

Introduction

Studies to determine the impacts of the proposed alternative alignments on the local ecology were conducted by biologists from Third Rock Consultants, LLC on February 5-7, 2008. Studies included literature and database surveys as well as on-foot reconnaissance. Particular attention was given to locating streams, wetlands, and specialized habitats such as springs, and sinkholes which could harbor protected species or influence water quality.

Project Type

At the time of these studies, the project is proposed to extend from State Route 21 to Cates Landing Road. One alternative was studied. The alternative begins at the junction of State Route 21 and State Route 78, and is on a new location within the southern portion. The northern portion of the proposed project runs along the existing facility. The facility type anticipated at the time of the study is a rural highway with two, 12-foot travel lanes with 10-foot shoulders.



***Looking South at Junction of SR 78
and SR 21***



***Looking South at SR 22 from End of
Project***

Project Setting

The proposed project is located in northern Lake County, Tennessee. It is shown on the Tiptonville USGS 7.5 minute topographic quadrangle. This portion of the county is within the Mississippi River Valley physiographic unit (Miller 1974), and is underlain by quaternary alluvial deposits (sand, silt, gravel, and clay) of the Gulf Coastal Plain (Hardeman 1966). Soils in the areas are primarily of the Reelfoot-Tiptonville-Adler association, described on the USDA General Soil Map for Lake County (1969) as somewhat poorly drained and moderately well drained, silty and loamy soils on high bottoms of the Mississippi River. Soils of the Iberia-Sharkey-Bowdre association are also well represented within the project area. These soils are described as poorly drained and somewhat poorly drained, silty and clayey soils on low, broad flats. The project is in the Mississippi River watershed.

Terrestrial Ecology

All of the land in the project corridor has been disturbed at one time or another. Very little of the land is forested or in shrub/scrub thickets. These areas are located along streams and property boundaries. There are also very few habitats in earlier stages of succession; industrial, commercial, and residential lands which have limited habitat values are common in the southern portion of the project area. The vast majority of the project is located within row crop agricultural areas and transportation right-of-way adjacent to State Route 22.



Agricultural Area Typical of Study Area



Fencerow Habitat within the Project Area

Plant communities found in the area are characteristic of communities formed in highly disturbed, agricultural areas. The forested communities are dominated by hackberry, accompanied most often by honey locust, and green ash. Other prominent associates are oaks and red maples. Hackberry, and red maple are widespread in old-field and floodplain habitats in the area. Japanese honeysuckle, multiflora rose, and blackberry dominates the ground cover along floodplain areas, and in forested fencerow habitats. Both upland and floodplain forested habitats provide food cover, and nesting opportunities for numerous small mammals, including rabbits, squirrels, and other rodents, as well as numerous reptiles, native birds.

Old-field habitats in various stages of succession are also useful to many types of wildlife. These areas are most often dominated by grasses and legumes, blackberries, and young cedars. The industrial, commercial, and residential lands generally have limited wildlife value, as they are usually paved or mowed, except for undisturbed vegetation along fencerows or boundaries. Row crop agricultural areas have very limited wildlife value as they are actively maintained throughout the year. Tall row crops (e.g. corn) may provide better wildlife cover later in the growing season than short row crops (e.g. soybean). All row crops may provide potential forage for some wildlife.

Terrestrial Impacts

Direct impacts. The loss of 9 acreages of forested and old-field habitat is one of the smaller impacts of the project. There will be direct long-term adverse impacts when productive forests and old-field areas are converted to roadway. Mortality of individual wildlife may occur both during construction and highway operation. Although roadway mortality is generally not believed to significantly affect animal populations under normal conditions, if the population is experiencing other sources of stress such as disease or habitat degradation, then traffic-related mortality can contribute to the demise of the population. Highway noise can affect the utilization of habitats by wildlife. Since this is a rural project and is located near a state highway, noise is already a factor within existing habitats. After project construction, areas that remain undisturbed within highway right-of-way, will, over time, provide some degree of refuge for local wildlife as the surrounding areas continue to urbanize and habitats are destroyed.

Indirect impacts. The plant communities found along the project corridor serve as shelter, nesting, and foraging habitat for numerous species of wildlife. Loss of habitat initially displaces animals from the area, forcing them to concentrate into a smaller area, which causes over-utilization of the habitat. This ultimately lowers the carrying capacity of the remaining habitat and is manifested in some species as becoming more susceptible to disease, predation, and starvation.

