrial Biological Resources."

3.347 A total of 28 individual wetlands were identified. These wetlands range in size from a few hundred square ft to about eight acres. Several of the larger wetlands occur in the portion of the proposed reservoir near the dam site. Wetlands in the Maple Branch arm of the proposed lake are confined to the upper portions of this area. The remaining wetlands are scattered north of the proposed dam site, beginning near the junction of Sugar Creek and its unnamed eastern tributary, continuing upstream to the northern end of the proposed lake

3.348 One acre of jurisdictional wetlands is located within the pipeline corridor from the proposed new reservoir to the City of Marion water treatment plant. Each stream crossing would include a 20-foot wide construction area.

Terrestrial Biological Resources

3.349 Land located within the proposed reservoir (1,172 acres) has been manipulated by man for a number of years through activities such as clearing for agricultural purposes, road building, construction of railroad lines, pond development, and timber harvesting. In addition to the 1,172 acres required for the reservoir, an additional 661 acres would be purchased by the City of Marion for watershed protection and other municipal uses. As of August 1998, the City of Marion had acquired or has an agreement in place to purchase approximately 1,803 acres of land. Acreage figures for the various vegetation cover types described in this document are based on aerial photography taken in April 1988 and pre-date recent timber removal activities. The plant communities identified on these aerial photographs were field checked and verified in December 1989 and January 1990 (Thomas Heineke, Wetland Science Applications, Inc., information dated February 5, 1993).

3.350 The area that would be inundated by the proposed reservoir includes approximately 594 acres that are either wetlands, woodlands, thickets, or old fields (previous agricultural land not actively being farmed). Five hundred thirty-three acres of land within the limits of the proposed lake were being farmed at the time the aerial photography was taken. The remaining area within the proposed lake consists of ponds, local roadways, and former railroad rights-of-way. The land outside of the proposed reservoir is predominantly woodlands (436 acres) and open non-wooded land (225 acres).

3.351 Of the 594 acres of non-agriculture vegetated lands included in the proposed reservoir area, 40 acres are (jurisdictional) wetlands, 415 acres are woods, 89 acres are thickets, and 50 acres are old fields. The wetlands are primarily wooded wetlands and wet meadows. The wooded areas at this location are primarily riparian woods, mesic woods, and mesic to dry woods. Thickets are areas that have been previously cleared and are reverting back to wooded areas. Old fields are abandoned agricultural areas in early or late successional stage.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

3.352 Wooded wetlands are primarily located in depressions and along the edges of streams. A large amount of the wooded wetland acreage occurs along the abandoned railroad right-of-way. This earth structure has created or enhanced many of the wooded wetlands in the bottoms of Sugar Creek. These plant communities are predominantly thickets of young woodlands with low species diversity and in the early to middle stages of succession to a mature forest. River birch is the dominant canopy species in these wet depressions. In the young thickets, this species occurs in almost pure stands where it averages 1 to 3 in. in diameter at breast height (DBH). Species that occur in some or all of the more mature woodlands (where a tree canopy has begun to form) include box elder, red maple, American elm, and green ash. Some areas include eastern cottonwood, black willow, and sycamore. The understory in areas with canopy typically consists of red maple and green ash, with box elder and American elm also common. In the areas that have the most developed canopy, green ash is typically dominant, frequently associated with American elm, box elder, and sycamore. In these mature areas, buttonbush is the dominant understory. Vines occurring in the wooded wetlands are frequently Japanese honeysuckle (*Lonicera japonica*), winter grape (*Vitis cinerea*), and trumpet creeper (*Campsis radicans*). The most common non-woody ground cover includes wood reed (*Cinna arundinacea*) and rice cutgrass (*Leersia oryzoides*). The wettest sites include false nettle (*Boehmeria cylindrica*) and various species of sedges (*Carex squarrosa*, *C. tribuloides*, and *Cyperus strigosus*). Somewhat drier areas include lowland aster (*Aster simplex*) and square-stemmed monkey flower (*Mimulus alatus*).

3.353 Wet meadows are found in two areas within the limits of the proposed reservoir that receive an almost continuous flow of water from seeps. These areas frequently have saturated soils and are predominantly covered with non-woody vegetation. A few areas of woody sapling cover can also be found. Plant species in these areas are diverse and vary significantly with minimal changes in water conditions. Rice cutgrass and barnyard grass (*Echinochloa pungens*) are the dominant species. Other species commonly found here include agrimony (*Agrimonia parviflora*), soft rush (*Juncus effusus*), camphor-weed (*Pluchea camphorata*), cinnamon willow herb (*Epilobium coloratum*), moneywort (*Lysimmachia nummularia*), blue vervain (*Verbena hastata*), square-stemmed monkey flower, and swamp marigold (*Bidens artistosa*). Woody vegetation consists mostly of black willow with occurrences, depending on wetness, of green ash and river birch.

3.354 Riparian woods are those which line streams and stream banks. These areas are mainly thin strips along the streams due to clearing for agricultural purposes. Dominant trees on these stream banks are river birch, American elm, and red maple. Other trees that may be found include sugarberry, box elder, and sycamore. The tops of banks commonly include black walnut, northern red oak, tulip poplar, bitternut hickory, sugar maple, white oak, and American elm. Understory species commonly include sugar maple, iron wood (*Carpinus caroliniana*), hazelnut (*Corylus americana*), coralberry (*Symphoricarpos orbiculatus*), and blackberry (*Rubus alleghiensis*).

3.355 Wooded areas not immediately adjacent to streams that are somewhat drier in nature (mesic) have tulip poplar, white oak, sweetgum, and red maple as dominant species. Northern red oak is often found but is never a dominant species. Similarly occurring are shagbark hickory, bitternut hickory, sugar maple, American elm, and wild black cherry. In more disturbed sites, box elder, river birch, green ash, and sugarberry are more common. In the upper portion of the proposed reservoir, beech occurs on the highest portion of the stream bottoms and low slopes. Understory plants include flowering dogwood, sugar maple, giant cane (*Arundinaria gigantea*), and hop hornbeam. Occasional species include American elm, red maple, and coralberry.

TABLE 2-9
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3.356 Drier woodland areas in the project area occur on relatively steep hillsides, from mid-slope to the tops of ridges. The mid-slope areas are strongly dominated by white oak with some bitternut hickory, southern red oak and sugar maple as associated species. Upper slopes and ridge tops are typically dominated with black oak; pignut hickory, black gum, and post oak (*Quercus stellata*) are species also found but less dominant. The driest sites also include blackjack oak (*Quercus marilandica*) and Texas hickory (*Carya texana*). The understory of these drier woods is generally open with species such as sugar maple, hop hornbeam, flowering dogwood, and iron wood typically present with less common occurrences of coralberry and slippery elm (*Ulmus rubra*).

3.357 Mesic thicket areas are locations that are somewhat drier than wetlands, have been subjected to clearing a number of years ago, and have reforested through natural regeneration. Trees in these stands are very dense and are usually 6 in. or less DBH. Commonly occurring species include river birch, box elder, American elm, sycamore, and green ash. In areas that are slightly drier, species such as wild black cherry, black walnut, and red maple become dominant. An understory is usually present only in older thickets and may include blackberry, multiflora rose (*Rosa multiflora*), and coralberry. Japanese honeysuckle and poison ivy (*Toxicodendron radicans*) are also common species.

3.358 Thickets that occur in drier areas are typically dense stands of small (3 to 6 inch DBH) southern red oak with occasional stands dominated by winged elm (*Ulmus alata*). Like the mesic thickets, these thickets have typically been created by land clearing a number of years ago. Species associated with these dominants are often sugar maple and white ash (*Fraxinus americana*) with less common occurrences of wild black cherry, green ash, persimmon (*Diospyros virginia*), and sassafras (*Sassafras albidum*). These thickets also typically include dense areas of Japanese honeysuckle.

3.359 Old fields are areas of abandoned agricultural lands that will eventually revert to woodlands if natural succession is allowed to continue. Most of this habitat is characterized as open and grass dominated with widely scattered trees. Dominant grasses include little bluestem, common broomsedge, and Elliott's broomsedge (*Andropogon elliotti*). Other species that occur on a regular basis include hairy bush clover (*Lespedeza hirta*) and mountain mint (*Pycnanthemum tenuifolium*). Recently disturbed sites include purple-top (*Tridens flavus*), ironweed, field thistle, Canada goldenrod, and frost aster (*Aster pilosus*). Prominent in these areas are widely spaced eastern red cedar, found in most old fields. Other trees that may be found include persimmon, southern red oak, shingle oak (*Quercus imbricaria*), and white ash. The driest old fields also include scattered post oak, blackjack oak, and Texas hickory. Concentrations of trees in old fields are usually greater along edges of existing woodlands. Shrubs and small trees that have also begun to invade these old fields include shining sumac (*Rhus copallina*), flowering dogwood, and winged elm.

3.360 The route of the pipeline from the proposed reservoir to the City of Marion water treatment plant would primarily follow an abandoned railroad corridor. This corridor includes approximately 5 acres of woods and about one acre of wetlands associated with 14 stream crossings.

3.361 The wooded areas of the corridors are primarily mesic thicket areas, locations that were subjected to clearing a number of years ago and have reforested through natural regeneration. Commonly occurring species include river birch, box elder, American elm, sycamore, and green

ash. In areas that are slightly drier, species such as wild black cherry, black walnut, and red maple become dominant. Understory in these areas typically includes blackberry, multiflora rose, and poison ivy.

3.362 Wetlands associated with the pipeline corridor stream crossings include riparian species such as river birch, American elm, red maple, box elder, and sycamore.

3.363 Large mammals that typically occur in these habitats include whitetail deer, gray fox, red fox, raccoon, opossum, fox squirrel, gray squirrel, eastern cottontail rabbit, striped skunk, woodchuck, and eastern chipmunk. Small mammals would typically be white-footed mouse, prairie vole, eastern mole, least shrew, and short-tailed shrew.

3.364 Birds that would occur either as residents or seasonally include red-tailed hawk, American kestrel, turkey vulture, barred owl, northern bobwhite, mourning dove, northern flicker, blue jay, whip-poor-will, eastern wood-peewee, great crested flycatcher, northern cardinal, American crow, white-throated sparrow, blue-gray gnatcatcher, summer tanager, Carolina chickadee, tufted titmouse, Carolina wren, northern mockingbird, American robin, eastern meadowlark, horned lark, downy woodpecker, red-bellied woodpecker, red-headed woodpecker, pileated woodpecker, and white-breasted nuthatch.

3.365 Reptiles that likely use these habitats include eastern box turtle, black rat snake, speckled kingsnake, blue racer, eastern garter snake, eastern hognose snake, northern fence lizard, and five-lined skink.

3.366 Amphibians would include American toad, northern spring peeper, western chorus frog, eastern gray treefrog, and small-mouthed salamander.

Threatened and Endangered Species

3.367 The area that includes the proposed water supply reservoir is known to have one state threatened species, least brook lamprey, and one state endangered species, Indiana crayfish, present. Both species are known to occur in Sugar Creek, within the limits of the proposed reservoir and downstream of the reservoir site. These two species prefer a pool and riffle stream habitat and are intolerant of sedimentation and chemical pollution.

3.368 The area of the proposed lake includes the range of two species that are listed as federally endangered, the Indiana bat and gray bat and one that is federally threatened, the bald eagle (Thomas M. Groutage, USFWS, letter dated October 13, 1989). The area of the proposed project includes the range of an additional species, the copperbelly watersnake, that was proposed for listing as federally threatened (Richard Nelson, U.S. Fish and Wildlife Service, letter dated January 17, 1995), but due to additional population information has been taken off of the candidate species list by U.S. Fish and Wildlife. Bald eagles and gray bats are not expected to occur in the immediate project area. The area does include habitat suitable for the seasonal presence of the Indiana bat, but no intensive surveys or studies have been conducted specifically for this permit application to determine the presence or absence of this species. The copperbelly watersnake was determined to be possibly present and a survey to determine presence or absence was conducted. No individuals of this species were recorded. The Indiana crayfish is also a Category 2 candidate species for the Federal list of threatened or endangered species.

TABLE 2-9
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3.369 The least brook lamprey is found west of the Appalachian Mountains from Pennsylvania, Ohio, and West Virginia to Kentucky, Tennessee, and Alabama. A few populations are also found in Indiana, Missouri, Arkansas, and Mississippi (*Atlas of North American Freshwater Fishes*, David Lee, et al., 1980). The only reported populations of least brook lamprey in Illinois occur in the Saline River drainage area. The species is found in small creeks and brooks with riffle bottoms of sand and gravel. Critical to the success of this species are areas of slower velocity water with substrate of sand and organic debris for ammocoetes (larval stage) development. The ammocoetes are vulnerable to siltation as this action can destroy suitable habitat. Individuals of this species are found over a wide geographic region but are very uncommon in Illinois. The Illinois populations represent extensions of the known range of this species. Least brook lampreys have been found at Sugar Creek sample site 1 within the proposed lake area and at Sugar Creek sample site 5, downstream from the Illinois Highway 166 bridge.

3.370 Recent sampling conducted for IDNR (Division of Natural Heritage report dated June 30, 1998) has indicated that the presence of the lamprey may be more common in Illinois than previously believed. This recent survey collected 112 lampreys, as compared to the 13 previously collected. Of the sites sampled, Lusk Creek in northeast Pope County was discovered to contain the largest known population of lampreys in the state. A total of 87 lampreys were collected from Lusk Creek and active spawning was observed during the survey.

3.371 The Indiana crayfish occurs in rocky riffles and pools of small to medium sized streams. Distribution of Indiana crayfish is limited to the Wabash River drainage in southwestern Indiana and in the Saline River and Honey Creek in southeastern Illinois (Illinois Natural History Survey Bulletin, Volume 33, Article 4, September 1985, Lawrence M. Page). The habitat this species requires is quite similar to that of the least brook lamprey in that it occupies clean small creeks that have not been subject to excessive siltation and chemical pollution. Contemporary distribution records (Illinois) for this species indicate it is found in Gallatin, Saline, Williamson, Pope, and Johnson Counties -- most always in the portion of the Saline River that drains the Shawnee Hills. Historic records (Illinois Natural History Survey Bulletin, Volume 33, Article 4, September 1985, Lawrence M. Page) show occurrences of individuals from the northern portion of the Saline River basin but no recent occurrences have been noted, likely the result of loss of habitat due to stream channelization, siltation, and chemical pollutants. Sampling by IDNR in 1993 found 27 individuals of Indiana crayfish. Twenty-two of these individuals were found at the Sugar Creek sample site 5 downstream from the Illinois Highway 166 bridge. Three individuals were found at Sugar Creek sample site 2 and two additional individuals were taken at Sugar Creek sample site 3.

3.372 While no sampling has been conducted to determine presence or absence, suitable habitat occurs within the area of the proposed lake for the federally endangered Indiana bat. Various mines and caves that are used during winter hibernation by this species have been identified as critical habitat for its continued existence. None of these designated critical habitats occur in the project area. Wintering colonies of this species disperse during the summer months during which time the young are born and raised. Summer maternal colonies make significant use of habitats that include bottomland riparian forests with small to medium sized streams. Females begin to make use of suitable habitat in early to mid-May and young are born in June and early July. Summer colonies begin to disperse in August and usually abandon summer habitat by the end of September. Optimum foraging habitat is thought to be the areas over small to medium sized streams that do not become dry and have mature overhanging trees along both stream banks.

TABLE 2-9
Estimated Total Annual Cost ($)
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3.373 After the close of the comment period on the FEIS, USFWS staff conducted an analysis of available habitat for Indiana bat on lands owned or optioned by the City of Marion (May 1995). The results of this analysis provided confirmation that suitable habitat occurs with the area of the proposed reservoir. However, this potential habitat was removed during clearing of the reservoir site under the initial permit for this project.

3.374 The copperbelly watersnake was determined as possibly occurring in the proposed project area. Records of occurrence of *N.e. neglecta* in southern Johnson County, as well as Saline, Gallatin, Pope, and Massac Counties indicated that a survey to determine presence or absence was needed. However, this species has been taken off of the candidate list by the USFWS since they determined that populations of this species are more prevalent than once thought. The copperbelly watersnake is protected by 17 Ill. Adm. Code 880.70, which prohibits its collection from designated counties within the state. The protection granted by the administrative rule is part of a conservation plan created by the USFWS and cooperating entities for protection of the species while not officially designating it as a listed species. This species is one of the least aquatic of the water snakes. They are characteristically inhabitants of bottomland hardwood forested wetlands and shrub swamps. While they may feed on fishes, *N.e. neglecta* feed primarily on amphibians. Copperbelly watersnakes emerge from hibernation in late March or early April. They bear young in September and enter hibernation typically in October, tending to select upland habitats as hibernation sites.

3.375 A survey was conducted to determine the presence or absence of *N.e. neglecta* in the project area. This survey was conducted in late April 1995. The results of this survey found no individuals of *N.e. neglecta* (ECOTECH, Inc., report dated May 1995).

3.376 Initial agency coordination for this proposed project regarding endangered species indicated that both the bald eagle and the gray bat are federally listed species whose known range includes the proposed project area.

3.377 Bald eagles are typically found in riparian areas along large streams, rivers, and lakes. Breeding areas are beginning to expand southward from the northern United States and Canada as a result of improvements in habitat conditions and management activities by various government and private organizations. Winter habitat preferences include riparian areas that are ice-free for feeding purposes. Large water bodies such as the Wabash and Ohio Rivers and the large regional lakes provide feeding opportunities for this species. Sugar Creek does not provide suitable feeding habitat for bald eagles during any season. No nesting or other summer eagle activity has been reported in the area of the proposed lake.

3.378 Gray bats roost in cave or cave-like habitat throughout the year. Gray bats are known to seasonally use caves in southern and southwestern Illinois and Missouri. Female gray bats use caves (or cave-like areas) with high humidity as nursery areas. No caves or cave-like habitat occur in the area included as part of the proposed water supply reservoir. Gray bats forage in riparian areas near roost sites.

Soils

3.379 Several soils are dominant in the proposed water supply reservoir. Sharon silt loam and Belknap silt loam are the primary soil types in the relatively flat stream bottoms. Sharon silt loam formed in recent alluvium, is moderately well-drained, and can be a productive soil with treatment

for high acidity and through the addition of phosphorus and potassium. Belknap silt loam is associated with Sharon silt loam but is more poorly drained, often requiring tile fields or drainage ditches to reduce soil moisture. Belknap soils also require more management for crop production as compared to Sharon soils with treatment for acidity, low phosphorus, and low potassium necessary. The occurrence of these two soils in the bottomlands is about evenly split.

3.380 Soils of the side slopes of the proposed reservoir area include the Hickory loam - Ava silt loam complex, Grantsburg silt loam, Wellston silt loam, and Manitou silt loam. The Hickory loam - Ava silt loam complex is typical of forested slopes, some quite steep. This soil is formed over glacial till and has a fragipan that limits root development. Hickory loam is generally found on the lower portions of the slopes with the Ava silt loam on the upper portions. This soil is typically easily eroded when cleared but provides pasture in cleared low slope areas. Grantsburg silt loam, Wellston silt loam, and Manitou silt loam all formed under forests from loess over weathered sandstone bedrock residuum. Grantsburg silt loam typically has a thicker loess parent layer and also usually has a fragipan. Wellston silt loam has the thinnest loess parent layer. Only the shallowest sloped areas of these soils are considered productive with high erosion potential, high acidity, and low phosphorous the principal limitations. These areas are typically forested or in pasture.

3.381 Soils included in the proposed pipeline corridor have largely been disturbed by man through the construction of railroad embankments and roads. Of the total 30 acres needed for the corridor, about 24 are in previously disturbed sites. The remaining acreage occurs in the portion of the corridor from the proposed reservoir to the City of Marion water treatment plant between the proposed damsite east and north of Creal Springs.

Geology

3.382 The location of the proposed water supply reservoir is in the unglaciated southern portion of Williamson and northern portion of Johnson Counties. This area is a complex dissected upland with narrow ridgetops and deeply cut valleys. Rock outcrops, primarily Pennsylvanian sandstones, are found in valley walls. The area is at the southern limit of the Illinois basin, with bedrock generally dipping slightly to the north and northeast.

3.383 The proposed reservoir area and pipeline corridor are located entirely outside of the Illinois coal basin, and no undermining has occurred in this region.

3.384 The bedrock of the proposed reservoir area is overlain with two distinct layers of loess, some deposited during Illinoian glaciation and the remainder associated with the Wisconsin glacial age. The oldest loess lies directly on bedrock or on residual soils developed from the bedrock. The main source of the loess was the Mississippi River valley. These wind-borne particles are silt-size, generally about .002 to .05 millimeters in diameter.

Land Use

3.385 Of the 1,172 acres included within the limits of the proposed reservoir (below elevation 496 feel msl), 40 acres are (jurisdictional) wetlands, 415 acres are woodlands, 89 acres are thickets, and 50 acres are old fields. Wetlands within the site are primarily wooded wetlands and wet meadows. The woodlands are forested areas including riparian woods, mesic woods, and

mesic to dry woods. Thickets are areas that have been previously cleared and are reverting back to wooded areas. Old fields are abandoned agricultural lands.

3.386 Agricultural lands comprise 533 acres of the proposed reservoir. These areas are currently planted in row crops, being utilized for the production of hay, are presently fallow and not being cropped, or being utilized for pasture. As crop production on agricultural lands often changes from year-to-year and occasionally with the season, no firm acreage value is available for each type of row crop. As the City of Marion has acquired lands, the title or easement provisions with each landowner determine whether they continue in agricultural production. Based on soil types, none of the croplands within the limits of the proposed reservoir are highly productive lands.

3.387 Ponds make up an additional 5 acres of the proposed reservoir area. Rights-of-way for abandoned railroads make up an additional 20 acres. Roadways and abandoned roads make up the balance of the area, accounting for 17 acres.

3.388 No houses are included in the area of the proposed reservoir; therefore, no families would be displaced due to the construction of the proposed reservoir.

3.389 Lands in addition to those that would be within the normal pool elevation of 496 ft (msl) would be required if the proposed reservoir receives approvals and is constructed. A perimeter of land around the lake must be acquired to satisfy floodplain requirements. These provisions require that adequate protection exists to accommodate a once in 100-year storm. Lands have been acquired to elevation 504 feel (msl) and to elevation 510 ft (msl) for this purpose. These additional lands provide a narrow border around the proposed lake edge.

3.390 Approximately 33 acres are included within the limits of the proposed pipeline corridor. Approximately five acres are wooded, one acre is wetland, three acres are cropland, one acre is streams, and 24 acres are existing or abandoned rights-of-way.

Transportation

3.391 The main road in the immediate vicinity of the proposed reservoir is Illinois State Highway 166. A network of Williamson and Johnson County roads encircles the area of the proposed lake. These roads are medium to light duty asphalt surfaced and gravel roads. None of these roads cross Sugar Creek in the main portions of the proposed lake. A north-south and an east-west county road cross an arm of the proposed reservoir in the Maple Branch area. A low-water ford crosses Sugar Creek in the uppermost portion of the proposed reservoir. The pipeline route to the City of Marion water treatment facility would require crossing one state highway (IL 166), six urban roads, eight rural roads, and two driveways.

Historic and Prehistoric Cultural Resources

3.392 A Phase I cultural resources reconnaissance study was completed for the area of the proposed water supply reservoir, dam site, and raw water pipeline to the City of Marion water treatment facility. The study of the lake and dam area was completed during 1989-90 and found 45 prehistoric archaeological sites (early Archaic - Mississippian), 20 historic archaeological sites (mid-19th to early 20th century), and 25 chronologically diverse isolated finds (American Resources Group, Ltd., report dated March 1990). A reconnaissance of the route of the proposed raw water pipeline in 1994, which lies primarily in an abandoned railroad right-of-way, found no

additional prehistoric or historic sites (American Resources Group, Ltd., report dated July 29, 1994).

3.393 Based on a review of data gathered during the reconnaissance stage efforts, the Corps and the Illinois State Historic Preservation Officer (SHPO) agreed that further investigations (Phase II testing) were needed for some of these sites. A total of 37 prehistoric and historic sites that occur within the limits of the proposed lake and dam or within the 504-foot or 510-foot (elevation, msl) real estate acquisition line for the proposed reservoir were identified for further investigation. These sites were tested during 1990-1991 (American Resources Group, Ltd., reports dated April 1991 and December 1991).

3.394 Prior to the physical testing of these 37 sites, the Corps, SHPO, the City of Marion, and the Advisory Council on Historic Preservation developed and signed a Memorandum of Agreement (MOA). This MOA outlined the planned testing and types of mitigation required for the possible loss of cultural resources should a permit be issued for the proposed lake project (Don L. Klima, Advisory Council on Historic Preservation, letter dated March 5, 1991). A Memorandum of Agreement is a legally binding document completed pursuant to Section 106 of the National Historic Preservation Act of 1966 for the appropriate treatment of cultural resources considered eligible for the National Register of Historic Places.

3.395 Following completion of the testing stage of the cultural resources studies, it was determined that 11 sites comprised a significant resource. These sites represent a cluster of Early through Late Woodland and Mississippian habitations in a small physical area. Each site was determined to be a significant resource and, as a group, these sites were determined to be eligible for the National Register of Historic Places (Theodore W. Hild, Deputy State Historic Preservation Officer, letter dated October 21, 1991). These sites provide information regarding semi-permanent field and residential base camps during a long period of Woodland habitation.

3.396 Following the letter from the Deputy SHPO and pursuant to the signed Memorandum of Agreement, Phase III mitigation activities (data recovery) were initiated for these 11 sites. Data recovery has been completed at all 11 phase III sites.

Recreation Opportunities

3.397 Residents adjacent to Sugar Creek, landowners that still retain property, and former residents that have sold property in the area of the proposed reservoir most likely use the area for recreation. Some residents of Creal Springs also probably use these areas for recreation. Small populations of sunfishes, black bass, and other small stream fish are probably caught by a small number of local individuals. The forested areas and farms support populations of both large and small mammals that are considered game species. Hunting by local residents occurs during various seasons in the area of the proposed reservoir.

3.398 The FEIS indicated that IDNR had begun construction of the Tunnel Hill State Trail, a regional hiking - bicycling trail in the area of the proposed reservoir project. This trail will follow an abandoned railroad alignment from near Harrisburg, Illinois to near Karnak, Illinois.

3.399 The route of the second phase of this trail crosses Sugar Creek in the uppermost area of the proposed lake. This portion of the trail is in the planning stage with no current schedule for construction. The bridge structure that crosses Sugar Creek remains in place and has a bridge

deck elevation of 509 ft (msl), approximately 13 ft above the elevation of the water surface of the proposed reservoir. The railroad bed near Sugar Creek and the bridge structure are presently owned by the City of Marion. The City of Marion has expressed a willingness to work with the IDNR to allow the Tunnel Hill State Trail to be built on property presently owned by the City of Marion (Robert L. Butler, Mayor, City of Marion, letter dated March 24, 1994).

Lake of Egypt Water District

3.400 A reservoir with a normal pool elevation of 485 ft (msl) would be required to supply sufficient water to compensate for LEWD's removal of water from Lake of Egypt in excess of the amount contracted with SIPC. A pipeline approximately 1.8 miles long would be constructed from the proposed reservoir to the Lake of Egypt to transfer the water.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Surface Water Resources

3.401 See paragraphs 3.319 – 3.326 for a discussion of surface water resources within the reservoir site.

3.402 The pipeline required to transfer water from the proposed reservoir to Lake of Egypt would require the crossing of Maple Branch upstream of the reservoir site.

Aquatic Biological Resources

3.403 See paragraphs 3.328 – 3.344 for a discussion of aquatic biological resources within the proposed reservoir site.

Wetland Resources

3.404 Construction of the proposed reservoir would inundate approximately 30 acres of jurisdictional wetlands. The pipeline route from the reservoir to Lake of Egypt would require crossing wetland area associated with Maple Branch. This crossing would represent a construction area about 20 feet wide.

Terrestrial Biological Resources

3.405 The proposed reservoir site contains approximately 354 acres of non-agricultural vegetated lands. This number includes approximately 250 acres of woodlands (most of which have been cleared), 30 acres of jurisdictional wetlands, 47 acres of thickets and 27 acres of old fields. The reservoir location also includes approximately 271 acres of agricultural land. See paragraphs 3.349 – 3.366 for a discussion of the community types within the proposed reservoir area.

3.406 The pipeline corridor includes approximately 3.5 acres of woodland that would be impacted. The pipeline will utilize existing road right-of-way to minimize impacts.

Threatened and Endangered Species

3.407 See paragraphs 3.367 – 3.378 for a discussion of threatened and endangered species within the proposed project area.

Soils

3.408 See paragraphs 3.379 – 3.381 for a discussion of soils within the proposed reservoir area.

3.409 The pipeline will be installed primarily in existing road right-of-way. These soils have generally been disturbed by prior road construction making specific identification difficult.

Geology

3.410 See paragraphs 3.382 – 3.384 for a discussion of the geology within the project area.

Land Use

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

3.411 Of the 625 acres included within the limits of the proposed reservoir (below elevation 485 feet msl), 30 acres are jurisdictional wetlands, 250 acres of woodlands, 47 acres of thickets and 27 acres of old fields. Wetlands within the site are primarily wooded wetlands and wet meadows. The woodlands are forested areas including riparian woods, mesic woods, and mesic to dry woods. Thickets are areas that have been previously cleared and are reverting back to wooded areas. Old fields are abandoned agricultural lands.

3.412 The proposed reservoir site contains approximately 271 acres of agricultural land. The croplands in this area are not highly productive based on general soil type. As the City of Marion acquired the land in the area, the title or easement provisions with each landowner determined whether the land would continue in agricultural production.

3.413 The majority of the land to be utilized for the pipeline corridor is road right-of-way. Approximately 4.4 acres of land will be required for the pipeline.

Transportation

3.414 See paragraph 3.391 for a discussion of the transportation facilities in the area of the proposed reservoir.

3.415 The pipeline corridor will follow existing road right-of-way. This corridor will necessitate the crossing of 2 additional roads and 2 driveways.

Historic and Prehistoric Cultural Resources

3.416 See paragraphs 3.392 – 3.396 for a discussion of historic and prehistoric cultural resources in the proposed reservoir area.

Recreation Opportunities

3.417 See paragraphs 3.397 – 3.399 for a discussion of recreational opportunities in the area.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

ENVIRONMENTAL CONSEQUENCES

4.000 The following environmental consequences discussion provides a detailed analysis of the resources impacted by each of the six feasible alternatives. The discussion of each feasible alternative is subdivided into a discussion of resource impacts involved with supplying the City of Marion as one action or supplying LEWD as a separate action. The narrative addresses the eleven environmental categories covered in the affected environment section incorporating discussion of short-term and long-term impacts associated with the action. A summary of irreversible and irretrievable resource commitments for each separate action is included for each separate action narrative. The short-term and long-term impacts are summarized in the exhibit at the end of the discussion of each separate action.

REND LAKE ALTERNATIVE RESOURCES

Introduction

4.001 Rend Lake is a multiple purpose reservoir constructed by the U.S. Army Corps of Engineers with a surface area of approximately 18,900 acres at summer pool. Should the City of Marion and/or LEWD choose to pursue this alternative, it would be an action outside the jurisdiction of the U.S. Army Corps of Engineers, Louisville District. Pipeline crossings of streams and/or wetlands may require specific individual Department of the Army authorization. If either pipeline route was developed, any decision regarding the need for Department of the Army permits would fall within the jurisdiction of the U.S. Army Corps of Engineers, St. Louis District. Any requirements for mitigation for any pipeline crossings would be under the direction of that office.

4.002 With the treated water alternative, no modifications to Rend Lake, the raw water withdrawal structure at Rend Lake, the RLCD water treatment plant, or the Rend Lake Intercity Water System distribution lines would be required for initial average daily volumes of water that may be needed by the City of Marion water system and/or LEWD. The water withdrawal structure, treatment plant, and/or distribution lines would likely need expansion in future years to serve growing needs but all features are capable of being expanded to serve the foreseeable future needs of RLCD, City of Marion, and LEWD. A new junction point on the existing Rend Lake Intercity Water System near Johnston City would be needed as would pipeline to connect the junction point to the City of Marion water treatment plant and also to the Lake of Egypt water treatment plant. The width of the pipeline corridor is assumed to be approximately 20 ft wide. The pipes that would be installed are a maximum of 24 in. in diameter.

4.003 The raw water alternative would require a new intake structure and pipeline system to be built from Rend Lake to water treatment facilities for the City of Marion and/or LEWD. The pipeline route from Rend Lake would follow new corridors as RLCD has determined that corridor sharing would not be feasible. The width of the pipeline corridor is assumed to be approximately 20 ft wide. The pipes that would be installed are a maximum of 24 in. in diameter. Withdrawal of raw water will require the authorization of the U.S. Army Corps of Engineers, St. Louis District and the State of Illinois.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Treated Water From Rend Lake

City of Marion

Surface Water Resources

4.004 The treated water line to Marion will require crossing eight small unnamed tributary streams. The crossings of the unnamed streams would cause minimal short-term construction impacts due to the installation of pipeline. Limited excavation would be needed to bury the pipe. Construction in creeks would result in disruption of stream substrate and temporary increases in suspended solids.

4.005 Consumptive use of water from Rend Lake would cause minimal drawdown of the reservoir that would slightly reduce outflow from the lake. The lake is a multiple purpose reservoir and is presently being used for water supply. The present volume of water needed by the City of Marion is less than the volume presently withdrawn from Rend Lake by the RLCD. The reservoir plan includes volumes of water set aside to assure low flow discharges from the lake. Increases in consumption of water from Rend Lake would need to increase substantially (more than twice current withdrawal rates) before any effect may occur to the ability of the reservoir to meet downstream low flow discharges.

Aquatic Biological Resources

4.006 The streams that would be crossed by the pipeline corridor would likely be populated with species that prefer minimal silt deposition. Construction would be short-term and limited in area. Construction impacts on aquatic species would likely be detrimental in the immediate area of excavation and construction.

4.007 Removal of water from Rend Lake would likely have negligible effect on aquatic species populating the reservoir. Drawdown would be minimal.

4.008 Organisms populating Big Muddy River downstream from Rend Lake would not be adversely affected as releases from Rend Lake would not likely be reduced due to consumptive use of water for the foreseeable future.

Wetland Resources

4.009 The treated water corridor to Marion does not contain any wetlands.

Terrestrial Biological Resources

4.010 See paragraphs 3.010 – 3.019 for discussion of terrestrial biological resources in the area.

4.011 The treated water pipeline corridor would include three acres that are woodlands. Approximately four acres of land within the limits of the treated water pipeline corridor are considered cropland. An additional three acres of existing right-of-way that are managed lands are included in the treated water corridor. These areas provide limited habitat and would be disturbed

temporarily during pipeline construction. Disturbance for pipeline construction would remove minimal habitat value and would be revegetated by the following season.

4.012 The three acres of woods in the treated water corridor would predominantly be altered to old field type habitat following construction as trees would be removed for construction and maintenance would retard voluntary succession back to woodland.

4.013 Large mammals that typically use the available habitats (including whitetail deer, gray fox, red fox, raccoon, opossum, fox squirrel, gray squirrel, eastern cottontail rabbit, striped skunk, woodchuck, and eastern chipmunk) would be minimally affected by pipeline construction and corridor maintenance. These species habitat requirements are such that a 20-foot path for a pipeline would not substantially influence their life requisites. Those individuals that prefer open old field habitat would benefit, conversely those species that require tree canopy would see declines in populations if food and den trees are removed and not allowed to revegetate because of pipeline corridor maintenance.

4.014 Small mammals (typically white-footed mouse, prairie vole, eastern mole, least shrew, and short-tailed shrew) require small areas of habitat. Because adjacent habitat is likely utilized, any individuals that would occur in the pipeline corridor would likely be displaced during pipeline construction and some overall loss in populations expected. Long-term impacts would be for increased available habitat for those species that prefer open old field areas.

4.015 Birds that prefer woodlands would permanently lose habitat with pipeline construction. Those species that prefer large forest blocks (in particular, neotropical migrants) would lose habitat. Species that require forest habitat for feeding, roosting, and/or nesting would lose available trees. The corridors would be managed so that the forest species would not be allowed to revegetate. Birds that prefer open old field habitats or woodlands interspersed with old fields would benefit from post-construction pipeline corridor conditions.

4.016 Reptiles and amphibians that prefer woodlands would permanently lose habitat with pipeline construction. Species that require forest habitat would lose available trees. The corridors would be managed so that the forest species would not be allowed to revegetate. Species that prefer open old field habitats or woodlands interspersed with old fields would benefit from post-construction pipeline corridor conditions.

Threatened and Endangered Species

4.017 Suitable habitat occurs within the area of the pipeline corridor for the federally endangered Indiana bat. No designated critical habitats occur in the area of the pipeline corridor. The wintering colonies of this species disperse during the summer months during which time young are born and raised. Summer maternal colonies make significant use of habitats that include bottomland riparian forests with small to medium sized streams. Optimum foraging habitat is thought to be the areas over small to medium sized streams that do not become dry and have mature overhanging trees along both stream banks.

4.018 Removal of riparian trees could adversely affect Indiana bats if removal occurred during the summer season of use by direct impact to roosting bats. Small breaks in riparian edge would likely minimally affect feeding activity for this species.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

4.019 Bald eagles are typically found in riparian areas along large streams, rivers, and lakes. Summer occurrences of bald eagles are becoming more common in the region. Winter habitat preferences include riparian areas that are ice-free for feeding purposes. Pipeline construction would not likely be disruptive to bald eagles.

4.020 Gray bats roost in cave or cave-like habitat throughout the year. In the region that includes this proposed project, gray bats are known to seasonally use caves in southern and southwestern Illinois and Missouri. Female gray bats use caves (or cave-like areas) with high humidity as nursery areas. No caves or cave-like habitat occurs in the area included as part of the pipeline corridor. Gray bats do forage in riparian areas in close proximity to the roost sites. Roost sites are not near the pipeline corridor. Additionally, removal of riparian vegetation for pipeline construction would not likely affect foraging success for gray bats.

4.021 The copperbelly watersnake could possibly occur in the area of the pipeline corridor. Records of occurrence for the copperbelly watersnake indicates that the area of the corridor would be more likely in the range of the yellowbelly watersnake, another subspecies of *N. erythrogaster*, or be populated by intergrades, individuals with some characteristics of both yellowbelly and copperbelly watersnakes. Should they occur in the area of the pipeline corridors, pipeline construction in bottomland hardwood forested wetlands would remove habitat for this species.

Soils

4.022 The soils of the corridor would be disturbed during pipeline construction by excavation for placement of the pipeline and due to compaction by construction equipment. Compacted cropland areas would likely be restored by the following growing season through plowing and/or disking. Areas of excavation would have the soil profile extensively disrupted and would likely require a number of years to recover.

Geology

4.023 The pipeline corridor is almost entirely located within the Big Muddy River basin. The geologic formation underlying the proposed pipeline corridor is predominantly post-glacial till. Construction in the pipeline corridor would minimally disturb bedrock geology.

4.024 Franklin and Williamson counties have extensive areas of surface and underground coal mining. Subsidence of previously mined areas is common in southern Illinois. Subsidence of the mined areas could increase the chance of line ruptures and amount of maintenance required. Approximately 4 miles of pipeline will need to be installed through areas that have been mined.

Land Use

4.025 No homes would be acquired as part of this pipeline corridor. Approximately 4 acres of cropland would be included in the treated water pipeline route from the junction point near Johnston City to the City of Marion water treatment facility. These cropland areas may lose one season of production, depending on timing of pipeline construction.

Transportation

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

4.026 Pipeline construction would cause no permanent impacts on roadways or railroads. Little disruption would occur to traffic on major highways since construction techniques generally would include tunneling or jacking under the road surfaces. Construction across less traveled roads, in particular gravel roads and driveways, may include excavation and temporary minor disruption of traffic because of one lane roads and resurfacing following construction. None of these actions would likely affect traffic for more than several days at any one site.

Historic and Prehistoric Cultural Resources

4.027 The treated water corridor has not had specific reconnaissance efforts to characterize individual historic or prehistoric cultural resources. The route is of narrow width and the ability to modify final pipeline alignments to avoid any located sites would preclude these resources from occurring in a final selected corridor. If construction was planned, the corridor would likely include a field reconnaissance to identify sites. The extent of work needed to identify cultural resources would depend on the pipeline route and the degree of involvement by permitting and/or reviewing government agencies.

Recreation Opportunities

4.028 Rend Lake is a large multiple use reservoir that includes opportunities for swimming, boating, water-skiing, and fishing. Hunting, hiking, and camping would likely not be impacted. Water withdrawal from Rend Lake to support the needs of the City of Marion would be minimal and most likely not noticeable when compared to any drawdown associated with current water consumption.

Irreversible and Irretrievable Resources

4.029 Resources lost due to the pipeline installation include approximately three acres of woodland habitat. A 20 ft. wide corridor through existing stands of woods will be cleared and maintained with low growing species for maintenance reasons. Faunal species inhabiting the woodland corridor will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. Future land use of the 20 ft. wide corridor will be limited due to the pipeline.

Short-term/Long-term Impacts Rend Lake Treated Water Alternative – City of Marion Individually
Short-term • Increase in suspended solids in waterways crossed and temporary disruption of substrate. • Temporary relocation of mobile aquatic organisms while suspended solids have increased. • Cropland areas will be unavailable for use during installation of pipeline (assuming installation is during the growing season), but post construction use will not be limited. • Transportation corridors will experience temporary delays due to installation under or across transportation lines.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Long-term • Conversion of 3 acres of woodlands to old field habitat. • Limitations on future land use of pipeline corridor. • Soil profiles will be disrupted through construction.

Lake of Egypt Water District

Surface Water Resources

4.030 The treated water line to Lake of Egypt will require crossing 16 small unnamed tributary streams. Impacts to these surface water resources and Rend Lake are discussed in paragraphs 4.004 – 4.005.

Aquatic Biological Resources

4.031 Impacts to aquatic biological resources are discussed in paragraphs 4.006 – 4.008.

Wetland Resources

4.032 The treated water corridor does not include wetlands.

Terrestrial Biological Resources

4.033 The treated water pipeline corridor includes approximately ten acres of woodlands and approximately 14 acres of cropland. An additional three acres of existing right-of-way that are managed lands are included in the treated water corridor. Impacts to the terrestrial biological resources are discussed in paragraphs 4.011 – 4.016.

Threatened and Endangered Species

4.034 Impacts to threatened and endangered species are discussed in paragraphs 4.017 – 4.021.

Soils

4.035 Impacts to soils are discussed in paragraph 4.022.

Geology

4.036 Impacts to area geology are discussed in paragraphs 4.023 – 4.024. Approximately 4 miles of pipeline will need to be installed through areas that have been mined.

Land Use

4.037 No homes would be acquired as part of the pipeline corridor. Approximately 14 acres of cropland would be included in the treated water pipeline route from the junction point near Johnston City to the LEWD water treatment facility. These cropland areas may lose one season of production, depending on timing of pipeline construction.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Transportation

4.038 Impacts to transportation in the area are discussed in paragraph 4.026.

Historic and Prehistoric Cultural Resources

4.039 Impacts to historic and prehistoric cultural resources in the area are discussed in paragraph 4.027.

Recreation Opportunities

4.040 Impacts to the recreation opportunities are discussed in paragraph 4.028.

Irreversible and Irretrievable Resources

4.041 Resources lost due to the pipeline installation include approximately ten acres of woodland habitat. A 20 ft. wide corridor through existing stands of woods will be cleared and maintained with low growing species for maintenance reasons. Faunal species inhabiting the woodland corridor will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. Future land use of the 20 ft. wide corridor will be limited due to the pipeline.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Short-term/Long-term Impacts Rend Lake Treated Water Alternative – LEWD Individually
Short-term • Increase in suspended solids in waterways crossed and temporary disruption of substrate. • Temporary relocation of mobile aquatic organisms while suspended solids have increased. • Cropland areas will be unavailable for use during installation of pipeline (assuming installation is during the growing season), but post construction use will not be limited. • Transportation corridors will experience temporary delays due to installation under or across transportation lines.
Long-term • Conversion of ten acres of woodlands to old field habitat. • Limitations on future land use of pipeline corridor. • Soil profiles will be disrupted through construction.

Raw Water From Rend Lake

City of Marion

Surface Water Resources

4.042 The raw water pipeline corridor from Rend Lake to Marion would require crossing 29 streams or rivers, including a crossing of the Middle Fork of the Big Muddy River. Crossings of Lake Creek, Panel Creek, and Marcus Branch would be needed as would 25 additional small unnamed tributary streams.

4.043 The crossings of Big Muddy River and named and unnamed streams would cause minimal short-term construction impacts due to the installation of pipeline. Limited excavation would be needed to bury the pipe. Construction in waterways would result in disruption of stream substrate and temporary increases in suspended solids.

4.044 Consumptive use of water from Rend Lake would cause minimal drawdown of the reservoir that would slightly reduce outflow from the lake. The lake is a multiple purpose reservoir and is presently being used for water supply. The present volume of water needed by the City of Marion is less than the volume currently withdrawn from Rend Lake by the RLCD. The reservoir plan includes volumes of water set aside to assure low flow discharges from the lake. Increases in consumption of water from Rend Lake would need to increase substantially (more than twice current withdrawal rates) before any effect may occur to the ability of the reservoir to meet downstream low flow discharges.