Cumulative Impacts. In a rural area such as State Route 22 north of Tiptonville, the amount of forest and old-field habitat is already very limited due to agricultural activities. Especially in the northern section of the project almost all of the area around the project corridor has already been converted to row crops. After project construction, areas that remain undisturbed within the right-of-way, will, over time, provide refuge for local wildlife.

Table 1. Total Terrestrial Habitat Acreages Potentially Affected per Alternative (Estimated)*

Alternative	Forested, scrub/shrub, forested floodplain	Pasture, agricultural, or early stages of old-field succession	Commercial/ Industrial/ Residential	Total acres per alternative
Alternative A	9 acres	250 acres	25 acres	284 acres

Note: These acreage amounts were calculated based on the study boundaries shown on aerial photographs, and are given for impact estimation/comparison purposes. They include all areas within existing rights-of-way in the project areas that are already owned by the state, portions of which are likely to be utilized for project construction. For instance, existing rights-of-way along the road are included in the habitat calculations, but are not included in the right-of-way acquisition amounts shown elsewhere in the environmental document. Not all of the habitat amounts shown will actually be disturbed, since lands outside those needed for actual construction or work zones or for other reasons will not be cleared.

Aquatic Ecology

The project alternative has been located, and the chosen alternative will be designed, to avoid major impacts to waters of the state to the extent practicable. Efforts to further minimize impacts will continue throughout the design, permitting, and construction processes. Unavoidable impacts will be mitigated as required by applicable laws and regulations. Mitigation is discussed further in the sections applying to streams and wetlands. In an effort to minimize sedimentation impacts, erosion and sediment control plans will be included in the project construction plans. TDOT will also implement its *Standard Specifications for Road and Bridge Construction*, which include erosion and sediment control standards for use during construction. The State of Tennessee sets water quality criteria for waters of the state; these standards must be met during the construction of the highway improvement.

Streams, Springs, and Seeps and other Waterbodies. Streams, springs, seeps, impoundments and other watercourses and waterbodies which are known at this time to be potentially affected by the project alternatives are listed in Table 2 of this report, along with the potential direct impacts. The determinations as to which are waters of the State and/or of the U.S. have not been confirmed by TDEC and the Corps. All aquatic impacts identified as project development continues will be avoided, minimized, or mitigated to the extent possible, and incorporated into the permitting.

Direct Impacts. The project will affect thirty wet weather conveyances and five streams. It is difficult to determine the exact impact type at these sites with present information; therefore the information in Table 2 represents the anticipated worst-case impact, with the assumption that these impacts will be reduced, where possible, during further project design. It appears that twenty two of the wet weather conveyances will be eliminated, and eight may be crossed. One of the streams may have a section eliminated because the crossing is within its headwaters. The other four streams will be crossed, and more than likely encapsulated due to their small size.



**Looking Downstream at STR-4 from
SR 22**



Looking North at WWC-9



7.Looking West at STR-1



8.Looking West at WWC-27

Indirect Impacts: The project could add some sedimentation impacts to all five streams within the project area; these impacts could probably be minimized by good sediment control planning and implementation. The TDOT hydraulics section noted that all runoff would be drained to surface streams and ditches.

Cumulative Impacts: Culverting, sediment impacts, and the addition of impervious surfaces in a geographic area all tend to degrade overall quality of aquatic habitats and water quality. The placement of lengths of streams in culverts is considered by TDEC to be a permanent impact. While the water quality impacts of culverts over 200 feet in length are mitigated by off-site programs, increases in numbers of culverts associated with highways, private driveways, and industrial and commercial development may cumulatively reduce available habitats over time.

Mitigation: Stream channels requiring relocation will be replaced on-site to the extent possible, using techniques that will replace existing stream characteristics such as length, width, gradient, and tree canopy. Stream or waterbody impacts that cannot be mitigated on site, such as impacts of culverts over 200 feet, or impacts to springs or seeps which require rock fill to allow for movement of water underneath the roadway, will either be mitigated off-site by improving a degraded system or by making a comparable payment to an in-lieu-fee program which will perform such off-site mitigation under the direction of state and Federal regulatory and resource agencies.