Aquatic Biological Resources

4.045 Impacts to aquatic biological resources are discussed in paragraphs 4.006 – 4.008.

Wetland Resources

4.046 The Rend Lake raw water corridor would include approximately five acres of jurisdictional wetlands. This area is a narrow (20 ft wide) strip that would be disturbed for short periods of time but would be recolonized within one growing season. The crossing would, however, be almost one-half mile in length and could cause more disruption than would be indicated by its relative physical size. Areas that are treed would be cleared and periodically re-cleared to provide a maintenance access right-of-way. The access corridor would likely result in a community dominated by low growing species.

Terrestrial Biological Resources

4.047 The raw water pipeline corridor would include approximately 20 acres of cropland. These areas provide limited habitat and would be disturbed temporarily during pipeline construction. They would be available for reuse as cropland for the growing season following construction. An additional eight acres of existing rights-of-way are managed lands that are frequently disturbed by mowing or other similar actions. Disturbance for pipeline construction would remove minimal habitat value and would be revegetated by the following growing season.

4.048 Five acres are (jurisdictional) wetlands and 19 acres of woods are included in the raw water corridor. Wooded wetlands would be permanently altered as woody vegetation would need to be removed for construction and maintenance access. Wet meadows would be disturbed during construction but most areas would recover by the following growing season.

4.049 Success in recovery would be closely related to final grading after construction and soil compaction, both of which would influence local hydrology. Woods in the raw water corridor would predominantly be altered to old field type habitat following construction as trees would be removed for construction and maintenance would retard voluntary succession back to woodland.

4.050 Impacts to animals are discussed in paragraphs 4.013 – 4.016.

Threatened and Endangered Species

4.051 Impacts to threatened and endangered species are discussed in paragraphs 4.017 – 4.021.

Soils

4.052 Impacts to soils are discussed in paragraph 4.022.

Geology

4.053 Impacts to geology are discussed in paragraphs 4.023 – 4.024. Approximately 15 miles of pipeline will need to be installed through areas that have been mined.

Land Use

4.054 No homes would be required as part of this alternative. Approximately 20 acres of cropland would be included in this alternative. These cropland areas may lose one season of production, depending on timing of pipeline construction.

Transportation

4.055 Impacts to transportation are discussed in paragraph 4.026.

Historic and Prehistoric Cultural Resources

4.056 Impacts to cultural resources are discussed in paragraph 4.027.

Recreation Opportunities

4.057 Rend Lake is a large multiple use reservoir that includes opportunities for swimming, boating, water-skiing, and fishing. Construction of a new intake structure with the raw water alternative would cause limited localized disruption to lake users, depending on season of construction. Hunting, hiking, and camping would likely not be impacted. Water withdrawal from Rend Lake to support the needs of the City of Marion and/or LEWD would be minimal and likely not noticeable when compared to any drawdown associated with current water consumption.

Irreversible and Irretrievable Resources

4.058 Resources lost due to the pipeline installation include approximately 19 acres of woodland habitat. A 20 ft. wide corridor through existing stands of woods will be cleared and maintained with low growing species for maintenance reasons. Faunal species inhabiting the woodland corridor will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. Approximately five acres of wetlands will be crossed, which will necessitate the removal of any wetland tree species for pipeline corridor maintenance. The corridor through wetland areas will be maintained with low growing wetland species. Future land use of the 20 ft. wide corridor will be limited due to the pipeline.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Short-term/Long-term Impacts Rend Lake Raw Water Alternative – City of Marion Individually
Short-term • Increase in suspended solids in waterways crossed and temporary disruption of substrate. • Temporary relocation of mobile aquatic organisms while suspended solids have increased. • Cropland areas will be unavailable for use during installation of pipeline (assuming installation is during the growing season), but post construction use will not be limited. • Transportation corridors will experience temporary delays due to installation under or across transportation lines. • Temporary disruption of a 20 ft. wide corridor across wetlands totaling about 5 acres.
Long-term • Conversion of 19 acres of woodlands to old field habitat. • Limitations on future land use of pipeline corridor. • Removal of wetland tree species within corridor and maintained as lower growing wetland species. • Soil profiles will be disrupted through construction.

Lake of Egypt Water District

Surface Water Resources

4.059 The raw water pipeline corridor from Rend Lake to the LEWD water treatment plant would require crossing 37 streams or rivers, including a crossing of the Middle Fork of the Big Muddy River. Crossings of Lake Creek, Panel Creek, and Marcus Branch would be needed as would the crossing of 33 additional small unnamed tributary streams.

4.060 Impacts to surface water resources are discussed in paragraphs 4.004 – 4.005.

Aquatic Biological Resources

4.061 Impacts to aquatic biological resources are discussed in paragraphs 4.006 – 4.008.

Wetland Resources

4.062 The raw water pipeline corridor includes approximately 5 acres of wetlands. Impacts to wetland resources are discussed in paragraph 4.046.

Terrestrial Biological Resources

4.063 The raw water pipeline corridor would include approximately 30 acres cropland. These areas provide limited habitat and would be disturbed temporarily during pipeline construction. They would be available for reuse as cropland for the growing season following construction. An additional eight acres of existing rights-of-way are managed lands that are frequently disturbed by mowing or other similar actions. Disturbance for pipeline construction would remove minimal habitat value and would be revegetated by the following growing season.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

4.064 Of the 31 acres of non-agriculture vegetated lands included in the raw water corridor, five acres are (jurisdictional) wetlands and 26 acres are woods. Wooded wetlands would be permanently altered as woody vegetation and would need to be removed for construction and maintenance access. Wet meadows would be disturbed during construction but most areas would recover by the following growing season.

4.065 Success in recovery would be closely related to final grading after construction and soil compaction, both of which would influence local hydrology. Woods in the raw water corridor would predominantly be altered to old field type habitat following construction as trees would be removed for construction and maintenance would retard voluntary succession back to woodland.

4.066 Impacts to animals in the area are discussed in paragraphs 4.013 – 4.016.

Threatened and Endangered Species

4.067 Impacts to threatened and endangered species are discussed in paragraphs 4.017 – 4.021.

Soils

4.068 Impacts to soils are discussed in paragraph 4.022.

Geology

4.069 The pipeline corridor is almost entirely located within the Big Muddy River basin. The geologic formation underlying the proposed pipeline corridor is predominantly post-glacial till. Small portions of the corridor include the Shawnee Hills and associated bedrock strata. Construction in the pipeline corridor would minimally disturb bedrock geology. Approximately 15 miles of pipeline would need to be installed through areas that have been mined, increasing the chance of system failures due to subsidence.

Land Use

4.070 No homes would be acquired as part of this pipeline corridor. Approximately 30 acres of cropland would be included in the route from Rend Lake to the LEWD water treatment plant. These cropland areas may lose one season of production, depending on timing of pipeline construction.

Transportation

4.071 Impacts to transportation are discussed in paragraph 4.026.

Historic And Prehistoric Cultural Resources

4.72 Impacts to cultural resources are discussed in paragraph 4.027.

Recreation Opportunities

4.073 Impacts to recreation opportunities are discussed in paragraph 4.057.

Irreversible and Irretrievable Resources

4.074 Resources lost due to the pipeline installation include approximately 26 acres of woodland habitat. A 20 ft. wide corridor through existing stands of woods will be cleared and maintained with low growing species for maintenance reasons. Faunal species inhabiting the woodland corridor will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. Approximately five acres of wetlands will be crossed, which will necessitate the removal of any wetland tree species for pipeline corridor maintenance. The corridor through wetland areas will be maintained with low growing wetland species. Future land use of the 20 ft. wide corridor will be limited due to the pipeline.

Short-term/Long-term Impacts Rend Lake Raw Water Alternative – LEWD Individually
Short-term • Increase in suspended solids in waterways crossed and temporary disruption of substrate. • Temporary relocation of mobile aquatic organisms while suspended solids have increased. • Cropland areas will be unavailable for use during installation of pipeline (assuming installation is during the growing season), but post construction use will not be limited. • Transportation corridors will experience temporary delays due to installation under or across transportation lines. • Temporary disruption of a 20 ft. wide corridor across wetlands totaling about 5 acres.
Long-term • Conversion of 26 acres of woodlands to old field habitat. • Limitations on future land use of pipeline corridor. • Removal of wetland tree species within corridor and maintained as lower growing wetland species. • Soil profiles will be disrupted through construction.

CEDAR LAKE ALTERNATIVE RESOURCES

Introduction

4.075 Cedar Lake is a water supply reservoir constructed by the City of Carbondale in 1974 with a surface area of approximately 1,750 acres. Should the City of Marion and/or LEWD choose to pursue this alternative, it would be an action outside the jurisdiction of the U.S. Army

Corps of Engineers, Louisville District. Pipeline crossings of Crab Orchard Lake may require specific individual Department of the Army authorization. If the northern pipeline route was developed, any decision regarding need for Department of the Army permits would fall within the jurisdiction of the U.S. Army Corps of Engineers, St. Louis District. Any requirements for mitigation for any pipeline crossings would be under the direction of that office. Further, any mitigation that would be required for crossings of Crab Orchard National Wildlife Refuge and Crab Orchard Lake would be under the review of the USFWS.

4.076 No modifications to Cedar Lake, the raw water withdrawal structure at Cedar Lake, or the City of Carbondale water treatment plant would be required for initial volumes of water that may be needed by the City of Marion water system and/or the LEWD. The water withdrawal structure and treatment plant are capable of being expanded to serve the foreseeable future needs of Carbondale, Marion, and/or the LEWD.

4.077 A raw or treated water pipeline system would need to be built from the City of Carbondale water treatment facilities for either the City of Marion and/or the LEWD. As previously indicated, two routes between the City of Carbondale plant and the City of Marion and/or LEWD treatment plant have been considered since Crab Orchard National Wildlife Refuge and Crab Orchard Lake lie between these points. The pipeline routes avoid Crab Orchard Lake to the greatest extent possible for both cost and environmental reasons. The width of the pipeline corridor is assumed to be approximately 20 ft wide. The pipes that would be installed are a maximum of 24 in. in diameter.

City of Marion - Northern Route

Surface Water Resources

4.078 The northern pipeline corridor would require the crossing of two lakes and a number of streams. These include 6 crossings of Crab Orchard Lake and one of Carbondale Reservoir. Crab Orchard Creek would be crossed twice; Piles Fork, Pigeon River, and 14 additional small unnamed tributary streams would also be crossed.

4.079 The crossings of the named and unnamed streams would cause minimal short-term construction impacts due to the installation of pipeline. Limited excavation would be needed to bury the pipe. Construction in creeks would result in disruption of stream substrate and temporary increases in suspended solids.

4.080 Construction of a pipeline across the Carbondale Reservoir would cause minimal impacts as the line would be laid on the bottom of the lake. Some disruption of sediments would result and short-term increases in turbidity would likely result in the vicinity of the installation.

4.081 Construction of a pipeline across portions of Crab Orchard Lake would disturb lake sediments. This action would resuspend bottom materials, but none of these materials are likely to be contaminated with PCBs. The impacts of resuspending bottom sediments that are not contaminated would be short-term localized increases in turbidity. Disturbance of sediments would not add to any bioaccumulation of PCBs that may be occurring in the lake.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

4.082 Increased consumptive use of water from Cedar Lake would increase drawdown of the reservoir or reduce outflow from the lake. The lake has been constructed for several years and the choice of reducing releases or allowing greater drawdown would be up to the City of Carbondale. If the City were to maintain releases at current levels, drawdown of the reservoir would likely be less than one foot in addition to any increase in drawdown by the City of Carbondale. If it the City of Carbondale decided to reduce downstream releases to minimize any drawdown associated with the sale of water, flows in Cedar Creek would be reduced.

Aquatic Biological Resources

4.083 The streams that would be crossed by the proposed pipeline corridor are most likely populated with species that prefer minimal silt deposition. Construction would be short-term and limited in area. Construction impacts on aquatic species would likely be temporarily detrimental in the immediate area of excavation and construction.

4.084 The northern route crossings of Carbondale Reservoir and Crab Orchard Lake would likely result in localized turbidity. Lacusterine species in these reservoirs would likely avoid these areas during and, for a short time, after construction. Bioaccumulation of PCBs from disturbed sediment in Crab Orchard Lake would not be a significant concern since the majority of contaminated sediments occur in areas that would not be disturbed by pipeline construction.

4.085 Removal of water from Cedar Lake would likely have minimal effect on aquatic species populating the reservoir. Drawdown would be minimal, particularly if downstream releases were reduced to compensate.

4.086 Organisms populating Cedar Creek would be adversely affected if releases from Cedar Lake were reduced due to increased consumptive use of water from Cedar Lake.

Wetland Resources

4.087 This pipeline corridor alternative would include approximately four acres of jurisdictional wetlands. The corridor is a narrow strip (20 ft wide) that would be disturbed for short periods of time but would be revegetated within one growing season. Areas that currently have trees would be altered to low growing species to provide access for maintenance of the right-of-way.

Terrestrial Biological Resources

4.088 The northern pipeline corridor would include approximately 14 acres of cropland. These areas provide limited habitat and would be disturbed temporarily during pipeline construction. They would be available for reuse as cropland for the growing season following construction. An additional 19 acres of existing rights-of-way are managed lands that are frequently disturbed by mowing or other similar actions. Disturbance for pipeline construction would remove minimal habitat value and would be revegetated by the following growing season.

4.089 Of the 26 acres of non-agriculture vegetated lands included in the northern pipeline corridor, 4 acres are jurisdictional wetlands, 18 acres are woods, and 4 acres are old fields.

Wooded wetlands would be permanently altered, as woody vegetation would need to be removed for construction and maintenance access. Wet meadows would be disturbed during construction but most areas would recover by the following growing season.

4.090 Success in recovery would be closely related to the final grade after construction and soil compaction, both of which would influence local hydrology. Wooded areas would predominantly be altered to old field type habitat following construction since trees would be removed during construction and pipeline maintenance would retard voluntary succession back to woodland. Old fields would be temporarily disturbed during construction. These areas would revert back to old field in several growing seasons.

4.091 Large mammals that typically use the available habitats (including whitetail deer, gray fox, red fox, raccoon, opossum, fox squirrel, gray squirrel, eastern cottontail rabbit, striped skunk, woodchuck, and eastern chipmunk) would be minimally affected by pipeline construction and corridor maintenance. These species' habitat requirements are such that a 20-foot path for a pipeline would not substantially influence their life requisites. If food and den trees are removed and not allowed to revegetate because of pipeline corridor maintenance, those individuals that prefer open old fields would benefit; conversely, those species that require canopy would see declines in populations.

4.092 Small mammals (typically white-footed mouse, prairie vole, eastern mole, least shrew, and short-tailed shrew) require small areas of habitat. Because adjacent habitat is likely utilized, any individuals that would occur within the pipeline corridor would likely be displaced during pipeline construction and some overall loss in populations would be expected. Long-term impacts would be increased available habitat for those species that prefer open old field areas.

4.093 Birds that prefer woodlands would permanently lose habitat with pipeline construction. Those species that prefer large forest blocks (in particular, neotropical migrants) would lose habitat. Species that require forest habitat for feeding, roosting, and/or nesting would lose available trees. The corridor would be managed so that trees would not be allowed to regenerate. Birds that prefer open old field habitats or woodlands interspersed with old fields would benefit from post-construction corridor conditions.

4.094 Reptiles and amphibians that prefer woodlands would permanently lose habitat with pipeline construction. Species that require forest habitat would lose available trees. The pipeline corridor would be managed so that trees would not be allowed to regenerate. Species that prefer open old field habitats or woodlands interspersed with old fields would benefit from post-construction corridor conditions.

Threatened and Endangered Species

4.095 Suitable habitat occurs within the area of the pipeline corridor for the federally endangered Indiana bat. No designated critical habitats occur in the area of the pipeline corridor. The wintering colonies of this species disperse during the summer months when the young are born and raised. Summer maternal colonies make significant use of habitats that include bottomland riparian forests with small to medium sized streams. Optimum foraging habitat is

thought to be the areas over small to medium sized streams that do not become dry and have mature overhanging trees along both stream banks. Removal of riparian trees could adversely affect Indiana bats if removal occurred during the summer season. Small breaks in riparian edge would minimally affect feeding activity for this species.

4.096 Bald eagles are typically found in riparian areas along large streams, rivers, and lakes. Summer occurrences of bald eagles are becoming more common in the region. Winter habitat preferences include riparian areas that are ice-free for feeding purposes. Pipeline construction could possibly be disruptive to bald eagles that use Crab Orchard Refuge, since the northern pipeline corridor has a number of lake crossings and would remove riparian vegetation. However, this corridor is in close proximity to Illinois Highway 13, which would reduce the potential for disruption to bald eagles.

4.097 Gray bats roost in cave or cave-like habitats throughout the year. In the region that includes this proposed project, gray bats are known to seasonally use caves in southern and southwestern Illinois and Missouri. Female gray bats use caves (or cave-like areas) with high humidity as nursery areas. No caves or cave-like habitat occurs in the area included as part of the pipeline corridor. Gray bats do forage in riparian areas in close proximity to the roost sites. No known roost sites are located near the pipeline corridor. Additionally, removal of riparian vegetation for pipeline construction would not affect foraging success for gray bats.

4.098 The copperbelly watersnake could possibly occur in the area of the pipeline corridor. Records of occurrences of copperbelly watersnakes indicate that the pipeline corridor is located in an area more likely in the range of yellowbelly watersnakes, another subspecies of *N. erythrogaster*, or that it would be populated by intergrades, individuals with characteristics of both yellowbelly and copperbelly watersnakes. Pipeline construction in bottomland hardwood forested wetlands would remove habitat for this species.

Soils

4.099 The soils of the proposed pipeline corridor would be disturbed during construction by excavation for placement of the pipeline and through compaction by construction equipment. Compacted cropland areas would likely be restored by the following growing season by plowing and/or disking. Areas of excavation would have the soil profile extensively disrupted and would likely require a number of years to recover.

Geology

4.100 Construction in the pipeline corridor would minimally disturb bedrock geology.

Land Use

4.101 No homes would be acquired as part of this alternative. Approximately 14 acres of cropland would be impacted. These cropland areas may lose one season of production, depending on the timing of pipeline construction.

Transportation

4.102 Pipeline construction would cause no permanent impacts on existing roadways or railroads. Little disruption would occur to traffic on major highways since construction techniques generally would include tunneling or jacking under the road surfaces. Construction across less traveled roads, in particular gravel roads and driveways, may include excavation and temporary minor disruption of traffic due to one lane roads and resurfacing following construction. None of these actions would likely affect traffic for more than several days at any one site.

Historic and Prehistoric Cultural Resources

4.103 The pipeline corridor has not had specific reconnaissance efforts to characterize individual historic or prehistoric cultural resources. The proposed route is of narrow width and the final pipeline alignment can be modified to avoid any located sites. Further, approximately one-fourth of the northern alignment follows existing rights-of-way that have already been disturbed. If this alternative is selected, a Phase I archaeological survey of the pipeline route would need to be conducted.

Recreation Opportunities

4.104 Crab Orchard Lake is a large multiple-use reservoir that includes opportunities for swimming, boating, water-skiing, and fishing. Construction of the pipeline would have the potential to be visually disruptive, depending on the season of construction. Hunting, hiking, camping, and wilderness experience could similarly be disrupted by visual impacts and sound levels generated during construction, again depending on the season of construction.

Irreversible and Irretrievable Resources

4.105 Resources lost due to the pipeline installation include approximately 18 acres of woodland habitat. A 20 ft. wide corridor through existing stands of woods will be cleared and maintained with low growing species for maintenance reasons. Faunal species inhabiting the woodland corridor will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will

eliminate any sessile organisms inhabiting the corridor. If the City of Carbondale chooses to compensate for drawdown by reducing downstream releases into Cedar Creek, then species in Cedar Creek would be adversely impacted with some loss in numbers likely. Approximately four acres of wetlands will be crossed, which will necessitate the removal of any wetland tree species for pipeline corridor maintenance. The corridor through wetland areas will be maintained with low growing wetland species. Future land use of the 20 ft. wide corridor will be limited due to the pipeline.

Short-term/Long-term Impacts Cedar Lake Alternative, Northern Route – City of Marion Individually
Short-term • Increase in suspended solids in waterways crossed and temporary disruption of substrate. • Temporary relocation of mobile aquatic organisms while suspended solids have increased. • Cropland areas will be unavailable for use during installation of pipeline (assuming installation is during the growing season), but post construction use will not be limited. • Transportation corridors will experience temporary delays due to installation under or across transportation lines. • Temporary disruption of a 20 ft. wide corridor across wetlands totaling about 4 acres.
Long-term • Conversion of 18 acres of woodlands to old field habitat. • Limitations on future land use of pipeline corridor. • Removal of wetland tree species within corridor and maintained as lower growing wetland species. • Reduction of downstream releases to Cedar Creek to offset drawdown, could impact species inhabiting the stream. • Soil profiles will be disrupted through construction.

City of Marion - Southern Route

Surface Water Resources

4.106 A southern pipeline corridor would include crossings of Piles Fork, Drury Creek, Indian Creek, Sycamore Creek, Little Grassy Creek, Grassy Creek, Caney Branch, Little Wolf Creek, Middle Wolf Creek, Limb Branch, Little Saline Creek, the spillway below Lake of Egypt, and two crossings of Crab Orchard Creek. In addition, 15 more crossings of small unnamed tributary streams would be included.

4.107 Impacts to these surface water resources are discussed in paragraphs 4.079 and 4.082.

Aquatic Biological Resources

4.108 Impacts to aquatic biological resources are discussed in paragraphs 4.083 – 4.086.

Wetland Resources

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

4.109 This alternative pipeline corridor would impact approximately one acre of jurisdictional wetlands. Impacts to wetlands are discussed in paragraph 4.087.

Terrestrial Biological Resources

4.110 The southern pipeline corridor would impact approximately one acre of wetlands and 26 acres of woods. Approximately 24 acres of land within the limits of the pipeline corridor are cropland. An additional 2 acres of existing rights-of-way that are managed lands are included in this corridor.

4.111 Impacts to the terrestrial biological resources are discussed in paragraphs 4.090 – 4.094.

Threatened and Endangered Species

4.112 Impacts to threatened and endangered species are discussed in paragraphs 4.095 – 4.098.

Soils

4.113 Impacts to soils are discussed in paragraph 4.099.

Geology

4.114 Construction in the pipeline corridor would minimally disturb bedrock geology. However, the southern pipeline corridor passes through areas with greater potential for bedrock excavation.

Land Use

4.115 No homes would be acquired as part of this alternative. Approximately 24 acres of cropland would be impacted. These cropland areas may lose one season of production, depending on the timing of pipeline construction.

Transportation

4.116 Impacts to transportation are discussed in paragraph 4.102.

Historic and Prehistoric Cultural Resources

4.117 Impacts to cultural resources are discussed in paragraph 4.103.

Recreation Opportunities

4.118 No impacts to recreational opportunities are anticipated under this alternative.

Irreversible and Irretrievable Resources

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

4.119 Resources lost due to the pipeline installation include approximately 26 acres of woodland habitat. A 20 ft. wide corridor through existing stands of woods will be cleared and maintained with low growing species for maintenance reasons. Faunal species inhabiting the woodland corridor will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. If the City of Carbondale chooses to compensate for drawdown by reducing downstream releases into Cedar Creek, then species in Cedar Creek would be adversely impacted with some loss in numbers likely. Approximately one acre of wetlands will be crossed, which will necessitate the removal of any wetland tree species for pipeline corridor maintenance. The corridor through wetland areas will be maintained with low growing wetland species. Future land use of the 20 ft. wide corridor will be limited due to the pipeline.

Short-term/Long-term Impacts Cedar Lake Alternative, Southern Route – City of Marion Individually
Short-term • Increase in suspended solids in waterways crossed and temporary disruption of substrate. • Temporary relocation of mobile aquatic organisms while suspended solids have increased. • Cropland areas will be unavailable for use during installation of pipeline (assuming installation is during the growing season), but post construction use will not be limited. • Transportation corridors will experience temporary delays due to installation under or across transportation lines. • Temporary disruption of a 20 ft. wide corridor across wetlands totaling about one acre.
Long-term • Conversion of 26 acres of woodlands to old field habitat. • Limitations on future land use of pipeline corridor. • Removal of wetland tree species within corridor and maintained as lower growing wetland species. • Reduction of downstream releases to Cedar Creek to offset drawdown could impact species inhabiting the stream. • Soil profiles will be disrupted through construction.

Lake of Egypt Water District - Northern Route

Surface Water Resources

4.120 A northern pipeline route would require six crossings of tributary arms of Crab Orchard Lake and a single crossing of the Carbondale Reservoir. In addition, two crossings of Crab Orchard Creek and single crossings of Piles Fork, Pigeon Creek, and 18 unnamed tributary streams would be required.

4.121 Impacts to surface water resources are discussed in paragraphs 4.079 – 4.082.

Aquatic Biological Resources

4.122 Impacts to aquatic biological resources are discussed in paragraphs 4.083 – 4.086.

Wetland Resources

4.123 The northern pipeline corridor includes about 4 acres of wetlands. Impacts to wetlands are discussed in paragraph 4.087.

Terrestrial Biological Resources

4.124 Approximately four acres of wetlands, 25 acres of woods, 4 acres of old fields, and 17 acres of cropland are within the limits of the proposed pipeline corridor. An additional 20 acres of existing rights-of-way are managed lands that are frequently disturbed by mowing or other similar actions.

4.125 Impacts to terrestrial biological resources are discussed in paragraphs 4.090 – 4.094.

Threatened and Endangered Species

4.126 Impacts to threatened and endangered species are discussed in paragraphs 4.095 – 4.098.

Soils

4.127 Impacts to soils are discussed in paragraph 4.099.

Geology

4.128 Construction in the pipeline corridor would minimally disturb bedrock geology.

Land Use

4.129 No homes would be acquired as part of this alternative. Approximately 17 acres of cropland would be impacted by the proposed pipeline to the LEWD water treatment plant. These cropland areas may lose one season of production, depending on the timing of pipeline construction.

Transportation

4.130 Impacts to transportation are discussed in paragraph 4.102.

Historic and Prehistoric Cultural Resources

4.131 Impacts to historic and prehistoric cultural resources are discussed in paragraph 4.103.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Recreation Opportunities

4.132 Impacts to recreational opportunities are discussed in paragraph 4.104.

Irreversible and Irretrievable Resources

4.133 Resources lost due to the pipeline installation include approximately 25 acres of woodland habitat. A 20 ft. wide corridor through existing stands of woods will be cleared and maintained with low growing species for maintenance reasons. Faunal species inhabiting the woodland corridor will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. If the City of Carbondale chooses to compensate for drawdown by reducing downstream releases into Cedar Creek, then species in Cedar Creek would be adversely impacted with some loss in numbers likely. Approximately four acres of wetlands will be crossed, which will necessitate the removal of any wetland tree species for pipeline corridor maintenance. The corridor through wetland areas will be maintained with low growing wetland species. Future land use of the 20 ft. wide corridor will be limited due to the pipeline.

Short-term/Long-term Impacts Cedar Lake Alternative, Northern Route – LEWD Individually
Short-term • Increase in suspended solids in waterways crossed and temporary disruption of substrate. • Temporary relocation of mobile aquatic organisms while suspended solids have increased. • Cropland areas will be unavailable for use during installation of pipeline (assuming installation is during the growing season), but post construction use will not be limited. • Transportation corridors will experience temporary delays due to installation under or across transportation lines. • Temporary disruption of a 20 ft. wide corridor across wetlands totaling about 4 acres.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Short-term/Long-term Impacts Cedar Lake Alternative, Northern Route – LEWD Individually
Long-term • Conversion of 25 acres of woodlands to old field habitat. • Limitations on future land use of pipeline corridor. • Removal of wetland tree species within corridor and maintained as lower growing wetland species. • Reduction of downstream releases to Cedar Creek to offset drawdown could impact species inhabiting the stream. • Soil profiles will be disrupted through construction.

Lake of Egypt Water District - Southern Route

Surface Water Resources

4.134 A southern pipeline corridor would include crossings of Piles Fork, Drury Creek, Indian Creek, Sycamore Creek, Little Grassy Creek, Grassy Creek, Caney Branch, Little Wolf Creek, Middle Wolf Creek, Limb Branch, Little Saline Creek, the spillway below Lake of Egypt, and two crossings of Crab Orchard Creek. In addition, 15 more crossings of small unnamed tributary streams would be included.

4.135 Impacts to surface water resources are discussed in paragraphs 4.079 and 4.082.

Aquatic Biological Resources

4.136 Impacts to aquatic biological resources discussed in paragraphs 4.083 – 4.086.

Wetland Resources

4.137 This alternative pipeline corridor would impact approximately one acre of jurisdictional wetlands. Impacts to wetlands are discussed in paragraph 4.087.

Terrestrial Biological Resources

4.138 Approximately one acre of wetlands, 36 acres of woodlands, and 28 acres of cropland are located in the proposed southern route corridor. An additional 2 acres of existing rights-of-way that are managed lands would be impacted.

4.139 Impacts to terrestrial resources are discussed in paragraphs 4.090 – 4.094.

Threatened and Endangered Species

4.140 Impacts to threatened and endangered species are discussed in paragraphs 4.095 – 4.098.

Soils

4.141 Impacts to soils are discussed in paragraph 4.099.

Geology

4.142 Impacts to local geology are discussed in paragraph 4.114.

Land Use

4.143 No homes would be acquired as part of this alternative. Approximately 28 acres of cropland would be impacted by the southern pipeline route to the LEWD water treatment plant. These cropland areas may lose one season of production, depending on timing of pipeline construction.

Transportation

4.144 Impacts to transportation are discussed in paragraph 4.102.

Historic and Prehistoric Cultural Resources

4.145 Impacts to historic and prehistoric cultural resources are discussed in paragraph 4.103.

Recreation Opportunities

4.146 No impacts to recreational opportunities are anticipated for this alternative.

Irreversible and Irretrievable Resources

4.147 Resources lost due to the pipeline installation include approximately 36 acres of woodland habitat. A 20 ft. wide corridor through existing stands of woods will be cleared and maintained with low growing species for maintenance reasons. Faunal species inhabiting the woodland corridor will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. If the City of Carbondale chooses to compensate for drawdown by reducing downstream releases into Cedar Creek, then species in Cedar Creek would be adversely impacted with some loss in numbers likely. Approximately one acre of wetlands will be crossed, which will necessitate the removal of any wetland tree species for pipeline corridor maintenance. The corridor through wetland areas will be maintained with low growing wetland species. Future land use of the 20 ft. wide corridor will be limited due to the pipeline.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Short-term/Long-term Impacts Cedar Lake Alternative, Sothern Route – LEWD Individually
Short-term • Increase in suspended solids in waterways crossed and temporary disruption of substrate. • Temporary relocation of mobile aquatic organisms while suspended solids have increased. • Cropland areas will be unavailable for use during installation of pipeline (assuming installation is during the growing season), but post construction use will not be limited. • Transportation corridors will experience temporary delays due to installation under or across transportation lines. • Temporary disruption of a 20 ft. wide corridor across about 1 acre of wetlands.
Long-term • Conversion of 36 acres of woodlands to old field habitat. • Limitations on future land use of pipeline corridor. • Removal of wetland tree species within corridor and maintained as lower growing wetland species. • Reduction of downstream releases to Cedar Creek to offset drawdown could impact species inhabiting the stream. • Soil profiles will be disrupted through construction.

CACHE RIVER GROUNDWATER AQUIFER ALTERNATIVE RESOURCES

Introduction

4.148 A dependable water supply source was identified near the community of Perks (Pulaski County) for this alternative. The well field site for this alternative would require approximately 70 acres of land. These lands would either be purchased entirely or would be a combination of purchased lands with the remaining area having significantly restricted easements.

City of Marion

4.149 A 34.5 mile pipeline system would be required to transport water to the City of Marion water treatment facilities. Modifications and additions would be needed at the City of Marion water treatment facility. Bulk lime storage facilities, lime treatment equipment, and lime sludge handling and removal equipment would also be required. A location or locations for disposal of lime sludge would also be needed.

Surface Water Resources

4.150 A pipeline corridor from the Cache River Aquifer well field to the City of Marion water treatment plant would require 21 stream crossings. Stream crossings would be required for Cypress Creek, Cache River (near West Vienna), Bear Branch, two locations of Crab Orchard Creek, the spillway below Lake of Egypt, and 15 unnamed small, mostly intermittent flow tributary streams.

4.151 The crossings of the named and unnamed streams would cause minimal short-term construction impacts due to the installation of the pipeline. Limited excavation would be needed to bury the pipe. Construction in creeks would result in disruption of stream substrate and temporary increases in suspended solids.

4.152 The use of groundwater from the Cache River aquifer would likely have little effect on stream flows for the Cache River. The location of the well field would be in excess of 1.5 miles from the Cache River. The hydraulic conductivity of the sand and gravel aquifer is such that a cone of depression associated with the wells would not reach the river. If any effects would occur, they would be felt only during the driest portions of a year. This well field would, however, be a net consumer of groundwater otherwise available for recharge of the river. A slight reduction in stream flows may result during the driest portions of a year when little or no water would be available for the Cache River.

Aquatic Biological Resources

4.153 The streams that would be crossed by the pipeline corridor from the Cache River aquifer are most likely populated with species that prefer minimal silt deposition. Construction would be short-term and limited in area. Construction impacts on aquatic species would likely be detrimental in the immediate area of excavation and construction.

4.154 Removal of water from the groundwater aquifer would likely not impact water levels in the Cache River. Should any effect occur, minimal reductions in stream flows would likely result. It is not anticipated that adverse effects would be experienced by the portion of the Cache River designated by the INHS as a Biologically Significant Stream. Adverse effects to the cypress minnow would not be expected.

Wetland Resources

4.155 The Cache River aquifer pipeline route would include approximately one acre of jurisdictional wetlands based on the cumulative stream crossings for the pipeline corridor. Impacted areas would be narrow (20 ft wide) strips that would be disturbed for short periods of time and likely revegetate within one growing season. Any areas that are currently forested would be altered to low growing species to provide pipeline access for maintenance.

4.156 The Cache River Basin has substantial wetland resources near the proposed well field. A consumptive use of water would not likely reduce the groundwater levels in these wetlands.

Terrestrial Biological Resources

4.157 The area that would be included in the proposed well field (approximately 70 acres) is predominantly cropland (about 50 acres). The well field site would include approximately 25 acres that are old fields, previous agricultural land not actively being farmed. The cropland areas provide limited habitat and would be disturbed only at the location of well installation and for pipelines that would connect to a central pumping station. These areas would be affected temporarily during well field construction. With the exception of specific areas where structures

would be placed (less than one acre), the croplands would be available for reuse for the growing season following construction. Old fields would be temporarily disturbed during construction, but would revert back to their original form within several growing seasons.

4.158 Of the 13 acres of non-agriculture vegetated lands included in the pipeline corridor, about 1 acre is (jurisdictional) wetlands, 7 acres are woods, and 5 acres are old fields. Wooded wetlands would be permanently altered, as woody vegetation would need to be removed for construction and maintenance access. Success in recovery would be closely related to final grade after construction and soil compaction, both of which would influence local hydrology. Wooded areas in the pipeline corridor would predominantly be altered to old field type habitat following construction as trees would be cleared during construction and maintenance would retard voluntary succession back to woodland. These areas would revert back to old field in several growing seasons.

4.159 Approximately 48 acres of land within the limits of the pipeline corridors are cropland. These areas provide limited habitat and would be disturbed temporarily during pipeline construction. An additional 18 acres of existing rights-of-way are managed lands that are frequently disturbed by mowing or other similar actions. Minimal habitat value would be lost due to disturbance of these areas; they would be revegetated by the following growing season.

4.160 Large mammals that typically use the available habitats (including whitetail deer, gray fox, red fox, raccoon, opossum, fox squirrel, gray squirrel, eastern cottontail rabbit, striped skunk, woodchuck, and eastern chipmunk) would be minimally affected by pipeline construction and corridor maintenance. These species' habitat requirements are such that a 20-foot path for a pipeline would not substantially influence their life requisites. If food and den trees are removed and not allowed to revegetate because of pipeline corridor maintenance, those individuals that prefer open old fields would benefit; conversely, those species that require canopy would see declines in populations.

4.161 Small mammals (typically white-footed mouse, prairie vole, eastern mole, least shrew, and short-tailed shrew) require small areas of habitat. Because adjacent habitat is likely utilized, any individuals that would occur in the pipeline corridors would likely be displaced during pipeline construction and some overall loss in populations would be expected. Long-term impacts would see increased available habitat for those species that prefer old field areas.

4.162 Birds that prefer woodlands would permanently lose habitat with pipeline construction. Species that require forest habitat for feeding, roosting, and/or nesting would lose some available trees. The pipeline corridor would be managed to prevent tree species from revegetating the area. Birds that prefer open old field habitats or woodlands interspersed with old fields would benefit from post-construction pipeline corridor conditions.

4.163 Reptiles and amphibians that prefer woodlands would permanently lose habitat with pipeline construction. Species that require forest habitat would lose available trees. The pipeline corridor would be managed to prevent tree species from revegetating the area. Species that prefer open old field habitats or woodlands interspersed with old fields would benefit from post-construction pipeline corridor conditions.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Threatened and Endangered Species

4.164 Suitable habitat occurs within the area of the pipeline corridor for the federally endangered Indiana bat. No designated critical habitat occurs in the area of the proposed pipeline corridor. The wintering colonies of this species disperse during the summer months when the young are born and raised. Summer maternal colonies make significant use of habitats that include bottomland riparian forests with small to medium sized streams. Optimum foraging habitat is thought to be the areas over small to medium sized streams that do not become dry and have mature overhanging trees along both stream banks. Removal of riparian trees could adversely affect Indiana bats if removal occurred during the summer season. Small breaks in riparian edge would minimally affect feeding activity for this species.

4.165 Bald eagles are typically found in riparian areas along large streams, rivers, and lakes. Breeding areas are expanding southward from the northern United States and Canada as a result of improvements in habitat conditions and management activities by various government and private organizations. Summer occurrences of bald eagles are becoming more common in the region. It is not anticipated that any adverse effect on bald eagles would occur with construction and operation of the well field and associated pipeline.

4.166 Gray bats roost in cave or cave-like habitats throughout the year. In the region that includes this proposed project, gray bats are known to seasonally use caves in southern and southwestern Illinois and Missouri. Female gray bats use caves (or cave-like areas) with high humidity as nursery areas. No caves or cave-like habitat occur in the area included as part of the pipeline corridor. Gray bats do forage in riparian areas close to the roost sites. No known roost sites are located near the well field or pipeline corridor locations. Additionally, removal of riparian vegetation for pipeline construction would probably not affect foraging success for gray bats.

4.167 The copperbelly watersnake could possibly occur in the area of the pipeline corridor and well field. Records of occurrence exist for southern Johnson County, as well as Saline, Gallatin, Pope, and Massac Counties. They are characteristically inhabitants of bottomland hardwood forested wetlands and shrub swamps. Copperbelly watersnakes emerge from hibernation in late March or early April. They bear young in September and enter hibernation typically in October, tending to select upland habitats as hibernation sites. Construction and maintenance of the well field and pipeline corridor would remove habitats that are favored by copperbelly watersnakes.

Soils

4.168 The soils of the proposed pipeline corridor would be disturbed during pipeline construction by excavation for placement of the pipeline and from compaction by construction equipment. Compacted cropland areas would likely be restored the following growing season by plowing and/or disking. Areas of excavation would have the soil profile extensively disrupted and would likely require a number of years to recover.

Geology

4.169 Construction in the pipeline corridor would minimally disturb bedrock geology. The pipeline corridor passes through some areas with the potential for bedrock excavation.

Land Use

4.170 No homes would be acquired as part of this alternative. Approximately 48 acres of cropland would be impacted by the pipeline route to the City of Marion water treatment facility. These cropland areas may lose one season of production, depending on the timing of pipeline construction. The approximately 50 acres of cropland at the proposed well field site would also be temporarily disrupted, but most of the land would be available for production upon completion of construction activities.

Transportation

4.171 Pipeline construction would cause no permanent impacts to roadways or railroads. Little disruption would occur to traffic on major highways since construction techniques generally would include tunneling or jacking under the road surfaces. Construction across less traveled roads, in particular gravel roads and driveways, may include excavation and temporary minor disruption of traffic because of one lane roads and resurfacing following construction. None of these actions would likely affect traffic for more than several days at any one site.

Historic and Prehistoric Cultural Resources

4.172 The location of the well field and the alignment of the pipeline route have not had specific reconnaissance efforts to characterize individual historic or prehistoric cultural resources. The pipeline corridor route is narrow in width and the final pipeline alignment could be modified to avoid any located sites. If this alternative is selected, a Phase I archaeological survey of the well field and proposed pipeline route will need to be completed.

Recreation Opportunities

4.173 Impacts to recreation opportunities are not anticipated for this alternative.

Irreversible and Irretrievable Resources

4.174 Resources lost due to the pipeline installation include approximately 7 acres of woodland habitat. A 20 ft. wide corridor through existing stands of woods will be cleared and maintained with low growing species for maintenance reasons. Faunal species inhabiting the woodland corridor will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. Approximately one acre of wetlands will be crossed, which will

necessitate the removal of any wetland tree species for pipeline corridor maintenance. The corridor through wetland areas will be maintained with low growing wetlands species. Approximately one acre of cropland will be lost to provide for structure necessary at the proposed well field. Future land use of the 20 ft. wide corridor will be limited due to the pipeline.

Short-term/Long-term Impacts Cache River Aquifer Alternative – City of Marion Individually
Short-term • Increase in suspended solids in waterways crossed and temporary disruption of substrate. • Temporary relocation of mobile aquatic organisms while suspended solids have increased. • Cropland areas will be unavailable for use during installation of pipeline (assuming installation is during the growing season), but post construction use will not be limited. • Transportation corridors will experience temporary delays due to installation under or across transportation lines. • Temporary disruption of a 20 ft. wide corridor across wetlands totaling about one acre.
Long-term • Conversion of 7 acres of woodlands to old field habitat. • Limitations on future land use of pipeline corridor. • Removal of wetland tree species within corridor and maintained as lower growing wetland species. • Conversion of one acre of cropland for well field structures. • Soil profiles will be disrupted through construction.

Lake of Egypt Water District

4.175 A 25.7 mile pipeline system would be required to transport water to the LEWD treatment facilities. Modifications and additions would be needed at the LEWD treatment plant. Bulk lime storage facilities, lime treatment equipment, and lime sludge handling and removal equipment would also be required. A location or locations for disposal of lime sludge would be needed.

Surface Water Resources

4.176 A pipeline corridor from the Cache River Aquifer well field to the LEWD water treatment plant would require 18 stream crossings. Stream crossings would be required for Cypress Creek, Cache River (near West Vienna), Bear Branch, two locations of Crab Orchard Creek, the spillway below Lake of Egypt, and 13 unnamed small, mostly intermittent flow tributary streams.

4.177 Impacts to surface water features are discussed in paragraphs 4.151 – 4.152.

Aquatic Biological Resources

4.178 Impacts to aquatic biological resources are discussed in paragraphs 4.153 – 4.154.

Wetland Resources

4.179 Approximately 1 acre of wetlands will be required for the pipeline corridor. Impacts to wetland resources are discussed in paragraphs 4.155 – 4.156.

Terrestrial Biological Resources

4.180 Impacts to vegetative communities for the proposed well field are discussed in paragraph 4.157.

4.181 Of the 13 acres of non-agriculture vegetated lands included in the pipeline corridor, about 1 acre is (jurisdictional) wetlands, 7 acres are woods, and 5 acres are old fields. Wooded wetlands would be permanently altered, as woody vegetation would need to be removed for construction and maintenance access. Success in recovery would be closely related to final grade after construction and soil compaction, both of which would influence local hydrology. Wooded areas in the pipeline corridor would predominantly be altered to old field type habitat following construction as trees would be removed for construction and maintenance would retard voluntary succession back to woodland. These areas would revert back to old field within several growing seasons.

4.182 Approximately 46 acres of land within the limits of the pipeline corridor are cropland. These areas provide limited habitat and would be disturbed temporarily during pipeline construction. An additional 18 acres of existing rights-of-way are managed lands that are frequently disturbed by man by mowing or other similar actions. Minimal habitat value would be lost due to disturbance of these areas; they would be revegetated by the following growing season.

4.183 Impacts to wildlife are discussed in paragraphs 4.160 – 4.163.

Threatened and Endangered Species

4.184 Impacts to threatened and endangered species are discussed in paragraphs 4.164 – 4.167.

Soils

4.185 Impacts to soils are discussed in paragraph 4.168.

Geology

4.186 Impacts to local geology are discussed in paragraph 4.169.

Land Use

4.187 No homes would be acquired as part of this alternative. Approximately 46 acres of cropland would be included in the pipeline route to the LEWD water treatment facility. These cropland areas may lose one season of production, depending on the timing of pipeline

construction. The 50 acres of cropland at the proposed well field site would also be temporarily disrupted, but most of the land would be available for production upon completion of construction activities.