State Route 22 from State Route 21 to Cates Landing Road, Lake County, TN

Table 2. Streams, Watercourses, and Waterbodies Affected by Proposed Alternative Alignments of State Route 22, from State Route 21 to Cates Landing Road, Tiptonville, Lake County, State of Tennessee (see Map 1).*

Stream Watercourse Waterbody	Project Segment	Location	Potential Impacts	Legal Designation (confirmed/unconfirmed)	Stream/Watercourse/Waterbody Description
WWC-1	SR 78	Near intersection of SR 78 and SR 21	Cut/Eliminate	Wet Weather Conveyance	Roadside ditch with grass and bare soil substrate. Channel width 1.5 to 2 feet, water 0 to 0.5 foot deep, pooled not flowing. No signs of aquatic life.
WWC-2	SR 78	Near intersection of SR 78 and SR 21	Cut/Eliminate	Wet Weather Conveyance	Ditch draining commercial area into WWC-1. Grass and bare soil substrate. Channel 2 feet wide, water depth 3 inches. No signs of aquatic life.
WWC-3	SR 78	Near intersection of SR 78 and SR 21	Cut/Eliminate	Wet Weather Conveyance	Grass lined ditch draining empty commercial lot into WWC-1. Channel width 0.5 feet, no water present. No aquatic life present.
WWC-4	SR 78	North of intersection of SR 78 and SR 21	Cut/Eliminate	Wet Weather Conveyance	Roadside ditch with grass and bare soil substrate. Channel width 1.5 feet, water 0 to 2 inches deep, pooled not flowing. No signs of aquatic life. Not a well defined ditch.
WWC-5	SR 78	North of intersection of SR 78 and SR 21	Cut/Eliminate	Wet Weather Conveyance	Grass lined ditch draining commercial area into WWC-1 No signs of aquatic life. Not a well defined ditch.
WWC-6	SR 78	North of intersection of SR 78 and SR 21	Cut/Eliminate	Wet Weather Conveyance	Bare soil roadside ditch that connects WWC-4 and WWC-8. Channel width 2 feet, water 0 – 2 inches deep. No aquatic life present.
WWC-7	SR 78	North of intersection of SR 78 and SR 21	Cut/Eliminate	Wet Weather Conveyance	Bare soil roadside ditch that Drains into STR-1. Channel width 1 to 2 feet, water 0.5 feet deep, pooled no flow. No aquatic life present.

State Route 22 from State Route 21 to Cates Landing Road, Lake County, TN

Stream Watercourse Waterbody	Project Segment	Location	Potential Impacts	Legal Designation (confirmed/unconfirmed)	Stream/Watercourse/Waterbody Description
WWC-8	SR 78	North of intersection of SR 78 and SR 21	Crossing/Encapsulation	Wet Weather Conveyance	Bare soil ditch that drains agricultural fields before flowing into STR-1. Channel width 3 feet wide, water depth 0.5 feet. Very narrow strip of riparian vegetation.
WWC-9	SR 78	North of intersection of SR 78 and SR 21	Cut/Eliminate	Wet Weather Conveyance	Roadside ditch, bare soil substrate, channel width 2 feet, water depth 1 to 4 inches. No signs of aquatic life present.
WWC-10	SR 78	North of intersection of SR 78 and SR 21	Cut/Eliminate	Wet Weather Conveyance	Vegetation clogged ditch adjacent to railroad tracks, flows into STR-1. Channel width 1 foot wide, no water present, no signs of aquatic life present.
WWC-11	Donaldson Road	Agricultural field south of Donaldson Road	Cut/Eliminate	Weather Conveyance	Vegetation clogged ditch draining agricultural field into WWC-12. Channel width 1 foot, water depth 1 to 2 inches. No aquatic life present.
WWC-12	Donaldson Road	Agricultural field south of Donaldson Road	Cut/Eliminate	Weather Conveyance	Vegetation clogged ditch located on property boundary. Channel width ranges from 1 to 2 feet, water depth 0 to 4 inches. No aquatic life present.
WWC-13	Donaldson Road	Agricultural field south of Donaldson Road	Cut/Eliminate	Weather Conveyance	Ditch draining agricultural fields into STR-2, vegetation growing in channel, some bare substrate, channel width 2 feet, water depth 0 to 0.5 foot deep. No aquatic life present.
WWC-14	Donaldson Road	South of Donaldson Road	Crossing/Encapsulation	Weather Conveyance	Grass lined roadside ditch. Channel width 1 foot, no flow, water depth 0 to 2 inches. No aquatic life present.

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Stream Watercourse Waterbody	Project Segment	Location	Potential Impacts	Legal Designation (confirmed/unconfirmed)	Stream/Watercourse/Waterbody Description
WWC-15	Donaldson Road	North of Donaldson Road	Crossing/Encapsulation	Weather Conveyance	Grass lined roadside ditch. Channel width 1 foot, no flow, water depth 0 to 2 inches. No aquatic life present.
WWC-16	Donaldson Road	North of Donaldson Road	Cut/Eliminate	Weather Conveyance	Ditch draining agricultural field. Channel width 1 foot wide, water depth 0 to 1 inches deep, soil substrate with vegetation. No aquatic life present.
WWC-17	Donaldson Road	North of Donaldson Road	Cut/Eliminate	Weather Conveyance	Grass lined ditch draining abandoned residential area. No water present, channel width 0.5 foot. No signs of aquatic life.
WWC-18	Donaldson Road	North of Donaldson Road	Cut/Eliminate	Weather Conveyance	Ditch draining abandoned residential area. Channel width 0.5 to 1 foot wide, water depth 0 to 2 inches deep. Substrate grass with some bare soil patches. No signs of aquatic life.
WWC-19	Donaldson Road	North of Donaldson Road	Cut/Eliminate	Weather Conveyance	Grass lined ditch draining abandoned residential area. No water present, channel width 0.5 foot. No signs of aquatic life.
WWC-20	Donaldson Road	North of Donaldson Road	Crossing/Encapsulation	Weather Conveyance	Roadside ditch 1 to 2 feet wide, water depth 0 to 6 inches pooled, substrates bare soil and grass. No flow. No signs of aquatic life.
WWC-21	SR 22	South of Vaughn Road	Crossing/Encapsulation	Weather Conveyance	Ditch between property boundaries. Channel width 2 to 3 feet, water depth 0.5 foot, no flow. Vegetation growing in channel. No signs of aquatic life.
WWC-22	SR 22	South of Vaughn Road	Cut/Eliminate	Weather Conveyance	Grass lined roadside ditch 1 to 2 feet wide. No water, no signs of aquatic life.

State Route 22 from State Route 21 to Cates Landing Road, Lake County, TN

Stream Watercourse Waterbody	Project Segment	Location	Potential Impacts	Legal Designation (confirmed/unconfirmed)	Stream/Watercourse/Waterbody Description
WWC-23	SR 22	South of Vaughn Road	Cut/Eliminate	Weather Conveyance	Roadside ditch, channel width 2 to 3 feet wide, water depth 1 to 4 inches. Substrate bare soil with areas of vegetation. No signs of aquatic life.
WWC-24	SR 22	West side of SR 22 from STR-4 to end of project	Cut/Eliminate	Weather Conveyance	Roadside ditch, channel width 1 to 2 feet wide, water depth 0 to 2 inches. Substrate bare soil with grassy areas. No signs of aquatic life.
WWC-25	SR 22	East side of SR 22 from STR-4 to end of project	Cut/Eliminate	Weather Conveyance	Roadside ditch, channel width 2 to 4 feet, water depth 0 to 6 inches, no flow. Substrates mostly bare soil, some areas of vegetation. No signs of aquatic life.
WWC-26	SR 22	South side of Vaughn Road	Crossing/Encapsulation	Weather Conveyance	Roadside ditch 1 to 2 feet wide, no flow, water depth 0 to 2 inches. Substrates mostly grass. No signs of aquatic life.
WWC-27	SR 22	North side of Vaughn Road	Crossing/Encapsulation	Weather Conveyance	Roadside ditch 1 to 2 feet wide, no flow, water depth 0 to 2 inches. Substrates mostly grass. No signs of aquatic life.
WWC-28	SR 22	North of Vaughn Road	Cut/Eliminate	Weather Conveyance	Grass lined ditch along dirt farm road. Channel width 1.5 feet, water depth 0 to 2 inches, no flow. No signs of aquatic life.
WWC-29	SR 22	North of Vaughn Road	Cut/Eliminate	Weather Conveyance	Grass lined ditch along dirt farm road. Channel width 1.5 feet, water depth 0 to 2 inches, no flow. No signs of aquatic life.
WWC-30	SR 22	North of Vaughn Road	Crossing/Encapsulation	Weather Conveyance	Ditch draining agricultural field. Channel width 1 to 2 feet wide, water depth 0 to 6 inches, no flow. No signs of aquatic life.