Transportation

4.188 Impacts to transportation routes are discussed in paragraph 4.171.

Historic and Prehistoric Cultural Resources

4.189 Impacts to historic and prehistoric cultural resources are discussed in paragraph 4.172.

Recreation Opportunities

4.190 Impacts to recreation opportunities are not anticipated for this alternative.

Irreversible and Irretrievable Resources

4.191 Resources lost due to the pipeline installation include approximately 7 acres of woodland habitat. A 20 ft. wide corridor through existing stands of woods will be cleared and maintained with low growing species for maintenance reasons. Faunal species inhabiting the woodland corridor will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. Approximately one acre of wetlands will be crossed, which will necessitate the removal of any wetland tree species for pipeline corridor maintenance. The corridor through wetland areas will be maintained with low growing wetland species. Approximately one acre of cropland will be lost to provide for structure necessary at the proposed well field. Future land use of the 20 ft. wide corridor will be limited due to the pipeline.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Short-term/Long-term Impacts Cache River Aquifer Alternative – LEWD Individually
Short-term • Increase in suspended solids in waterways crossed and temporary disruption of substrate. • Temporary relocation of mobile aquatic organisms while suspended solids have increased. • Cropland areas will be unavailable for use during installation of pipeline (assuming installation is during the growing season), but post construction use will not be limited. • Transportation corridors will experience temporary delays due to installation under or across transportation lines. • Temporary disruption of a 20 ft. wide corridor across wetlands totaling about one acre.
Long-term • Conversion of 7 acres of woodlands to old field habitat. • Limitations on future land use of pipeline corridor. • Removal of wetland tree species within corridor and maintained as lower growing wetland species. • Conversion of one acre of cropland for well field structures. • Soil profiles will be disrupted through construction.

SALINE VALLEY GROUNDWATER ALTERNATIVE RESOURCES

Introduction

4.192 Utilizing Saline Valley as a water resource would require either tying into the existing SVCD water system or installing a new raw water line from the well field near Junction to Marion or LEWD. Several options for connecting Marion and/or LEWD to SVCD are possible, but all involve the installation of new water line.

Treated Water From Saline Valley Conservancy District

City of Marion

Surface Water Resources

4.193 The proposed water line from the Junction well fields to the Equality treatment plant would require the crossing of Cypress Ditch and the North Fork of the Saline River. The new finished water line to Marion from Equality would require crossing Cockerel Branch, the Middle Fork of the Saline River, the Pankey Branch, the West Harrisburg Ditch, Bankston Fork and Crab Orchard Creek perennial stream beds. In addition, an intermittent portion of Cypress Ditch, eight unnamed perennial tributaries, three unnamed intermittent tributaries of the North Fork and 17 intermittent waterways would be crossed.

4.194 Construction in waterways would result in disruption of stream substrate and temporary increases in suspended solids due to the limited excavation needed to bury the pipe. Several of the larger streams have floodplains associated with them that would require crossing. Pipeline installation would not permanently alter the floodplain.

Aquatic Resources

4.195 The water resources crossed by the pipeline corridor are most likely populated with species that prefer minimal silt deposition. Impacts on aquatic species would likely be detrimental in the immediate area of excavation and construction. Installation of the pipeline may temporarily increase the turbidity of the water and stress the aquatic life, but impacts would be short-term and limited in area.

Wetland Resources

4.196 Approximately 4 acres of wetlands would be impacted by the pipeline corridor. The corridor is a narrow strip (20 ft wide) that would be disturbed for short periods of time, but would revegetate within one growing season. Areas that currently have trees would be altered to low growing species to provide access for corridor maintenance.

Terrestrial Biological Resources

4.197 The pipeline will be installed in easements in existing road or railroad right-of-way. The approximately 97 acres will be cleared of woody vegetation, where present, and maintained in such a way as to prevent its regrowth.

4.198 Large mammals that typically use the available habitats (including whitetail deer, gray fox, red fox, raccoon, opossum, fox squirrel, gray squirrel, eastern cottontail rabbit, striped skunk, woodchuck, and eastern chipmunk) would be minimally affected by pipeline construction and corridor maintenance. These species' habitat requirements are such that a 20-foot path for a pipeline would not substantially influence their life requisites. If food and den trees are removed and not allowed to revegetate because of pipeline corridor maintenance, those individuals that prefer open old fields would benefit; conversely, those species that require canopy would see declines in populations.

4.199 Small mammals (typically white-footed mouse, prairie vole, eastern mole, least shrew, and short-tailed shrew) require small areas of habitat. Because adjacent habitat is likely utilized, any individuals that would occur in the pipeline corridor would likely be displaced during pipeline construction and some overall loss in populations would be expected. Long-term impacts would see increased available habitat for those species that prefer old field areas.

4.200 Birds that prefer woodlands would permanently lose habitat with pipeline construction. Species that require forest habitat for feeding, roosting, and/or nesting would lose some available trees. The pipeline corridor would be managed to prevent tree species from revegetating the area. Birds that prefer open old field habitats or woodlands interspersed with old fields would benefit from post-construction pipeline corridor conditions.

4.201 Reptiles and amphibians that prefer woodlands would permanently lose habitat with pipeline construction. Species that require forest habitat would lose available trees. The pipeline corridor would be managed to prevent tree species from revegetating the area. Species that

prefer open old field habitats or woodlands interspersed with old fields would benefit from post-construction pipeline corridor conditions.

Threatened and Endangered Species

4.202 Specific surveys to identify threatened or endangered species or suitable habitat for such species have not been conducted. The narrowness of the final pipeline corridor allows for great flexibility in avoiding any areas of potential or known habitat.

Soils

4.203 The majority of the waterline will be installed in existing road or abandoned railroad right-of-way. It is assumed that the pipeline corridor is generally composed of fill material for the right-of-way. The general soil associations encountered along the proposed route to Marion include Alvin-Roby-Raurk, Darwin-Shiloh-Wabash, Karnak-Allison-Wakeland, Reesville-Patton-Uniontown, Alford-Wellston, Hasmer-Wellston-Berks, McGary-Montgomery-Markland, Zipp-Patton-Hurst, Hosmer-Zanesville, Belknap-Banlic-Bonnie, Sharon-Belknap, Grantsburg-Manitou, Ava-Bluford, and Hoyleton-Cisne. These associations generally are composed of silty loams and require erosion controls.

4.204 The soil types in the pipeline corridor are difficult to identify since the width of the corridor is within the limits of the soil survey map lines. Installation of the waterline through any undeveloped area would temporarily disrupt the soils, but they would typically recover within three growing seasons. Care must be taken during pipeline installation to avoid impacts to localized surface and subsurface drainage.

Geology

4.205 Gallatin, Saline, and Williamson counties are located in the Mount Vernon Hill Country of the Central Lowland province. This area is at the southern rim of the Illinois Basin. Bedrock in this area is part of the Pennsylvania system. The northern portion of these three counties was generally covered with glacial till and loess from the Mississippi and Ohio river valleys.

4.206 The three counties include areas of coal mining which would be crossed by the pipeline routes. Surface and underground mines are located along the Illinois 13 corridor (the proposed right-of-way for pipeline installation) between Marion and Junction. Subsidence of the mined areas could increase the chance of line ruptures and amount of maintenance required to maintain the pipeline. Approximately 15.5 miles of pipeline will need to be installed through mined out areas to connect Marion with SVCD.

4.207 Oil fields are also included in Gallatin, Saline, and Williamson counties. The majority of the fields are located near or north of Junction and Shawneetown in Gallatin county. It is possible that an increase in the volume of water pumped from the well fields could influence the cone of depression to such an extent that the oil fields or mine runoff become a source of contamination for the groundwater supply. A detailed study would need to be completed to assess this potential impact.

Land Use

4.208 No homes would be acquired as part of this alternative. The majority of the land required for the pipeline route is currently road or railroad right-of-way. Right-of-way from Illinois 13 and other local roads as well as railroad right-of-way would be utilized for waterline installation. The installation of the pipeline would not permanently alter the current land use in the area, but would place limitations on future construction in the immediate area of the pipeline.

Transportation

4.209 Pipeline construction would cause no permanent impacts to roadways or railroads. Little disruption would occur to traffic on major highways since construction techniques generally would include tunneling or jacking under the road surfaces. Construction across less traveled roads, in particular gravel roads and driveways, may include excavation and temporary minor disruption of traffic because of one lane roads and resurfacing following construction. None of these actions would likely affect traffic for more than several days at any one site.

Historic and Prehistoric Cultural Resources

4.210 It is assumed that a cultural resources survey was completed either prior to roadway/railway construction or that construction activities have significantly disturbed potential sites. A cultural resources survey would not be required for installation of the line in existing road or railroad right-of-way. Any currently undeveloped land would require a field survey to assess the area prior to installation. Any discovered sites would be avoided by choosing an alternate pipeline route.

Recreation Opportunities

4.211 Impacts to recreation opportunities are not anticipated with this alternative.

Irreversible and Irretrievable Resources

4.212 The pipeline will be installed in existing road and railroad right-of-way. Any sections of woody vegetation within the pipeline corridor will be cleared and maintained as old field habitat. Faunal species inhabiting the woodland areas will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. Approximately four acres of wetlands will be crossed, which will necessitate the removal of any wetland tree species for pipeline corridor maintenance. The corridor through wetland areas will be maintained with low growing wetland species.

Short-term/Long-term Impacts
Saline Valley Conservancy District, Treated Water Alternative – City of Marion Individually

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Short-term • Increase in suspended solids in waterways crossed and temporary disruption of substrate. • Temporary relocation of mobile aquatic organisms while suspended solids remain increased. • Transportation corridors will experience temporary delays due to installation under or across transportation lines. • Temporary disruption of a 20 ft. wide corridor across wetlands totaling about four acres.
Long-term • Conversion of wooded right-of-way areas in pipeline corridor to old field habitat. • Removal of wetland tree species within corridor and maintained as lower growing wetland species. • Soil profiles will be disrupted through construction.

Lake of Egypt Water District

Surface Water Resources

4.213 The installation of a new water line would involve the crossing of perennial and intermittent waterways. This alternative would require the crossing of Cypress Ditch, the North Fork of the Saline River, Cockerel Branch, the Middle Fork of the Saline River, the Pankey Branch, the South Fork of the Saline River, Grassy Creek, Brushy Creek, Sugar Creek, Cana Creek, an intermittent portion of Cypress Ditch, three unnamed intermittent tributaries of the North Fork of the Saline River, two perennial waterways, and 24 intermittent waterways.

4.214 Impacts to surface water resources are discussed in paragraph 4.194.

Aquatic Resources

4.215 Impacts to aquatic resources are discussed in paragraph 4.195.

Wetland Resources

4.216 The total area of wetlands impacted is approximately 3.5 acres. Impacts to wetland resources are discussed in paragraph 4.196.

Terrestrial Biological Resources

4.217 Impacts to terrestrial biological resources are discussed in paragraphs 4.197 - 4.201.

Threatened and Endangered Species

4.218 Impacts to threatened and endangered species are discussed in paragraph 4.202.

Soils

4.219 The majority of the waterline will be installed in existing road or abandoned railroad right-of-way. Soil associations along the proposed corridor to Lake of Egypt include Zipp-Patton-Hurst, Hosmer-Zanesville, Belknap-Banlic-Bonnie, Orthents, Sharon-Belknap, and Grantsburg-Zanesville. These associations generally are composed of silty loams and require erosion controls. Impacts to soils are discussed in paragraph 4.204.

Geology

4.220 This alternative would require installation of approximately 6.5 miles of pipeline through areas that have been mined. Impacts to geology are discussed in paragraphs 4.205 – 4.207.

Land Use

4.221 No homes would be acquired as part of this alternative. The majority of the land required for the proposed route is currently road or railroad right-of-way. Right-of-way from Route 166, various county routes, and the abandoned railroad line paralleling U. S. 45 would be utilized for waterline installation. The abandoned railroad right-of-way along U.S. 45 is being developed by IDNR as a bike trail from Harrisburg to Karnak. The installation of the pipeline would not permanently alter the current land use in the area.

Transportation

4.222 Impacts to transportation routes are discussed in paragraph 4.209.

Historic and Prehistoric Cultural Resources

4.223 Impacts to cultural resources are discussed in paragraph 4.210.

Recreation Opportunities

4.224 Impacts to recreation opportunities are not anticipated with this alternative.

Irreversible and Irretrievable Resources

4.225 The pipeline will be installed in existing road and railroad right-of-way. Any sections of woody vegetation within the pipeline corridor will be cleared and maintained as old field habitat. Faunal species inhabiting the woodland areas will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream

crossings will eliminate any sessile organisms inhabiting the corridor. Approximately 3.5 acres of wetlands will be crossed, which will necessitate the removal of any wetland tree species for pipeline corridor maintenance. The corridor through wetland areas will be maintained with low growing wetland species.

Short-term/Long-term Impacts Saline Valley Conservancy District, Treated Water Alternative – LEWD Individually
Short-term • Increase in suspended solids in waterways crossed and temporary disruption of substrate. • Temporary relocation of mobile aquatic organisms while suspended solids remain increased. • Transportation corridors will experience temporary delays due to installation under or across transportation lines. • Temporary disruption of a 20 ft. wide corridor across wetlands totaling about 3.5 acres.
Long-term • Conversion of wooded right-of-way areas in pipeline corridor to old field habitat. • Removal of wetland tree species within corridor and maintained as lower growing wetland species. • Soil profiles will be disrupted through construction.

Raw Water From Saline Valley Conservancy District

City of Marion

Surface Water Resources

4.226 A raw water line to Marion would require the crossings of Cypress Ditch, the North Fork of the Saline River, Cockerel Branch, the Middle Fork of the Saline River, Pankey Branch, West Harrisburg Ditch, Bankston Fork, and Crab Orchard Creek. In addition, eight unnamed perennial waterways, seventeen unnamed intermittent waterways, an intermittent portion of Cypress Ditch, and three unnamed intermittent tributaries of the North Fork would require crossing.

4.227 Impacts to surface water resources are discussed in paragraph 4.194.

Aquatic Resources

4.228 Impacts to aquatic resources are discussed in paragraph 4.195.

Wetland Resources

4.229 The total area of wetlands to be impacted is approximately four acres. Impacts to wetlands are discussed in paragraph 4.196.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Terrestrial Biological Resources

4.230 Impacts to terrestrial biological resources are discussed in paragraphs 4.197 – 4.201.

Threatened and Endangered Species

4.231 Impacts to threatened and endangered species are discussed in paragraph 4.202.

Soils

4.232 The majority of the waterline will be installed in existing road or abandoned railroad right-of-way. It is assumed that the pipeline corridor is generally composed of fill material for the right-of-way. The general soil associations encountered along the proposed corridor are Alvin-Roby-Ruark, Darwin-Shiloh-Wabash, Karnak-Allison-Wakeland, Reesville-Patton-Uniontown, Alford-Wellston, Hosmer-Wellston-Berks, McGary-Montgomery-Markland, Zipp-Patton-Hurst, Hosmer-Zanesville, and Belknap-Banlic-Bonnie, Sharon-Belknap, Grantsburg-Manitou, Ava-Bluford, and Hoyleton-Cisne. These associations generally are composed of silty loams and require erosion controls.

4.233 Impacts to soils are discussed in paragraph 4.204.

Geology

4.234 Gallatin, Saline, and Williamson counties are located in the Mount Vernon Hill Country of the Central Lowland province. This area is at the southern rim of the Illinois Basin. Bedrock in this area is part of the Pennsylvania system. The northern portion of these three counties were generally covered with glacial till and loess from the Mississippi and Ohio river valleys.

4.235 The three counties include areas of coal mining which would be crossed by the pipeline routes. Surface and underground mines are located east of Marion and along the Illinois 13 corridor between Marion and Junction. Subsidence of the mined areas could increase the chance of line ruptures and amount of maintenance required to maintain the pipeline. Approximately 15.5 miles of pipeline will need to be installed in areas that have been mined.

4.236 Oil fields are also included in Gallatin, Saline, and Williamson counties. The majority of the fields are located near or north of Junction and Shawneetown in Gallatin county. It is possible that an increase in the volume of water pumped from the well fields could influence the cone of depression to such an extent that the oil fields or mine runoff become a source of contamination for the groundwater supply. A detailed study would need to be completed to assess this potential impact.

Land Use

4.237 No homes would be acquired as part of this alternative. The majority of the land required for the pipeline route is currently road or railroad right-of-way. Right-of-way from Illinois 13 and other local roads as well as railroad right-of-way would be utilized for waterline installation. The installation of the pipeline would not permanently alter the current land use in the area, but would place limitations on future construction in the immediate area of the pipeline.

Transportation

4.238 Impacts to transportation routes are discussed in paragraph 4.209.

Historic and Prehistoric Cultural Resources

4.239 Impacts to cultural resources are discussed in paragraph 4.210.

Recreation Opportunities

4.240 Impacts to recreation opportunities are not anticipated with this alternative.

Irreversible and Irretrievable Resources

4.241 The pipeline will be installed in existing road and railroad right-of-way. Any sections of woody vegetation within the pipeline corridor will be cleared and maintained as old field habitat. Faunal species inhabiting the woodland areas will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. Approximately four acres of wetlands will be crossed, which will necessitate the removal of any wetland tree species for pipeline corridor maintenance. The corridor through wetland areas will be maintained with low growing wetland species.

Short-term/Long-term Impacts Saline Valley Conservancy District, Raw Water Alternative– City of Marion Individually
Short-term • Increase in suspended solids in waterways crossed and temporary disruption of substrate. • Temporary relocation of mobile aquatic organisms while suspended solids remain increased. • Transportation corridors will experience temporary delays due to installation under or across transportation lines. • Temporary disruption of a 20 ft. wide corridor across wetlands totaling about four acres.
Short-term/Long-term Impacts Saline Valley Conservancy District, Raw Water Alternative– City of Marion Individually

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Long-term • Conversion of wooded right-of-way areas in pipeline corridor to old field habitat. • Removal of wetland tree species within corridor and maintained as lower growing wetland species. • Soil profiles will be disrupted through construction.

Lake of Egypt Water District

Surface Water Resources

4.242 A raw water line to Lake of Egypt would require the crossing of Cypress Ditch, the North Fork of the Saline River, Cockerel Branch, the Middle Fork of the Saline River, Pankey Branch, the South Fork of the Saline River, Grassy Creek, Brushy Creek, Sugar Creek, and Cana Creek perennial stream beds. In addition, an intermittent portion of Cypress Ditch, three unnamed intermittent tributaries of the North Fork of the Saline River, thirteen intermittent tributaries of the larger perennial streams, two unnamed perennial waterways, and eleven unnamed intermittent waterways would require crossing.

4.243 Impacts to surface water resources are discussed in paragraph 4.194.

Aquatic Resources

4.244 Impacts to aquatic resources are discussed in paragraph 4.195.

Wetland Resources

4.245 The total area of wetlands impacted by this alternative is approximately 3.5 acres. Impacts to wetlands are discussed in paragraph 4.196.

Terrestrial Biological Resources

4.246 Impacts to terrestrial biological resources are discussed in paragraphs 4.197 – 4.201.

Threatened and Endangered Species

4.247 Impacts to threatened and endangered species are discussed in paragraph 4.202.

Soils

4.248 The majority of the waterline will be installed in existing road or abandoned railroad right-of-way. Soil associations along the proposed corridor include Alvin-Roby-Ruark, Darwin-Shiloh-Wabash, Karnak-Allison-Wakeland, Reesville-Patton-Uniontown, Alford-Wellston, Hosmer-Wellston-Berks, McGary-Montgomery-Markland, Zipp-Patton-Hurst, Hosmer-Zanesville, Belknap-Banlic-Bonnie, Orthents, Sharon-Belknap, and Grantsburg-Zanesville. These associations generally are composed of silty loams and require erosion controls. Impacts to soils are discussed in paragraph 4.204.

Geology

4.249 This alternative will require the installation of approximately 6.5 miles of water lines through areas that have been mined. Impacts to geology are discussed in paragraphs 4.205 – 4.207.

Land Use

4.250 No homes will be acquired as part of this alternative. The majority of the land required for the proposed route is currently road or railroad right-of-way. Right-of-way from Illinois 13, Route 166, various county routes, and the abandoned railroad line paralleling U. S. 45 would be utilized for water line installation. The installation of the pipeline would not permanently alter the current land use in the area. The abandoned railroad right-of-way along U.S. 45 is being developed by the IDNR as a bike trail from Harrisburg to Karnak.

Transportation

4.251 Impacts to transportation routes are discussed in paragraph 4.209.

Historic and Prehistoric Cultural Resources

4.252 Impacts to cultural resources are discussed in paragraph 4.210.

Recreation Opportunities

4.253 Impacts to recreation opportunities are not anticipated with this alternative.

Irreversible and Irretrievable Resources

4.254 The pipeline will be installed in existing road and railroad right-of-way. Any sections of woody vegetation within the pipeline corridor will be cleared and maintained as old field habitat. Faunal species inhabiting the woodland areas will be forced to relocate. Relocation for animals with small territories, typically small mammals, will stress populations assuming adjacent land is at its carrying capacity. A minor overall loss in these populations is expected. Other woodland species, such as woodland bird species, will lose a minimal amount of available habitat. Stream crossings will eliminate any sessile organisms inhabiting the corridor. Approximately 3.5 acres of wetlands will be crossed, which will necessitate the removal of any wetland tree species for pipeline corridor maintenance. The corridor through wetland areas will be maintained with low growing wetland species.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Short-term/Long-term Impacts Saline Valley Conservancy District, Raw Water Alternative – LEWD Individually
Short-term • Increase in suspended solids in waterways crossed and temporary disruption of substrate. • Temporary relocation of mobile aquatic organisms while suspended solids remain increased. • Transportation corridors will experience temporary delays due to installation under or across transportation lines. • Temporary disruption of a 20 ft. wide corridor across wetlands totaling about 3.5 acres.
Long-term • Conversion of wooded right-of-way areas in pipeline corridor to old field habitat. • Removal of wetland tree species within corridor and maintained as lower growing wetland species. • Soil profiles will be disrupted through construction.

GOREVILLE RESERVOIR ALTERNATIVE RESOURCES

Introduction

4.255 The Goreville site is located upstream of the Lake of Egypt and the SIPC ash ponds. A reservoir of about 585 acres could be developed at this site. It was determined that the raw water yield of this reservoir would be approximately 3.6 mgd. This reservoir would be large enough to meet the requirements of either the City of Marion (with an additional source for peak flows) or LEWD.

4.256 New water lines would be required to transport the water from the proposed reservoir to the Marion or LEWD water treatment plant. The water lines would be installed primarily in existing road or railroad right-of-way to minimize impacts.

City of Marion

Surface Water Resources

4.257 The surface water resources impacted by the creation of the reservoir include unnamed tributaries that are intermittent in nature and located upstream of the proposed dam site and the perennial Little Saline Creek channel. The normal pool elevation of the reservoir will be 600 ft. (msl). This pool elevation will eliminate approximately six of the intermittent tributaries that form the headwater area for Little Saline Creek. Approximately 1.25 miles of the perennial Little Saline Creek streambed will be lost due to the reservoir. Little Saline Creek flows northeasterly from the proposed reservoir site and joins with the South Fork of the Saline River just north of the Lake of Egypt. A water release program will need to be established for maintenance of the stream habitat below the site of the dam.

4.258 The proposed pipeline route will require crossing Little Saline Creek and eleven intermittent waterways. This route also requires paralleling Crab Orchard Creek with the potential to cross the creek bed several times. Minimal short-term construction impacts would

result due to pipeline installation. A limited amount of excavation would be needed to bury the pipe, resulting in disruption of waterway substrate and temporary increases in suspended solids.

Aquatic Resources

4.259 The damming of Little Saline Creek will change the aquatic ecosystem in the area. The existing lotic system will be converted into a lentic system which will alter the balance of aquatic life present. Species adapted for life in the lotic environment will be dominated by species more adapted for a lake ecosystem. Such lake species typically include: white crappie (*Promoxis annularis*), black crappie (*Promoxis nigromaculatus*), largemouth bass, bluegill, and channel catfish (*Ictalurus punctatus*). A water release program will need to be established to maintain the aquatic habitat below the dam site.

4.260 The water resources crossed by the pipeline corridor are most likely populated with species that prefer minimal silt deposition. Construction would be short term and limited in area. Construction impacts on aquatic species would likely be detrimental in the immediate area of excavation and construction.

Wetland Resources

4.261 Approximately 44.2 acres of wetlands will be inundated due to the proposed reservoir. These wetlands include about 4.8 acres of intermittently exposed palustrine wetlands which have an unconsolidated bottom and are diked or impounded, typically farm ponds. Approximately 29.2 acres of temporarily flooded broad-leafed deciduous forested palustrine wetlands and about 3 acres of mixed emergent and broad-leafed deciduous forested palustrine temporarily flooded wetlands would be impacted. The wetlands lost due to the flooding of the immediate channel of Little Saline Creek and its tributaries include: 1.7 acres of broad-leafed deciduous forested palustrine temporarily flooded wetlands, 1.7 acres of permanently flooded lower perennial riverine unconsolidated bottom wetlands, and 3.8 acres of semi-permanently flooded intermittent streambed riverine wetlands. If this alternative is implemented, a field delineation and classification will be required for mitigation purposes.

4.262 The corridor to the Marion water treatment plant could impact forested palustrine wetlands along intermittent waterways and in isolated areas near Crab Orchard Creek and the railroad tracks the corridor would follow into Marion. This option also has the potential to impact excavated or impounded palustrine areas (generally man-made ponds or borrow material areas). The pipeline corridor would impact approximately one acre of wetland habitat. The pipeline corridor is a narrow strip (20 ft wide) that would be disturbed by construction, but would revegetate within a growing season. Areas that currently have trees would be altered to low growing species to provide access for maintenance of the pipeline.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Terrestrial Biological Resources

4.263 The site of the proposed reservoir contains areas of bottomland forest, upland forest, cropland, shrubland, pasture/hayland, tree/shrub savanna habitat, intermittent riverine habitat, pond/borrow pit/lake habitat, non-native grassland, and forbland.

4.264 Populations of small mammals such as white-footed mice, prairie voles, eastern moles, least shrews, and short-tailed shrews that exist in the reservoir area would be lost as it is assumed that available adjacent habitat is at capacity. Any individuals that do attempt to use adjacent habitat would likely create a stressed condition as competition for food and cover is increased. Increased predation on displaced individuals and/or current residents could occur for short periods of time in adjacent habitats, until populations ultimately stabilize.

4.265 Large mammals such as whitetail deer, opossum, fox squirrel, gray squirrel, eastern cottontail rabbit, and eastern chipmunk would likely see the same fate as described for small mammals. Highly opportunistic species such as raccoon, striped skunk, and woodchuck may be able to occupy adjacent areas at higher than present populations for a period of time. Other species such as red and gray fox would likely have increased feeding opportunities for a short time as adjacent habitats are stressed. Population levels of these predators are not expected to increase in the short-term, however, and would likely also decrease long-term because of limitations of available food.

4.266 Birds that would be adversely affected by loss of habitat with construction of the proposed reservoir would be northern bobwhite, mourning dove, northern flicker, blue jay, whip-poor-will, eastern wood-peewee, great crested flycatcher, northern cardinal, American crow, white-throated sparrow, blue-gray gnatcatcher, summer tanager, Carolina chickadee, tufted titmouse, Carolina wren, northern mockingbird, American robin, eastern meadowlark, horned lark, pileated woodpecker, and white-breasted nuthatch. It is assumed that the populations of birds presently using the area of the proposed reservoir would be substantially reduced. These losses would be due to the removal of present food sources and cover and the presumption that adjacent habitats are probably at or near capacity.

4.267 Short-term increased food conditions would exist for raptors such as the red-tailed hawk, American kestrel, and barred owl as habitats within the limits of the lake and adjacent to the reservoir area are modified by clearing and populations of mammals, reptiles, and amphibians are placed in more vulnerable situations. Long-term populations of these species would likely decline following the inundation of the reservoir site. Similarly, predation, accidents, and other mortality causes have the potential to create short-term increases in food opportunities for scavengers such as the turkey vulture.

4.268 Construction of the proposed reservoir would provide habitat for both migrating and resident waterfowl. Limited feeding opportunities may exist with this reservoir but resting habitat would be provided due to the large water surface area.

4.269 Reptiles that likely use the existing habitat that would be inundated, such as eastern box turtle, black rat snake, speckled kingsnake, blue racer, eastern garter snake, eastern hognose

snake, northern fence lizard, and five-lined skink, would be adversely affected and most would be lost since adjacent upland habitats are likely at capacity.

4.270 Amphibians, including American toad, northern spring peeper, western chorus frog, eastern gray treefrog, and small-mouthed salamander, would likely persist and may flourish since additional areas of aquatic habitat would be created if the proposed lake is built.

4.271 The pipeline will be installed primarily in existing right-of-way. The narrowness of the pipeline corridor (20 ft) would impact the smaller animal species that inhabit the corridor. Some overall population loss would be expected due to construction and maintenance activities.

Threatened and Endangered Species

4.272 Suitable habitat to support the copperbelly water snake, Henslow's sparrow, grass-leaved lily, and black cohosh can be found at the proposed reservoir site. A survey would need to be conducted to locate any of these protected species for possible relocation.

4.273 The pipeline corridor is of narrow enough width to allow for flexibility in the final alignment to avoid any habitat areas for the protected species.

Soils

4.274 The 1964 Soil Survey for Johnson County lists several soil types in the area of the proposed reservoir. The types include: Sharon silt loam, Homer silt loam, Zanesville silt loam, Rocky sandstone land, and Wellston-Muskingum complex. According to the soil survey, the Homer silt loam and Zanesville silt loam are located on slopes and have experienced moderate to severe erosion. These soils could pose a water quality problem due to erodability which would increase siltation. The soils in the reservoir basin would be converted to hydric soils.

4.275 Due to the narrowness of the pipeline corridor to Marion, it is difficult to identify the soil types in the proposed pipeline corridor to Marion. The general soil associations located in the area of the corridor are Hosmer-Zanesville, Sharon-Belknap, Grantsburg-Zanesville, Ava-Bluford, and Hoyleton-Cisne. It is assumed that the right-of-way for the pipeline is mainly fill material. Installation of the line in undeveloped areas would temporarily compact the soils and disrupt the soil profile in the area, but long term impacts are not anticipated.

Geology

4.276 Johnson County is located near the southern rim of the Illinois Basin. The northern portion of Johnson County is underlain with Pennsylvanian bedrock. Most of Johnson County was not glaciated, but extensions of the ice fringe may have reached upstream into the small valleys in the northeast part of the county. The bedrock is covered with loess deposits from the Mississippi river valley and the ancient Ohio river valley.
4.277 Installation of the pipeline and construction of the reservoir will minimally disturb bedrock geology.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Land Use

4.278 Current land use in the proposed Goreville Reservoir basin includes approximately 196.4 acres of bottomland forest, 104.5 acres of upland forest, 178.5 acres of cropland, 41.6 acres of shrubland, 20.8 acres of pasture/hayland, 10.3 acres of intermittent riverine habitat, 9.8 acres of pond/borrow pit/lake habitat, 6.6 acres of residential/commercial/industrial lands, 4.4 acres of denuded ground, 1.1 acres of non-native grassland, and 0.4 acres of forbland. The inundation of forest land will destroy habitat for the animal resources in the area. The loss of cropland in the project area represents an economic impact of approximately $683 per acre (based on 1992 census data). Approximately four structures, including one residence, would be lost due to reservoir construction.

4.279 Current land use for the proposed pipeline route to the Marion water treatment plant is primarily existing road and railroad right-of-way. A run of pipe (about 1000 ft) would need to be installed through pasture/hayland to reach from the Goreville draw-off point to the nearest roadway. Installation of this run would temporarily compact the soils in the area, but not destroy the land's productivity. Near the northern end of the corridor, the pipeline would utilize stretches of undeveloped land. The installation of the pipeline would not preclude this land's use for other purposes. No homes would need to be acquired for right-of-way to install the pipeline.

Transportation

4.280 The proposed reservoir would eliminate the use of portions of about five county/local roads creating adverse travel for residents and emergency vehicles in this area. The reservoir would not impact any of the state highways or interstates in the area.

4.281 Installation of the pipeline to Marion will be along state and county roads and railroad right-of-way. Pipeline construction would cause no permanent impacts to roadways or railroads. Little disruption would occur to traffic on major highways since construction techniques would generally include tunneling or jacking under the road surfaces. Construction across less traveled roads, in particular gravel roads and driveways, may include excavation and temporary minor disruption of traffic because of one lane roads and resurfacing following construction. None of these actions would likely affect traffic for more than several days at any one site.

Historic and Prehistoric Cultural Resources

4.282 The Illinois Archaeological Site Files were reviewed in May 1998. No sites are recorded within the project area. However, the majority of the area has not been formally surveyed for cultural resources. A survey of the project area would be required followed by mitigation of significant resources. Based on similar southern Illinois locations, survey and mitigation could be expected to take approximately 3-4 years.

4.283 It is assumed that a cultural resource survey was completed prior to construction of the road and railroad right-of-ways or that construction has destroyed any resources in the area. A survey of the undeveloped land would be required prior to pipeline installation.

Recreation Opportunities

4.284 The area for the proposed reservoir does not offer any recreation opportunities at the present time. Ferne Clyffe State Park and the Shawnee National Forest are located several miles south of the reservoir site. Crab Orchard National Wildlife Refuge is located several miles north of the reservoir site.

4.285 The creation of the reservoir would open opportunities for boating, fishing, swimming, and water-skiing. The land around the reservoir could be developed for hiking, hunting, and camping. The pipeline will not impact the recreational opportunities in the area.

Irreversible and Irretrievable Resources

4.286 The proposed reservoir basin contains approximately 301 acres of woodlands and 178.5 acres of croplands that will be lost to inundation of the area. About 1.25 miles of Little Saline Creek will also be inundated, converting the aquatic habitat from a lotic to lentic system supporting a differing species base. Approximately 44.2 acres of wetlands would be lost due to inundation. Faunal species inhabiting the reservoir basin will be forced to relocate. Animals with small territories will most likely experience overall population losses, assuming adjacent land is already inhabited. Species with dens included in the reservoir will also likely experience some population loss. Wooded areas within the pipeline corridor will also be cleared for pipeline installation and maintenance.

Short-term/Long-term Impacts Goreville Reservoir Alternative– City of Marion Individually
Short-term • Increase in suspended solids in waterways crossed and temporary disruption of substrate from pipeline installation. • Temporary relocation of mobile aquatic organisms while suspended solids remain increased. • Transportation corridors will experience temporary delays due to installation under or across transportation lines.
Long-term • Conversion of approximately 301 acres of woodlands and 178.5 acres of croplands into aquatic habitat. • Loss of 1.25 miles of Little Saline Creek. • Loss of 1 house and three other non-residential structures. • Loss of flora and some faunal species inhabiting the proposed reservoir basin. • Loss of 5 local/county roads and the generation of adverse travel in the area of the reservoir. • Soil profiles will be disrupted through construction.

Lake of Egypt Water District

Surface Water Resources

4.287 Impacts to surface water resources associated with reservoir construction are discussed in paragraph 4.257.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

4.288 The proposed pipeline route from the reservoir to the LEWD treatment plant will require crossing four unnamed intermittent tributaries of Little Saline Creek. The pipeline will also cross the perennial streambed of Little Saline Creek at one location. Minimal short-term construction impacts would result due to pipeline installation. A limited amount of excavation would be needed to bury the pipe, resulting in disruption of waterway substrate and temporary increases in suspended solids.

Aquatic Resources

4.289 Impacts to aquatic resources are discussed in paragraphs 4.259 – 4.260.

Wetland Resources

4.290 Impacts to wetland resources associated with reservoir construction are discussed in paragraph 4.261.

4.291 The pipeline corridor to the LEWD has the potential to impact less than one acre of forested palustrine wetland habitat associated with the intermittent tributaries it crosses. The narrow corridor strip (20 ft. wide) would be disturbed by construction, but would revegetate within a growing season. Treed areas would be altered to low growing species to provide access for pipeline maintenance.

Terrestrial Biological Resources

4.292 Impacts to terrestrial biological resources are discussed in paragraphs 4.263 – 4.271.

Threatened and Endangered Species

4.293 Impacts to threatened and endangered species are discussed in paragraphs 4.272 – 4.273.

Soils

4.294 Impacts to soils associated with reservoir construction are discussed in paragraph 4.274.

4.295 Due to the narrowness of the pipeline corridor, it is difficult to identify the soil types in the proposed pipeline corridor to Lake of Egypt. The general soil associations located in the area of the corridor are Hosmer-Zanesville and Sharon-Belknap. Most of the pipeline would follow road right-of-way which is assumed to be fill. Installation of the line in undeveloped areas would temporarily compact the soils and disrupt the soil profile in the area, but long term impacts are not anticipated.

Geology

4.296 Impacts to geology are discussed in paragraphs 4.276 – 4.277.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Land Use

4.297 Impacts to land use in the reservoir basin are discussed in paragraph 4.278. No homes would be acquired for right-of-way to install the pipeline. Installation of the pipeline would limit construction activities in the immediate area of the easement.

Transportation

4.298 Impacts to transportation associated with reservoir construction are discussed in paragraph 4.280.

4.299 Installation of the pipeline to LEWD will occur along local roads. Impacts to transportation associated with pipeline construction are discussed in paragraph 4.281.

Historic and Prehistoric Cultural Resources

4.300 Impacts to cultural resources are discussed in paragraphs 4.282 – 4.283.

Recreation Opportunities

4.301 Impacts to recreation opportunities are discussed in paragraphs 4.284 – 4.285.

Irreversible and Irretrievable Resources

4.302 The proposed reservoir basin contains approximately 301 acres of woodlands and 178.5 acres of croplands that will be lost to inundation of the area. About 1.25 miles of Little Saline Creek will also be inundated, converting the aquatic habitat from a lotic to lentic system supporting a differing species base. Approximately 44.2 acres of wetlands would be lost due to inundation. Faunal species inhabiting the reservoir basin will be forced to relocate. Animals with small territories will most likely experience overall population losses, assuming adjacent land is already inhabited. Species with dens included in the reservoir will also likely experience some population loss. Wooded areas within the pipeline corridor will also be cleared for pipeline installation and maintenance.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Short-term/Long-term Impacts Goreville Reservoir Alternative– LEWD Individually
Short-term • Increase in suspended solids in waterways crossed and temporary disruption of substrate from pipeline installation. • Temporary relocation of mobile aquatic organisms while suspended solids remain increased. • Transportation corridors will experience temporary delays due to installation under or across transportation lines.
Long-term • Conversion of approximately 301 acres of woodlands and 178.5 acres of croplands into aquatic habitat. • Loss of 1.25 miles of Little Saline Creek. • Loss of 1 house and three other non-residential structures. • Loss of flora and some faunal species inhabiting the proposed reservoir basin. • Loss of 5 local/county roads and the generation of adverse travel in the area of the reservoir. • Soil profiles will be disrupted through construction.

SUGAR CREEK ALTERNATIVE RESOURCES

Introduction

4.303 A new reservoir on Sugar Creek would require the acquisition of approximately 1,172 acres of land for a lake with a pool elevation of 496 ft (msl) to supply water to Marion alone or Marion and LEWD. An additional 203 acres of land in a strip surrounding the lake are needed to provide a 100-year floodplain to accommodate lake levels that may occur with a storm that has a one percent chance of occurring in a 100-year period of time. A smaller reservoir with a pool elevation of 485 ft (msl) could be developed to supply LEWD individually. This lake would require approximately 1,067 acres for the lake proper and 100-year floodplain.

City of Marion

Surface Water Resources

4.304 Sugar Creek is a medium sized stream containing predominantly pool and riffle habitat for its entire length of approximately 16.7 miles. The proposed reservoir site is approximately 7.9 miles upstream of the confluence of Sugar Creek with the South Fork of the Saline River.

4.305 Construction of a dam to create a water supply lake would require earth moving activities, vegetation removal, and dam construction. The outlet works for the reservoir would be constructed before the dam would be built. Following completion of the concrete outlet structure, Sugar Creek would be routed through it and would pass through the stilling basin and join the natural stream channel immediately downstream of the dam.

4.306 Construction of the dam and other associated work (primarily road relocations) would require considerable land clearing, excavation, and earth moving. IEPA administers the Clean Water Act, Storm Water National Pollutant Discharge Elimination System (NPDES) Permit

Program. The Storm Water NPDES requirements would include measures to prevent siltation and sediments from these actions from reaching Sugar Creek.

4.307 The Storm Water NPDES permit would require the City of Marion and its contractors to develop and implement runoff detention ponds, catch basins, silt fences, and other such features prior to taking actions associated with the construction of the proposed project. All disturbance sites for this proposed action would need to comply with the NPDES permit since the program includes "…common plans of development…that will result in the disturbance of five or more acres total land area…" which would include dam construction, road relocations, and similar actions.

4.308 Within the limits of the proposed water supply reservoir, the existing free flowing streams would be inundated and the existing pool and riffle conditions would be lost. The quantity of loss would be 6.2 miles of Sugar Creek, 1.1 miles of a small unnamed tributary, and 3.0 miles of Maple Branch. Mitigation of this loss will be addressed in a wetland mitigation plan.

4.309 A 1,172 acre reservoir would be created through the damming of Sugar Creek, based on a water surface elevation of 496 ft (msl). Like any man-made water supply lake, actual surface acreage and water surface elevation would vary due to a variety of conditions. The variation would be dependent primarily on local precipitation and watershed runoff, withdrawal for City of Marion and/or LEWD consumptive use, surface evaporation, and releases for Sugar Creek downstream of the lake.

4.310 Discharge rates of Sugar Creek have been estimated based on a gaging station on Hayes Creek. Based on Hayes Creek data, the mean annual discharge in Sugar Creek in the reach near the dam site has been estimated to be about 32.9 cfs. Monthly mean stream discharge in Sugar Creek at this location likely varies from less than 3 cfs in dry periods to about 70 cfs in wet periods. Periods of no flow in Sugar Creek could be expected to occur, on average, for about 18 percent of the year or about 65 days (not necessarily continuous) in any year.

4.311 Should the reservoir be constructed, impacts to the instream flow of the 7.9 mile portion of Sugar Creek downstream from the lake need to be considered. A method developed by the Illinois State Water Plan Task Force (*Instream Flow Protection: A Planning Standard for Illinois Streams*) was used to establish a plan for base flows and was described in the FEIS.

4.312 Based on comments on the FEIS, it was determined that a different water release schedule was needed that would best protect the aquatic resources of Sugar Creek. An interagency (Corps, USFWS, and U.S. Environmental Protection Agency) review has resulted in development of a new plan for downstream releases should a Department of the Army permit be issued to the City of Marion.

4.313 A strategy has been developed for Sugar Creek releases that would be made up of a mixture of controlled reservoir releases through the outlet works combined with uncontrolled spillway releases. The existing stream receives considerable variation in flow, including peaks and droughts, and it was considered important that a similar pattern be replicated as much as

possible. It was also determined that the stream be assured certain base flows in every month. The strategy continues to include 1-1/2 inch and 12-inch discharge pipes in the outlet tower with a revised discharge plan.

4.314 The release strategy provides a dependable base flow from the two pipes of about two-thirds existing average monthly flow in the months of May, June, July, and August. It was determined that spawning and juvenile life stages of aquatic biota in this stream reach require a substantial minimum amount of water. It was also agreed that the months of September and October would need a dependable flow somewhat lower than the summer flow rates; about one-half existing average monthly flow was agreed upon. During the remaining months of the year it was determined that a less dependable base flow was needed; thus, two-fifths existing average monthly flow was agreed upon.

4.315 Because the estimated consumptive use, evaporation, and low flow releases are less than inflow for a number of months, the dependable base flow for January through May should be supplemented with considerable volumes of water over the uncontrolled spillway. Large portions of the months of December and June would also have excess water that would flow over the spillway. In the remaining months, the reservoir level would be below spillway level. Reservoir drawdown would continue during summer and early fall and little flow over the spillway would be anticipated. Reservoir drawdown is described in more detail below.

4.316 It was also determined that the stream should have periodic events when minimal flow would occur. The reservoir releases through the outlet works would be reduced during a five day period in the months of July, August, September, and October to a discharge of 0.25 cfs. This low flow period would replicate periods when the existing stream would normally approach zero flow.

4.317 The chemical quality of water in the downstream releases from the proposed lake is predicted to be the same as occurs at present in Sugar Creek. The lake would, however, have the potential for variable temperature and dissolved oxygen levels at different depths. The outlet structure for the reservoir is designed to allow the flexibility of drawing water from three different depths of the reservoir. This structure could draw water from one or any combination of these three levels to obtain a desired temperature and quality of outflow.

4.318 The outlet structure would be built so that water released to Sugar Creek for the constant stream flow would be obtained from the same lake levels as the water that would be routed to the water treatment plant for human consumption. The City of Marion would draw water that would have high dissolved oxygen levels and would not have an elevated temperature to provide the best raw water for treatment. Water from the lowest portions of the lake would be avoided should dissolved oxygen levels be reduced. Similarly, water that has an elevated temperature (which could occur at the lake surface during late summer) would be avoided. The need for high quality water for human consumption would be complementary to the need to provide high quality water to Sugar Creek downstream from the proposed reservoir.

4.319 Reservoir water levels would fluctuate throughout the course of a year, depending on precipitation, consumptive use, and low flow releases to Sugar Creek. During the months of

January through May, the reservoir would operate at or slightly above elevation 496 msl, with inflow in excess of consumptive uses flowing over the reservoir spillway.