State Route 22 from State Route 21 to Cates Landing Road, Lake County, TN

Stream Watercourse Waterbody	Project Segment	Location	Potential Impacts	Legal Designation (confirmed/unconfirmed)	Stream/Watercourse/Waterbody Description
STR-1	SR 78	North of intersection of SR 78 and SR 21	Crossing/ Encapsulation	Stream	Intermittent stream, tributary to Old Graveyard Slough, channel bottom width 2 to 4 feet wide, top of bank width 6 to 8 feet. Bank height 2 feet. Water depth 1.5 feet, low flow. Soil substrate, with in-stream root wads. Good bank stability on right bank, left bank lacking riparian vegetation in upper section. Hackberry dominant riparian tree on right bank. Macroinvertebrates present but not diverse, midges and diving beetles (Dytiscid) present.
STR-2	Donaldson Road	South of Donaldson Road	Crossing/ Encapsulation	Stream	Intermittent stream, defined channel, dashed blue line stream, tributary to Old Graveyard Slough, channel bottom width 2 to 3 feet, wetted width 3 to 4 feet, top of bank width 8 feet, bank height 4 feet. In-stream root wads, banks moderately stable to stable, narrow riparian zone comprised mostly of shrubs and grasses, 30% canopy cover. Water depth 1 foot, macros present but not diverse, midges and diving beetles (Dytiscids) present.

State Route 22 from State Route 21 to Cates Landing Road, Lake County, TN

Stream Watercourse Waterbody	Project Segment	Location	Potential Impacts	Legal Designation (confirmed/unconfirmed)	Stream/Watercourse/Waterbody Description
STR-3	Donaldson Road	North of Donaldson Road	Cut/Eliminate		Agricultural ditch that has intermittent flow, Channel bottom width 2 to 3 feet, wetted width 4 feet, bank height 3 feet, soil substrate, water depth 1.5 to 2 feet. Riparian zone narrow strip of grasses and other herbaceous plants, both banks stable. Macroinvertebrates present but of low diversity, no fish present.
STR-4	SR 22	South of Vaughn Road	Crossing/ Encapsulation	Stream	Intermittent, dashed blue line stream, tributary to Old Graveyard Slough, entrenched, bottom channel width 4 feet, wetted width 10 feet, top of bank width 30 feet, bank height 15 feet. Soil substrate, in-stream root wads, water depth 2 feet, 100% canopy cover. Narrow riparian zone, macroinvertebrate community was poor with midges, aquatic beetles, and damselflies present. No fish observed.
STR-5	SR 22	North of Vaughn Road	Crossing/ Encapsulation	Stream	Intermittent stream, tributary to Old Graveyard Slough, channel bottom width 3 feet, wetted width 4 feet, bank height 2.5 feet, water depth 8 inches. Very narrow riparian zone comprised of Hackberry trees and shrubs, canopy cover 75%. Soil substrate, in-stream root wads with stable banks. Macroinvertebrates limited to midges and aquatic beetles. No fish present.

*These watercourses and waterbodies, and any others subsequently located, may require determination, or confirmation of, their status as stream or wet-weather

State Route 22 from State Route 21 to Cates Landing Road, Lake County, TN

conveyances or other waters of the state by TDEC Division of Water Pollution Control, and as perennial, intermittent or ephemeral streams or other waters of the U.S. by the U.S. Army Corp of Engineers

Wetlands. Approximately 1.1 acres of potential wetlands have been identified at 1 site near the anticipated project limits. Functions are shown in Table 3.

No wetlands were reported by the U.S. Fish and Wildlife Service based on National Wetland Inventory Maps (July 5, 2007). A low depression area located immediately south of STR-1 and west of State Route 78 was investigated. The area is within a field located between commercial properties and STR-1. The field visit was preceded the evening before by a severe thunderstorm and most of the field was inundated. Twenty-four hours later most of the water had run off from the field, exposing bare soil and clumps of fescue. Hydrophytic vegetation required for determination as a wetland was absent within this area. One scrub/shrub wetland was observed just to the west of the project corridor within the northern portion of the project. This wetland did exhibit soils, hydrology, and vegetation required for determination as a wetland. However, no surface water connection to this wetland was observed. Despite the fact that the project is located within the Mississippi River floodplain, and therefore has hydric soils, much of the surrounding area has been extensively disturbed for agricultural and industrial development.