4.320 The water quality of Sugar Creek is high (Robert Hite, IEPA, telephone interview dated October 4, 1994) and would correspond to high water quality in the proposed reservoir. Several small pockets of abandoned surface coal mines exist in the watershed creating site-specific runoff containing leachate with low pH and elevated metals. The area of these sites is about one percent (or less) of the Sugar Creek drainage basin above the proposed dam site and would not adversely affect reservoir water quality.

4.321 The annual average stream flow entering the reservoir and precipitation falling directly on the reservoir would total about 26,263 acre-ft, about 158 percent of total reservoir volume. Because of the high inflow, the volume of water within the reservoir would have relatively short residence time and preclude accumulation or concentration of pollutants.

4.322 The crossings of 14 named and unnamed streams would cause minimal short-term construction impacts due to the installation of pipeline. Limited excavation would be needed to bury the pipe. Construction in creeks would result in disruption of stream substrate and temporary increases in suspended solids.

Aquatic Biological Resources

4.323 IDNR staff sampled four sites within the limits of the proposed reservoir; two of these sites were also measured by employees of the IEPA. Three sites were on Sugar Creek, one 1.5 stream miles upstream of the proposed dam site, a second 3 miles further upstream, and the third located in the upper limits of the proposed reservoir. The fourth site was located on Maple Branch. Both agencies also sampled one site downstream from the proposed reservoir. Following this sampling, a report by the IDNR identified the reach of Sugar Creek that includes these four Sugar Creek sample sites as a "highly valued aquatic resource." Maple Branch was characterized as a "moderate aquatic resource." Sugar Creek below these sample sites was also described as a "moderate aquatic resource."

4.324 A total of 26 species of fish were found at the four sites within the boundary of the proposed lake. A comparison of the four most common species at each of the proposed reservoir sample sites indicates that nine species are the most common species of fish in Sugar and Maple Creeks.

4.325 The populations of some these species, such as orangethroat darter, redfin shiner, ribbon shiner, creek chubsucker, and creek chub, clearly prefer small to moderate stream habitat and would likely not survive the creation of the proposed water supply reservoir. Redfin shiners, creek chubsuckers, and creek chubs may use the most upstream portions of the reservoir but the numbers of these species would likely be very low. For all practical purposes, these species would no longer occur in the former streams above the dam site if the reservoir is constructed.

4.326 The populations of other species that are common in Sugar and Maple Creeks, such as longear sunfish, green sunfish, bluntnose minnow, and blackspotted topminnow would likely persist. The numbers of these species would likely increase as the volume of the proposed

reservoir would provide additional habitat as compared to the existing streams. Other more lacusterine species that would likely become common if the reservoir is built include largemouth bass, black crappie, white crappie, bluegill, and channel catfish. These species would likely result from accidental releases or by stocking.

4.327 The Sugar Creek sample site downstream of the proposed reservoir had the greatest number of species of all project area sites, twenty-one. The population was dominated by bluntnose minnow, longear sunfish, redfin shiner, creek chubsucker, orangethroat darter, and stripetail darter. This reach would not be inundated with the construction of the proposed reservoir. It would continue to receive a flow of water that would, in quantity, be similar to that which has historically occurred. The amount of water that would be released to Sugar Creek throughout the year is the result of an interagency agreement to provide the aquatic resources with optimal and adequate water flows to sustain available habitat. The diversity of species and numbers of individuals should not be reduced in this reach.

4.328 The IDNR also surveyed Sugar Creeks for mussels. Based on this sampling, few mussel resources exist in Sugar Creek. No individuals were found within the limits of the proposed reservoir. A small mussel population was located downstream from the proposed reservoir; this population would continue to receive water flows similar to existing conditions. It is anticipated that no adverse impacts from the proposed project would occur to the mussel population in Sugar Creek.

4.329 The portion of Sugar Creek from the proposed dam site to the upper reaches of the reservoir (6.2 miles) that has been classified by the IDNR as a "highly valued aquatic resource" would be inundated and lost. The remaining portion of Sugar Creek included in the reach described as "highly valued aquatic resource" downstream from the proposed dam site to a distance downstream from the Highway 166 bridge near Creal Springs would be protected by the multi-agency reservoir release plan. The portion of Sugar Creek downstream including the Palzo area characterized as a "moderate aquatic resource" would not be affected. Slightly more than three miles of Maple Branch, characterized as a "moderate aquatic resource," would also be inundated and lost. No adverse effects to the resources of the South Fork of the Saline River are expected.

4.330 The INHS has designated a 5.0 mile reach of Sugar Creek as a Biologically Significant Stream. Approximately 4 miles of this stream are below the proposed reservoir dam site. The upper one mile would be inundated and lost as stream habitat. The remaining 80 percent would be subject to the release plan developed by the Federal agencies to protect aquatic resources.

4.331 In addition, the City of Marion has agreed to add hard mast tree plantings along Sugar Creek between the dam site and Illinois Highway 166 to enhance streamside habitat. As part of the wetland mitigation plan, the City of Marion would also work with landowners to enhance Sugar Creek streamside habitat for a distance of about 6 miles downstream of Illinois Highway 166. These collective actions are intended to protect Sugar Creek from any additional degradation and may enhance stream quality.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

4.332 The streams that would be crossed by the proposed pipeline corridor from the proposed reservoir to the City of Marion water treatment plant would likely be populated with species that prefer minimal silt deposition. Construction would be short-term and limited in area. Construction impacts on aquatic species would likely be detrimental in the immediate area of excavation and construction. The crossing of the South Fork of the Saline River downstream of Illinois Highway 166 is downstream from a sampling site that historically had included a small population of Indiana crayfish. Minimal impact on this stream is expected since INHS characterized this stream as low biological diversity and the crossing is downstream from the portion included as a Biologically Significant Stream.

Wetland Resources

4.333 The area of the proposed reservoir includes wetlands that fall within the regulatory jurisdiction of the Corps of Engineers. In 1993, staff members of the Corps and the USFWS determined that 40.38 acres were appropriate for inclusion as jurisdictional wetlands. A total of twenty-eight individual wetlands make up this acreage. These wetlands range in size from a few hundred square ft to about eight acres. Should a Department of the Army permit be issued, construction of a new reservoir would inundate these areas and they would be lost.

4.334 A wetland mitigation plan has been developed to offset the loss of these jurisdictional wetlands should a Department of the Army permit be issued for the proposed reservoir. The plan includes the creation of new wetlands at various locations surrounding the border of the proposed lake project.

4.335 The mitigation plan would offset the loss of existing wetlands with the restoration of about 102 acres of wetland habitat. This plan has been developed by the applicant with significant input from USFWS, USEPA, and the Corps. Several different types of wetlands would be created. Eight areas (about 58 acres) have been identified that have shallow slopes and are currently open land. These areas would be one or two ft in elevation above the normal lake level and would be planted with a mixture of hard mast bottomland hardwoods and water tolerant trees. Areas with two to six ft of water at normal lake level would be planted with emergent aquatic species.

4.336 Some existing trees in a number of coves and upper areas of the proposed reservoir, about 113 acres, would not be cleared. Treed areas with more than one foot of standing water (at normal lake level, about 91 acres) would be given partial credit as mitigation wetlands (four acres left standing for one acre credit or about 23 acres credited). These areas would be planted by hand with the same tree mixtures as would be planted in the eight new wetland areas (about 22 acres). These areas would add about 45 acres of mitigation wetlands.

4.337 Tree species that are proposed to be planted in the wettest areas (areas that would typically have water depths of about one to two ft at normal lake level) would include bald cypress (*Taxodium distichum*) and water tupelo (*Nyssa aquatica*). Plantings for the immediate edge of the reservoir would be overcup oak (*Quercus lyrata*), water hickory (*Carya aquatica*), cherrybark oak (*Quercus pagoda*), pin oak (*Quercus palustris*), swamp white oak (*Quercus bicolor*), shummard oak (*Quercus shummardii*), and shellbark hickory (*Carya laciniosa*). A

number of locally dominant species with light seeds would be expected to naturally regenerate in these areas, including such species as river birch, green ash, black willow, eastern cottonwood, red maple, box elder, and American elm. Shrubs and herbaceous species would similarly invade these areas.

4.338 It is expected that the vegetative zones along the perimeter of the lake would be subject to a long-term transition if the reservoir is constructed. A long-term trend from upland to water tolerant species would be expected along the lake shore. Some areas immediately adjacent to the lake that are presently open land would colonize quickly with water tolerant species, likely a mixture similar to the light seed species listed in the previous paragraph.

4.339 In addition to these planted areas, the applicant would plant the same hard mast species in a corridor along Maple Branch at the upper end of the reservoir. This area of stream-side restoration would include a planted strip about 50 ft wide by 1,700 ft long on either side of Maple Branch, from the upper limit of the normal lake level to the end of property purchased by the City of Marion (approximately 504 ft msl elevation). This area is now generally open with scattered trees, primarily black willow and sycamore.

4.340 The applicant would also plant the same hard mast tree seedlings selectively in a corridor along Sugar Creek, from the downstream end of the dam to Illinois Highway 166, a distance of about 1.5 miles. This stream-side enhancement would add diversity to a 100-foot wide strip on either side of Sugar Creek in bottomland woods that are presently dominated by silver maple, cottonwood, river birch, and sycamore.

4.341 In addition, the applicant has agreed, should a Department of the Army permit be issued, to work with landowners whose properties border Sugar Creek downstream of Illinois Highway 166, for a distance of about 6 miles, to work toward implementation of best management practices for the stream banks. This activity could take the form of protective easements, voluntary fencing, and/or stream bank planting, among other actions -- all directed toward protecting the integrity of the aquatic habitat in this reach of Sugar Creek.

Terrestrial Biological Resources

4.342 The area of the proposed reservoir, 1,172 acres, has been disturbed by man for a number of years through clearing for agricultural purposes, road building, construction of railroad lines, pond development, and timber harvesting. The area that would be inundated by the proposed reservoir includes approximately 594 acres that are wetlands, woodlands, thickets, or old fields. Five hundred thirty-three acres of land within the limits of the proposed lake are classified as agricultural land.

4.343 Of the 594 acres vegetated lands included in the reservoir area, 40 acres are (jurisdictional) wetlands, 415 acres are woods, 89 acres are thickets, and 50 acres are old fields. As noted above, approximately 113 acres of woods would not be cleared and would remain standing within the limits of the reservoir's normal water level. All of the remaining 312 acres of woods have been cleared since issuance of the 404 permit in 1996. Some remaining areas of marketable timber may be removed prior to construction of the reservoir.

4.344 In most cases, vegetation that occurs at the elevation of the proposed reservoir would be placed in a moisture regime much wetter than presently exists. Some transition in the first few feet of the reservoir shoreline would likely result as species more tolerant of wetter soils would replace present species. Tree species such as river birch, red maple, green ash, cottonwood, and sycamore would begin to invade in these new wet areas. Trees that would likely be less able to compete in this narrow zone are tulip poplar, white oak, sweetgum, bitternut hickory, southern red oak, sugar maple, black oak, and pignut hickory. Plantings as part of the wetland migration plan along the water's edge of the reservoir (overcup oak, water hickory, cherrybark oak, pin oak, shummard oak, swamp white oak, and shellbark hickory) would speed transition to a more water tolerant community and provide added diversity.

4.345 The City of Marion has purchased or has agreements in place to purchase about 1,803 acres of land for creation of the reservoir and the flood zone. Alteration of vegetation in the flood zone would occur only at spot locations where adjacent land owners would be allowed to thin small riparian areas based on the Lake Shore Management Plan.

4.346 Of the 661 acres above the normal pool level, approximately 443 acres would be set aside in perpetuity as open space. The areas that are agricultural lands would continue to be cropped if the City of Marion can find farmers willing to lease the land for farming. Some or all of these lands may be allowed to revert to old field and ultimately to woodlands if no one maintains crop production. Areas that are presently woodlands would remain woodlands.

4.347 These wooded areas would continue to include such species as tulip, poplar, white oak, sweetgum, and red maple. Northern red oak, shagbark hickory, bitternut hickory, sugar maple, American elm, and wild black cherry would also continue to occur. Drier woodland areas may also include black oak, pignut hickory, black gum, and post oak. The understory of these woods would generally continue to be species such as sugar maple, hop hornbeam, flowering dogwood, and iron wood with less common occurrences of coralberry and slippery elm.

4.348 Small and large mammals would lose both agricultural lands and native vegetation habitat that would be inundated should the proposed lake be constructed. Populations of small mammals such as white-footed mice, prairie voles, eastern moles, least shrews, and short-tailed shrews that exist in the reservoir area would be lost as it is assumed that available adjacent habitat is at capacity. Any individuals that do attempt to use adjacent habitat would likely create a stressed condition as competition for food and cover is increased. Increased predation on displaced individuals and/or current residents could occur for short periods of time in adjacent habitats, until populations ultimately stabilize.

4.349 Large mammals such as whitetail deer, opossum, fox squirrel, gray squirrel, eastern cottontail rabbit, and eastern chipmunk would likely see the same fate as described for small mammals. Highly opportunistic species such as raccoon, striped skunk, and woodchuck may be able to occupy adjacent areas at higher than present populations for a period of time. Other species such as red and gray fox would likely have increased feeding opportunities for a short time as adjacent habitats are stressed. Population levels of these predators are not expected to

increase in the short-term, however, and would likely also decrease long-term because of limitations of available food.

4.350 Birds that would be adversely affected by loss of habitat with construction of the proposed reservoir would be northern bobwhite, mourning dove, northern flicker, blue jay, whip-poor-will, eastern wood-peewee, great crested flycatcher, northern cardinal, American crow, white-throated sparrow, blue-gray gnatcatcher, summer tanager, Carolina chickadee, tufted titmouse, Carolina wren, northern mockingbird, American robin, eastern meadowlark, horned lark, pileated woodpecker, and white-breasted nuthatch. It is assumed that the populations of birds presently using the area of the proposed reservoir would be substantially reduced. These losses would be due to the removal of present food sources and cover and the presumption that adjacent habitats are probably at or near capacity.

4.351 If the reservoir is constructed, timber would be left standing in a number of the coves of the lake. This flooded timber would begin to die shortly after the reservoir pool reaches its normal level (496 ft msl). In addition, stress due to high soil moisture regime at the edge of the lake would result in the loss of less water tolerant trees. This should create a number of dead and dying trees that would provide habitat for birds such as the downy woodpecker, red-bellied woodpecker, and the red-headed woodpecker. These species may increase in number. Habitat for wood ducks (*Aix sponsa*) would also be increased substantially.

4.352 Short-term increased food conditions would exist for raptors such as the red-tailed hawk, American kestrel, and barred owl as habitats within the limits of the lake and adjacent to the reservoir area are modified by clearing and populations of mammals, reptiles, and amphibians are placed in more vulnerable situations. Long-term populations of these species would likely decline following the inundation of the reservoir. Similarly, predation, accidents, and other mortality causes have the potential to create short-term increases in food opportunities for scavengers such as the turkey vulture.

4.353 Construction of the proposed reservoir would provide habitat for both migrating and resident waterfowl. Limited feeding opportunities may exist with this reservoir but resting habitat would be provided due to the large water surface area.

4.354 Reptiles that likely use the existing habitat that would be inundated, such as eastern box turtle, black rat snake, speckled kingsnake, blue racer, eastern garter snake, eastern hognose snake, northern fence lizard, and five-lined skink, would be adversely affected and most would be lost since adjacent upland habitats are likely at capacity.

4.355 Amphibians, including American toad, northern spring peeper, western chorus frog, eastern gray treefrog, and small-mouthed salamander, would likely persist and may flourish since additional areas and volume of aquatic habitats would be created if the proposed lake is built.

Threatened and Endangered Species

4.356 Adult least brook lamprey (Illinois state threatened species) habitat, riffles of sand and gravel, would be lost in Sugar Creek and tributary streams within the limits of the proposed

reservoir. The most upstream portions of the proposed reservoir may provide suitable habitat for development of ammocoetes (slower velocity water with substrate of sand and organic debris) for any populations that exist upstream of the reservoir limits.

4.357 Suitable habitat for adults and ammocoetes also exists downstream of the proposed reservoir. This habitat would remain available since construction of the proposed lake must follow IEPA regulations prohibiting silt runoff from large construction projects. Similarly, this habitat would remain available or be improved during project operation since minimum lake discharges would be maintained in reaches that presently have zero flow during a number of days each year.

4.358 The state endangered Indiana crayfish occurs in rocky riffles and pools of small to medium sized streams. Sampling in 1993 found 22 of these individuals at the Sugar Creek sample site downstream from the Illinois Highway 166 bridge, three were found at Sugar Creek sample site 2, and two individuals were taken at Sugar Creek sample site 3. Available habitat for Indiana crayfish would be lost in Sugar Creek, including sample sites 2 and 3, over the reach that would be inundated if the proposed reservoir is constructed. Habitat conditions at the sample site downstream from the Illinois Highway 166 bridge would be the same or improved as a continuous minimum flow of water would be provided in an area that presently has zero flow during a number of days each year.

4.359 The habitat conditions downstream of the reservoir would be similar or better based on the interagency water release schedule developed for the proposed reservoir. Releases have been designed to provide small amounts of water all days of the year as compared to periods of zero flow at present. It was determined that this would likely be beneficial to these two species. The releases throughout the year were determined to maximize the possibility of variable spillway releases to simulate, as best possible, the normal variability of flow in Sugar Creek.

4.360 While no sampling has been conducted specifically for this permit application to determine presence or absence, suitable habitat occurs within the area of the proposed lake for the federally endangered Indiana bat. No critical habitat occurs in the project area. Removal of timber and flooding of the stream bottoms would remove potential feeding habitat over most of Sugar Creek and tributaries. Maternal colonies that may presently use the proposed project area would lose trees that could be used for raising young.

4.361 The USFWS has prepared a Biological Opinion regarding possible effects to Indiana bat if a Department of the Army permit would be issued for the proposed reservoir. The findings of the Biological Opinion are that the project could be constructed and operated without jeopardizing the continued existence of the Indiana bat. Reasonable and prudent measures have been developed by the USFWS to minimize incidental take of Indiana bats.

4.362 No timber clearing would be allowed from April 15 to September 15 to avoid adverse direct impacts to bats that may be using streamside trees. Foraging habitat downstream of the proposed reservoir would be improved if the lake were built. Discharges to Sugar Creek downstream of the proposed reservoir would be maintained in reaches that presently have zero flow during a number of days each year and aid in production of insects for foraging. In

addition, the City of Marion would enhance the forest cover along the streamside habitats for the reach of Sugar Creek under their direct ownership down to Illinois Highway 166 by selectively planting trees as indicated in the wetland migration plan.

4.363 Bald eagles are typically found in riparian areas along large streams, rivers, and lakes. Breeding areas are beginning to expand southward from the northern United States and Canada. The Sugar Creek project area does not provide suitable feeding habitat for bald eagles during any season. No nests or other summer eagle activity have been reported in the area of the proposed lake. Because of the lack of suitable habitat, no impacts on this species would occur if the reservoir is constructed. It is possible that beneficial feeding habitat for bald eagles would be created as a result of reservoir construction.

4.364 Gray bats roost in cave or cave-like habitats throughout the year. In the region that includes this proposed project, gray bats are known to seasonally use caves in southern and southwestern Illinois and Missouri. Female gray bats use caves (or cave-like areas) with high humidity as nursery areas. No caves or cave-like habitats occur in the area included as part of the proposed reservoir or pipeline corridor. Gray bats do forage in riparian areas in proximity to the roost sites. Additionally, removal of riparian vegetation for pipeline construction would not likely affect foraging success for gray bats.

4.365 The USFWS has concurred that the proposed project would not adversely affect bald eagles or gray bats (Richard Nelson, USFWS, letter dated January 17, 1995). The USFWS has also concurred that the proposed project would have no affect on copperbelly watersnakes (Richard Nelson, USFWS, letter dated June 19, 1995). As noted above, the USFWS has determined that the proposed project, with institution of certain reasonable and prudent measures, would not adversely affect Indiana bats and that an incidental take provision has been granted to the City of Marion (John Blankenship, USFWS, letter dated June 29, 1995).

Soils

4.366 Soils in the location of the proposed reservoir will be inundated and converted to hydric soils.

4.367 Most of the soils included in the pipeline corridor to the City of Marion have been previously disturbed from railroad construction. Those that have not been disturbed will have their soil profiles disrupted through construction activities and will be compacted by heavy equipment. These soils will recover within about three years.

Geology

4.368 Construction of this alternative will minimally disturb bedrock geology.

Land Use

4.369 Of the 1,172 acres included within the limits of the proposed reservoir, 40 acres of (jurisdictional) wetlands, 415 acres of woodlands, 89 acres of thickets, and 50 acres of old fields

would be inundated. Included in the inundated area would be 533 acres of agricultural lands that are in various levels of active production. These cultivated lands are not considered prime agricultural lands. Cultivated lands required for the pipeline to the City of Marion water treatment plant would cross small areas of agricultural lands. Following construction, these lands would be restored to ensure continued productivity by chisel plowing or ripping compacted soils and repairing any damaged subsurface drainage tiles or pipes.

4.370 Five acres that are presently ponds would be inundated, as would 20 acres that are presently rights-of-way for abandoned railroads; the remaining acreage consists of either abandoned roads that would be inundated or existing roads that would be raised.

4.371 No houses exist in the area of the proposed reservoir; therefore, no families or residences would be displaced should the proposed lake be constructed.

4.372 In addition to the land that would be inundated by normal water levels within the proposed lake, additional land would be required to satisfy requirements that a once in 100-year storm occurrence would not cause property damage to others. Lands have been acquired to an elevation of 504 ft (msl) and 510 ft (msl) for this purpose. These additional lands provide a thin border around the proposed lake edge. These lands would be owned by the City of Marion and subject to the Lake Shore Management Plan administered by the City. This management plan would be included as a Special Condition to the Department of the Army permit if a determination is made that permit issuance is warranted.

4.373 A total of 443 acres of these additional lands acquired by the City of Marion would be set aside in perpetuity as open space. The remaining 218 acres would be managed with minimal development, if any, to insure that the integrity of water quality within the watershed is preserved. The only other development proposed by the City of Marion, in addition to the dam and raw water pump station, would be a small public and maintenance boat ramp and parking lot on the west side of the proposed lake near Creal Springs.

4.374 Three hundred sixty-three acres of woodlands are included in the area to be set aside in perpetuity. Eight acres to be set aside are non-wooded, either cultivated or old field. The area not set aside in perpetuity includes 73 acres of wooded and 145 acres of non-wooded land.

Transportation

4.375 No roads would need to be abandoned should the proposed water supply reservoir be constructed. No changes in school bus or rural mail delivery routes would be needed. No area residents would need to alter their permanent travel patterns. During periods when scattered road construction would be necessary, temporary bypasses would be available. Small low areas in roads on both east and west sides of the proposed reservoir would need minor construction. The roads that pass through the Maple Branch bottoms would require the most construction. These would require localized construction to raise the elevation of the roadway and, in some instances, replacement of a culvert or similar drainage structure.

TABLE 2-9
Estimated Total Annual Cost ($)
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4.376 A north-south county road borders the western side of the proposed lake and has several points where the roadway would require elevation if the reservoir is built. Four small valleys on this road may require some small areas of fill to raise the grade of the road, installation of new culverts, or both. The primary area where work would be required is in the vicinity of Maple Branch where 1,500 ft of the north-south roadway would need to be reconstructed and one bridge would need replaced. The east-west county road that crosses Maple Branch in the same area would require 3,500 ft of road reconstruction and replacement of two small culverts.

4.377 The north-south county road that crosses Sugar Creek with a low water ford in the upper part of the proposed reservoir (southern end) would require work. Five hundred feet of the roadway would need to be raised and a new bridge or culverts installed. An intersection one mile north on this roadway may also require some fill to raise the road elevation.

Historic and Prehistoric Cultural Resources

4.378 Phase I and Phase II cultural resources reconnaissance studies have been completed for the proposed project. The Phase I study of the lake and dam area was completed during 1989-1990 with 45 prehistoric archaeological sites (early Archaic – Mississippian), 20 historic archaeological sites (mid-19th to early 20th century), and 25 chronologically diverse isolated finds. Thirty-seven of these prehistoric and historic sites were tested during 1990-91. Following completion of the testing stage, it was determined that 11 sites comprised a significant resource and, as a group, were determined to be eligible for the National Register of Historic Places. Data recovery at the 11 phase III sites has been completed.

4.379 The executed Memorandum of Agreement requires that the sites that have been determined eligible for the National Register of Historic Places have data recovery completed if a Department of the Army permit be approved. Based on this previously executed document, completion of the data recovery on all sites would mitigate any adverse effects on cultural resources. In addition, should a determination be made that a Department of the Army permit is warranted for the applicant's proposed reservoir, a testing program for historic resources would be conducted in the railroad right-of-way in the immediate area of the dam site and outlet works to ensure that resources are not lost.

Recreational Opportunities

4.380 Residents adjacent to Sugar Creek and landowners that either still retain property or have sold property in the area of the proposed reservoir probably use Sugar Creek for fishing and the adjacent woods and farms for hunting. Some residents of Creal Springs also probably use these areas for the same activities. Should the proposed reservoir be constructed, these opportunities would be lost.

4.381 The IDNR Tunnel Hill State Trail, a hiking-bicycling trail, would follow an abandoned railroad alignment from near Harrisburg, Illinois to near Karnak, Illinois. Construction of the trail in the vicinity of the proposed reservoir has not begun.

4.382 The trail crosses Sugar Creek in the uppermost area of the proposed lake. The abandoned bridge that crosses Sugar Creek has a bridge deck elevation of 609 ft (msl), approximately 13 ft above the elevation of the water surface of the planned reservoir. In order for this structure to allow the conveyance of stream flows associated with a 100-year storm, the open area under the bridge deck would need to be enlarged. This could be accomplished by adding openings in the abutments or by modifying the bridge's structural steel.

4.383 The City of Marion transferred ownership of a bridge and a small length of former railroad right-of-way to IDNR on October 26, 1998 to allow further development of the Tunnel Hill State Trail. No technical reasons why both the proposed water supply reservoir and this regional trail cannot both be built and successfully operated.

4.384 A new waterbody for fishing and boating would be created if the proposed reservoir is built. Should this occur, the City of Marion intends to allow public access to the lake. One boat ramp would be provided by the City of Marion on the west side of the lake near Creal Springs. No private boat ramps would be permitted. The City of Marion lake shore management plan would limit boat motor size to 15 horsepower.

Irreversible and Irretrievable Resources

4.385 The proposed reservoir basin contains approximately 415 acres of woodlands and 533 acres of agricultural lands that will be lost to inundation of the area. About 6.2 miles of Sugar Creek and 3 miles of Maple Branch will also be inundated, converting the aquatic habitat from a lotic to lentic system supporting a differing species base. Approximately 40.4 acres of wetlands would be lost due to inundation. Faunal species inhabiting the reservoir basin will be forced to relocate. Animals with small territories will most likely experience overall population losses, assuming adjacent land is already inhabited. Species with dens included in the reservoir will also likely experience some population loss. About 1.5 acres of wooded areas within the pipeline corridor will also be cleared for pipeline installation and maintenance.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Short-term/Long-term Impacts Sugar Creek Reservoir Alternative– City of Marion Individually
Short-term • Increase in suspended solids in waterways crossed and temporary disruption of substrate from pipeline installation. • Temporary relocation of mobile aquatic organisms while suspended solids remain increased. • Transportation corridors will experience temporary delays due to installation under or across transportation lines.
Long-term • Conversion of approximately 415 acres of woodlands and 533 acres of agricultural land into aquatic habitat. • Loss of 6.2 miles of Sugar Creek and 3 miles of Maple Branch. • Loss of flora and some faunal species inhabiting the proposed reservoir basin. • Damming of Sugar Creek. • Soil profiles will be disrupted through construction.

Lake of Egypt Water District

Surface Water Resources

4.386 A 625 acre reservoir would be created through the damning of Sugar Creek, based on a surface elevation of 485 ft (msl). See paragraphs 4.304 – 4.321 for a discussion of impacts to surface water resources associated with reservoir construction.

4.387 The crossing of Maple Branch for pipeline installation would cause minimal short-term construction impacts. Limited excavation would be needed to bury the pipe resulting in disruption of stream substrate and a temporary increase in suspended solids.

Aquatic Biological Resources

4.388 Impacts to aquatic biological resources associated with the creation of the reservoir are discussed in paragraphs 4.323 – 4.331.

4.389 The pipeline corridor would require the crossing of Maple Branch. This stream was rated a “moderate aquatic resource” by IDNR. Species in this stream would likely prefer minimal silt deposition. Construction would be short-term and limited in area. Construction impacts on aquatic species would likely be detrimental in the immediate area of excavation and construction.

Wetland Resources

4.390 Approximately 30 acres of jurisdictional wetlands are located within the proposed reservoir area. These areas will be inundated and would be mitigated for following a general wetland mitigation plan similar to the plan created for the City of Marion reservoir alternative discussed in paragraphs 4.333 – 4.341.

TABLE 2-9
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4.391 The crossing of Maple Branch will inflict minimal impact. Construction would cause minimal disruption of the wetland area which would typically recover within a growing season.

Terrestrial Biological Resources

4.392 The proposed reservoir site contains approximately 354 acres of non-agricultural vegetated lands. This number includes approximately 250 acres of woodlands (all of which were cleared in 1996), 30 acres of jurisdictional wetlands, 47 acres of thickets and 27 acres of old fields. The reservoir location also includes approximately 271 acres of agricultural land. Impacts to terrestrial biological resources in the proposed reservoir area are discussed in paragraphs 4.342 – 4.355.

Threatened and Endangered Species

4.393 Impacts to threatened and endangered species are discussed in paragraphs 4.356 – 4.365.

Soils

4.394 Soils in the location of the proposed reservoir will be inundated by the reservoir and converted to hydric soils.

4.395 Most of the soils included in the pipeline corridor have been previously disturbed by road construction. Those that have not been disturbed will have their soils profiles disrupted through construction activities and will be compacted by heavy equipment. These soils will recover within about three years.

Geology

4.396 Construction of this alternative will minimally disturb bedrock geology.

Land Use

4.397 Of the 625 acres included within the limits of the proposed reservoir (below elevation 485 feet msl), 30 acres are jurisdictional wetlands, 250 acres of woodlands, 47 acres of thickets and 27 acres of old fields. The proposed reservoir site contains approximately 271 acres of agricultural land. The croplands in this area are not considered prime agricultural lands.

4.398 No houses exist in the area of the proposed reservoir; therefore, no families or residences would be displaced should the reservoir be constructed.

4.399 In addition to the land that would be inundated by normal reservoir water levels, additional land would be required to satisfy requirements that a once in 100-year storm occurrence would not cause property damage. Lands would need to be acquired to an elevation

of 493 ft (msl) for this purpose. These lands provide a border around the proposed lake and would be subject to a Lake Shore Management Plan administered by LEWD.

4.400 The majority of the land to be utilized for the pipeline corridor is road right-of-way. Approximately 4.4 acres of land will be required for the pipeline.

Transportation

4.401 Impacts to transportation facilities in the proposed project area are discussed in paragraphs 4.375 – 4.377.

Historic and Prehistoric Cultural Resources

4.402 Impacts to cultural resources in the area of the proposed reservoir are discussed in paragraphs 4.378 – 4.379.

Recreation Opportunities

4.403 Impacts to recreational opportunities are discussed in paragraphs 4.380 – 4.384.

Irreversible and Irretrievable Resources

4.404 The proposed reservoir basin contains approximately 415 acres of woodlands and 533 acres of agricultural lands that will be lost to inundation of the area. About 6.2 miles of Sugar Creek and 3 miles of Maple Branch will also be inundated, converting the aquatic habitat from a lotic to lentic system supporting a differing species base. Approximately 30 acres of wetlands would be lost due to inundation. Faunal species inhabiting the reservoir basin will be forced to relocate. Animals with small territories will most likely experience overall population losses, assuming adjacent land is already inhabited. Species with dens included in the reservoir will also likely experience some population loss. About 1.5 acres of wooded areas within the pipeline corridor will also be cleared for pipeline installation and maintenance.

Short-term/Long-term Impacts Sugar Creek Reservoir Alternative– LEWD Individually
Short-term • Increase in suspended solids in waterways crossed and temporary disruption of substrate from pipeline installation. • Temporary relocation of mobile aquatic organisms while suspended solids remain increased. • Transportation corridors will experience temporary delays due to installation under or across transportation lines.
Long-term • Conversion of approximately 415 acres of woodlands and 533 acres of agricultural land into aquatic habitat. • Loss of 6.2 miles of Sugar Creek and 3 miles of Maple Branch. • Loss of flora and some faunal species inhabiting the proposed reservoir basin. • Damming of Sugar Creek. • Soil profiles will be disrupted through construction.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

LIST OF PREPARERS

5.001 The following individuals of the U.S. Army Corps of Engineers, Louisville, Kentucky, were primarily responsible for the preparation of the Draft and Final EIS, the Draft and Final Supplement I to the Final EIS, and the Draft Supplement II to the Final EIS:

Terry S. Siemsen - Environmental Specialist, Planning Division. Twenty-five years experience of environmental impact assessment of various water resource projects. Principal author of the Draft and Final EIS.

Ann Nunn - Attorney, Office of Counsel. Seventeen years of experience as an attorney, eight years with the Corps of Engineers.

Ronny J. Sadri - Environmental Engineer, P.E., Operations and Readiness Division. Fifteen years experience and engineer, four years with the Corps of Engineers. Project manager for this application.

5.002 The following individuals of ETI Corporation, Memphis, Tennessee, were responsible for information used in the preparation of the Draft and Final EIS, and the Draft Supplement II to the Final EIS:

Robert Rehkopf, P.E. - Principal and Chief Civil Engineer. Twenty-five years engineering, design, and planning experience. Directed the preparation of the cost analysis of water transmission alternatives.

David M. Docauer, Ph. D. - Project Coordinator and Hydrologist. Nineteen years experience in planning, design, and research. Responsible for report on cost analysis of water transmission alternatives.

Donald Dixon, P.E. - Project Engineer. Twelve years experience in civil engineering and land development. Collected data for the cost analysis of water transmission alternatives.

5.003 The following individuals of Clarida Engineering Co., Marion, Illinois, were responsible for information used in the preparation of the Draft and Final EIS, and the Draft Supplement II to the Final EIS:

Glenn Clarida - Principal, Consulting Engineer to the City of Marion, Illinois, Thirty-five years experience as consulting engineer. Responsible for gathering information for the Draft and Final EIS, and the Draft Supplement II to the Final EIS.----------

Wayne Whitehead - Project Engineer. Twelve years experience in civil and consulting engineering. Responsible for data gathering for the Draft and Final EIS, and the Draft Supplement II to the Final EIS.

5.004 The following individuals of TAMS Consultants, Inc., Chicago, Illinois, were responsible for information used in the preparation of the Draft Supplement II to the Final EIS:

TABLE 2-9
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Steve Culberson - Environmental Specialist. Twelve years experience in NEPA documentation and environmental assessments. Responsible for data collection and authoring portions of the Draft Supplement II to the Final EIS.

5.005 The following individuals of Hanson Engineers Inc. were responsible for information used in the preparation of the Draft Supplement II to the Final EIS:

Mary Lou Goodpaster - Partner, Biologist. Twenty-three years experience in the environmental consulting industry and EIS preparation. Directed the preparation of the Draft Supplement II to the Final EIS.

Will McRoy - Biologist. Two years experience in environmental assessments. Responsible for data collection and authoring portions of the Draft Supplement II to the Final EIS.

5.006 The following individuals of Thompson Coburn, Attorneys at Law, were responsible for information used in the Draft Supplement II to the Final EIS:

Stephen Jeffery, Attorney - Eighteen years of experience as an attorney. Responsible for information used in the preparation of the Draft Supplement II to the Final EIS.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

PUBLIC INVOLVEMENT, INCLUDING A LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM COPIES OF THIS DOCUMENT ARE SENT

Notice of Intent

6.001 A "Notice of Intent" to prepare the Draft Environmental Impact Statement (EIS) for the proposed water supply reservoir was published in the Federal Register dated October 15, 1992. A "Notice of Intent" to prepare the Draft Supplement I to the Final EIS for the proposed water supply reservoir was published in the Federal Register dated December 13, 1995. A "Notice of Intent" to prepare the Draft Supplement II to the Final EIS for the proposed water supply reservoir was published in the Federal Register dated October 31, 1997.

Scoping

6.002 Comments and concerns regarding this proposed project by the City of Marion for consideration in the preparation of this Draft EIS were solicited by a Public Notice dated October 29, 1992. This Public Notice was sent to all persons (about 400 individuals) included in the project mailing list as of that date.

6.003 A meeting was held with representatives of the Sierra Club and several project area landowners on October 29, 1992 in Carbondale, IL, regarding the proposed project and the role of the Corps of Engineers in the preparation of this document. The purpose of the meeting was also to obtain information and concerns regarding the proposed water supply reservoir and alternative actions from these persons. Personal interviews and telephone conversations with several of these individuals occurred throughout the period of Draft EIS preparation.

6.004 An interagency scoping meeting was held in Springfield, IL on November 19, 1992 to discuss the proposed City of Marion project and the preparation of the Draft EIS. This meeting was attended by representatives of the Corps of Engineers, US Forest Service (USFS), USFWS, USEPA, IEPA, IDNR, Illinois Department of Agriculture, IDOT, Illinois Attorney General's Office, and the City of Marion and several of their consultants.

6.005 An additional interagency meeting was held on December 10, 1992 in Marion, IL and included a visit to the site of the reservoir proposed by the City of Marion. This meeting was attended by staff of the Corps of Engineers, USEPA, USFWS, USFS, IDNR, the City of Marion, and several of the EIS consultants.

Draft EIS Distribution

6.006 Copies of the Draft EIS were sent to Federal, state, and local government agencies, a number of public interest groups and a large number of individuals. Multiple copies were also sent to public libraries in the region for anyone to review. More than 270 copies of the Draft EIS were mailed or delivered.

6.007 The Draft EIS mailing list included a large number of individuals that have shown an interest in this project since the initial proposal by the City of Marion. Those individuals

received a "Notice of Availability" that announced that the Draft EIS was completed and how a copy could be obtained. More than 400 copies of the Notice of Availability were issued.

6.008 The Draft EIS was furnished to the USEPA for official filing and notification in the Federal Register. The Draft EIS was noted in the Federal Register dated October 21, 1995.

6.009 Comments on the Draft EIS were received form Federal, state, and local agencies, organized groups, and individuals. Comments primarily regarding support for the proposed project were also received during the public comment period. Over 1200 letters, postcards, or other form of written statements were received by the Corps.

Public Hearing

6.010 A Public Hearing on the Draft EIS and Department of the Army permit application was held on December 15, 1994 in Marion, IL. Approximately 370 persons attended the hearing and 52 individuals provided statements. The hearing was opened at 7:00 PM and was closed at approximately 11:20 PM. This was the second Public Hearing held on the proposal by the City of Marion, the earlier hearing having been held on April 11, 1991, also in Marion, IL. The transcript for this Public Hearing is incorporated in the Draft Supplement I to the Final EIS by reference and the concerns expressed at the Public Hearing have been reviewed and considered during preparation of the Final EIS. A copy of the transcript is available for review at the Marion Public Library, 206 South Market, Marion, IL.

Final EIS Distribution

6.011 Copies of the Final EIS were sent to Federal, state and local government agencies, a number of public interest groups and a large number of individuals. Multiple copies were sent to public libraries in the region for anyone to review. Mare than 600 copies of the Final EIS were mailed or delivered.

6.012 A large number of individuals have shown an interest in this project since the initial proposal by the City of Marion but have not made specific written comments regarding the environmental effects of the proposal. Those individuals received a "Notice of Availability" that announced the Final EIS had been completed and how a copy could be obtained. More than 1000 copies of the Notice of Availability were issued.

6.013 The Final EIS was furnished to the USEPA for official filing and notification in the Federal Register. The Final EIS was noted in the Federal Register dated August 4, 1995.

Draft Supplement I to the Final EIS Distribution

6.014 Copies of the Draft Supplement I to the Final EIS were sent to Federal, state and local government agencies, a number of public interest groups and a large number of individuals that had commented on the Final EIS. Multiple copies were again sent to public libraries in the region for anyone to review. More than 500 copies of the Draft Supplement I to the Final EIS were mailed or delivered.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

6.015 A large number of individuals continue to show an interest in this project since the initial proposal by the City of Marion but have not provided recent written comment regarding the proposal. Those individuals received a "Notice of Availability" that announced the Draft Supplement I to the Final EIS had been completed and how a copy could be obtained. More than 800 copies of the Notice of Availability were issued.

6.016 The Draft Supplement I to the Final EIS was furnished to the USEPA for official filing and notification in the Federal Register. The Draft Supplement I to the Final EIS was noted in the Federal Register dated March 1, 1996.

6.017 Comments on the Draft Supplement I to the Final EIS were received from Federal, state, and local agencies, organized groups, and individuals.

Final Supplement I to the Final EIS Distribution

6.018 Copies of the Final Supplement I to the Final EIS were sent to Federal, state, and local government agencies, a number of public interest groups, and a large number of individuals. Multiple copies were sent to public libraries in the region for anyone to review.

Draft Supplement II to the Final EIS Distribution

6.019 Copies of the Draft Supplement II to the Final EIS will be sent to Federal, state, and local government agencies, a number of public interest groups, and a large number of individuals. Multiple copies will again be sent to public libraries in the region for anyone to review.

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

References

American Resources Group, Ltd., report dated July 29, 1994
American Resources Group, Ltd., reports dated April 1991 and December 1991

Richard Berry, USFWS, letter dated February 12, 1993
Richard Berry, USFWS, statement at interagency meeting, November 19, 1992
Richard Berry, USFWS, letter dated December 4, 1992
John Blankenship, USFWS, letter dated June 29, 1995
Robert L. Butler, Mayor, City of Marion, letter dated March 24, 1994

City of Marion Water Department, memorandum dated May 5, 1995
Glenn Clarida, Clarida Engineering Co., letter dated January 28, 1993
Glenn Clarida, Clarida Engineering Co., statement at interagency meeting, November 19, 1992
Glenn Clarida, Clarida Engineering Co., interview dated June 3, 1994

Kevin Davis, RLCD, letter dated May 28, 1993
David Day, IDNR, letter dated April 19, 1994
Jeff Doherty, City of Carbondale, letter dated April 13, 1993
Daniel Doshier, USFWS, letter dated November 5, 1998
Frank Dunkle, USFWS, letter dated July 22, 1988

ECOTECH, Inc., report dated May 1995

J.R. Graham, Bureau of Reclamation, letter dated December 7, 1987
Thomas M. Groutage, USFWS, letter dated October 13, 1989

Thomas Heineke, Wetland Science Applications, Inc., information dated February 5, 1993
Theodore W. Hild, Deputy State Historic Preservation Officer, letter dated October 21, 1991
Robert Hite, IEPA, letter dated April 27, 1994
Robert Hite, IEPA, telephone interview dated October 4, 1994

IDNR Division of Natural Heritage. *Status Survey of the Least Brook Lamprey, Lampetra aepyptera, A Threatened Species in Illinois*. June 1998. Weitzell, Stewart, and Brooks.
IEPA, The Illinois Water Quality Report 1996
IEPA letters dated January 7, 1993; January 18, 1995; and January 25, 1995
Illinois Natural History Survey. *Biologically Significant Illinois Streams.* Technical Report 1992(1). Lawrence M. Page, et al.
Illinois Natural History Survey Bulletin, Volume 33, Article 4, September 1985, Lawrence M. Page
Illinois State Water Plan Task Force *Instream Flow Protection: A Planning Standard for Illinois Streams*

Don L. Klima, Advisory Council on Historic Preservation, letter dated March 5, 1991

David Lee, et al., *Atlas of North American Freshwater Fishes*, 1980

TABLE 2-9
Estimated Total Annual Cost ($)
Combinations of Feasible Alternatives (Separate Actions for City of Marion and LEWD) and Combined Single Source

Shirley Ligon, SVCD, telephone interview dated June 1, 1994

Thomas McSwiggin, IEPA, letters dated January 7, 1993; January 18, 1995; and January 25, 1995
Richard Myott, SIPC, letter dated September 30, 1988

Harvey K. Nelson, letter dated December 14, 1984
Richard Nelson, USFWS, letter dated January 17, 1995
Richard Nelson, USFWS, letter dated June 19, 1995

Robert Pippins, IEMA Region 11, letter dated January 25, 1995

Tim Reeves, SIPC, letter dated February 8, 1993

Dale Shadowens, LEWD, letter dated May 17, 1994

U.S. Army Corps of Engineers Wetland Delineation Manual, Technical Report Y-87-1, January 1987
U.S. Army Corps of Engineers, St. Louis District, Rend Lake Reservoir, Design Memorandum No. 1, approval date January 30, 1963
U.S. Geological Survey, Water-Data Report IL-75-1
U.S. Geological Survey, Water-Data Report IL-92-1
U.S. Army Corps of Engineers, Louisville District, EIS for Amax Coal Company, Delta Mine - West Harrisburg Field, 1996

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APPENDIX A

CORRESPONDENCE