Flooded Field on February 6, 2008



Flooded Field on February 7, 2008

Direct Impacts. No direct impacts to wetlands are anticipated as the project is presently proposed. However, if the project was to shift to the west side of State Route 22, WTL-1 could be affected. Efforts will be made, however, during further project design, to avoid or minimize impacts to this site.

Indirect Impacts. No indirect impacts to wetlands are anticipated for this project.

Cumulative Impacts. There are no anticipated cumulative wetland impacts associated with this project.

Avoidance of Wetland Impacts. The alignment has been located to miss wetlands. Moving the current proposed alignment to the west in the northern portion of the project could result in impacts to WTL-1, and should be avoided if possible.

Minimization. During project design, further efforts will be made to minimize impacts to wetlands remaining outside the right-of-way, and to reduce changes in drainage patterns and water levels.

Mitigation. Mitigation is required for all wetland impacts which do not meet requirements for general Aquatic Resource Alterations Permits (State of Tennessee), or for certain Nationwide Section 404 permits (U. S. Army Corps of Engineers). The minimum replacement ratio for wetlands is



Looking West at WTL-1

2:1, and may be higher depending on hydrogeomorphic analyses or if optimum mitigation sites are unavailable. The first option for any substantial replacement mitigation is on-site (near the project, and within the watershed). The mitigation option most favored by regulatory agencies is that of restoration of a former wetland. Enhancement of an existing but degraded wetland may also be an option, but higher replacement ratios are generally required. Both the site selection and the mitigation, when proposed, will be subject to the approval of regulatory agencies. In the event that no acceptable mitigation site can be obtained locally, the regulatory agencies may allow mitigation further away, or allow use of credits in a mitigation bank.

State Route 22 from State Route 21 to Cates Landing Road, Lake County, TN

Table 3. Potential Wetland Impacts for Proposed Alternative Alignments of State Route 22, from State Route 21 to Cates Landing Road, Tiptonville, Lake County, State of Tennessee (see Map 1)

Wetland Type*	Location	Likely Project Impact on Wetland**	Primary functions of the wetland	Wetland Size (acres) (Estimated)**		Description
				Total	Likely eliminated or drained	
WTL-1 Scrub-Shrub, isolated	Northern portion of the project, west side of SR 22, next to Cronanville Cemetery	No impacts anticipated	Wildlife habitat and wildlife watering	1.1	0	Low area, most likely excavated. Standing water, 2 to 12 inches deep, throughout. Gleyed, low-chroma soils with oxidized roots present. Dominated by button bush. No surface water connection observed.

*Isolated or contiguous designation may have a bearing on the type of State or Federal permits required. Designations are unconfirmed by permitting agencies at this time.

**Reported sizes of impacts and sizes of wetlands are estimates at this time. These sites require confirmation of their wetland status by permit agencies, and accurate measurement by survey methods. Sizes of impacts will be determined when project design plans are developed.

***At the time of this writing, the U. S. Army Corps of Engineers and TDEC have confirmed no sites. Since wetland status can change over time, and the alignment can shift within the corridor, all potential wetland sites have been allowed to remain in this discussion. When project plans are developed, they will be reviewed, and any additional determinations, confirmations, and impact minimizations/mitigations performed. An accurate accounting of aquatic impacts will be prepared prior to the permit application process. The permitting process conducted by TDEC and the U. S. Army Corps of Engineers includes an opportunity for public review and comment.

Beneficial Ecological Floodplain Values. No significant floodplains are impacted by this project.

Endangered and Threatened Species. Information from several sources, as well as prior experience with habitats in the area, was used to prepare for field surveys to locate protected species or habitats. These sources included database information provided by TDEC and books or databases of cave records.

Direct and Indirect Impacts. No protected species records were shown within the likely direct impact zone of the project. A letter from the U.S. Fish and Wildlife Service (July 5, 2007) listed no species for consideration. A search of the TDEC Division of Natural Heritage's Endangered species database was done on January 3, 2007. Species records listed within a one-mile radius are meadow jumping mouse (*Zapus hudsonius*), and interior least tern (*Sterna antillarum athalassos*). The interior least tern is a federally endangered bird species that nests on sandbars of large rivers, and forages in shallow water. While this type of habitat is located immediately north of this project on the Mississippi River, none exists within the project impact zone. Additionally, construction activities will not impact the adjacent habitat for this species. Meadow jumping mouse is a state listed small mammal Deemed in Need of Management by the state of Tennessee, and has a record within the city of Tiptonville, Tennessee just south of the project. It prefers moist lowlands such as brush areas adjacent to marshes and streams. Intermittent streams within the project area could provide this type of habitat for the meadow jumping mouse. Removal would result in a reduction of the availability of this type of habitat for the meadow jumping mouse.

Several aquatic species are recorded between one and four miles downstream of the project. The federally endangered pallid sturgeon (*Scaphirhynchus albus*) has been recorded from the Mississippi River within 4 miles of the project area (last observed 1990). It is assumed that these species would not occur within the actual construction zone. They could be affected by sedimentation; it is assumed, however, that most sedimentation impacts can be prevented. Additionally, due to the small size of the streams present within the project area, and their low gradient, sedimentation from this project would have negligible effect on a large body of water such as the Mississippi River.

Cumulative impacts. No additional cumulative impacts to federally listed species are anticipated.

Conclusions. At this time, no state or Federally listed protected species are known to be affected by the proposed project, except for potential habitat reduction for the state-listed meadow jumping mouse. Impacts to the jumping meadow mouse has been coordinated with the Tennessee Wildlife Resource Agency (January 24, 2008), and all requirements will be complied with.

Information received from TDEC is periodically reviewed and updated. If any protected species or their habitats are identified as project development continues, they will be addressed in accordance with applicable laws and regulations.

Required Permits

Stream and miscellaneous water quality permits. Alterations to streams or other aquatic sites designated as waters of the State or waters of the United States require either individual or general Aquatic Resource Alteration Permits (ARAP) from the State of Tennessee, individual or Nationwide 404 U. S. Army Corps of Engineers permits and, where applicable, a TVA 26a permit or letter of no objection. Construction projects disturbing one or more acres of land require storm water control permits issued by the State of Tennessee pursuant to the National Pollutant Discharge Elimination System. For any project that affects water flowing into an open sinkhole or cave, or for any impact that may affect the ground water via a sinkhole, a Class V Injection Well permit may be required. This process involves obtaining a permit before the project is let if open sinkholes are known to exist. If other sinkholes are encountered after construction has begun, the appropriate TDOT offices will be notified and the appropriate steps taken to comply with laws, regulations, and permits. These or any other permit requirements identified in the project development process will be complied with (TVA permit, coast guard permit).

Wetland Permits. All wetland impacts require confirmation by, and coordination with, permitting agencies. All require either general or individual Aquatic Resources Alteration (ARAP) permits from the State of Tennessee. Almost all require either Nationwide or Individual permits from the U. S. Army Corps of Engineers pursuant to Section 404 of the Clean Water Act. Other agencies such as the U. S. Fish and Wildlife Service (USFWS) and the Environmental Protection Agency may be involved in the permitting process.

Wetland impacts which are subject to either State or Federal jurisdiction, and which do not meet criteria for either general or Nationwide permits require individual permits; these typically require compensatory mitigation for impacts. In general, **isolated** wetlands with less than 0.25 acre impacts may come under the guidelines of a general permit issued by the State of Tennessee; no mitigation is required. This permit cannot be used, however, for a cumulative series of small impacts. Some wetland impacts of less than 0.5 acres qualify for Corps of Engineers nationwide permits.

TDOT will carry out further coordination with the regulatory agencies before preparing mitigation plans and submitting permit applications. Permit requirements and mitigation plans will be based on these discussions.

Summary of Findings

- Five unnamed tributaries to Old Graveyard Slough will be crossed by the project.
- Twenty-two wet weather conveyances will be cut/eliminated, and eight wet weather conveyances will be crossed by this project. All are ditches associated with roadsides and agricultural fields.
- No wetlands will be impacted by this project.
- No federally threatened or endangered species will be impacted by this project.
- Potential habitat for the meadow jumping mouse, a state listed Deemed in Need of Management species may be impacted by this project.